# Connecting Mathematics

## for Primary School
## Standard 4 and 5




Cherryl Bradshaw
Tricia Peters
Mohan Sadal

Caribbean Educational Publishers

FM.indd 1 24/04/18 5:06 PM

# Connecting Mathematics

## for Primary School
## Standard 4 and 5




Cherryl Bradshaw
Tricia Peters
Mohan Sadal

Caribbean Educational Publishers

FM.indd 1 24/04/18 5:06 PM

© Caribbean Educational Publishers (2003) Ltd.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, without the prior permission in writing from the Publishers.

Photographer

Mikhail Bradshaw

**Connecting Mathematics for Primary School Standard 4 & 5**

ISBN #978-976-648-463-7

First Published 2017 L-EN-0001

Caribbean Educational Publishers (2003) Ltd.,
Teddy's Shopping Centre,
Gulf View Link Road,
La Romaine, Trinidad.
Phone: (868) 657-9613/(868) 653-5535
Fax: (868) 652-5620
E-mail: admin@mbsceptt.com



FM.indd 2 24/04/18 5:06 PM

# Connecting Mathematics

## for Primary School Standard 4 and 5

## Authors


### Cherryl Bradshaw

Primary School Teacher
Teacher's Diploma
BSc. Computing and Information System Management
Pg. Dip. Management of Information Systems

### Mohan Sadal

Vice Principal
Teacher's Diploma
Cert. Ed. The Teaching of Mathematics
B. Ed. Educational Administration
M. Ed. Curriculum Studies

### Tricia Peters

Primary School Teacher
Teacher's Diploma
B. Ed. Mathematics




FM.indd 3 24/04/18 5:06 PM

# Preface

**Connecting Mathematics for Primary School Standard 4 and 5** was designed to teach the content of the **Primary Curriculum: Mathematics, 2013.** Use of this book will allow students to gain a deeper understanding of concepts, to develop fluency with skills, and, to become confident in problem solving. In turn, they will be prepared for all formal assessments including the SEA examinations 2019 and beyond.

There is equal emphasis on conceptual understanding and skill development. Teaching Points present the use of concrete and pictorial representations before moving on to more symbolic forms. Throughout the book, there is an abundant use of clear, attractive visuals which introduce concepts and model solutions to allow students to gain mastery.

Problem solving is central to all mathematics study. This book is organized to support students to become problem solvers. They are encouraged to use Polya's problem solving steps. They are given the opportunity to use bar modelling as a strategy to assist with reasoning while solving problems.

Topics are sequenced within the chapters to facilitate learning through instruction. Content for new topics is scaffolded carefully and thoroughly to develop understanding through activities, and promote guided learning, before moving on to independent learning. The activities and lessons build foundations for number, operations, algebraic thinking, measurement, geometry and statistics.

Vocabulary terms are introduced to students in each chapter. This lets them connect the terms to their understanding of the concepts, expand their abstract reasoning ability and move beyond operations to problem solving.

By using this book, students will be able to develop the ability to think and reason creatively and critically. They will also be able to make connections with concepts and real life experiences. Each chapter begins with a picture and content that shows the relevance of the Mathematics topic to everyday life. Thereby making them appreciate mathematics.



FM.indd 4 24/04/18 5:06 PM

# Table of Contents


Chapter 1: Number Concepts, Place Value and Rounding 1
- Getting Ready for Chapter 1 2
- Represent Numbers 2
- Place Value and Value 5
- Expanded Notation 7
- Compare and Order Numbers 8
- Rounding 11
- Chapter Review 13

Chapter 2: Number Patterns 14
- Getting Ready for Chapter 2 15
- Describe Number Patterns 15
- Complete Number Patterns 16
- Identify Errors in Number Patterns 17
- Relationships in Patterns 18
- Patterns with One and Zero 19
- Factors and Multiples Patterns 20
- Prime and Composite Numbers 21
- Chapter Review 22

Chapter 3: Number Relationships 24
- Getting Ready for Chapter 3 25
- Use Inverse Operations to Find Missing Numbers 25
- Use Relational Thinking to Find Missing Numbers 26
- Chapter Review 29

Chapter 4: Types of Numbers 30
- Getting Ready for Chapter 4 31
- Odd and Even Numbers 31
- Factors 32
- Factors and Divisibility 33
- Multiples 34
- Prime and Composite Numbers 35
- Prime Factorisation 36




FM.indd 5 24/04/18 5:06 PM

Square Numbers 37
Chapter Review 38

Chapter 5: Addition and Subtraction of Whole Numbers 40
Getting Ready for Chapter 5 41
Addition Properties 41
Add and Subtract Mentally 42
Estimate Sums and Differences 43
Add and Subtract Whole Numbers 45
Real World Problems: Add and Subtract 46
Chapter Review 48

Chapter 6: Multiplication and Division of Whole Numbers 50
Getting Ready for Chapter 6 51
Multiplication Properties 51
Relate Multiplication and Division 53
Division Rules for 1 and 0 53
Multiply and Divide Mentally 54
Estimate Products 56
Divide by 2-Digit Divisors 59
Interpret Remainders 61
Chapter Review 64

Chapter 7: Mixed Operations 66
Multi-Step Problems 67
Problem Solving: Unitary Method 69
Unequal Sharing 70
Chapter Review 72

Chapter 8: Understanding Fractions 74
Getting Ready for Chapter 8 75
Represent Fractions 75
Fraction of a Set 78
Mixed Numbers and Improper Fractions 79
Equivalent Fractions 81
Lowest Equivalent Form 84
Compare and Order Fractions 85
Chapter Review 89



FM.indd 6 24/04/18 5:06 PM

Chapter 9: Add and Subtract Fractions 91
Getting Ready for Chapter 9 92
Add and Subtract Fractions with Like Denominators 92
Add Fractions to a Whole Number 93
Subtract Fractions from a Whole Number 94
Add Fractions with One Denominator a Multiple of the Other 96
Subtract Fractions with One Denominator a Multiple of the Other 98
Add and Subtract Fractions and Mixed Numbers 99
Number Patterns with Fractions 105
Chapter Review 106
Chapter 10: Multiply and Divide Fractions 108
Getting Ready for Chapter 10 109
Multiply Fractions by Whole Numbers 109
Fractional Parts of a Set 111
Multiply Fractions 113
Multiply Mixed Numbers 115
Relate Fractions to Division 118
Divide A Whole Number by a Fraction 119
Divide Fractions by Whole Numbers 123
Divide a Fraction by a Fraction 125
Number Patterns with Fractions 126
Chapter Review 127
Chapter 11: Understanding Decimals 129
Getting Ready for Chapter 11 130
Fractions and Decimals – Tenths 130
Decimal Place Value – Tenths 133
Fractions and Decimals – Hundredths 134
Common Fractions and Decimal Equivalents 139
Decimal Place Value – Hundredths 140
Relate Decimals and Money 144
Compare and Order Decimals 146
Round Decimals 149
Chapter Review 150
Chapter 12: Operations with Decimals 153
Getting Ready for Chapter 12 154



FM.indd 7 24/04/18 5:06 PM

Estimate Decimal Sums and Differences 154
Add and Subtract Decimals through Hundredths 156
Multiply Decimals and Whole Numbers 159
Multiply Decimals by Decimals 165
Divide Decimals by Whole Numbers 167
Decimal Patterns 172
Chapter Review 172

Chapter 13: Rates 175
Getting Ready for Chapter 13 176
Rates 176
Chapter Review 179

Chapter 14: Money and Money Transactions 181
Getting Ready for Chapter 13 182
Money 182
Bills 185
Profit and Loss 187
Unit Cost 189
Best Buy 191
Time and Payment Rates 193
Chapter Review 194

Chapter 15: Percent 197
Getting Ready for Chapter 15 198
Percent, Fractions and Decimals 198
Compare and Order Fractions, Decimals and Percents 208
Percent of a Quantity 210
Compare Percentages of Quantities 213
Quantity as Percentage of Another 214
Use Mental Strategies 216
Chapter Review 217

Chapter 16: Applying Percentages 219
Getting Ready for Chapter 16 220
Discount 220
Commission 222
Taxes 223
Simple Interest 225



FM.indd 8 24/04/18 5:06 PM

Chapter Review 227

Chapter 17: Wages and Salary 229
Getting Ready for Chapter 17 230
Hourly Rates and Daily Pay 230
Weekly Rates 232
Overtime Payment 233
Chapter Review 234

Chapter 18: Direct Proportion 236
Getting Ready for Chapter 18 237
Direct Proportion 237

Chapter 19: Understanding the Metric System 239
Getting Ready for Chapter 19 240
Metric Units of Length 240
Conversion – Units of Lengths 241
Metric Units of Mass 243
Conversion – Units of Mass 244
Metric Units of Capacity 245
Conversion – Units of Capacity 246
Chapter Review 247

Chapter 20: Measure Length 248
Getting Ready for Chapter 20 249
The Millimetre 249
Estimate, Measure and Record Lengths 250
Use the Appropriate Unit 254
Compare Lengths 254
Approximate Distances and Lengths 255
Calculation in Metres 256
Solve Problems in Measurement 258
Chapter Review 259

Chapter 21: Perimeter 261
Getting Ready for Chapter 21 262
Model Perimeter 262
Measure and Calculate Perimeter 264
Use a Formula to Find the Perimeter 265
Apply the Formula with Simple Composite Figures 267



FM.indd 9 24/04/18 5:06 PM

Find One Side Given the Perimeter 269
Draw Rectangles and Squares for Given Perimeters 270
Solve Problems in Perimeter 272
Chapter Review 273

Chapter 22: Measure Mass 275
Getting Ready for Chapter 22 276
Estimate Mass 276
Measure Mass in Grams and Kilograms 278
Compare and Order Mass 280
Calculation in Grams 282
Calculate Unknown Mass on a Balance 284
Solve Problems in Measurement 285
Chapter Review 285

Chapter 23: Measure Capacity 287
Getting Ready for Chapter 23 288
Estimate Capacity 288
Solve Problems in Capacity 290
Chapter Review 290

Chapter 24: Area 292
Getting Ready for Chapter 24 293
Measure Area 293
Approximate Area of Surfaces 297
Use Area Models to find Area 298
Use a Formula to Find Area 299
Area of Compound Shapes 300
Multi–Step Problems Involving Area 301
Chapter Review 302

Chapter 25: Time 304
Getting Ready for Chapter 25 305
Units of Time 305
Read and Record Time on Digital and Analog Clocks 306
The 24 Hour Clock 308
Convert Units of Time 311
Computation of Units of Time 312
Elapsed Time 314



FM.indd 10 24/04/18 5:06 PM

Interpret Time Schedules 315
Chapter Review 317

Chapter 26: Lines, Angles and Triangles 318
Getting Ready for Chapter 26 319
Lines 319
Angles 321
Classify Triangles 325
Chapter Review 327

Chapter 27: Plane Shapes 329
Getting Ready for Chapter 27 330
Identify and classify Plane Shapes 330
Classify Quadrilaterals 333
Sketch Quadrilaterals 335
Patterns with Plane Shapes 336
Chapter Review 338

Chapter 28: Symmetry 340
Getting Ready for Chapter 28 341
Line Symmetry 341
Draw Lines of Symmetry 342
Complete Symmetrical Shapes 345
Solve Problems Involving Symmetry 346
Chapter Review 347

Chapter 29: Solids 348
Getting Ready for Chapter 29 349
Properties of Solids 349
Model Solids 351
Cross Section of Solid Figures 352
Drawing Solids 354
Chapter Review 355

Chapter 30: Measure Volume 356
Getting Ready for Chapter 30 357
Describe Volume 357
Explore Volume of Cubes and Cuboids 358
Use Standard Units to Measure Volume 360
Apply Volume Formulas 362



FM.indd 11 24/04/18 5:06 PM

Compare and Order Volume 364
Relationship between Capacity and Volume 366
Solve Problems in Volume 368
Chapter Review 368

Chapter 31: Statistics 370
Getting Ready for Chapter 31 371
Formulate Questions 371
Collect and Record Data 372
Represent Data Using Graphs 374
Mode 377
Mean 379
Interpret Data in Charts, Tables and Graphs 382
Chapter Review 386

Practice Test 1 388
Practice Test 2 401
Practice Test 3 415
Practice Test 4 428
Practice Test 5 442



FM.indd 12 24/04/18 5:06 PM




Caribbean Educational Publishers

ISBN-978 976 648 463 7

FM.indd 13 24/04/18 5:06 PM

CHAPTER

1

# Number Concepts, Place Value and Rounding

**Vocabulary:**

digit
place value
value
ten thousand
hundred thousand
million
approximate

**Chapter Outcomes:**

- Recognize, represent, model, compare and order numbers up to 1 000 000 with reference to place value.
- Demonstrate an understanding of different types of numbers.
- Develop an understanding of rounding to thousands.



This is a picture of the city of Port of Spain. The 2011 Housing and Population Census recorded that there were 39 963 persons living in the city of Port-of-Spain. Of those persons, 17 861 were male, while 19 103 were female. Almost all of them resided in the 12 383 households found in the city.

## Getting Ready for Chapter 1

1. Write in words 9,803.
2. Write the numeral for five thousand, and twenty seven.
3. Write 7 326 in expanded notation.
4. 4 tens = ____ ones
5. 2 hundreds = ____ tens
6. 6 thousands = ____ hundreds
7. Which is larger, 9 099 or 9 100?
8. Round 829 to the nearest ten.
9. Round 2 456 to the nearest hundred.

## Represent Numbers

### Teaching Point 1:

All numbers are made from the **digits** 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

**Place value** is the value given to a digit by its place in a number.

A **place value chart** shows the value of the digits in a number.

**Patterns to One Million**

| Millions | Thousands | | | Ones | | |
|---|---|---|---|---|---|---|
| M. | HT. | TT. | Th. | H. | T. | O. |
| 1 000 000 | 100 000 | 10 000 | 1 000 | 100 | 10 | 1 |

1 ten = 10 ones

1 hundred = 10 tens

1 thousand = 10 hundreds

1 ten thousand = 10 thousands

1 hundred thousand = 10 ten thousands

1 million = 10 hundred thousands

This place value chart shows 134 982.

| Thousands | | | Ones | | |
|---|---|---|---|---|---|
| Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
| 1 | 3 | 4 | 9 | 8 | 2 |
| 100 000<br>1 × 100,000 | 30 000<br>3 × 10,000 | 4 000<br>4 × 1000 | 900<br>9 × 100 | 80<br>8 × 10 | 2<br>2 × 1 |

### Activity 1:

**Use place value charts to show the numbers below.**

1. 9 900
2. 12 087
3. 52 100
4. 65 999
5. 142 250
6. 801 267
7. 431 703
8. 350 289
9. 200 300
10. 20 981
11. 301 000
12. 76 008
13. 999 999
14. 1 000 000

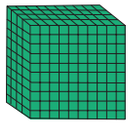
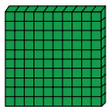
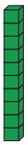


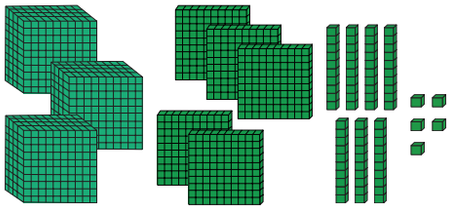
Chapter 1 Number Concepts Place Value and Rounding.indd 2 10/08/17 4:01 PM

## Teaching Point 2:

***Represent 3 575 in different ways.***

**Using Place Value Blocks**

| | | | |
|---|---|---|---|
|  |  |  |  |
| 1 000 | 100 | 10 | 1 |

 = 3 575

**Using Words**

Three thousand, five hundred and seventy - five

**Using Place Value**

3 575 = 3 thousands, 5 hundreds, 7 tens, 5 ones

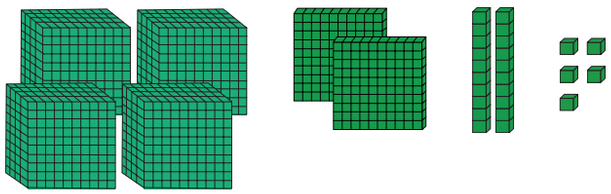
3 575 = three 1 000s, five 100s, seven 10s, five 1s

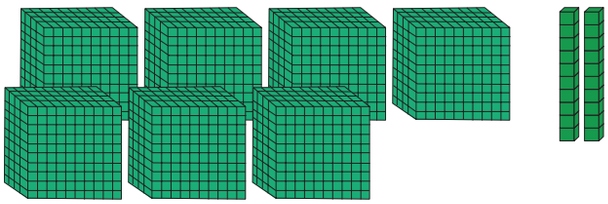
3 575 = 35 hundreds and 75 ones

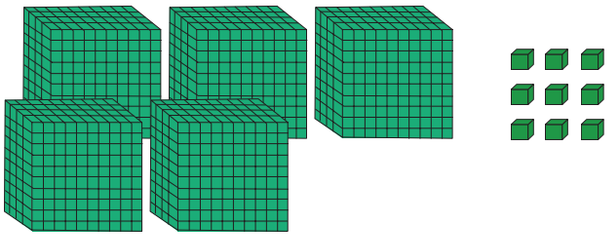
3 575 = 357 tens and 5 ones

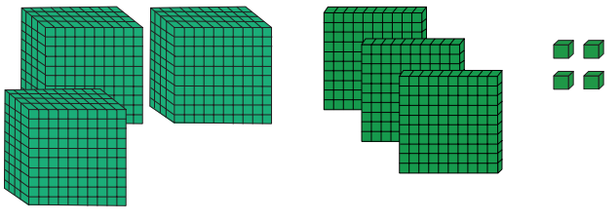
## Activity 2:

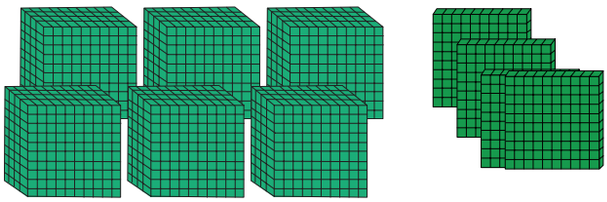
**Write the number shown by each model.**

**1.** 

**2.** 

**3.** 

**4.** 

**5.** 

## Activity 3:

**Write the word names for these numerals. A place value chart can help you.**

| | | | | | |
|---|---|---|---|---|---|
| **1.** | 5 601 | **2.** | 9 380 | **3.** | 7 150 |
| **4.** | 24 800 | **5.** | 63 975 | **6.** | 3 040 |
| **7.** | 58 000 | **8.** | 801 524 | **9.** | 19 300 |
| **10.** | 496 703 | **11.** | 640 182 | **12.** | 451 300 |



Chapter 1 Number Concepts Place Value and Rounding.indd 3 10/08/17 4:01 PM

**13.** 709 004 **14.** 1 000 000 **15.** 260 714

**16.** 100 500 **17.** 397 248 **18.** 906 100

## Activity 4:

**Write the numerals for the word names.**

1. Three hundred and eleven.
2. Four thousand and nine.
3. Fourteen thousand and seventy-six.
4. Thirty three thousand.
5. Twenty-five thousand, six hundred and seventeen.
6. Forty thousand and one.
7. Fifty thousand and thirty.
8. Two hundred thousand.
9. Eight hundred and seventy-seven thousand.
10. One hundred and ninety-eight thousand and four.
11. Six hundred and eighteen thousand, seven hundred and thirty-three.
12. Four hundred thousand and twenty-six.
13. Three hundred and ten thousand, one hundred and eleven.
14. Twenty-eight thousand, seven hundred and eight.
15. Nine hundred and eight thousand, four hundred and nine.
16. Seven hundred and fifty thousand and ten.
17. Eight hundred and thirteen thousand and thirteen.
18. One million

## Activity 5:

**Complete the following.**

1. 30 = ___ ones
2. 28 = ___ ones
3. 100 = ___ ones
4. 458 = ___ ones
5. 6 701 = ___ ones
6. 200 = ___ tens
7. 340 = ___ tens
8. 5 100 = ___ tens
9. 7 850 = ___ tens
10. 4 000 = ___ hundreds
11. 8 200 = ___ hundreds
12. 78 900 = ___ hundreds
13. 23 000 = ___ thousands
14. 809 000 = ___ thousands
15. 425 = ___ tens and ___ ones
16. 178 = ___ ones
17. 2 678 = ___ thousands and ___ ones
18. 5 130 = ___ thousands and ___ ones
19. 8 005 = ___ hundreds and ___ ones
20. 6 912 = ___ hundreds, ___ tens and ___ ones
21. 74 201 = ___ thousands and ___ ones



Chapter 1 Number Concepts Place Value and Rounding.indd 4 10/08/17 4:01 PM

22. 80 123 = ___ hundreds and ___ ones

23. 93 074 = ___ hundreds, ___ tens and ___ ones

24. 1 000 000 = ___ thousands

## Activity 6:

**Write the numeral for each of the following.**

1. 2 hundreds, 8 tens, 9 ones
2. 3 hundreds, 7 ones
3. 1 hundred, 4 tens
4. 6 thousands, 5 hundreds, 5 tens, 8 ones
5. 25 thousands, 7 tens, 2 ones
6. 12 thousands, 3 hundreds
7. 2 hundred thousands, 1 ten thousands, 8 thousands, 3 hundreds, 5 tens, 4 ones
8. 420 thousands, 2 hundreds, 6 tens

# Place Value and Value

## Teaching Point 1:

**Place value patterns**

| Thousands | | | Ones | | |
|---|---|---|---|---|---|
| HT | TT | Th | H | T | O |
| 1 | 1 | 1 | 1 | 1 | 1 |
| 100 000 | 10 000 | 1 000 | 100 | 10 | 1 |

10 times as much as

$\frac{1}{10}$ of

| | |
|---|---|
| $10 = 1 \times 10$ | $10\,000 = 100\,000 \div 10$ |
| $100 = 10 \times 10$ | $1\,000 = 10\,000 \div 10$ |
| $1\,000 = 100 \times 10$ | $100 = 1\,000 \div 10$ |
| $10\,000 = 1\,000 \times 10$ | $10 = 100 \div 10$ |
| $100\,000 = 10\,000 \times 10$ | $1 = 10 \div 10$ |

## Activity 1:

**Use place value patterns in a place value chart to complete the table below.**

| Number | Number to the Right | Number to the left |
|---|---|---|
| 1. 50 | 5 | 500 |
| 2. 2 000 | | |
| 3. 400 | | |
| 4. 60 000 | | |
| 5. 70 | | |
| 6. 100 000 | | |

**Complete the sentences below.**

7. 200 is _____ times as much as 20.
8. 800 is ____ times as much as 8.
9. 3 000 is ____ times as much as 30.
10. 40 000 is ____times as much as 400.
11. 230 is 10 times less than ____.
12. 4 100 is 100 times less than _____.
13. 10 000 is _____ times less than 1 000 000.
14. 7 000 is _____ less than 700 000.
15. 9 120 is _____ less than 912 000.



Chapter 1 Number Concepts Place Value and Rounding.indd 5 10/08/17 4:01 PM

## Teaching Point 2:

***What is the place value and value of the underlined digit in the number 243 517?***

| Thousands | | | Ones | | |
|---|---|---|---|---|---|
| Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
| 2 | 4 | 3 | 5 | 1 | 7 |
| 200 000 | 40 000 | 3 000 | 500 | 10 | 7 |

The **place value** of **4** is **ten thousands**.

The **value** of **4** is **40 000**.

## Activity 2:

**Write the place value and value of the underlined digits?**

1. 12 145
2. 54 067
3. 490 125
4. 593 809
5. 305 291
6. 132 570
7. 921 384
8. 310 432
9. 762 098
10. 645 100
11. 1 000 000
12. 798 301
13. 201 341
14. 53 772

## Activity 3:

**Solve the problems.**

1. Circle the digit in the number 177 007 which has a value of 70 000.
2. Write a six digit number that has a 7 in the ten thousands place and the number in the thousands place has a value of 3 000.
3. Is the following statement *true* or *false*? 1 000 thousands = 1 000 000
4. Write the number with the smallest value using the digits 1 to 6.
5. Write the number with the largest value using the digits 1 to 6.
6. A digit is in the thousands place. It is moved so that its value is ten times greater. To which place did the digit move?
7. The vote count of the 2015 general election was 734 792. Write the values of the 7s in the number.
8. The table below shows the total population of three Regions in Trinidad.

| Arima | Sangre Grande | Diego Martin |
|---|---|---|
| 33 807 | 74 546 | 101 703 |

In which region does the digit 7 have the least value? Write the value.

9. In 2011 the total population of the Tunapuna, Piarco region was 211 741. Which digit has the greatest value in the number? Write the value.
10. How many times greater is the first 4 than the second 4 in the number 4 042?



Chapter 1 Number Concepts Place Value and Rounding.indd 6 10/08/17 4:01 PM

# Expanded Notation

## Teaching Point 1:

***Express 620 184 in expanded notation?***

| Thousands | | | Ones | | |
|---|---|---|---|---|---|
| HT | TT | Th | H | T | O |
| 6 | 2 | 0 | 1 | 8 | 4 |
| 600 000<br>6 × 100 000 | 20 000<br>2 × 10 000 | 0<br>0 × 1 000 | 100<br>1 × 100 | 80<br>8 × 10 | 4<br>4 × 1 |

620 184 = 600 000 + 20 000 + 0 + 100 + 80 + 4

or

620 184 = (6 × 100 000) + (2 × 10 000) + (0 × 1 000) + (1 × 100) + (8 × 10) + (4 × 1)

## Activity 1:

**Write the numerals in expanded notation.**

**1.** 34 **2.** 86 **3.** 1 789

**4.** 4 530 **5.** 72 109 **6.** 587

**7.** 123 549 **8.** 711 **9.** 5 639

**10.** 23 000 **11.** 981 177 **12.** 27 863

**13.** 1 000 000 **14.** 634 179 **15.** 200 000

**16.** 23 901 **17.** 100 023 **18.** 300 050

**19.** 7 030 **20.** 802 104 **21.** 570 206

## Activity 2:

**Write the missing numerals.**

**1.** ☐ = (4 × 10) + (9 × 1)

**2.** ☐ = (7 × 100) + (0 × 10) + (5 × 1)

**3.** ☐ = (1 × 1 000) + (3 × 100) + (2 × 10) + (0 × 1)

**4.** ☐ = (3 × 10 000) + (4 × 1 000) + (1 × 100) + (9 × 10) + (3 × 1)

**5.** ☐ = (5 × 100 000) + (9 × 10 000) + (3 × 1 000) + (2 × 100) + (1 × 10) + (7 × 1)

**6.** ☐ = (6 × 100 000) + (0 × 10 000) + (0 × 1 000) + (7 × 100) + (0 × 10) + (1 × 1)

**7.** ☐ = (1 × 100 000) + (5 × 10 000) + (0 × 1 000) + (0 × 100) + (9 × 10) + (9 × 1)

**8.** ☐ = (9 × 10) + (9 × 1)

**9.** ☐ = (9 × 10 000) + (1 × 1 000) + (1 × 100) + (5 × 10) + (0 × 1)

**10.** ☐ = (1 × 100 000) + (4 × 100) + (3 × 1)

**11.** ☐ = (9 × 10 000) + (5 × 1 000) + (6 x 10)

**12.** ☐ = (5 × 100 000) + (1 × 1)



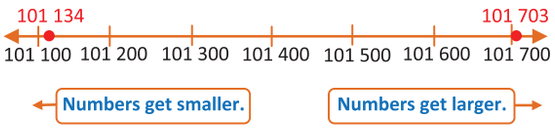
Chapter 1 Number Concepts Place Value and Rounding.indd 7 10/08/17 4:01 PM

## Compare and Order Numbers

### Teaching Point 1:

*According to the 2011 Population and Housing Census, Diego Martin has a total population of 101 703 persons and Princes Town has a total population of 101 134 persons. Which region has a larger population?*

***Compare using a number line.***




101 703 is to the right of 101 134.

So, 101 703 > 101 134.

***Compare using place value.***

| HT | TT | Th | H | T | O |
|---|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 3 | 4 |
| 1 | 0 | 1 | 7 | 0 | 3 |

The **hundred thousands**, the **ten thousands** and the **thousands** are the same.

7 hundreds is more than 1 hundred.

So, 101 703 is more than 101 134.

101 703 > 101 134

### Activity 1:

**Compare the numbers. Use >, < or =.**

1. 24 ◯ 48
2. 145 ◯ 138
3. 579 ◯ 579
4. 2011 ◯ 2008
5. 9074 ◯ 978
6. 21 100 ◯ 21 100
7. 111 411 ◯ 49 998
8. 215 417 ◯ 67 999
9. 874 510 ◯ 900 000
10. 74 673 ◯ 101 004
11. 1 000 000 ◯ 999 238
12. 678 849 ◯ 678 900

**Copy and write the missing digit to make the number sentence true.**

13. 658 637 > ☐ 00 000
14. 912 185 < 912 ☐ 85
15. 82 290 = 82 2☐ 0
16. ☐ 5 000 < 31 000



Chapter 1 Number Concepts Place Value and Rounding.indd 8 10/08/17 4:01 PM

**The table below shows the total population for each region.**

| Region | Total Population |
|---|---|
| Port of Spain | 36 963 |
| Arima | 33 807 |
| San Fernando | 50 208 |
| Chaguanas | 84 316 |

17. Which region has the smallest population?

18. Which region has the largest population?

19. Which regions has more persons than Port of Spain?

## Teaching Point 2:

*Write the following numerals in **ascending order, smallest** first.*

*678, 3 125, 98, 21 000*

| HT | TT | Th | H | T | O |
|---|---|---|---|---|---|
| | | | 6 | 7 | 8 |
| | | 3 | 1 | 2 | 5 |
| | | | | 9 | 8 |
| | 2 | 1 | 0 | 0 | 0 |

First, compare the **values** of the digits in each numeral. Then, order the numbers.

**Answer:** 98, 678, 3 125, 21 000

## Activity 2:

**Write the following groups of numerals in ascending order, smallest first.**

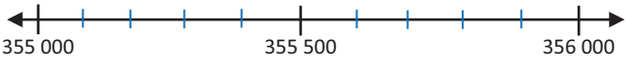
1. 90, 7, 35, 89
2. 243, 209, 218, 250
3. 4 891, 1 345, 6 180, 3 408
4. 900, 6, 7 921, 28
5. 23, 10 321, 355, 4 098
6. 12 098, 50 900, 32 999, 21 751
7. 16 830, 82, 400 000, 210
8. 7 502, 6 793, 6 723, 7 593
9. 80 371, 15 048, 80 137, 15 840
10. 32 463, 32 482, 32 947, 32 782
11. 849 551, 940 039, 941 100, 849 399

**Use the number lines to order the numbers from least to greatest.**

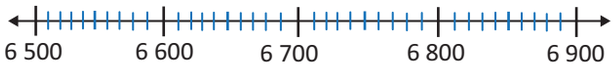
12. 26 905, 26 505, 27 800




13. 355 200, 355 000, 355 900




14. 6 783, 6 505, 6 810, 6 650






Chapter 1 Number Concepts Place Value and Rounding.indd 9 10/08/17 4:01 PM

## Teaching Point 3:

*Write the following numbers in* ***descending order, largest*** *first.*

*7 651, 462, 11 671, 67*

| HT | TT | Th | H | T | O |
|---|---|---|---|---|---|
| | | 7 | 6 | 5 | 1 |
| | | | 4 | 6 | 2 |
| | 1 | 1 | 6 | 7 | 1 |
| | | | | 6 | 7 |

First, compare the **values** of the digits in each numeral. Then, order the numbers.

**Answer:** 11 671, 7 651, 462, 67

## Activity 3:

**Write the following numerals in descending order, largest first.**

1. 70, 17, 45, 59
2. 562, 115, 788, 350
3. 1 990, 8 845, 4 154, 9 768
4. 345, 9, 1 621, 75
5. 59, 30 300, 476, 1 450
6. 67 056, 79 987, 53 954, 43 073
7. 54 609, 23, 126 022, 897
8. 8 435, 7 853, 8 584, 5 487
9. 20 371, 51 048, 48 137, 20 840
10. 46 463, 46 482, 46 947, 46 782
11. 489 551, 409 039, 419 100, 498 399

**Solve the problems below.**

12. Use the digits 3, 4, 5, 6 and 8 to create four five-digit numerals. Use each digit exactly once in each numeral. Order the numerals from *largest* to *smallest*.

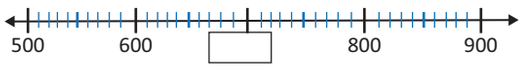
**Use the data from the table for Questions 13 and 14.**

| Funds Raised at Food Stalls | |
|---|---|
| **Name of Stall** | **Funds raised** |
| Cake Stall | $3 235 |
| Hot Dog Stand | $3 523 |
| Ice Cream Stall | $3 532 |

13. List the food stalls in order from greatest to least amount of funds raised.
14. If the Roti Stall raised $3 332, how would the list change?

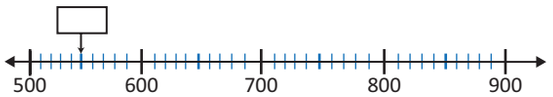
## Teaching Point 4:

*Write the missing numbers on the number line.*




The number line is divided into hundreds.

So, the missing number is 700.




The missing number is halfway between 500 and 600.

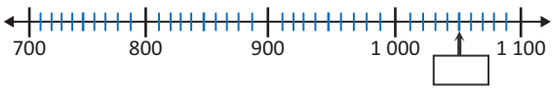
So, the missing number is 550.

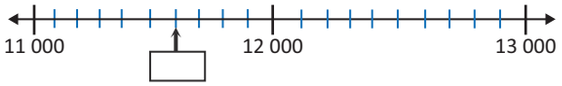


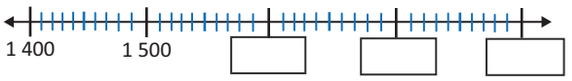
Chapter 1 Number Concepts Place Value and Rounding.indd 10 10/08/17 4:01 PM

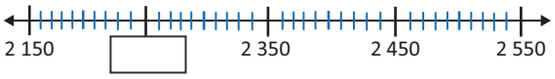
## Activity 4:

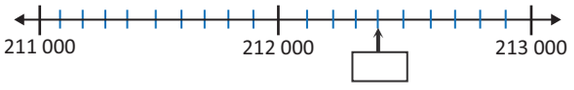
**Write the missing numbers on the number lines.**

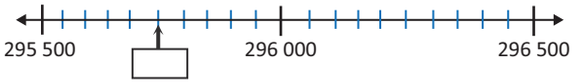
1. 

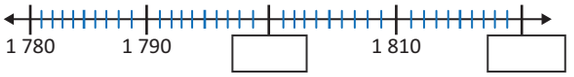

2. 

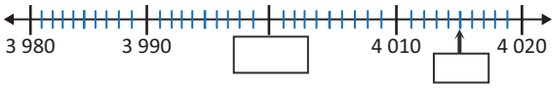

3. 


4. 


5. 


6. 

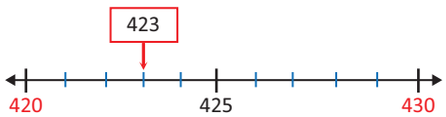

7. 


8. 


# Rounding

## Teaching Point 1:

***Round 423 to the nearest ten.***



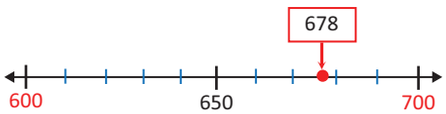

**423** is nearer to 420 than to 430.

**tens place** ↓ 4**2**3 4**2**0

The digit to the right of the tens place is less than 5. Leave 2 tens and change the ones to zero.

**Answer:** 420.

***Round 678 to the nearest hundred.***




**678** is nearer to 700 than to 600.

**hundreds place** ↓ **6**78 **7**00

The digit to the right of the hundreds place is more than 4. Add 1 to the hundreds and change the tens and ones to zeros.

**Answer:** 700.

***Round 34 590 to the nearest thousand.***




**34 590** is nearer to 35 000 than to 34 000.

**thousands place** ↓ 3**4** 590 3**5** 000

The digit to the right of the thousands place is more than 4. Add 1 to the thousands and change the hundreds, tens and ones to zeros.

**Answer:** 35 000.



Chapter 1 Number Concepts Place Value and Rounding.indd 11 10/08/17 4:01 PM

## Activity 1:

**Round the following numbers to the nearest <u>ten</u>.**

| | | |
|---|---|---|
| **1.** 54 | **2.** 76 | **3.** 89 |
| **4.** 535 | **5.** 109 | **6.** 583 |
| **7.** 544 | **8.** 711 | **9.** 639 |
| **10.** 3 312 | **11.** 1 176 | **12.** 7 863 |
| **13.** 34 565 | **14.** 64 189 | **15.** 211 254 |

## Activity 2:

**Round the following numbers to the nearest <u>hundred</u>.**

| | | |
|---|---|---|
| **1.** 124 | **2.** 362 | **3.** 809 |
| **4.** 478 | **5.** 716 | **6.** 549 |
| **7.** 1 643 | **8.** 4 891 | **9.** 6 394 |
| **10.** 3 402 | **11.** 1 276 | **12.** 7 833 |
| **13.** 21 565 | **14.** 42 189 | **15.** 300 354 |

## Activity 3:

**Round the following numbers to the nearest <u>thousand</u>.**

| | | |
|---|---|---|
| **1.** 1 246 | **2.** 4 662 | **3.** 8 109 |
| **4.** 4 678 | **5.** 7 716 | **6.** 5 249 |
| **7.** 1 543 | **8.** 4 091 | **9.** 6 264 |
| **10.** 13 402 | **11.** 41 276 | **12.** 27 833 |
| **13.** 28 065 | **14.** 491 189 | **15.** 300 654 |

## Activity 4:

**Solve the problems below.**

1. The distance between Trinidad and Jamaica is 1 930 km. What is the distance in kilometres to the nearest thousand?
2. Dillon rounded the number 34 890 to the nearest hundred. He wrote 34 800. Find and correct his mistake.
3. Mr. Lee bought a car for $88 575. To the nearest thousand, how much did the car cost?

**Use the data from the table for Questions 4-6.**

| Students Sitting SEA | |
|---|---|
| **Year** | **Number of Students** |
| 2012 | 17 916 |
| 2013 | 16 125 |
| 2014 | 18 039 |
| 2015 | 18 357 |

4. Which year had about 18 400 students rounded to the nearest hundred?
5. What is the number of students sitting the exam in the year 2014 rounded to the nearest thousand?
6. In which years did approximately 18 000 students sit the examination?



Chapter 1 Number Concepts Place Value and Rounding.indd 12 10/08/17 4:01 PM

## Chapter Review

**Solve the problems below.**

1. The greatest place value in a 6-digit number is the _____ place.
2. 10 000 greater than 75 250 is _____.
3. _____ is 40 000 less than 43 987.
4. Jayelle has $4 500 in her bank account. She withdrew $1 000 dollars from the account. How much money has she left?
5. Write the numeral for four hundred and sixty-five thousand, seven hundred and fifteen.
6. In 2011 the number of males living in Trinidad and Tobago was 665 119 and the number of females was 659 580. Which group was larger?
7. Write the number that stands for 6 ones, 8 hundreds, 0 tens, 12 thousands.
8. Arrange these numbers in order starting with the largest first: 721 643, 712 643, 732 614
9. Mrs. Roberts bought a television for $14 395. Approximate the cost of the television to the nearest thousand?
10. Which is the value of the 7 in the number 798 610?

    a) 7 b) 7 000

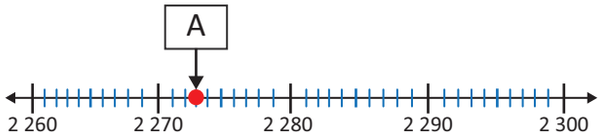
    c) 70 000 d) 700 000
11. How many thousands are there in one million?
12. Malachi has $10 000 in one hundred dollar bills. How many bills does he have?
13. Mummy deposited the following bills in her bank account:

    15 one-hundred dollar bills

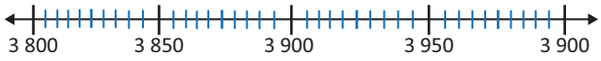
    20 ten dollar bills

    14 one dollar bills

    What was the sum of money that mummy deposited in her account?
14. Write a four-digit numeral that has a digit with the value of 3 000 and another digit with a value of 500.
15. What number will fit at the point A on the number line below?




16. Find and correct the error in the number line below.




17. David checked the price of a PlayStation at three toy stores.

    Store 1: $2 495

    Store 2: $2 549

    Store 3: $2 459

    At which store should he purchase the toy if he wants to spend the least amount of money?
18. In the number 12 562, how many times is the value of the digit in the ten thousands place greater than the digit in the ones place?



Chapter 1 Number Concepts Place Value and Rounding.indd 13 10/08/17 4:01 PM

CHAPTER

2

# Number Patterns

**Vocabulary:**

pattern
ordered
term
element
pattern rule
sequence
factor
multiple
prime number
composite
number

**Chapter Outcomes:**

- Recognize and explore number patterns up to 1 000.
- Develop an understanding of different types of numbers by exploring their patterns.
- Develop an understanding that pattern recognition can aid in problem solving.



Construction workers have to know the size of the space they have to work with and the size of the pieces they have to place in that space. They can use number patterns to make sure they use just the right amount of pieces, which requires adding and subtracting lengths of material. The laying of the glass tiles on the face of the National Academy of the Performing Arts building required such mathematical skills.

## Getting Ready for Chapter 2

**Find the missing number.**

1. $8 + \square = 15$
2. $\square - 9 = 5$

**Write the missing number in each pattern.**

3. 3, 6, 9, 12, ☐
4. 5, 10, 15, ☐, 25
5. 85, ☐, 65, 55, 45

**Find each product.**

6. $4 \times 9 = \square$
7. $8 \times 7 = \square$

**Find each quotient.**

8. $63 \div 7 = \square$
9. $24 \div 8 = \square$

## Describe Number Patterns

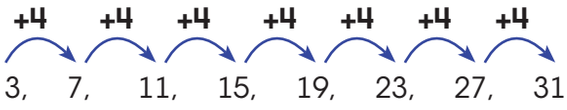
### Teaching Point 1:

*How can you identify patterns?*

A number pattern is an **ordered** set of numbers. Each number in the pattern is called a **term** or **element**.

A **sequence** is a list of numbers that follow a specific pattern.

The numbers below form a pattern. The first term in the pattern is 3.




**First term**

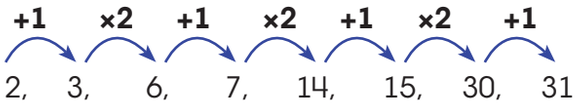
A pattern **rule** is used to describe patterns. In this pattern the **rule** is ***add 4***.

Other patterns can be found in the numbers.

e.g. The **terms** in the pattern are all odd numbers.

---

You can say this pattern is made from doing **two operations**.




The pattern **rule** is ***add 1, multiply by 2***.

### Activity 1:

**Write the pattern rule for each pattern. Describe other patterns in the numbers.**

1. 16, 20, 24, 28, 32
2. 75, 70, 65, 60, 55
3. 4, 8, 16, 32, 64, 128
4. 104, 94, 84, 74, 64
5. 16, 24, 32, 40, 48
6. 28, 24, 28, 24, 28, 24
7. 14, 14, 12, 12, 10, 10, 8, 8
8. 7, 8, 6, 7, 5, 6, 4



Chapter 2 Number Patterns.indd 15 06/03/18 11:09 AM

9. 63, 62, 31, 30, 15, 14, 7

10. 3, 3, 6, 9, 15, 24

11. 12, 7, 14, 9, 16, 11

### Activity 2:

**Use the rule to write the numbers in the pattern. Describe another pattern in the numbers.**

1. **Rule**: Add 4.

   15, ___, ___, ___, ___, ___,...

2. **Rule**: Multiply by 3.

   2, ___, ___, ___, ___, ___,...

3. **Rule**: Subtract 5.

   50, ___, ___, ___, ___, ___,...

4. **Rule**: Divide by 2.

   128, ___, ___, ___, ___, ___,...

5. **Rule**: Subtract 1. Multiply by 2.

   55, ___, ___, ___, ___, ___,...

6. **Rule**: Subtract 5. Add 6.

   19, ___, ___, ___, ___, ___,...

7. **Rule**: Multiply by 10.

   1, ___, ___, ___, ___, ___,...

8. **Rule**: Add 7.

   12, ___, ___, ___, ___, ___,...

9. **Rule**: Divide by 3. Add 6.

   9, ___, ___, ___, ___, ___,...

10. **Rule**: Subtract 3. Multiply by 2.

    10, ___, ___, ___, ___, ___,...

11. Why is it important to look at more than the first two numbers of a pattern to decide the rule for the pattern?

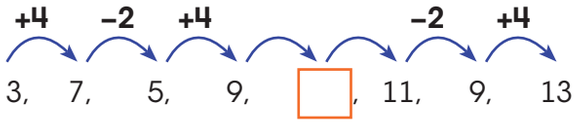
12. Why do the terms in the number pattern 11, 16, 21, 26, 31, 36, alternate between odd and even numbers?

13. The first term in a pattern is an odd number. The rule is to multiply by 2. Explain why the rest of the terms in the pattern will be even numbers?

## Complete Number Patterns

### Teaching Point 1:

***Write the missing elements in the number pattern.***




The **rule** is ***add 4, subtract 2***.

Therefore, the missing number is **7**.

### Activity 1:

**Write the missing numbers in the pattern.**

1. 15, 19, 23, ☐, 31, 35

2. 64, 32, ☐, 8, 4, 2

3. 1, 3, ☐, 27, 81, 243

4. 19, 16, 18, 15, 17, ☐, ☐

5. 36, 18, 20, ☐, 12, 6

6. 16, 32, 8, 16, 4, ☐



Chapter 2 Number Patterns.indd 16 06/03/18 11:09 AM

7. 3, 6, 9, 12, 15, ☐, ☐

8. ☐, 86, 82, 84, 80, 82, 78

9. 2, 2, 4, 6, 10, ☐, 26, ☐

10. 5, 5, 10, 15, ☐, 40, 65, ☐

**Solve the problems below.**

11. Kejan lives in the tenth house on Dean Street. The first house on Dean Street is numbered 3. The second house is 6. The third is 9. If the pattern continues what is Kejan's house number likely to be?

12. Balata trees bear fruit every four years. Marianna who is now 18 years old saw her first balata when she was five years old. Write a number pattern which shows her ages when the balata trees bore fruit.

13. Akal saved $75 dollars during the vacation. He plans to spend $5 each week when school begins. Write a pattern to show how much money Akal will have after 6 weeks.

14. Jamal earns $20 each week from washing his father's car. Each week he spends $10 from his earnings and saves the rest. Write a pattern to show how much money Jamal would have in his savings after 6 weeks.

15. Matthew is reading a book from the school library. He reads 15 pages the first day. Then each day he reads 6 more pages than the day before. How many pages did he read on the eighth day?

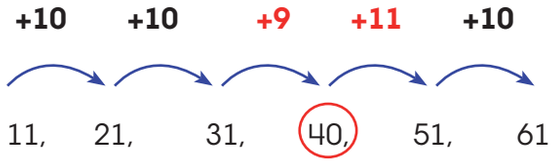
16. Marcus and Mikey are saving money to buy a football. Marcus adds $5 dollars to their piggy bank every week. Mikey adds $10 every other week. How much money would they have at the end of the 10th week?

17. Jervon's father pays him $20 to wash his car on Sundays. During the week Jervon spends $10 from the money he earned and saves the rest. If Jervon has $60 at the beginning of the 6th week, how much money did he have at the beginning of the 4th week?

## Identify Errors in Number Patterns

### Teaching Point 1:

Find the error in the pattern below.




The **rule** is ***add 10***.

Therefore, the **error** in the number pattern is **40.**

The pattern should be:

11, 21, 31, 41, 51, 61

### Activity 1:

**Identify and correct the error in each number pattern.**

1. 10, 20, 30, 30, 50

2. 9, 12, 15, 16, 21

3. 275, 250, 225, 200, 185



Chapter 2 Number Patterns.indd 17 06/03/18 11:09 AM

4. 72, 68, 60, 54, 48

5. 13, 26, 13, 26, 13, 13

6. 640, 120, 80, 20, 5

7. 2, 4, 7, 11, 17, 22, 29

8. 1, 1, 2, 3, 7, 8, 13, 21

9. 7, 70, 700, 7 000, 77 000, 700 000

10. 1, 4, 9, 16, 25, 37

## Relationships in Patterns

### Teaching Point 1:

The table below shows the ages of two children. ***How old will Alina be when Alex is 25?***

| Alex's Age (yrs) | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|
| Alina's Age (yrs) | 10 | 11 | 12 | 13 | 14 |

Find the relationship between the two sets of numbers.

The **rule** is subtract 5.

Therefore, 25 – 5 = 20. Alina will be 20 years old.

### Activity 1:

**Identify the relationship in the numbers and solve the problems.**

1. The table shows the ages of two children. How old will Alex be when Alina is 34?

| Alex's Age (yrs) | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|
| Alina's Age (yrs) | 10 | 11 | 12 | 13 | 14 |

2. Myron jogs each day. What is the rule for the pattern shown in his jogging record?

| Day | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Time in minutes | 30 | 45 | 60 | 75 | 90 |

3. The table below shows the number of cricket bats sold at a sports store. Based on the pattern shown, how many bats were sold on the Day 6?

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Bats Sold | 8 | 6 | 11 | 9 | 14 | | 17 |

4. The table below shows heights of two plants over 5 weeks.

| Week | Tomato Height (cm) | Ochro Height (cm) |
|---|---|---|
| 1 | 1 | 3 |
| 2 | 3 | 5 |
| 3 | 6 | 8 |
| 4 | 9 | 11 |
| 5 | 15 | |

a) Complete the table.

b) If the plants continue growing this way, what will be the height of the tomato plant if the ochro is 20 cm?



Chapter 2 Number Patterns.indd 18 06/03/18 11:09 AM

5. Emily and Nneka saves money each month. Based on the pattern shown, how much money will Emily have in savings if Nneka has $100?

| | | | | | |
|---|---|---|---|---|---|
| **Emily's Savings** | $50 | $75 | $100 | | $150 |
| **Nneka's Savings** | $20 | $45 | $70 | $100 | $120 |

## Patterns with One and Zero

### Teaching Point 1:

**Add zero.**

12 + 0 = 12

0 + 12 = 12

**Subtract zero.**

12 – 0 = 12

When you **add** to **zero** or **add zero** to a number the **sum** is the same as the number.

When you **subtract zero** the same number is left.

**Multiplying by one and zero.**

| × | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 |
| 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

When you multiply a number and **1**, the **product** is the same number.

When you multiply a number and **0**, the **product** is **0**.

| | | |
|---|---|---|
| **Multiply with 10** | **4 × 10 = 40** | Add **one** zero to the product. |
| **Multiply with 100** | **4 × 100 = 400** | Add **two** zeros to the product. |
| **Multiply with 1 000** | **4 × 1 000 = 4 000** | Add **three** zeros to the product. |

### Activity 1:

**Complete each number sentence.**

1. 345 + ☐ = 345
2. 690 – ☐ = 690
3. ☐ + 0 = 477
4. ☐ – 0 = 631
5. 45 × ☐ = 45
6. ☐ × 12 = 0
7. 287 × ☐ = 287
8. ☐ × 89 = 89
9. 134 × ☐ = 0
10. 58 × 1 = ☐



Chapter 2 Number Patterns.indd 19 06/03/18 11:09 AM

## Activity 2:

**Find each product.**

1. $8 \times 5 =$
   $8 \times 50 =$
   $8 \times 500 =$
   $8 \times 5000 =$

2. $11 \times 2 =$
   $11 \times 20 =$
   $11 \times 200 =$
   $11 \times 2000 =$

3. $6 \times 7 =$
   $6 \times 70 =$
   $6 \times 700 =$
   $6 \times 7000 =$

4. $4 \times 9 =$
   $4 \times 90 =$
   $4 \times 900 =$
   $4 \times 9000 =$

5. $12 \times 3 =$
   $12 \times 30 =$
   $12 \times 300 =$
   $12 \times 3000 =$

6. $10 \times 5 =$
   $10 \times 50 =$
   $10 \times 500 =$
   $10 \times 5000 =$

# Factors and Multiples Patterns

## Teaching Point 1:

You can use patterns to find factors and multiples.

***What patterns can you find in multiples of 2 and 9?***

**0**, **2**, **4**, **6**, **8**, 1**0**, 1**2**, 1**4**, ... Multiples of 2 end with 0, 2, 4, 6 or 8.

3, 6, 9, 12, 15, 18, ...The sum of the digits of multiples of 3 will be a multiple of 3.

0, 9, 18, 27, 36, 45,...The sum of the digits of the multiples will be 9 or a multiple of 9, unless the multiple is 0.

***What patterns can you find in factors?***

**7** × **2** = 14 is the same as **7** + **7** = 14. Multiplying by 2 is the same as using a double fact.

**5** × 9 = **4**5 The tens digit in a product will be 1 less than the factor being multiplied by 9.

## Activity 1:

**Use patterns in factors and multiples to solve the problems.**

1. Which of the numbers are multiples of 2?
   32, 78, 90, 15, 126, 1541

2. Which of the numbers below are multiples of 5?
   36, 40, 165, 95, 300

3. Which of the numbers below are multiples of 3?
   27, 91, 126, 56, 108, 711

4. Which of the numbers below are NOT multiples of 9?
   27, 81, 90, 56, 108, 37

5. Which of the numbers below have multiples of 30, 40, 50 and 60?
   2, 3, 5, 6, 10

6. Write the multiple of 2 that comes after each multiple below.
   a) 134 b) 260 c) 88

7. Write the multiple of 5 that comes after each multiple below.
   a) 365 b) 490 c) 675

8. Write the double facts for the multiplication facts below.
   a) $12 \times 2 = 24$ b) $19 \times 2 = 38$
   c) $16 \times 2 = 32$ d) $23 \times 2 = 46$



Chapter 2 Number Patterns.indd 20 06/03/18 11:09 AM

e) 13 × 2 = 26 f) 17 × 2 = 34

**9.** Write the missing digit in each multiplication fact.

a) 8 × 9 = ☐2 b) 3 × 9 = ☐7

c) 7 × 9 = ☐3 d) 10 × 9 = ☐0

e) 6 × 9 = ☐4 f) 5 × 9 = ☐5

**10.** Write the missing digit in each multiplication fact.

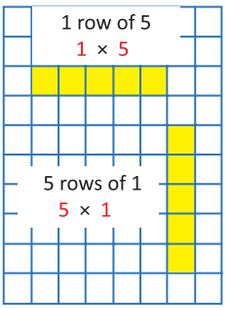
a) 8 × 10 = 8☐ b) ☐ × 10 = 50

c) 1☐ × 10 = 170

## Prime and Composite Numbers

### Teaching Point 1:

The grid shows all the arrays possible for 5.

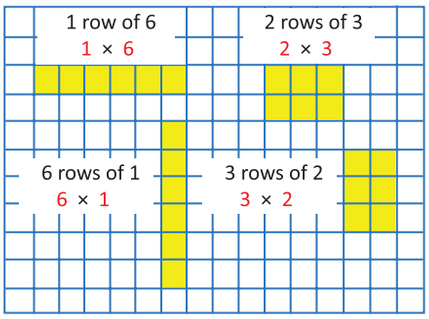



The **factors** of **5** are **1** and **5**.

**Prime numbers** have **two** factors, 1 and itself. **5** is a prime number.

Other multiples of 5 are not prime numbers.

The grid shows all the arrays possible for **6**.

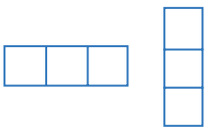


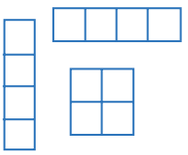

The **factors** of **6** are **1**, **2**, **3** and **6**.

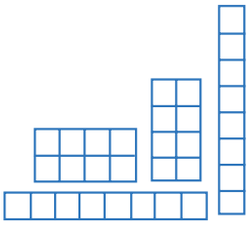
**Composite numbers** have **more than two** factors. **6** is a composite number.

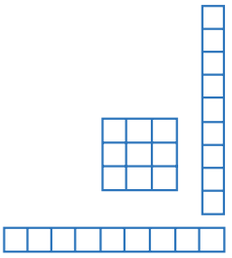
### Activity 1:

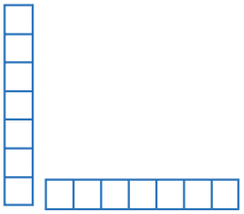
**Write the number represented by the arrays and state whether it is prime or composite.**

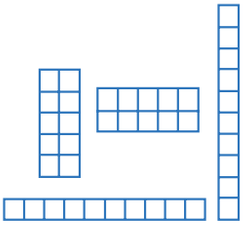
**1.** 

**2.** 

**3.** 

**4.** 

**5.** 

**6.** 



Chapter 2 Number Patterns.indd 21 06/03/18 11:09 AM

**7. Follow the guidelines to create a list of prime numbers from 1 to 100.**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | ~~4~~ | 5 | ~~6~~ | 7 | ~~8~~ | ~~9~~ | ~~10~~ |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

a) Write all the numbers from 1 to 100.

b) Draw a square around 1. It is not a prime or a composite number.

c) Shade the prime number 2. Cross out all other multiples of 2.

d) Shade the prime number 3. Cross out all other multiples of 3.

e) Shade the prime number 7. Cross out all other multiples of 7.

f) Continue in the same way until you have done all the numbers up to 100.

**Solve the problems below.**

8. How many different arrays can you make to show the number 11?

9. Daddy is laying 36 tiles. Draw all the arrays possible to show how he can lay the tiles with the same number of tiles in each row. Is 36 prime or composite?

10. Alex has 7 trophies for sprinting that he wants to display in an array. How many different arrays are possible?

11. There are 12 desks in a room. How many different ways can the desks be arranged if they are in even rows?

12. Are all odd numbers prime numbers? Explain.

13. Why is 1 neither a prime number nor a composite number?

## Chapter Review

**Complete the number sequences.**

1. 14, 22, 30, ___
2. 233, 223, 213, ___
3. 1, 3, 6, ___, 15
4. 1, 1, 2, 1, 1, 2, ___, 1
5. 3, 6, ___, 24, 48, 96
6. 3, 3, 6, 9, ___, 24
7. 216, 72, 144, ___, 96

**Solve the problems below.**

8. What rule describes the pattern below?
12, 14, 11, 13, 10, 12

9. The house numbers on one side of George Street are even. From the corner, the first four house numbers are 1042, 1052, 1062 and 1072. What will the number of the 10th house likely to be?

10. Extend the pattern below by five terms.
Rule: subtract 6
76, ___, ___, ___, ___, ___



Chapter 2 Number Patterns.indd 22 06/03/18 11:09 AM

**11.** A school bus runs 6 times a day, 5 days a week. The bus can carry 25 passengers. Find the greatest number of children who can ride the school bus each week.

**12.** Using the pattern rule from the table below, what will be the cost of 15 school shirts?

| Price | Number of School Shirts |
|---|---|
| $200 | 8 |
| $225 | 9 |
| $250 | 10 |

**13.** Miss Betty has 72 roses to decorate Easter bonnets for sale. If she puts an even number of roses on each bonnet, what are some ways she could decorate the bonnets using all 72 roses?

| No. of Roses | 2 | 3 | 4 | 6 | 8 |
|---|---|---|---|---|---|
| No. of Bonnets | 36 | 24 | | | |

**a)** Complete the table.

**b)** Why can't Miss Betty decorate bonnets with 5 or 7 roses?

**c)** What is one more way to decorate the bonnets?

**14.** Which of the numbers below are divisible by both 3 and 8?
168 132 192 320 24 468

**15.** What is the sum of the prime numbers that are less than 10?

**16.** The sets of dots below form a pattern.



**(a)** Continue the drawings to show the fifth and sixth set of dots.

**(b)** How many dots will be in the 10th set?

**17.** During the vacation, Anika read 24 pages each day. Her brother Aaron read 8 pages each day. Complete a table to show how many pages each of them read after 5 days.

**18.** Javan saves money from his allowance every month. Over the first four months his savings was $50, $52, $55 and $59. If the pattern continues what will be his savings for the 10$^{th}$ month?

**19.** The numbers 13, 17, 19 and 29 are prime numbers. If you reverse the order of the digits in each number, which of them also result in prime numbers?

**20.** A jogger jogs the following distances over 5 weeks as shown in the table below.

| week 1 | week 2 | week 3 | week 4 | week 5 |
|---|---|---|---|---|
| 2 km | 4 km | 7 km | 11 km | 16 km |

If he continues to jog with the same pattern, how far will he jog during the 8th week?

**21.** Harry is saving money to buy a game. In the first week, he saved $4. In the second week, he saved $8 and in the third week he saved $16.

**(a)** If Harry continues to save in this manner, how much will he save in the sixth week?

**(b)** How much money will Harry have at the end of the sixth week?



Chapter 2 Number Patterns.indd 23 06/03/18 11:09 AM

CHAPTER

3

# Number Relationships

**Vocabulary:**

operation
inverse operation

**Chapter Outcomes:**

- Solve problems involving number sentences with one unknown.



Equality is all about sameness. Number sentences allow you to use the equal sign to show the relationship that exists between expressions of equal value. The equal sign makes it possible for number sentences to be changed and rearranged, so that you can find new ways of expressing equality and find unknowns.

Equality can be found in the natural world. Each flower on the Frangipani plant has equal number of petals.

## Getting Ready for Chapter 3

**Write >, < or = in the circle.**

1. 45 ◯ 24
2. 4 + 3 ◯ 8
3. 12 – 2 ◯ 6 + 4
4. 9 + 7 ◯ 11 + 6

**Find the missing number.**

5. 8 + ☐ = 11
6. 7 – ☐ = 5
7. 18 ÷ ☐ = 6
8. 10 × ☐ = 20

**Complete the number sentences.**

9. 11 + 6 – 6 =
10. 12 – 4 + 2 =
11. 8 + 6 – 10 =

**Complete the number pattern.**

12. 9, 14, 19, ☐
13. 32, 26, 20, ☐

## Use Inverse Operations to Find Missing Numbers

### Teaching Point 1:

*How can I use inverse operations to find missing numbers?*

***Using the inverse operation to calculate missing values in a number sentence.***

Subtraction is the **inverse** of Addition

6 + 5 = 11

11 – 6 = 5 **or** 11 – 5 = 6

**Complete the number sentence.**

23 + ☐ = 48

48 – 23 = 25 So, 23 + 25 = 48.

Division is the **inverse** of Multiplication

9 × 5 = 45

45 ÷ 9 = 5 **or** 45 ÷ 5 = 9

**Complete the number sentence.**

☐ ÷ 4 = 25

25 × 4 = 100 So, 100 ÷ 4 = 25.

### Activity 1:

**Use inverse operations to complete the number sentences.**

1. 37 + ☐ = 57
2. 45 + ☐ = 100
3. ☐ + 23 = 68
4. ☐ + 78 = 120
5. 87 – ☐ = 27
6. 145 – ☐ = 100



Chapter 3 Number Relationships.indd 25 10/08/17 4:04 PM

7. ☐ – 23 = 40
8. ☐ – 24 = 78
9. 15 × ☐ = 45
10. 25 × ☐ = 125
11. ☐ × 10 = 680
12. ☐ × 8 = 720
13. 250 ÷ ☐ = 10
14. 132 ÷ ☐ = 12
15. ☐ ÷ 9 = 32
16. ☐ ÷ 7 = 53
17. 75 ÷ ☐ = 15
18. 64 × ☐ = 192
19. ☐ + 58 = 95
20. ☐ – 17 = 23

## Use Relational Thinking to Find Missing Numbers

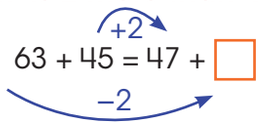
### Teaching Point 1:

*How can number relationships help me find the missing number?*

63 + 45 = 47 + ☐ ?

How does the 45 compare to 47? So, how will the missing number compare to 63?

**47 is 2 more than 45.**




**I need a number that is 2 less than 63.**

So, the number that goes in the box is 61.

63 + 45 = 47 + **61**

### Activity 1:

**Find the missing number without calculating.**

1. 25 + 35 = 20 + ☐
2. 18 + 56 = 58 + ☐
3. 41 + ☐ = 19 + 47
4. 67 + ☐ = 49 + 70
5. 26 + 17 = ☐ + 23
6. 240 + ☐ = 250 + 32
7. 155 + 28 = ☐ + 150
8. 309 + 23 = 32 + ☐
9. 15 + ☐ = 416 + 11
10. 637 + 47 = ☐ + 630

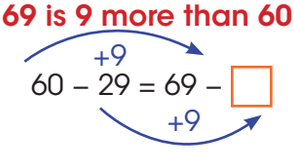
### Teaching Point 2:

*How can number relationships help me find the missing number?*

60 – 29 = 69 – ☐ ?

How does the 60 compare to 69? So, how will the 29 compare to missing number?

**69 is 9 more than 60.**




**I need a number that is 9 more than 29.**

So, the number that goes in the box is 38.

60 – 29 = 69 – **38**



Chapter 3 Number Relationships.indd 26 10/08/17 4:04 PM

## Activity 2:

**Find the missing number without calculating.**

1. $65 - 35 = 69 - \square$
2. $47 - \square = 50 - 35$
3. $\square - 12 = 36 - 9$
4. $78 - 15 = \square - 22$
5. $90 - 29 = 99 - \square$
6. $83 - \square = 76 - 18$
7. $\square - 40 = 67 - 35$
8. $146 - 34 = \square - 39$
9. $372 - 11 = 370 - \square$
10. $249 - \square = 250 - 60$

## Teaching Point 3:

*How can number relationships help me find the missing number?*

$12 \times 2 = 4 \times \square$ ?

How does the 12 compare to 4? So, how will the 2 compare to missing number?

**4 is 3 times less than 12.**

$12 \times 2 = 4 \times \square$ (÷3 above, ×3 below)

**I need a number that is 3 times more than 2.**

So, the number that goes in the box is 6.

$12 \times 2 = 4 \times \mathbf{6}$

## Activity 3:

**Find the missing number without calculating.**

1. $12 \times 3 = 4 \times \square$
2. $9 \times \square = 3 \times 6$
3. $\square \times 5 = 4 \times 10$
4. $6 \times 12 = \square \times 24$
5. $24 \times 6 = 8 \times \square$
6. $30 \times \square = 10 \times 15$
7. $\square \times 8 = 7 \times 24$
8. $108 \times 9 = \square \times 81$
9. $99 \times 7 = 9 \times \square$
10. $132 \times \square = 12 \times 66$

## Teaching Point 4:

*How can number relationships help me find the missing number?*

$12 \div 2 = 24 \div \square$ ?

How does the 12 compare to 24? So, how will the 2 compare to missing number?

**24 is 2 times 12.**

$12 \div 2 = 24 \div \square$ (×2 above, ×2 below)

**I need a number that is 2 times 2.**

So, the number that goes in the box is 4.

$12 \div 2 = 24 \div \mathbf{4}$



Chapter 3 Number Relationships.indd 27 10/08/17 4:04 PM

## Activity 4:

**Find the missing number without calculating.**

1. $8 \div 2 = 24 \div \square$
2. $24 \div \square = 48 \div 6$
3. $\square \div 4 = 32 \div 8$
4. $30 \div 3 = \square \div 9$
5. $60 \div 15 = 20 \div \square$
6. $40 \div \square = 80 \div 16$
7. $\square \div 6 = 60 \div 30$
8. $48 \div 8 = \square \div 16$
9. $14 \div 7 = 42 \div \square$
10. $50 \div \square = 200 \div 40$

## Activity 5:

**Write the number sentence for each problem below. Solve the problem.**

1. Farmer Jones sold 256 mangoes on Monday. He sold some more mangoes on Tuesday. If on both days he sold 402 mangoes, how many mangoes did he sell on Tuesday?




2. There were some books on a shelf in the library. After 17 more books were stacked on the shelf, there were 55 books. How many books were on the shelf at first?

3. Every two weeks, Mr. Job mows a total of 47 lawns. After one week he has 27 lawns left to mow. How many lawns has Mr. Job mowed?

4. Mrs. Jones shared $40 equally among her 8 children. Mr. Bradshaw gave his two sons an equal amount of money. If each child received the same amount of money, what is the total amount of money that Mr. Bradshaw gave to his sons?

5. If ☆ + ○ = 49

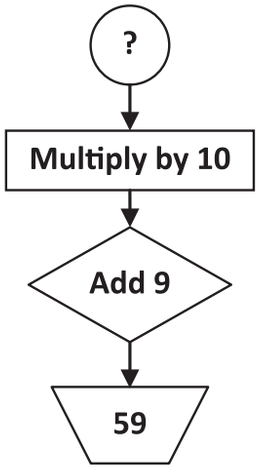
   ○ + ○ = 36

   What is the value of ☆?

6. The pet store had some goldfish. Eight goldfish were sold. There are 28 goldfish left. How many goldfish did the pet store have before some were sold?

7. Erik worked 13 hours and Alex worked 22 hours on a project. Isaac and Marvin worked on their projects the same number of hours that Eric and Alex worked in total. If Isaac worked 17 hours on his project, how many hours did Marvin work?

8. What number should go in the circle?






Chapter 3 Number Relationships.indd 28 10/08/17 4:04 PM

## Chapter Review

**Complete the number sentences.**

1. ☐ ÷ 7 = 287
2. 250 – ☐ = 78
3. ☐ × 124 = 372
4. 397 + ☐ = 1091
5. ☐ × 7 = 315 × 3
6. ☐ + 14 = 257 + 10
7. 152 – 34 = ☐ – 42

**Write = or ≠ in the box to make each number sentence true.**

8. 14 ÷ 2 ☐ 56 ÷ 8
9. 105 × 4 ☐ 21 × 20
10. 255 + 43 ☐ 155 + 143

**Solve the problems below.**

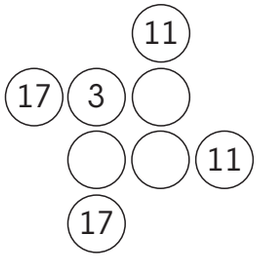
11. △ = 25 and ◇ = 125.
    △ + ○ + ○ = ◇
    What is the value of ○?
12. ☐ = 150
    ☐ + ⬠ + ⬠ = ☐ + ☐
    What is the value of ⬠ ?
13. The product of two numbers is 480. If one number is 24. What is the other number?



14. Jane bought a dress for $155 and a bag at the mall. Altogether she spent $286. How much did the bag cost?
15. A mason was paid $2 per block to build a wall of 260 blocks. A tile layer was paid $10 an hour to tile a room. After tiling the room he received the same amount of money as the mason. How many hours did the tile layer work?



16. A baker has cupcake trays with 12 cupcake pans and 6 cupcake pans. The baker baked 4 trays of 12 cupcake pans and some trays of 6 cupcake pans. The total number of cupcakes from each type of tray are equal. How many 6 cupcake pan trays did the baker use?
17. The sum of the three numbers in each line of circles below is 24. Write the missing numbers in each circle.




18. What number has to be divided by 8 to equal 36 divided by 4?



Chapter 3 Number Relationships.indd 29 10/08/17 4:04 PM

CHAPTER

4

# Types of Numbers

**Vocabulary:**

factors
factorisation
multiples
prime numbers
prime factors
composite numbers
square numbers
square root

**Chapter Outcomes:**

- Demonstrate an understanding of different types of numbers.




We use numbers every day. Almost all the things we do involve numbers. Numbers come in different types because they are used in different ways. Numbers are used to count how many of something there are. They are used to measure things, label things and order things. We use numbers at school, at home, when telling the time, checking our change, driving on the road or cooking a meal.

## Getting Ready for Chapter 4

**Skip count and write the missing numbers.**

1. 2, 4, 6, _____, _____, _____
2. 6, 12, 18, _____, _____, _____
3. 8, 16, 24, _____, _____, _____

**Write the missing number in each multiplication fact.**

4. $6 \times \square = 72$
5. $\square \times 9 = 72$
6. $7 \times 4 = \square$

**Write the missing number in each division fact.**

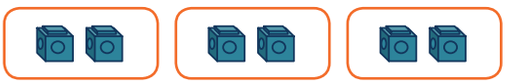
7. $\square \div 6 = 6$
8. $40 \div \square = 5$
9. $108 \div 9 = \square$

## Odd and Even Numbers

### Teaching Point 1:

You can find **odd** and **even** numbers by making groups of 2.

Put 6 cubes into groups of 2.



There are **no** blocks left. 6 is an **even number**.

Put 7 cubes into groups of 2.



There is **one** block left. 7 is an **odd number**.

**Patterns in Even and Odd Numbers**

Even numbers end with 0, 2, 4, 6 or 8.

Odd numbers end with 1, 3, 5, 7 or 9.

### Activity 1:

**Write which of the following numbers are odd or even.**

| | | | | | |
|---|---|---|---|---|---|
| 1. | 45 | 2. | 23 | 3. | 160 |
| 4. | 238 | 5. | 87 | 6. | 249 |
| 7. | 572 | 8. | 1 354 | 9. | 681 |

**Solve the problems.**

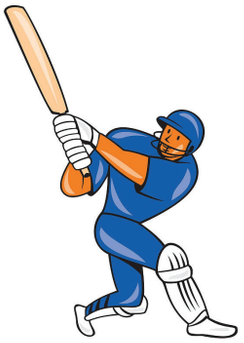
10. Write the odd numbers between 83 and 91.
11. How many even numbers are there that is less than 101?
12. If you add two even numbers, will the sum be odd or even?



Chapter 4 Types of Numbers.indd 31 10/08/17 4:06 PM

13. Is the sum of the 69 and 27 odd or even?

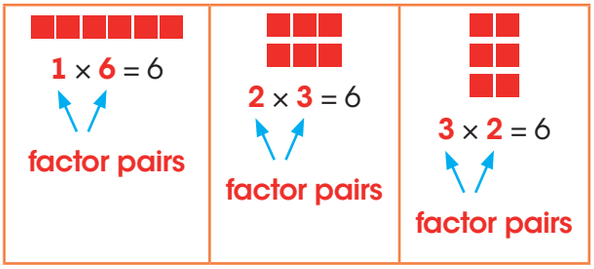
14. In the first innings of a cricket match the Parkites scored 364 runs, while the Islanders scored 274 runs. In the second innings the Parkites scored 210 and won the match. If the Islanders total runs for both innings was the closest even number to the Parkites total score, how much runs did the Islanders score in the second innings?



## Factors

### Teaching Point 1:

***What are the factors of 6?***




6 can be divided exactly by 1, 2, 3, and 6.
So 1, 2, 3 and 6 are factors of 6.

### Activity 1:

**Write the factors of the following numbers.**

| | | |
|---|---|---|
| 1. 8 | 2. 15 | 3. 4 |
| 4. 12 | 5. 14 | 6. 25 |
| 7. 9 | 8. 27 | 9. 36 |
| 10. 16 | 11. 20 | 12. 42 |
| 13. 24 | 14. 32 | 15. 30 |

### Teaching Point 2:

***Find the common factors of 4 and 6?***

The factors of 4 are (1), (2) and 4.

The factors of 6 are (1), (2), 3 and 6.

The **common factors** of 4 and 6 are 1 and 2.

A **common factor** is shared by two or more numbers.

### Activity 2:

**Find the common factors for each pair of numbers.**

| | | |
|---|---|---|
| 1. 12, 16 | 2. 14, 21 | 3. 32, 12 |
| 4. 45, 96 | 5. 24, 27 | 6. 18, 30 |
| 7. 30, 40 | 8. 96, 48 | 9. 60, 54 |
| 10. 18, 72 | 11. 15, 45 | 12. 8, 12 |
| 13. 16, 48 | 14. 28, 70 | 15. 24, 40 |

### Activity 3:

**Solve the problems below.**

1. What factor pair does every number have?

2. Which number between 1 and 20 has exactly 5 factors?



Chapter 4 Types of Numbers.indd 32 10/08/17 4:06 PM

3. Which of the following numbers have the common factors 1, 3 and 10?

   3, 10, 13, 30, 40, 60



4. Lisa wants to share 35 mangoes equally into heaps. She will make more than 1 heap but fewer than 10 heaps. How many heaps can Lisa make?

5. Miss Jones has 20 flowers. She wants to plant all the flowers in equal rows in her garden. What are the different ways Miss Jones can arrange the flowers.

6. What are the factor pairs for 48?

7. A grocery manager wants to display 45 cans of peas in an array. How many different ways can he display the cans?

8. An auditorium has rows of seats with 8 seats in each row. Alisha knows that there are at least 70 seats and fewer than 130 seats. How many seats can there be in the auditorium?

9. List all the factors of 24. Then list all the factors of 16. What factors do they share in common? Which common factor is the greatest number?

10. I am a factor of 40 and a multiple of 5. I am a 2-digit number greater than 10 but less than 30. What number am I?

## Factors and Divisibility

### Teaching Point 1:

A whole number is **divisible** by another number when the quotient is a whole number and the remainder is 0.

You can use divisibility rules to find factors of a number.

**Divisibility Rules**

**A number is divisible by:**

**2 –** If the number is even.

**3 –** If the sum of the digits is divisible by 3.

**4 –** If the last two digits are divisible by 4.

**5 –** If the last digit is 0 or 5.

**6 –** If the number is divisible by BOTH 2 and 3.

**9 –** If the sum of the digits is divisible by 9

**10 –** If the last digit is 0.

### Activity 1:

**Use divisibility rules to solve the problems.**

1. Write the numbers between 51 and 61 that are divisible by 2.

2. Which of the numbers below has 6 as a factor?

   54 37 84 26



Chapter 4 Types of Numbers.indd 33 10/08/17 4:06 PM

3. Brian has 126 sweets to distribute equally into 9 bags. Could he distribute them equally?

## Multiples

### Teaching Point 1:

To find a **multiple** of a number, multiply that number by any whole number.

***What are the multiples of 2?***

| | | |
|---|---|---|
| 2 × 1 = **2** | 2 × 5 = **10** | 2 × 9 = **18** |
| 2 × 2 = **4** | 2 × 6 = **12** | 2 × 10 = **20** |
| 2 × 3 = **6** | 2 × 7 = **14** | 2 × 11 = **22** |
| 2 × 4 = **8** | 2 × 8 = **16** | 2 × 12 = **24** |

2, 4, 6, 8, 10, 12, 14, 16, 18, 10, 24... are **multiples** of 2.

You can skip count to find **multiples** of numbers.

***Is 12 a multiple of 4?***

12 ÷ 4 = 3

12 can exactly be divided by 4. So 12 is a multiple of 4.

### Activity 1:

**Write the first 5 multiples of the following numbers.**

1. 3
2. 5
3. 4
4. 6
5. 9
6. 7
7. 2
8. 10
9. 8
10. 12
11. 14
12. 20

### Activity 2:

**Tell whether the first number is a multiple of the second number.**

1. 12, 3
2. 16, 5
3. 23, 4
4. 19, 6
5. 21, 9
6. 28, 7
7. 20, 2
8. 55, 10
9. 32, 8
10. 144, 12
11. 36, 14
12. 100, 20

### Teaching Point 2:

***What is a common multiple of 3 and 5?***

The multiples of 3 are 3, 6, 9, 12, (15),...

The multiples of 5 are 5, 10, (15), 20, 25,...

A **common multiple** of 3 and 5 is 15.

A number that is a multiple of two or more numbers is a **common multiple**.

**Solve the problems.**

13. Is 6 a multiple of 18 or a factor?
14. Is 9 a multiple of 3 or a factor?



Chapter 4 Types of Numbers.indd 34 10/08/17 4:06 PM

15. What number has 2 and 3 as factors and 12 and 18 as multiples?

16. What number has 10, 15 and 30 as multiples?

17. Javan bought some snacks for $6 each. Maria bought some snacks for $8 each. Both children spent the same amount of money on snacks. What is least amount of money they could have spent?

## Prime and Composite Numbers

### Teaching Point 1:

***What are the factors of 5?***



1 × 5 = 5

Prime numbers have only 1 array. So the factors of 5 are 1 and 5.

A **prime number** has only 2 different factors, 1 and the number itself. 5 is a prime number.

***What are the factors of 4?***



1 × 4 = 4



2 × 2 = 4

The factors of 4 are 1, 2 and 4.

A **composite number** has more than 2 different factors. 4 has 3 factors, so it is a composite number.

***What are the factors of 1?***



1 × 1 = 1

The number 1 has **only** 1 factor.

1 is neither a prime nor a composite number.

### Activity 1:

**Find the factors for each number. Write whether it is prime or composite.**

| | | |
|---|---|---|
| 1. 12 | 2. 2 | 3. 3 |
| 4. 15 | 5. 10 | 6. 9 |
| 7. 11 | 8. 21 | 9. 7 |

Eratosthenes, a Greek mathematician, who lived more than 2,200 years ago invented a method of finding prime numbers.

10. Use Eratosthenes method to find the prime numbers that are less than 100.

**Step 1:** **Cross out** 1. It is not a prime number.

**Step 2:** **Circle** the prime number 2. **Cross out** all other multiples of 2.

**Step 3:** **Circle** the next number that is not crossed out. This number is prime. **Cross out** all the multiples of this number.



Chapter 4 Types of Numbers.indd 35 10/08/17 4:06 PM

**Step 4:** Repeat step 3.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

**11.** Write all the prime numbers that are less than 100.

**12.** Write all the composite numbers between 1 and 50.

**13.** Why are the multiples of any number other than 1 not prime numbers?

**14.** The sum of three prime numbers which are all less than 25 is also a prime number. What are the three prime numbers?

**15.** The sum of three prime numbers is 12. What could the numbers be?

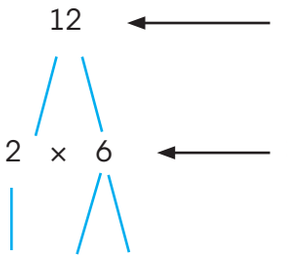
**16.** I am thinking of a composite number between 20 and 30 that is not even, not prime, and not divisible by 3. What is the number?

## Prime Factorisation

### Teaching Point 1:

***How can you find the prime factors of 12?***

A **factor tree** can show the prime factorisation of a composite number.



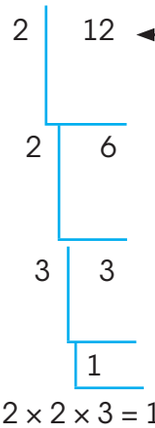

**1.** Write the number to be factored at the top.

**2.** Choose any factor pair for 12.

**3.** Factor any number that is not a prime number.

**4.** Write the prime factors in order from least to greatest.

You can use a **ladder diagram** to show the prime factorisation of a composite number.




**1.** 12 is even, so divide 12 by the prime number 2.

**2.** Write the quotient below 12. Divide by 2.

**3.** Write the quotient below. Divide by the prime number 3.

**4.** Write the prime factors in order from least to greatest.



Chapter 4 Types of Numbers.indd 36 10/08/17 4:06 PM

### Activity 1:

**Write the prime factorisation of the following.**

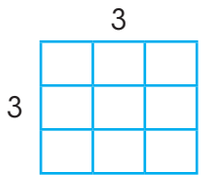
| | | |
|---|---|---|
| **1.** 8 | **2.** 14 | **3.** 15 |
| **4.** 24 | **5.** 16 | **6.** 36 |
| **7.** 45 | **8.** 33 | **9.** 130 |
| **10.** 84 | **11.** 35 | **12.** 49 |
| **13.** 108 | **14.** 72 | **15.** 96 |
| **16.** 81 | **17.** 132 | **18.** 125 |

## Square Numbers

### Teaching Point 1:

***How can you find the square of a whole number?***

To square a whole number you multiply it by itself.




$3 \times 3 = 9$

$3 \times 3$ is called the square of 3.
You can write $3 \times 3$ as $3^2$.

So, $3^2 = 9$.

The square of a whole number is called a **perfect square**. Since $9 = 3 \times 3$, 9 is a perfect square.

### Activity 1:

**Square the following numbers.**

| | | |
|---|---|---|
| **1.** 2 | **2.** 3 | **3.** 4 |
| **4.** 7 | **5.** 5 | **6.** 8 |
| **7.** 6 | **8.** 10 | **9.** 12 |
| **10.** 11 | **11.** 1 | **12.** 9 |

### Teaching Point 2:

***Find the square root of 16?***

**Method 1: Recall multiplication facts.**

Recall multiplication facts of 4.
$4 \times 4 = 16$

4 is called the square root of 16. This can be written as $\sqrt{16} = 4$. We read this as "the square root of 16 is equal to 4".

**Method 2: Use prime factorisation.**

$16 = 2 \times 2 \times 2 \times 2$

$16 = (2 \times 2) \times (2 \times 2)$

$2 \times 2 = 4$

$\sqrt{16} = 4$

1. Write prime factors of 16.
2. Find pairs of similar factors.
3. Select one factor from each pair.



Chapter 4 Types of Numbers.indd 37 10/08/17 4:06 PM

## Activity 2:

**Find the square root of each number.**

| | | | | | |
|---|---|---|---|---|---|
| **1.** | 36 | **2.** | 25 | **3.** | 144 |
| **4.** | 121 | **5.** | 49 | **6.** | 81 |
| **7.** | 100 | **8.** | 64 | **9.** | 16 |

**10.** Find the value of $3^2 + 5^2$.

**11.** $5^2 \times 4^2 - 10^2$

**12.** $\sqrt{100} + \sqrt{64}$

**13.** $\sqrt{81} + 5^2$

**14.** Which of the numbers below are square numbers?

13 16 23 36 49 55

**15.** How many squares with sides 10 cm long are needed to cover a square with a side length of 70 cm long without overlapping?

**16.** Find two consecutive numbers whose squares differ by 25.



**17.** The area of a square floor is 49 $m^2$. What is the length of the sides of the floor?

**18.** The square root of 196 lies between which pair of numbers below?

**(a)** 2 – 10

**(b)** 4 – 8

**(c)** 9 – 13

**(d)** 10 – 15

**19.** What is the missing number in the pattern below?

1, 4, 9, ___, 25, 36

## Chapter Review

**Express each number as a product of prime factors.**

| | | | | | |
|---|---|---|---|---|---|
| **1.** | 42 | **2.** | 33 | **3.** | 24 |

**Find the common factors of each pair of numbers.**

| | | | | | |
|---|---|---|---|---|---|
| **4.** | 14 and 42 | **5.** | 15 and 60 | **6.** | 27 and 81 |

**Write the first three common multiples of each pair of numbers.**

| | | | | | |
|---|---|---|---|---|---|
| **7.** | 2 and 3 | **8.** | 4 and 5 | **9.** | 6 and 8 |

**Find the lowest common multiple for the pairs of numbers below.**

| | | | | | |
|---|---|---|---|---|---|
| **10.** | 3 and 8 | **11.** | 4 and 12 | **12.** | 3 and 4 |



Chapter 4 Types of Numbers.indd 38 10/08/17 4:06 PM

**Solve the problems below.**

**13.** Four digits are shown below.

| 3 | 4 | 7 | 8 |
|---|---|---|---|

**(a)** Write the largest four-digit EVEN number.

**(b)** Write the smallest four-digit ODD number.

**14.** What factor is paired with 6 to give 24?

**15.** Which of the numbers 19, 21, 23 and 25 has the most factors.

**16.** Which of the numbers 12, 21, 27, 36 and 45 are divisible by both 3 and 9?

**17.** What is the square root of 225?

**18.** Find three numbers you can multiply together to get 300.

**19.** You have 12 coloured squares of paper. What are the possible ways you can arrange the coloured squares to make a rectangle?

**20.** A number is between 58 and 68. It has prime factors of 2, 3 and 5. What is the number?




**21.** Jervon has football practice every 3 days and piano lessons every 7 days. If he has both lessons on the first day of the month, in how many days will he have both lessons on the same day again?

**22.** Miss Valentine's class is selling hot dogs to raise funds. They can buy hot dogs in packs of 12 and hot dog buns in bags of 10. They want to get the same number of hot dogs and buns with none left over.



What is the least number of packs of hot dogs and the least number of bags of buns they should buy? How many hot dogs will they be able to sell?

**23.** The sum of two factors of 32 is 12. What are the factors?

**24.** Which number below does not belong in the group? Explain.

| 30 | 42 | 15 | 24 | 39 | 49 |
|---|---|---|---|---|---|



Chapter 4 Types of Numbers.indd 39 10/08/17 4:06 PM

CHAPTER 5

# Addition and Subtraction of Whole Numbers

**Vocabulary:**

estimate
front end estimation
rounding
compensation
compatible numbers
inverse operations
addendum
subtrahend
identity property
commutative
associative

**Chapter Outcomes:**

- Solve problems using whole numbers involving the four operations.
- Demonstrate an understanding of algorithms, mental strategies and estimation strategies.



Gardeners use mathematics to create gardens that are both beautiful and functional every day. When planting crops such as watermelons, it requires the gardener to map out the space and calculate how many plants will be able to grow in the space. Gardeners also use addition and subtraction in the harvesting and sale of their produce.

## Getting Ready for Chapter 5

**Solve the problems below.**

**1.** 45 + 27 = ____

**2.** 403 − 278 = ____

**3.** 64 − 36 = ____

**4.** 3000 + 631 = ____

**5.** What is the sum of 24, 801 and 2 197?

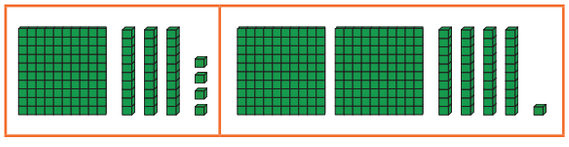
**6.** Felicia is reading a 145 page book. She has read 78 pages. How many pages does Felicia have left to read?

**7.** What is the difference between 109 and 598?

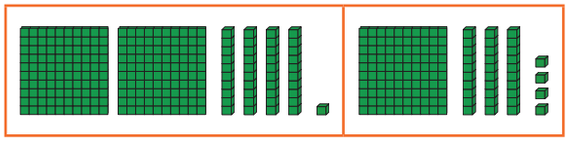
## Addition Properties

### Teaching Point 1:

**Commutative Property of Addition:** Add numbers in any order. The sum will be the same.

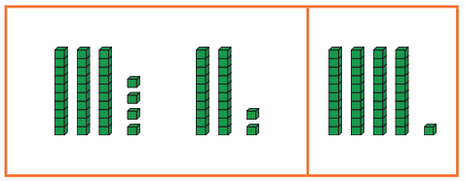


134 + 241 = 375

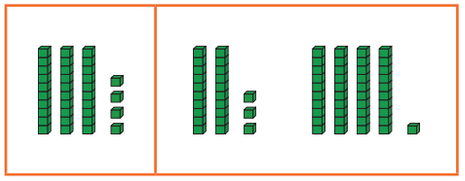


241 + 134 = 375

**Associative Property of Addition:** Add any pair of numbers first. The sum will be the same.

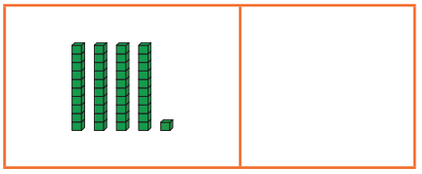


(**34 + 23**) + 41 = 98



34 + (**23 + 41**) = 98

**Identity (Zero) Property of Addition:** Add zero to any number the answer is that number.



41 + 0 = 41

### Activity 1:

**Complete each number sentence. Write the property used.**

**1.** 23 + 45 = ___ + 23

**2.** 129 + ___ = 129

**3.** 21 + (87 + 63) = (___ + ___) + 63

**4.** 65 + ___ + 43 = 65 + 43

**5.** (___ + 0) + 200 = 175 + 200



Chapter 5 Addition and Subtraction.indd 41 06/03/18 11:11 AM

6. 67 + 25 = 25 + ___

7. 12 + (59 + 73) = (73 + ___) + 59

8. Miss James' class has 18 boys and 17 girls. Mr. Mark's class has 17 girls and 18 boys. Which class has more children? Tell which property was used?

9. Use the table below to answer the question.

| Clothing Store | |
|---|---|
| **Blouse** | $80 |
| **Skirt** | $79 |
| **Dress** | $150 |

Jenna wants to buy a blouse, a skirt and a dress. Show two ways she can add the prices to find the total cost. Then find the total.

10. Which shows the Commutative Property of Addition?

a) 26 + 73 = 73 + 26

b) 26 + 0 = 26

c) 20 + (6 + 73) = (20 + 6) + 73

d) 26 + 73 = 26 + 70 + 3

## Add and Subtract Mentally

### Teaching Point 1:

Use **compatible numbers** to add.

45 + 55 + 251 = ?

100 + 251 = 351

Compatible numbers can be added together easily to make target numbers.

Use **compensation** to add.

Find 337 + 106.

**Think** 340 + 106 = 446

↓ 3 more than 337 is 340

↓ The final answer is 3 less than 446.

337 + 106 = 443

Use **compensation** to subtract.

Find 268 – 190.

**Think** 268 – 200 = 68

↓ 10 more than 190 is 200.

↓ The final answer is 10 more than 68.

268 – 190 = 78



Chapter 5 Addition and Subtraction.indd 42 06/03/18 11:11 AM

## Activity 1:

**Add or subtract mentally.**

1. 67 + 18 + 33 =
2. 246 – 127 =
3. 237 + 195 + 5 =
4. 49 + 87 =
5. 468 – 190 =
6. 306 + 199 =
7. 2 004 + 56 =
8. 401 – 99 =
9. 353 – 198 =
10. 86 – 48 =
11. 299 + 101 + 47 + 3 =
12. 273 + 100 + 7 =
13. 403 + 22 + 278 =
14. 64 + 149 + 236 =
15. 982 – 56 =
16. 7 932 – 4 623 =
17. 6 627 + 3 303 =
18. 222 + 728 =

**Solve the problems mentally.**

| Ice cream | Cake | Pizza |
|---|---|---|
|  |  |  |
| $225 | $135 | $119 |

19. Mummy bought a tub of ice-cream and a cake for the party. If she gave the cashier $400, how much change should she receive?
20. Mr. Ali bought a pizza. How much change did he receive if he paid the cashier $200?

# Estimate Sums and Differences

## Teaching Point 1:

***Estimate the sum of 4 789 and 1 258.***

- Use **front end estimation.** Add the **leading digits**. Write zeros for the other digits.

  4 789 → **4** 000
  + 1 258 → + **1** 000
  **5** 000

- Use **rounding.**

| Round to **hundreds.** | Round to **thousands** |
|---|---|
| 4 789 → **1** **4** 800<br>+ 1 258 → + **1** 300<br>**6** 100 | 4 789 → **5** 000<br>+ 1 258 → + **1** 000<br>**6** 000 |

***Estimate the difference between 4 789 and 1 258.***

- Use **front end estimation.** Subtract the **leading digits**. Write zeros for the other digits.

  4 789 → **4** 000
  – 1 258 → – **1** 000
  **3** 000

- Use **rounding.**

| Round to **hundreds.** | Round to **thousands** |
|---|---|
| 4 789 → **4** 800<br>– 1 258 → – **1** 300<br>**3** 500 | 4 789 → **5** 000<br>– 1 258 → – **1** 000<br>**4** 000 |



Chapter 5 Addition and Subtraction.indd 43 06/03/18 11:11 AM

## Activity 1:

**Round to the nearest ten to estimate the sums and differences.**

1. 1 292 + 48 =
2. 3 246 – 57 =
3. 87 + 2 495 =
4. 49 + 127 =
5. 468 – 210 =
6. 3 306 + 1 199 =
7. 2 004 + 56 =
8. 401 – 99 =

**Round to the nearest hundred to estimate the sums and differences.**

9. 353 – 198 =
10. 6 186 – 548 =
11. 4 760 – 1 987 =
12. 7 273 – 609 =
13. 139 + 732 + 1 256 =
14. 3 109 + 269 + 1 348 =
15. 222 + 4 239 + 821 =
16. 299 + 101 + 1 647 =
17. 403 + 722 + 278 =
18. 7 932 – 4 623 =

**Round to the nearest thousand to estimate the sums and differences.**

19. 5 982 + 3 056 =
20. 7 932 – 4 623 =
21. 3 198 – 1 464 =
22. 2 222 – 1 828 =
23. 5 462 + 2 107 =
24. 3 799 + 3 934 =
25. 4 187 – 1 245 =
26. 2 467 – 1 801 =
27. 3 728 + 1 298 + 2 153 =
28. 5 326 + 1 530 + 2 476 =

**Use front end estimation to estimate the sums and differences.**

29. 1 452 + 7 017 =
30. 2 456 – 423 =
31. 4 176 – 2 328 =
32. 3 876 + 813 =
33. 3 128 + 999 + 4 329 =
34. 673 + 1 745 + 2 932 =
35. 7 128 + 457 + 1 571 =

**Estimate to solve the problems below.**

36. Mrs. Williams has $9 000. She wants to buy a stove for $2 599 and a washing machine for $5 189. Estimate whether Mrs. Williams has enough money.
37. About much money did I spend if I bought a pair of shoes for $567, a shirt for $195 and a suit for $1 798?
38. Mr. Bertie has $1000 and wants to buy a cell phone that costs $805 and a cell phone case that costs $150. Will he have enough money to purchase both items?
39. Jamal has $250. He wants to spend $63 on a ball, $45 on sneakers and $120 on sports clothes. Does he have enough money?



Chapter 5 Addition and Subtraction.indd 44 06/03/18 11:11 AM

**40.** On Monday Mr. Ali sold 547 oranges, on Wednesday he sold 389 oranges and on Friday he sold 703 oranges. About how many oranges did he sell on the three days?

## Add and Subtract Whole Numbers

### Teaching Point 1:

***Find the <u>sum</u> of 4 789 and 1 258.***

**1.** Estimate the sum: **Round** to thousands.

4 789 → **5** 000
+ 1 258 → + **1** 000
**6** 000

**2.** Use a place value chart to line up the numbers.

**3.** Start from the ones place. Add from right to left, regrouping when necessary.

| | Ten Thousands | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|---|
| | | 1 4 | 1 7 | 1 8 | 9 |
| + | | 1 | 2 | 5 | 8 |
| | | 6 | 0 | 4 | 7 |

**4.** Check your answer against your estimate. The sum 6 047 is close to the estimate 6 047. So, the answer is reasonable.

***Find the <u>difference</u> between 4 789 and 298.***

**1.** Estimate the sum: Round to hundreds.

4 789 → **4 8**00
− 298 → − **3**00
**4 5**00

**2.** Use a place value chart to line up the numbers.

**3.** Start from the ones place. Subtract from right to left, regrouping when necessary.

| | Ten Thousands | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|---|
| | | 4 | 6 ~~7~~ | 1 8 | 9 |
| − | | | 2 | 9 | 8 |
| | | 4 | 4 | 9 | 1 |

**4.** Check your answer against your estimate. The difference 4 471 is close to the estimate 4 500. So, the answer is reasonable.

### Activity 1:

**Estimate. Then find each sum.**

**1.**
230
46
+ 179
_____

**2.**
83
598
+ 617
_____

**3.**
3 403
568
+ 99
_____

**4.**
3 982
+ 56
_____

**5.**
2 111
7 470
+ 839
_____

**6.**
6 098
1 852
+ 157
_____

**7.**
3 657
2 243
+ 1 259
_____

**8.**
7 256
+ 1 689
_____

**9.**
2 098
4 173
+ 1 932
_____

**10.**
2 348
3 635
+ 2 465
_____



Chapter 5 Addition and Subtraction.indd 45 06/03/18 11:11 AM

**11.** 457 + 1 256 = **12.** 5 426 + 3 210 =

**13.** 8 943 + 268 = **14.** 1 628 + 4 596 =

**15.** Find the sum of 123, 498 and 2 980.

**16.** Which number is 478 more than 3 109?

**17.** Mario collected 345 empty bottles on Monday. He collected 580 on Tuesday and 298 on Wednesday. How many bottles did he collect in total?

## Activity 2:

**Estimate. Then find the difference.**

**1.** 982 − 56 = ____

**2.** 702 − 48 = ____

**3.** 1 560 − 813 = ____

**4.** 5 000 − 4 068 = ____

**5.** 6 112 − 3 006 = ____

**6.** 9 657 − 6 987 = ____

**7.** 8 090 − 4 614 = ____

**8.** 5 508 − 3 999 = ____

**9.** 1 760 − 1 056 = ____

**10.** 8 002 − 5 679 = ____

**11.** 5 176 – 4378 = **12.** $3 450 – $567 =

**13.** $4 692 – $893 = **14.** 6 003 – 5 147 =

**15.** 7 000 – 42 = **16.** 3 310 – 1 789 =

**17.** Calculate the difference between 2 678 and 1 099.

**18.** Take 587 from 1 000.

**19.** Which number is 379 less than 2 741?

**20.** Compare 1 245 with 1 254. By how much is the larger number greater than the smaller number?

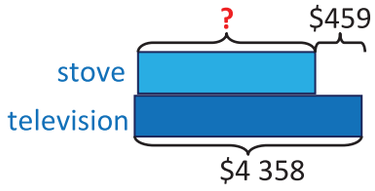
**21.** By how much does 1 752 km exceed 1 450 km?

# Real World Problems: Add and Subtract

## Teaching Point 1:

A television costs $4 358. It costs $459 more than a stove.

**a)** How much does the stove cost?




**Cost of stove:** $4 358 – $459 = $3 899

Use the **inverse operation** to check:

$3 899 + $459 = $4 358



Chapter 5 Addition and Subtraction.indd 46 06/03/18 11:11 AM

**b)** What is the total cost of both items?

**Total cost:** $3 899 + $4 358 = $8 257

Use the **inverse operation** to check:

$8 257 – $4 358 = $3 899

Addition and subtraction undo each other. They are **inverse operations**.

## Activity 1:

**Solve. Use the inverse operation to check your answers.**

1. A school has 740 girls. It has 255 more boys than girls. How many children attend the school?

2. A poultry farm has 1 006 chickens and ducks. 856 of them are chickens. How many fewer ducks there are than chickens?

3. During the year 2016 a used car salesman imported 1 200 cars. If 987 of the cars were sold, how many of the vehicles were not sold?

4. 1 256 passengers took the ferry to go to Tobago. 756 of them were children and the rest were adults.

   a) What is the total number of adults on the ferry?

   b) If there were 190 more men than women, how many women were on the ferry?

5. Alex had $450. He spent $199 on a game and $138 on a ball. How much money did he have left?

6. A caterer organised a wedding reception. The caterer is listing the costs of items.

| Item | Price |
|---|---|
| Tables and chairs | $650 |
| Decoration | $375 |
| Food | $_____ |
| Drinks | $1 898 |

   The total cost is $5 976. How much did the food cost?

7. The cafeteria had 400 paper bags. They used 254 at recess so, they bought 150 more. Then they used some more bags at lunch time. Now they have 86 bags left. How many bags did they use at lunch time?

8. Daddy drove 1 363 km in his new car in January. He drove 2 934 km in February and 3 780 km in March. He must service the car at the 9 000 km mark. How many more kilometres can he drive?

9. Two suitcases together cost a total of $608. What is the cost of the cheaper suitcase if the other one costs $498?

10. The total height of three boys is 420 cm. If the heights of first two boys are 120 cm and 145 cm respectively, what is the height of the third boy?

11. After spending $785 in the grocery and $327 paying utility bills, mother was left with $2 795 of her fortnightly earnings. How much was mother's fortnightly earnings?

12. A bakery produced 430 loaves of bread on Thursday, 580 on Friday and



Chapter 5 Addition and Subtraction.indd 47 06/03/18 11:11 AM

645 on Saturday. If 1 500 loaves were sold during the 3 days, how many loaves were left over?

13. A plane flies 2 342 kilometres on Monday. On Tuesday, it flies 586 more kilometres than on Monday. What is the total number of kilometres the plane flies on Monday and Tuesday?

14. There were 6 491 visitors to the zoo in the year 2015. In 2016 there were 1 873 more visitors than the year before. What is the total number of visitors for both years?

## Chapter Review

**Find each unknown.**

1. $276 + 489 = \square + 276$

2. $45 + (60 + 55) = (\_\_\_ + \_\_\_) + 60$

3. $51 + \square + 84 = 51 + 84$

**Use compatible numbers to add mentally.**

4. $60 + 140 + 2\,800 =$

5. $506 + 349 + 194 =$

6. Samantha had $235. She earned $265. How much money does she have now?

**Use compensation to add or subtract mentally.**

7. $1\,298 + 502 =$

8. $6\,857 - 1\,003 =$

9. $4\,529 + 3\,472 =$

10. $\$655 - \$295 =$

**Add or subtract. Estimate to check your answers.**

11.
$$\begin{array}{r} 2\,403 \\ 1\,722 \\ +\ 3\,278 \\ \hline \end{array}$$

12.
$$\begin{array}{r} 7\,002 \\ -\ 4\,183 \\ \hline \end{array}$$

13.
$$\begin{array}{r} 3\,980 \\ -\ \ 594 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 480 \\ 7\,502 \\ +\ 2\,786 \\ \hline \end{array}$$

**Add or subtract. Use the inverse operation to check.**

15. $1\,353 + 698 =$

16. $3\,006 + 1\,548 =$

**Solve each problem.**

17. A farmer collected 256 eggs on Monday. On Tuesday he collected 62 fewer eggs than on Monday. How many eggs did he collect on both days?

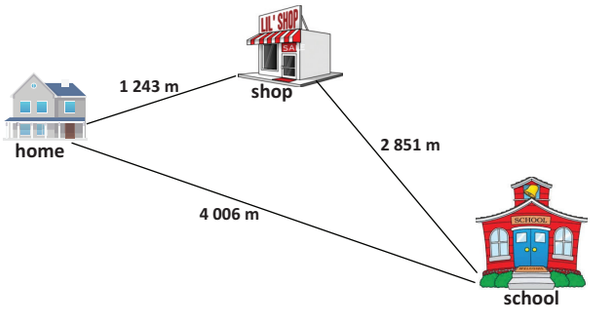
18. Two trucks carried a total load of 2 341 oranges. The first truck carried 958 oranges. How many more oranges does the second truck carry than the first truck?

19. A school buys P.E. equipment for $1 240 and pays $98 less for Art and Craft supplies. How much money did the school spend in total?



Chapter 5 Addition and Subtraction.indd 48 06/03/18 11:11 AM

**20.** Jim walked from his home to school in the morning. In the afternoon he walked from the school to the shop and then to his home.




a) When did Jim walk the longest distance?

b) How many metres did Jim walk that day?

**21.** In a test match, India scored 288 runs in the first innings, while the West Indies scored 356 runs. In the second innings, India scored 382 runs and won the game by 2 runs. What was the West Indies' score for the 2nd innings?





**22.** Father bought a printer for $679, a computer for $3 789 and a tablet. The three items cost $5 831. What was the cost of the tablet?

**23.** Miss Peters class went on a field trip to the zoo, 38 km away. Mr. Johnson class drove 12 km to the Caroni Swamp.

a) How much further did Miss Peters class travel than Mr. Johnson's class?

b) Explain how you used mental mathematics to determine the difference.

**24.** Mark buys a notebook for $15, a box of pencils for $26, and a story book for $45. Use mental mathematics to find out how much he spent in all.

**25.** A primary school has an enrollment of 653 students. If there are 387 boys, how many girls attend the school?

**26.** The total cost of two dresses is $598. What is the cost of the cheaper dress if the other one costs $399?

**27.** The sum of three numbers is 2 875. If the first and the last numbers are 857 and 783, what is the second number?

**28.** The difference between two numbers is 54. If one number is 756, what is the other number?

**29.** There are 2 775 children attending a show. The number of adults attending the show is 689 less than the children.

a) How many adults are attending the show?

b) How many people are there altogether?

**30.** A store orders 2 000 shirts for sale. Of them 850 are size L, 260 are size M, and the rest of the shirts are size S.

a) How many Size L and Size M shirts are there altogether?

b) How many Size S shirts are there?



Chapter 5 Addition and Subtraction.indd 49 06/03/18 11:11 AM

CHAPTER

6

# Multiplication and Division of Whole Numbers

**Vocabulary:**

estimate
compatible numbers
compensation
inverse operations
quotient
product
identity property
commutative property
associative property
distributive property

**Chapter Outcomes:**

- Solve problems using whole numbers involving the four operations.
- Demonstrate an understanding of algorithms, mental strategies and estimation strategies.



We all use multiplication and division everyday whether we're aware of it or not. Ask any market vendor and he will tell you how important multiplication and division are when it comes to estimating the amount of money he will earn at the end of the day if all of his produce is sold.

## Getting Ready for Chapter 6

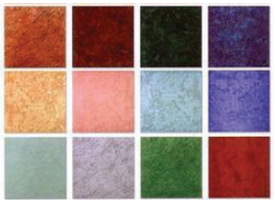
**Solve the problems below.**

1. $\begin{array}{r} 45 \\ \times\ 9 \\ \hline \\ \hline \end{array}$

2. $126 \div 3 =$

3. $101 \times 13 =$

4. $5\overline{)155}$



5. Write a multiplication fact and a division fact for the array of tiles above.

6. Round each number to the nearest 10.

   a) 17

   b) 125

   c) 2 631

7. Round each number to the nearest 100.

   a) 3 403

   b) 642

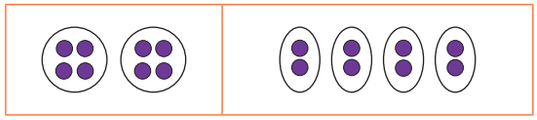
   c) 819

## Multiplication Properties

### Teaching Point 1:

**Commutative Property of Multiplication**:

Multiply factors in any order. The product will be the same.



$4 \times 2 = 2 \times 4$

**Identity Property of Multiplication**:

Multiply any number by 1, the product is that number.

$$\mathbf{6 \times 1 = 6}$$

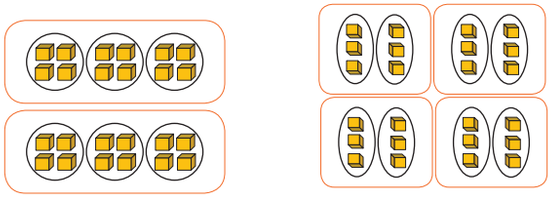
**Zero Property of Multiplication**:

Multiply a number with zero, the product is 0.

$$9 \times \mathbf{0} = \mathbf{0}$$

**Associative Property of Multiplication**:

Change the grouping of the factors. The product will be the same.



$(\mathbf{4} \times \mathbf{3}) \times 2 =$

$\mathbf{12} \times 2 = 24$

$4 \times (\mathbf{3} \times \mathbf{2}) =$

$4 \times \mathbf{6} = 24$



Chapter 6 Multiplication and Division.indd 51 06/03/18 11:22 AM

## Activity 1:

**Write the unknown factor.**

1. $4 \times 2 = \square \times 2$
2. $6 \times 9 = 9 \times \square$
3. $8 \times \square = 5 \times 8$
4. $\square \times 8 = 8 \times 10$

**Multiply with 1 and 0. Write the product.**

5. $239 \times 0 =$
6. $615 \times 1 =$
7. $308 \times 1 =$
8. $712 \times 0 =$

**Write another way to group the factors. Then find the product.**

9. $(2 \times 5) \times 10$
10. $5 \times (6 \times 9)$
11. $3 \times (7 \times 4)$
12. $(1 \times 7) \times (9 \times 3)$

**Find the unknown factor.**

13. $7 \times (2 \times \square) = 56$
14. $90 = (3 \times \square) \times 6$
15. $0 = \square \times (12 \times 11)$
16. $8 \times (5 \times \square) = 400$
17. $12 \times 10 = 24 \times \square$
18. $\square \times 6 = 2 \times 21$

19. Javan works at the grocery 3 days each week. He works 4 hours each day and earns $10 an hour. Write a multiplication sentence to show how much money Javan earns each week.

## Teaching Point 2:

*How can you use the **distributive property** to find the product of 18 × 9?*

Break apart 18.

18 = 10 + 8

Think of 18 × 9 as

(10 × 9) + (8 × 9)

Find each product.

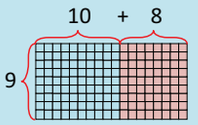
90 + 72

Add the products

90 + 72 = 162

**Area Model** for

(10 × 9) + (8 × 9)




## Activity 2:

**Use the distributive property to multiply. Draw an area model to help you.**

1. $24 \times 7 =$
2. $36 \times 8 =$
3. $33 \times 4 =$
4. $19 \times 3 =$
5. $32 \times 6 =$
6. $17 \times 9 =$
7. $\begin{array}{r} 48 \\ \times\ 9 \\ \hline \\ \hline \end{array}$
8. $\begin{array}{r} 21 \\ \times\ 5 \\ \hline \\ \hline \end{array}$



Chapter 6 Multiplication and Division.indd 52 06/03/18 11:22 AM

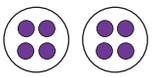
**9.** 34
× 8
_____
_____

**10.** 28
× 7
_____
_____

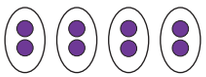
## Relate Multiplication and Division

### Teaching Point 1:

Multiplying by 2 and dividing by 2 are inverse operations.



4 × 2 = 8



8 ÷ 4 = 2

Operations that undo each other are **inverse operations**.

### Activity 1:

**Write the inverse operation of each number sentence.**

**1.** 7 × 6 = 42
**2.** 12 × 9 = 108
**3.** 99 ÷ 9 = 11
**4.** 26 ÷ 2 = 13
**5.** 12 × 12 = 144
**6.** 48 ÷ 8 = 6

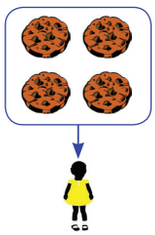
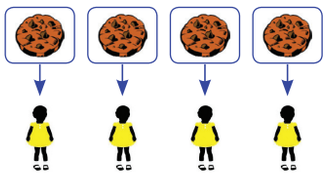
### Activity 2:

**Write the related multiplication and division facts for each set of numbers.**

**1.** 6, 9, 54
**2.** 7, 12, 84
**3.** 11, 12, 132
**4.** 8, 9, 72
**5.** 3, 13, 39
**6.** 6, 15, 90

## Division Rules for 1 and 0

### Teaching Point 1:

| **Rule 1:** | **Rule 2:** |
|---|---|
|  Share 4 cookies equally with 1 child. One child gets 4 cookies. |  Share 4 cookies equally with 4 children. Each child gets 1 cookie. |
| 4 ÷ 1 = 4 | 4 ÷ 4 = 1 |

**Rule 1:** Any number divided by 1 equals that number.

**Rule 2:** Any number except 0 divided by itself equals 1.



Chapter 6 Multiplication and Division.indd 53 06/03/18 11:22 AM

| Rule 3: | Rule 4: |
|---|---|
|  Share 4 cookies with 0 children. There are 0 children. Dividing by 0 is not possible. |  Share 0 cookies with 4 children. Each child gets 0 cookies. |
| ~~4 ÷ 0 = 0~~ | 0 ÷ 4 = 0 |

**Rule 3:** You cannot divide by 0.

**Rule 4:** Zero divided by any number equals 0.

### Activity 1:

**Find the quotient.**

1. 12 ÷ 12 =
2. 0 ÷ 6 =
3. 72 ÷ 1 =
4. $8\overline{)8}$
5. $1\overline{)25}$
6. $9\overline{)990}$

7. On an outing to the zoo, a teacher bought 24 snow cones for her 24 students.
   a) If the snow cone vendor gave all the snow cones to the teacher, how many snow cones will that 1 teacher have?
   b) If the snow cones are divided evenly among the students, how many snow cones will each student get?

## Multiply and Divide Mentally

### Teaching Point 1:

*How can you multiply with **multiples of 10**, 100 and 1 000?*

| | |
|---|---|
| 3 × 2**0** = 6**0** | **Multiply**: 3 × 2 = 6 Write **one zero** after 6. |
| 3 × 2**00** = 6**00** | **Multiply**: 3 × 2 = 6 Write **two zeros** after 6. |
| 3 × 2 **000** = 6 **000** | **Multiply**: 3 × 2 = 6 Write **three zeros** after 6. |

4**0** × 3**0** = 1 2**00**

The number of zeros in the product is the total number of zeros in the factors.

### Activity 1:

**Use basic facts to solve.**

1. 12 × 10 =
2. 13 × 200 =
3. 7 × 60 =
4. 900 × 8 =
5. 20 × 60 =
6. 40 × 80 =
7. 50 × 60 =
8. 120 × 40 =
9. 110 × 30 =

10. Without calculating, tell which has the greatest product, 40 × 80 or 200 × 6.
11. A ticket to the zoo is $50. How much money would 20 tickets cost?



Chapter 6 Multiplication and Division.indd 54 06/03/18 11:22 AM

12. Amanda jogs for 120 minutes each day. How many minutes will she jog in 10 days?

## Teaching Point 2:

Use **compensation** to multiply mentally.

| Find 398 × 4. | Find 306 × 5. |
|---|---|
| **400** is close to 398. | **300** is close to 306. |
| Multiply 400 × 4 and adjust the answer. | Multiply 300 × 5 and adjust the answer. |
| 400 × 4 = 1 600 | 300 × 5 = 1 500 |
| 398 + **2** = 400 | 306 – **6** = 300 |
| **2** × 4 = 8 | **6** × 5 = 30 |
| Adjust the answer by **subtracting** 8. | Adjust the answer by **adding** 30. |
| 1 600 – 8 = 1 592 | 1 500 + 30 = 1 530 |

## Activity 2:

**Use compensation to solve mentally.**

1. 22 × 5 =
2. 199 × 6 =
3. 295 × 7 =
4. 998 × 8 =
5. 144 × 5 =
6. 8 × 15 =
7. 304 × 3 =
8. 6 × 38 =
9. 156 × 7 =

10. A baker bakes 104 cookies every hour. How many cookies are baked in 6 hours?

11. Three friends are going to Tobago for Easter. The cost of a plane ticket is $395. How much will the trip cost for the three friends?

12. A water bottle holds 308 ml of water. How much water would 8 such water bottles hold?

## Teaching Point 3:

Divide mentally.

6**0** ÷ 3 = 2**0**
**6** tens ÷ 3 = 2 tens or 20

6**00** ÷ 3 = 2**00**
**6** hundreds ÷ 3 = 2 hundreds or 200

6 **000** ÷ 3 = 2 **000**
**6** thousands ÷ 3 = 2 thousands or 2 000

When dividing numbers that end in zero, use basic division facts and patterns to help divide mentally.

## Activity 3:

**Use basic facts to divide mentally.**

| | |
|---|---|
| 1. 12 ÷ 6 =<br>120 ÷ 6 =<br>1 200 ÷ 6 = | 2. 28 ÷ 7 =<br>280 ÷ 7 =<br>2 800 ÷ 7 = |
| 3. 40 ÷ 8 =<br>400 ÷ 8 =<br>4 000 ÷ 8 = | 4. 72 ÷ 9 =<br>720 ÷ 9 =<br>7 200 ÷ 9 = |
| 5. 840 ÷ 7 = | 6. 8 100 ÷ 9 = |
| 7. 8 100 ÷ 6 = | 8. 3 200 ÷ 4 = |



Chapter 6 Multiplication and Division.indd 55 06/03/18 11:22 AM

| | |
|---|---|
| **9.** 480 ÷ 8 = | **10.** 270 ÷ 3 = |
| **11.** 1 200 ÷ 2 = | **12.** 2 500 ÷ 5 = |

Questions 13 and 14 are based on the table below.

| Food Items | Total Amount in Sales |
|---|---|
| Hot Dogs | $900 |
| Pop corn | $600 |
| Cakes | $810 |
| Water | $4 200 |

**13.** One bottle of water was sold for $6. How many bottles of water were sold?

**14.** A bag of pop corn cost $5 and a hot dog cost $9. Which of the two items more persons bought?

**15.** There are 7 days in one week. How many weeks in 350 days?

## Estimate Products

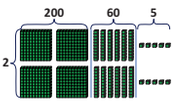
### Teaching Point 1:

*Alan collected 265 empty bottles. He can sell each bottle for $2. How much money can he earn from the bottles he collected?*

***Find the product. Use estimation to check if the answer is reasonable.***

**1.** **Multiply**: 265 × 2 =

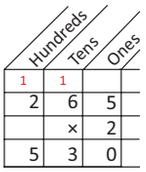
**One way to Multiply** - Draw an **array**.




**(200 × 2)** + **(60 × 2)** + **(5 × 2)**

400 + 120 + 10 = 530

**Another Way to Multiply**




**Multiply**: 5 ones x 2 = 10 ones
**Regroup**: 1 ten 0 ones
**Multiply**: 6 ten × 2 = 12 tens
**Add extra ten**: 12 + 1 = 13 tens
**Regroup**: 1 hundred 3 tens
**Multiply**: 2 hundreds × 2 = 4 hundreds
**Add extra hundred**: 4 + 1 = 5 hundreds

**2.** Use **rounding** to **estimate**.

| **Round** to the **nearest hundred** | Use **front-end estimation**. |
|---|---|
| 265 × 2 = ↓ **300** × 2 = 600 | Multiply the digit with the greatest place value. 265 × 2 = ↓ **200** × 2 = 400 |
| The **estimated product** is 600. | The **estimated product** is 400. |
| The answer 530 is reasonable. | The answer 530 is reasonable. |

### Activity 1:

**Find the product. Estimate to check if answer is reasonable.**

**1.** 346 × 7 =
↓ Round 346
___ × 7 = ___

**2.** 1 006 × 5 =
↓ Round 1 006
___ × 5 = ___



Chapter 6 Multiplication and Division.indd 56 06/03/18 11:22 AM

| | |
|---|---|
| **3.** 671 × 9 =<br>↓ Round 671<br>___ × 9 = ___ | **4.** 812 × 6 =<br>↓ Round 812<br>___ × 6 = ___ |
| **5.** 505 × 8 =<br>↓ Round 505<br>___ × 8 = ___ | **6.** 129 × 4 =<br>↓ Round 129<br>___ × 4 = ___ |
| **7.** 613 × 3 =<br>↓ Round 613<br>___ × 3 = ___ | **8.** 398 × 2 =<br>↓ Round 398<br>___ × 2 = ___ |
| **9.** 940 × 7 =<br>↓ Round 940<br>___ × 7 = ___ | **10.** 762 × 6 =<br>↓ Round 762<br>___ × 6 = ___ |
| **11.** $315 × 5 =<br>↓ Round $315<br>___ × 5 = ___ | **12.** 2 209 × 4 =<br>↓ Round 2 209<br>___ × 4 = ___ |
| **13.** 1 473 × 2 =<br>↓ Round 1 473<br>___ × 2 = ___ | **14.** 478 × 8 =<br>↓ Round 478<br>___ × 8 = ___ |

**15.** Rhys wants to buy pants that cost $195 each. If he has $500, can he buy three pants?

**16.** Jerrel's school has 238 students. Mia's school has four times as many students. How many students are in Mia's school?

**17.** Mr. Khan earns $1 150 each week. How much will he earn in 8 weeks?

**18.** A furniture factory makes 234 chairs in one month. Estimate how many chairs can be made in 6 months.

**19.** It costs a restaurant $9 to make a burger. About how much will it cost to make 182 burgers?

**20.** A car rental service rents cars at the rates in the table below.

| Car Rental Rates | |
|---|---|
| **Rental Rates** | **Price** |
| Daily | **$125** |
| 3 days | **$356** |
| Monthly | **$3 000** |

The rate for 7 days is $784. Estimate how much money you save with a 7 day package instead of using the daily rate for 7 days.

**21.** The distance between Harry's home and the school is 794 metres. About how many metres would Harry walk from home to school and back in 3 days?

**22.** A school hallway has 78 rows of tiles. Each row has 9 tiles. How many tiles are in the hallway?

**23.** Su Ling is buying three story books that cost $45 each. The tax on each book is $5. What is the total cost?

**24.** Sharon works 178 hours each month. How many hours does she work in 10 months?

**25.** Eight hundred and thirty-five persons bought tickets to attend a concert. The concert hall has 28 rows of chairs with 30 chairs in each row. Estimate whether there will be enough chairs for each person.

**26.** Mother estimates that she will pay $90 for a bread, a chicken, a pack of sugar and a tin of peas. If a bread costs $16, a chicken costs $41 and a pack of sugar costs $19, what is the least possible price a tin of peas will cost?



Chapter 6 Multiplication and Division.indd 57 06/03/18 11:22 AM

## Teaching Point 2:

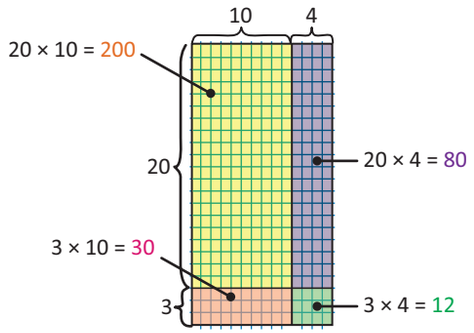
*It costs a roti shop $14 to make one chicken roti. About how much will it cost to make 23 rotis?*

- ***Find the product. Use estimation to check if answer is reasonable.***

**1.** **Multiply**: 23 × 14 =

**One way to Multiply** - Draw an **area model**.

**Separate** each factor into tens and ones.




**Add** the products.

(20 × 10) + (3 × 10) + (20 × 4) + (3 × 4) =

$200 + $30 + $80 + $12 = $322

### Another Way to Multiply

**Multiply** the ones.

23 × 4 ones = **92**

**Multiply** the tens.

23 × 1 ten = **23** tens or **230**

**Add** the products.

92 + 230 = 322

| | Hundreds | Tens | Ones |
|---|---|---|---|
| | | 1 | |
| | | 2 | 3 |
| × | | 1 | 4 |
| | | 9 | 2 |
| + | 2 | 3 | 0 |
| | 3 | 2 | 2 |

**2.** **Estimate** to check if your answer is reasonable.

| Use **rounding** to estimate. | Use **compatible numbers** to estimate. |
|---|---|
| Estimate<br>23 × 14 = | 23 × 14 = |
| **Round** both factors<br>23 × 14 = | **25** × **10** = 250 |
| **20** × 14 = 280 | |
| The **estimated** cost in $280. | The **estimated** cost in $250. |
| The answer $322 is **reasonable**. | The answer $322 is **reasonable**. |

## Activity 2:

**Find the product. Estimate to check if the answer is reasonable.**

| | | |
|---|---|---|
| **1.** 48 × 19 | **2.** 72 × 25 | **3.** 69 × 40 |
| **4.** 55 × 37 | **5.** 114 × 15 | **6.** 370 × 91 |
| **7.** 456 × 24 | **8.** 309 × 38 | **9.** 815 × 42 |
| **10.** 1370 × 14 | **11.** 1652 × 23 | **12.** 2829 × 42 |



Chapter 6 Multiplication and Division.indd 58 06/03/18 11:22 AM

| | |
|---|---|
| **13.** 82 × 67 = | **14.** 601 × 48 = |
| **15.** 389 × 75 = | **16.** 871 × 31 = |
| **17.** 2 351 × 22 = | **18.** 4 159 × 69 = |

**19.** Jelani spends $125 on his cell phone each month. How much does he spend in two years?

**20.** A packet of paper has 500 sheets. How many sheets of paper are in 24 packets?



**21.** Maria drinks 2 450 ml of water each day. How much water will she drink in a month of 31 days?

**22.** Mr. Johnson gives each of his 32 students 12 minutes to present a project report to the class. How many minutes will it take for all of his students to present their reports?

**23.** A furniture store orders 32 chairs. Each chair costs $2 159. What will be the total cost for the chairs?



**24.** Twenty-eight students took the plane to go to Tobago. Each plane ticket costs $345. What was the total cost of the tickets?

**25.** A tile layer covers a rectangular floor with 32 rows of tiles. In each row he lays 296 small tiles. What is the total number of tiles he used to cover the floor?

## Divide by 2-Digit Divisors

### Teaching Point 1:

*How can I estimate quotients?*

***A vendor has 3 248 pimento peppers. She wants to put them in bags of 16 to sell. About how many bags can she make?***

**1.** **Estimate**: 3 248 ÷ 16 =

**a)** Use compatible numbers.

3 248 ÷ 16 =

↓

3 200 ÷ 16 = **200**

Change 3 248 to 3 200 because 32 and 16 are compatible numbers. Divide mentally.

**b)** Use multiplication.

2 × 16 = 32, so **200** × 16 = 3 200

**c)** Use rounding and compatible numbers.

**Round** the dividend to the nearest thousand.

**3 248** ÷ 16 =

↓

**3 000** ÷ 16 =

Change the divisor to a **compatible number** with 3 000. Divide mentally.

3 248 ÷ **16** =

↓ ↓

3 000 ÷ **15** = **200**

She can make **approximately** 200 bags



Chapter 6 Multiplication and Division.indd 59 06/03/18 11:22 AM

## Activity 1:

**Estimate to solve.**

| | | | |
|---|---|---|---|
| **1.** | 336 ÷ 4 =<br>↓ Estimate<br>___ ÷ 4 = ___ | **2.** | 246 ÷ 6 =<br>↓ Estimate<br>___ ÷ 6 = ___ |
| **3.** | 1 784 ÷ 8 =<br>↓ Estimate<br>___ ÷ 8 = ___ | **4.** | 2 970 ÷ 9 =<br>↓ Estimate<br>___ ÷ 9 = ___ |
| **5.** | 780 ÷ 13 =<br>↓ Estimate<br>___ ÷ 13 = ___ | **6.** | 210 ÷ 42 =<br>↓ Estimate<br>___ ÷ 42 = ___ |
| **7.** | 540 ÷ 15 =<br>↓ Estimate<br>___ ÷ 15 = ___ | **8.** | 682 ÷ 62 =<br>↓ Estimate<br>___ ÷ 62 = ___ |
| **9.** | 4 466 ÷ 22 =<br>↓ Estimate<br>___ ÷ 22 = ___ | **10.** | 4 968 ÷ 23 =<br>↓ Estimate<br>___ ÷ 23 = ___ |

**11.** A bag of cereal contains 1 984 grams. If there are 16 servings, about how many grams are there in one serving.

**12.** A bakery puts 12 hops in a bag for sale. If it bakes 504 hops, how many bags does the bakery need?

**13.** The 504 students and teachers of Maracas Primary went on a field trip by bus. If each bus hold 42 persons, how many buses did they use?

**14.** A security guard is paid at a rate $15 an hour. If at the end of the week his pay is $1050, how many hours did he work?

**15.** A farmer planted 2 996 tomato plants. There were 14 tomato plants on each bed. How many tomato beds did he plant?

**16.** Mrs. Branch paid $720 for 15 shirts. About how much money did she pay for each shirt?

**17.** A gardener has 384 lettuce seedlings to plant. If he plants 16 seedlings on each bed, about how many beds will he need?

**18.** A case of soft drinks contains 24 cans. About how many cases can be filled with 1 248 cans?

## Teaching Point 2:

*How can you divide by 2-digit divisors?*

***3 394 pepper are packed into bags of 16. How many bags can be made?***

**2.** **Divide**.

```
      2 1 2 r2
16 | 3 3 9 4
   –3 2
     1 9
   – 1 6
       3 4
     – 3 2
       0 2
```

**Divide the hundreds**: 33 ÷ 16 = 2
**Multiply**: 16 × 2 = 32
**Subtract**: 33 – 32 = 1
**Compare**: 1 is less than 16
**Divide the tens**:
Bring down the tens: 9
**Divide**: 19 ÷ 16 = 1
**Multiply**: 16 × 1 = 19
**Subtract**: 19 – 16 = 3
**Compare**: 3 is less than 16
**Divide the ones**:
Bring down the ones: 4
**Divide**: 34 ÷ 16 = 2
**Multiply**: 16 × 2 = 32
**Subtract**: 34 – 32 = 2
**Compare**: 2 is less than 16

**3.** Use the **inverse** to **check**.

212 × 16 = 3 392 → 3 392 + 2 = 3 394

212 bags can be made. 2 peppers will remain.



Chapter 6 Multiplication and Division.indd 60 06/03/18 11:22 AM

## Activity 2:

**Copy and complete each of the following.**

| | |
|---|---|
| **1.** 12 $\overline{)672}$ | **2.** 15 $\overline{)375}$ |
| **3.** 14 $\overline{)208}$ | **4.** 19 $\overline{)577}$ |
| **5.** 32 $\overline{)2\,592}$ | **6.** 26 $\overline{)5\,521}$ |
| **7.** 48 $\overline{)4\,656}$ | **8.** 45 $\overline{)7\,670}$ |
| **9.** 36 $\overline{)7\,248}$ | **10.** 17 $\overline{)1\,241}$ |
| **11.** 33 $\overline{)6\,765}$ | **12.** 24 $\overline{)4\,809}$ |
| **13.** 21 $\overline{)6\,405}$ | **14.** 27 $\overline{)8\,154}$ |
| **15.** 31 $\overline{)2\,139}$ | **16.** 36 $\overline{)9\,586}$ |
| **17.** 13 $\overline{)1\,243}$ | **18.** 18 $\overline{)1\,656}$ |
| **19.** 19 $\overline{)3\,610}$ | **20.** 20 $\overline{)2\,890}$ |

# Interpret Remainders

### Teaching Point 1:

*How do I interpret the remainder?*

Write the **remainder** as **fraction.**

*11 cookies are shared equally among 4 children. How many cookies would each child get?*

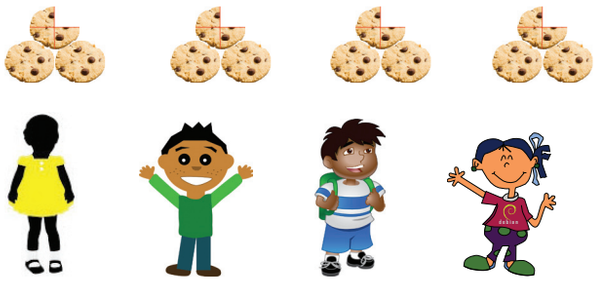
**Divide**. 11 ÷ 4 =

$$\begin{array}{r} 2\ r3 \\ 4\,\overline{)\,1\,1} \\ -\,8 \\ \hline 3 \end{array}$$

The remainder represents **3 cookies left over**, which can also be divided into **4 equal parts** and written as a **fraction**.

$$\frac{\textit{remainder}}{\textit{divisor}} = \frac{3}{4}$$

Each child will get $2\frac{3}{4}$ cookies.



## Activity 1:

**Interpret remainders to solve.**

1. A jug holds 850 ml of juice. If the juice is equally shared among 6 children. How much juice would each child get?
2. Mummy made 2 562 ml soup for her family of 5. If each person gets the same amount of soup, how much soup will each person get?
3. Martin has a 189 cm length of string. He wants to cut the string into 8 equal pieces. What will be the length of each piece?
4. Nine children shared 60 cookies equally among themselves. How many cookies did each child get?



Chapter 6 Multiplication and Division.indd 61 06/03/18 11:22 AM

5. Mr. Lee has a 650 cm roll of crepe paper. He wants to make 15 streamers to decorate for the class party. How long will each streamer be if he cuts the roll into equal pieces?

6. Miss Baptiste has 195 cm of ribbon to make bows for the 10 players on the netball team. How much ribbon can she use for each bow if she cuts the ribbon into equal pieces?



7. A factory cuts a piece of fabric 165 metres long into 14 equal pieces to make tablecloths. What will be the length of each tablecloth?

## Teaching Point 2:

*How do I interpret the remainder?*

The **remainder** causes the answer to be **rounded** up.

*11 children are going on boat trip. A boat can carry only 4 children at a time. How many boats are needed for all the children?*

**Divide**. 11 ÷ 4 =

$$\begin{array}{r} 2\ r3 \\ 4\overline{)\,11} \\ -\ 8 \\ \hline 3 \end{array}$$

The remainder represents **3 children left over**. To carry all the children, they will need **one more** boat.

Add **1** to the quotient. **Three** boats will be needed.



## Activity 2:

**Interpret remainders to solve.**

1. Mrs. Martin has 139 muffins to pack into boxes. If each box holds 4 muffins. How many boxes will she need?

2. How many boards 6 metres long are needed for a 189 metres fence?

3. Water stations are placed every 40 metres in a 5 000 metres race. How many water stations are needed?

4. Miss Sheila is transporting 375 chairs in her van. Her van can only hold 68 chairs at one time. How many trips will she have to make to carry all the chairs?



5. Alisha wants to pack 89 books into boxes. Each box can hold 13 books. What is the least number of boxes will she need to pack all the books?



Chapter 6 Multiplication and Division.indd 62 06/03/18 11:23 AM

## Teaching Point 3:

*How do I interpret the remainder?*

The **remainder** is not part of the question.

*A rope is 22 metres long. How many 3 metres jump ropes can be made?*

**Divide**. 22 ÷ 3 =

$$\begin{array}{r} 7\ r1 \\ 3\overline{)\,2\,2} \\ -\ 2\,1 \\ \hline 1 \end{array}$$

The **quotient** of **7** represents the number of jump ropes that can be made.

The remainder of **1 metre** is **discarded** because it is not needed to answer the question.

## Activity 3:

**Interpret remainders to solve.**

1. Miss Ann has 486 grams of ice-cream. If she shares all the ice-cream and gives each child 72 grams. How many children will get equal amounts?

2. Mr. Khan, a tour guide at the Caroni Swamp can take no more than 8 people at a time on a tour. If 135 persons came to do the tour, how many full tour groups of exactly 8 will Mr. Khan have?

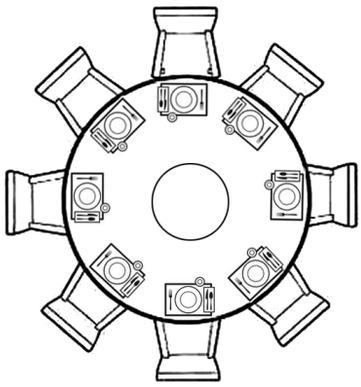



3. How many of the footballs above can you buy with $873?

4. Mrs. Peters is buying scrapbooks for a class project. Scrapbooks cost $20 each. How many scrapbooks can she buy with $350?

5. Three metres of fabric will be cut into pieces so that each piece is 24 cm long. How many pieces can be cut?

6. There are 6 toilet paper rolls in each package. If there are 365 rolls of toilet paper, how many packages can be made?



7. At a wedding reception there are 129 guests seated at tables. Each table seats 8 guests. How many full tables are there?

8. Maria has 46 metres of fabric to make tablecloths. How many tablecloths can be made if she uses 8 metres for each tablecloth?

9. There are 652 copy books to be shared equally among 25 children. How many books will each child get?

10. On the opening day of a pastry shop every 15th customer was given a free drink. If 389 customers visited the shop on that day, how many free drinks were given out?



Chapter 6 Multiplication and Division.indd 63 06/03/18 11:23 AM

## Teaching Point 4:

*How do I interpret the remainder?*

The **remainder** is the only part needed to answer the question.

*22 students have signed up to be part of a relay team. If each relay team can have 4 runners, how many students will not make a relay team?*

**Divide**. 22 ÷ 4 =

```
   5 r2
4 | 2 2
  - 2 0
  -----
    2
```

The **quotient** of **5** represents the number of relay teams.

The **remainder** of **2** represents the number of students that are not on a relay team.

**2** students will not make the relay team.

## Activity 4:

**Interpret remainders to solve.**

1. 248 persons have signed up to play football. Each football team has 18 persons. How many persons will not be in a team?
2. Keron has $500. He used the money to buy shirts that costs $45 each. How much money had he left?
3. A vendor has 448 limes to sell at the market. He puts them in bags with 6 limes in each bag. How many limes will not be in equal bags?
4. At an exhibition tour guides take around groups of 7 persons at a time to view the exhibits. If 80 persons arrive at the same time, how many of them will be in the last tour?
5. Isaiah is at the arcade. He has 65 tokens to play arcade games. It costs 7 tokens to play a game. If he plays as many games as he can, how many tokens will he have left?

## Chapter Review

**Find the unknown number.**

1. 12 × (2 × ☐ ) = 240
2. 9 × ☐ = 8 × 9
3. 123 ÷ ☐ = 1
4. ☐ ÷ 13 = 0

**Solve mentally.**

5. 120 × 90 =
6. 1 080 ÷ 9 =
7. What is the largest number which when multiplied by 20 is less than 156?
8. One pack of biscuits costs $8. How many packs of biscuits can you buy with $640?
9. Carla drinks 295 ml of juice each day. How much juice will she drink in 7 days?

**Solve each problem.**

10. 1 487 × 19 = _____
11. 282 ÷ 22 =
12. 1 202 ÷ 9 =



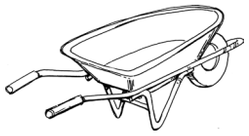
Chapter 6 Multiplication and Division.indd 64 06/03/18 11:23 AM

13. What is the dividend in a division problem when the quotient is 15, the divisor is 8 and there is a remainder of 5?

14. A bus can hold 48 persons. If 245 persons are going on the field trip, how many buses will be needed?

15. Mr. Martin works for $25 an hour. If he works for 8 hours each day and 5 days a week, how much money will he earn after 4 weeks?

16. A school which has 24 classrooms allows 35 students to be seated in each classroom. How many pupils can have seats in the school?



17. A gardener has to move 2 150 kilograms of dirt to his garden. He can carry 49 kilograms of dirt in his wheelbarrow. How many trips will he need to make with the wheelbarrow?

18. If a case of water costs $23, what will be the cost of 42 cases of water?

19. An auditurium contains 48 rows of seats. If each row has 40 seats. How many seats are in the auditurium?

20. A bakery has 197 cupcakes to be packed into boxes of 12. The extra cupcakes are for the workers. How many cupcakes will the workers get?

21. Karen earns $789 per week. How much money will she earn in 16 weeks?

22. A photocopying machine prints 36 copies in 1 minute. How long does it take the machine to print 1 260 copies?

23. Altogether there are 264 sticks of chalk in a box. There are 10 times as many white sticks of chalk as coloured sticks. How many of each type of chalk are in the box?



24. A fruit stall buys 30 boxes of 48 apples. They pack the apples into bags of 6 and sell each bag for $15. How much money do they collect after selling all the apples?

25. Mr. James fills his 105 litre fuel tanks at $4 per litre. How much money does he need to pay to fill 10 such fuel tanks?

26. Leanna is 2 years old. If Allyah is 6 times more than twice Leanna's age, how old is Allyah?

27. A school has 32 classrooms with 25 tables. If each table can seat 2 students, how many students can be accommodated at the school?



28. Mark sold 27 pineapples and Dianne sold three times as many as Mark. How much money did Dianne collect if each pineapples cost $20?

29. A 256 kg bag of peas are packaged in 16 kg packets and sold at $23 a packet. How much money will be collected after all the packets are sold?



Chapter 6 Multiplication and Division.indd 65 06/03/18 11:23 AM

CHAPTER

7

# Mixed Operations

**Vocabulary:**

multi-step problems
unequal sharing

**Chapter Outcomes:**

- Solve problems using whole numbers involving the four operations.
- Solve problems involving unequal sharing.




Problems are a part of life. So it's important to know how to solve them. You do not magically become a good problem solver simply by reaching adulthood. Even the maxi taxi driver began learning how to solve problems as a child and practiced problem solving every day from childhood to adulthood. Knowing how to combine skills in addition, subtraction, multiplication and division helps him in solving problems as he transports persons from place to place.

# Multi-Step Problems

## Teaching Point 1:

*How can I solve a multi-step problem?*

Miss Thomas has 108 pencils and 72 erasers to share equally among her 9 grandchildren. How many more pencils than erasers will each child receive?

### Read

**What do I need to find?**

I need to find the number of pencils that are **more than** erasers which each child will get.

**What information am I given?**

There are **108 pencils** and **72 erasers**.

**9 children** must **share** the pencils and erasers **equally**.

### Plan

**What is my plan?**

I can draw a **bar model** for each step and write each number sentence.

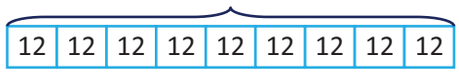
Then I can **divide** to find the number of pencils and erasers each child gets and **subtract** to find how many more pencils than erasers each child will get.

### Solve

I can draw bar models and write number sentences to find out how many pencils and erasers each child gets.

**Step 1:** Find how many pencils each child gets.

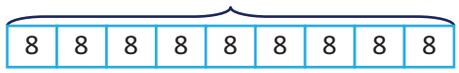
**108**




108 ÷ 9 = 12 pencils

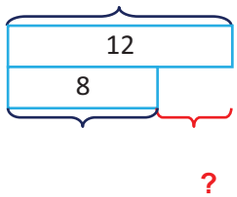
**Step 2:** Find how many erasers each child gets.

**72**




72 ÷ 9 = 8 erasers

**Step 3:** Find how many more pencils than erasers each child gets.




12 – 8 = 4

Each child will get 4 more pencils than erasers.

### Check

**How can I check my answer?**

I can do the inverse operations.

8 + 4 = 12

12 × 9 = 108 and 8 × 9 = 72

If the results are **108** and **72**, the answer is correct.



Chapter 7 Mixed Operations.indd 67 06/03/18 11:34 AM

## Activity 1:

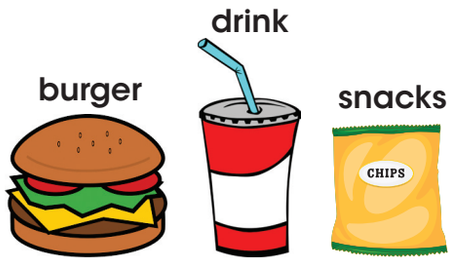
**Solve the problems below.**

1. A cinema has 25 seats in each row. When the cinema is full, it holds 475 persons. If there are 7 empty rows of seats in the cinema, how many persons are there in the cinema?
2. There are 256 boys and 248 girls at the National Primary School Sports. Each student participates in one event. Each event has 24 students participating. How many events are there?
3. Mr. Jack has 14 boxes with 125 apples in each box. He packs the apples into bags of 5 and sells each bag for $10. How much money will he collect after selling all the apples?
4. There are 267 houses in Marisa's community. She collected $355 from her neighbours as donations for her school's bazaar. If she collected $5 at each house, from how many houses Marisa did not collect donations?
5. Marcus earns $655 each week. He spends $275 and saves the rest. How much money will he have saved after 8 weeks?
6. Alex, Alina and Aaron played darts at the school bazaar. Aaron's score is shown in the table below.

| Children | Points |
|---|---|
| Alex | |
| Alina | |
| Aaron | 23 |

The total number of points scored by the three children is 96. Alina points is twice Aaron's score. How many points did Alex score?

7. Javan received $100 as a gift. He plans to buy two packs of wrist bands that cost $15 per pack and a headphone set that costs $59. How much money will he have left?
8. Ricardo is 13 years old. His father takes him and his two younger sisters to a cricket match. Tickets are $265 for adults and $155 for children (12 years and under). What was the total cost of their tickets?
9. A cafeteria sells burgers, drinks and snacks at the prices listed below.




If Melissa orders a burger, a drink and two snacks, what will be her change from a $50 bill?

10. Joe scored 3 489 points in the first round of a computer game. He scored 3 415 more points in the second round than he did in the first round. How many points did Joe score in the two rounds?
11. The scout troop is raising $1 500 for their holiday camp. So far they have earned $365 from a car wash and $25 donations each from 15 persons. How much more money do they have to earn to reach their goal?



Chapter 7 Mixed Operations.indd 68 06/03/18 11:34 AM

# Problem Solving: Unitary Method

## Teaching Point 1:

*How can I use the unitary method to solve problems?*

If 5 apples cost $30, how much will 8 apples cost?

**Read**

**What do I need to find?**

I need to find the cost of 8 apples.

**What information am I given?**

5 apples cost **$30**.

**Plan**

**What is my plan?**

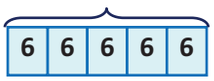
I can draw a **bar model** to show how much 1 apple cost.

Then I can write a number sentence to find out how much 8 apples will cost.

**Solve**

I can draw a bar model and write number sentences to find out how much 8 apples cost.

**$30**




5 apples → **$30**

1 apple → **$30 ÷ 5 = $6** ← Divide

8 apples → **$6 × 8 = $48** ← Multiply

So, 8 apples will cost $48.

**Check**

**How can I check my answer?**

I can do the inverse operations.

48 ÷ 8 = 6

6 × 5 = 30

If the result is **30**, the answer is correct.

## Activity 1:

**Solve the problems.**

1. The cost of 5 kg of flour is $25. What will be the cost of 25 kg of flour?
2. A mason gets $684 for 9 days of work. How many days should he work to get $912?
3. Shelly bought a dozen pens for $144.
   (a) Find the cost of 15 such pens.
   (b) How many pens can be bought for $84?
4. The weight of 6 books is 12 kg. What is the weight of 20 such books?
5. Four equal sized boxes contain a maximum of 80 books. How many books will fit in 10 boxes?
6. There are 12 eggs in a carton and 12 cartons in a box. How many eggs are in 8 boxes?
7. If ◇ represents 6 items, and the cost of ◇◇◇◇ is $72, what is the total cost of ◇◇◇◇◇◇?
8. If 15 buses can carry 795 passengers, what is the total number of passengers that can be carried by 18 buses?



Chapter 7 Mixed Operations.indd 69 06/03/18 11:34 AM

9. Twenty tiles weigh 5 kg.

(a) How much will 7 of the same tiles weigh?

(b) If a man wants to carry no more than 12 kg, how many of the same tiles can there be in one load?

## Unequal Sharing

### Teaching Point 1:

*How can I solve an **unequal sharing** problem?*

Jamal, Alex and Arun altogether have 22 marbles. Jamal has 3 more than Alex and Arun has 4 more than Jamal. How many marbles do each of them have?

**Read**

**What do I need to find?**

I need to find the number of marbles each boy has.

**What information am I given?**

Three boys have **22 marbles** altogether.

Jamal has **3 more** marbles than Alex.

Arun has **4 more** marbles than Jamal.

**Plan**

**What is my plan?**

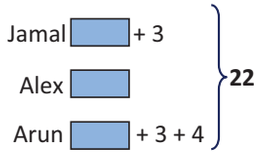
I can draw a **bar model** to show how many marbles each boy has.

Then I can write the number sentences to find out how many marbles each boy has.

**Solve**

I can draw a bar model and write number sentences to find out how many marbles each boy has.

First, draw a bar model to show how the marbles are shared.




**Add** the extra marbles that Jamal and Arun have.

**3 + 3 + 4 = 10**

**Subtract** the extra marbles from the total number of marbles.

**22 – 10 = 12**

**Divide** the marbles that remain equally.

**12 ÷ 3 = 4**

Jamal has 4 + 3 = 7 marbles.

Alex has 4 marbles.

Arun has 4 + 3 + 4 = 11 marbles.

**Check**

**How can I check my answer?**

I can add the marbles that each boy got.

7 + 4 + 11 = 22

If the result is **22**, the answer is correct.



Chapter 7 Mixed Operations.indd 70 06/03/18 11:34 AM

## Activity 1:

**Solve the problems.**

1. Alisha has 9 fewer sweets than Jenna. They have 35 sweets altogether. How many sweets does Alisha have?

2. Garvin and Thomas shared 35 mangoes between themselves so that Garvin received 5 more than Thomas. Find each boy's share.



3. A string 120 cm long is cut into two pieces. One piece is 20 cm shorter than the other piece. Calculate the length of each piece of string.

4. Joshua and Josiah are playing marbles, they have 42 marbles altogether. At the end of the game Joshua has 8 marbles fewer than Josiah. How many marbles does Joshua have now?

5. Mommy is 28 years older than her son, Anthony. She is 4 years younger than daddy. The total age of the three of them is 84 years. What is Mommy's age?

6. Jervon, Marissa and Kareena altogether sold 146 tickets for the Barbecue. Jervon sold 14 more tickets than Marissa and Kareena sold 10 more tickets than Jervon. How many tickets did Marissa sell?

7. In a school with 459 students the number of boys is twice the number of girls. How many girls are there in the school?

8. Valley Primary School's football team played a total of 24 games. They won 6 more games than they lost and tied 2 games. How many games did they win?

9. Penny has 41 counters that are either red, yellow or blue in colour. If there are 8 more red than yellow counters and the same number of blue and yellow counters, how many counters are red?



10. Ameera, Maria and David have a combined weight of 63 kilograms. David weighs 8 more kilograms than Maria and Ameera weighs 2 more kilograms than David. How much does each child weigh?

11. A notebook costs $5 more than a folder. Greg purchased 3 notebooks and 2 folders and paid a total cost $30. What is the cost of each item?



12. Kate, Cindy, Sarah and Hema shared some cookies among themselves. Kate got twice as much cookies as Cindy. Sarah got 4 more than Kate but Hema got three fewer than Cindy. If the smallest share was 12, find the total number of cookies shared.



Chapter 7 Mixed Operations.indd 71 06/03/18 11:34 AM

13. Andell is 9 years older than Arnez. Arnez is 3 years younger than Arianne. The sum of their ages is 24 years. What is the age of each child?

14. A book and a pen together cost $24. If the book costs 11 times as much as the pen, find the cost of the pen.

## Chapter Review

**Solve the problems below.**

1. A cafeteria sells 6 times as many bottles of water as bottles of juice. If the cafeteria sells 750 bottles of water, how many bottles of juice did the cafeteria sell?

2. Ming ran 5 more laps around the track than Jim.

   (a) If they both ran 15 laps around the track how many laps did Jim run?



   (b) If the distance around the track is 400 metres, what is the total distance they both ran?

3. Maya saved $456 one month, $374 the second month, and some more money during the third month. Altogether Maya saved $1 245 during those three month. How much money did Maya save during the third month?

4. Last week James spent $247 of his savings on a video game. Today, he put $562 into his savings account. He now has $951 in the account. How much money did he have in the account before he bought the video game?

5. Kathy uses 2 slices of bread to make a sandwich. She has 32 slices of bread and 48 pieces of cheese. She will use 4 pieces of cheese in each sandwich.

   (a) How many cheese sandwiches can she make?

   (b) Kathy makes tuna sandwiches with the slices of bread that remains and sells them for $8 each. How much money does she get?

6. Rishi and Avinash are combining their money to buy game tokens. Rishi has $57 and Avinash has $48. Each game token costs $8.

   (a) How many tokens can they buy?

   (b) How much more money will they need to purchase another token?

7. If the sum of two numbers is 56 and their difference is 8, what are the numbers?

8. Four small maxi taxis can hold a maximum of 48 passengers. How many passengers can 14 small maxi taxis take to the beach?

9. A farmer harvested 630 heads of lettuce. The heads of lettuce are packaged in crates that each hold 24.

   (a) How many full crates of lettuce will the farmer get?

   (b) How many more heads of lettuce are needed to fill the last crate?



Chapter 7 Mixed Operations.indd 72 06/03/18 11:34 AM

10. There are 10 hops in a bag. How many bags of hops will be needed to feed 64 persons if each person has 2 hops?

11. Timothy and Ali had 36 marbles altogether. Timothy loses 8 marbles to Ali during a game. Now Ali has 4 more marbles than Timothy. How many marbles did Ali have before the game?

12. Farmer Lee harvests 90 kilograms of cucumbers and 120 kilograms of tomatoes from his garden. He makes 15 packages of equal weight with both tomatoes and cucumbers.

    (a) What will be the weight of each package?

    (b) How many more kilograms of tomatoes than cucumbers will be in each package?

13. Three containers A, B and C weigh a total of 300 kg. Container A weighs 40 kg more than B and container C weighs 10 kg more than A. Calculate the weight of container B.

14. Maraj's Bakery uses 220 kg of sugar to make 1,000 cakes. Each cake contains the same amount of sugar. How many kilograms of sugar does the bakery need if they bake only 150 cakes?

15. Eight identical shirts cost $64. How much will 12 shirts cost?

16. Jason and Mark went fishing. Jason's fish was 3 times the weight of Mark's fish. If the combined weight of both fishes was 104 kilograms, how much did Jason's fish weigh?

17. Daniel lost 11 of his marbles. His mother gave him the same number of marbles as the number of marbles that he had left. He packs all the marbles equally in 8 bags. Each bag has 13 marbles. How many marbles did Daniel have at first?

18. A school hall has 15 rows of chairs. Each row has the same number of chairs.

    (a) If there are 165 chairs in the hall, how many chairs are in each row?

    (b) The school has 385 children and wants to have enough chairs in the hall for each child. How many more rows of chairs must be added to the chairs in the hall?

19. A bakery bakes 984 cookies and packs them in boxes of 12 for sale. If 37 of the cookies were broken, what is the least number of boxes the bakery can pack with the remaining cookies?

20. A farmer has 144 tomato seedlings. She planted 3 rows of 16 seedlings each and 4 rows of 14 seedlings each. How many seedlings does she have left to plant?



Chapter 7 Mixed Operations.indd 73 06/03/18 11:34 AM

CHAPTER 8

# Understanding Fractions

**Vocabulary:**

proper fractions
improper fractions
mixed numbers
equivalent fractions
lowest equivalent form
simplest form

**Chapter Outcomes:**

- Develop and apply procedures to solve problems involving fractions and the four operations.

We use fractions in everyday life even though we may not completely realize it. There are parts of a whole everywhere. If you don't believe this, then try baking a cake without using fractions. If it were not for fractions something as simple as baking a cake would be impossible. When you put 4 eggs into the cake batter you are using $\frac{1}{3}$ of a dozen.



## Getting Ready for Chapter 8

**1. Choose the best term from the box to complete the sentences.**

| | |
|---|---|
| fraction | quarters |
| numerator | denominator |

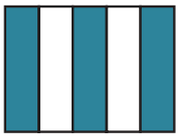
a) A _____ can name a part of a whole.

b) The number above the fraction bar in a fraction is called the _____.

c) Four equal parts of a whole are called _____.

---

**2.** What fraction of the shape below is shaded?



**3.** Write an equivalent fraction for $\frac{3}{5}$.

**4.** Convert $2\frac{3}{6}$ to an improper fraction.

**5.** What is $\frac{2}{3}$ of 18?

## Represent Fractions

### Teaching Point 1:

*What is a fraction?*

A **fraction** is a number that names one or more parts of a whole that is divided into equal parts. The whole can be an **area or region**, a **set** or **length**.

**Part of a region or area**

numerator → 3
vinculum →
denominator → 4

of the **region** is shaded.



---

**Part of a set**

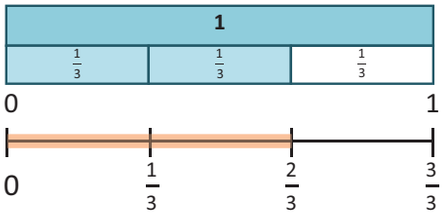


There are **4** balls in the **set**.
**1** out of the **4** balls is yellow.

$\frac{1}{4}$ of the balls is yellow.

---

**Part of a unit of length**




There are **3** equal parts in the unit of length.
**2** out of the **3** equal parts are shaded.

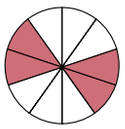
$\frac{2}{3}$ of the number line is shaded.



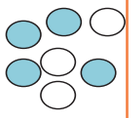
Chapter 8 Understanding Fractions.indd 75 13/04/18 1:40 PM

## Activity 1:

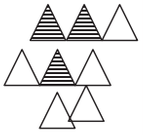
**Write the fraction that names the shaded part of each whole.**

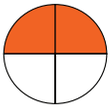
1. 

2. 

3. 

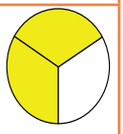
4. 

5. 

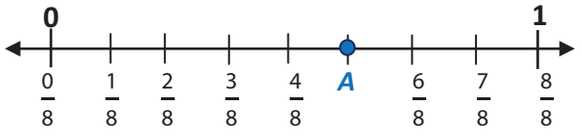
6. 

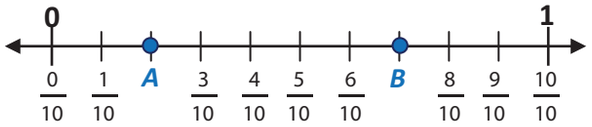
7. 

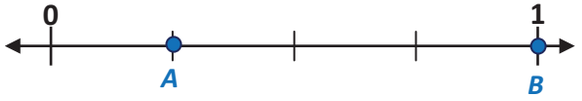
8. 

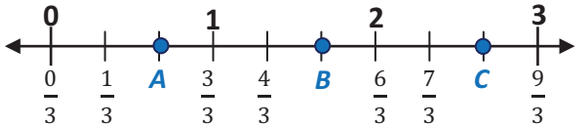
9. 

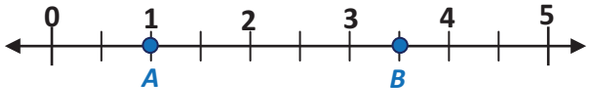
**Write the fraction that names each point.**

10. 


11. 

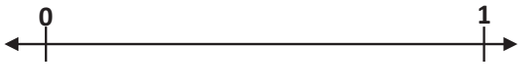

12. 


13. 


14. 


**Locate each fraction on each number line below.**

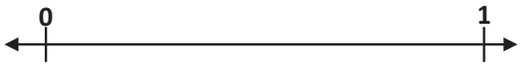
15. $\frac{1}{6}$



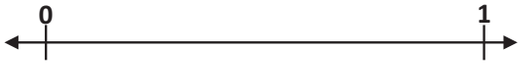

16. $\frac{4}{8}$



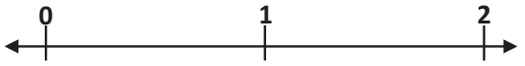

17. $\frac{3}{9}$



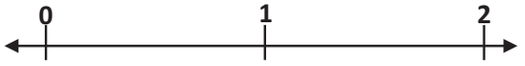

18. $\frac{7}{12}$



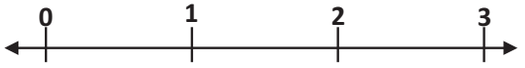

19. $\frac{3}{2}$



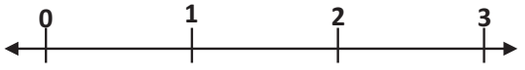

20. $\frac{8}{6}$




21. $\frac{9}{4}$




22. $\frac{7}{3}$



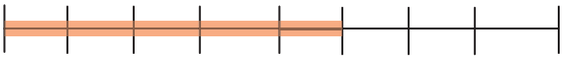

23. $\frac{8}{5}$

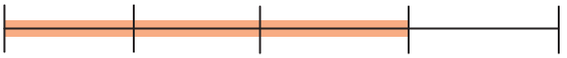


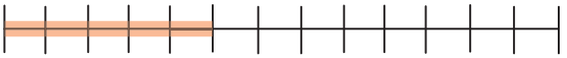



Chapter 8 Understanding Fractions.indd 76 13/04/18 1:40 PM

**Write the fraction that names the shaded part.**

24. 

25. 

26. 

## Activity 2:

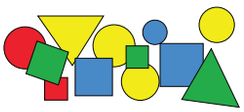
**Draw a picture and shade part of it to show each fraction.**

1. $\frac{4}{12}$ of a region.

2. 3 out of 6 parts of a set.

3. $\frac{8}{9}$ of a length.

4. What fraction of the shapes below are not circles?



**Solve the following problems.**

5. Kevin cleans the dog kennel three times a week while his brother cleans it on the other days. What fraction names the part of the week his brother cleans the kennel?

6. Alex and Mark each have a granola bar broken into equal pieces. They each eat one piece, or $\frac{1}{4}$, of their granola bar. How many more pieces altogether do Alex and Mark need to eat to finish both granola bars?

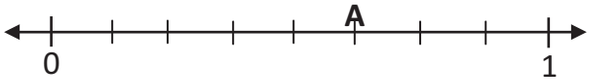
7. Chang has a rectangular flag that is $\frac{3}{10}$ white and the rest of it blue. Draw Chang's flag.

8. In an aquarium $\frac{4}{12}$ of the fishes are orange and the rest are black. What fraction of the fishes are black?

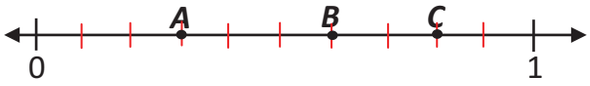
9. Mummy made 10 fried bakes. Leeann ate 2 bakes and her brother ate 3 bakes. What fraction of the fried bakes was left?

10. Mr. Smith stops to buy some doubles for breakfast when he is $\frac{3}{4}$ of the way to work. Show this distance on a number line?

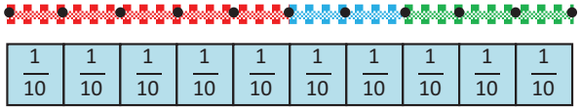
11. Write the fraction that is at A on the number line below.




12. Which letter on the number line below best represents $\frac{6}{10}$?




13. What fraction of the ribbon below is red?




14. Tia has a box of 12 crayons. She gives 4 crayons to her brother and 3 crayons to her sister. What fraction of the crayons does Tia have left?



Chapter 8 Understanding Fractions.indd 77 13/04/18 1:40 PM

15. A box contains 4 red pencils and 6 blue pencils. What fraction of the pencils are red?

16. Alisha has a bag with 4 mangoes and 6 oranges. Two of the mangoes are green and the rest are ripe. What fraction of the fruits are ripe mangoes?

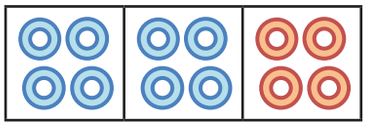
## Fraction of a Set

### Teaching Point 1:

*How can you find the fractional part of a set?*

Find $\frac{2}{3}$ of 12.

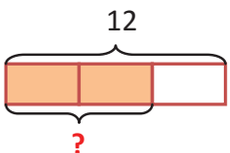
**Use objects.**



$\frac{2}{3}$ of the buttons are blue

So, $\frac{2}{3}$ of 12 is 8.

**Use a model.**




The shaded parts of the **bar model** show $\frac{2}{3}$ of the set.

Find $\frac{2}{3}$ of 12.

3 units ⟶ 12

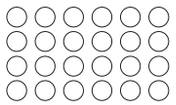
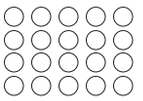
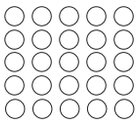
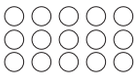
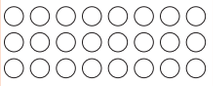
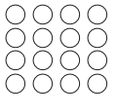
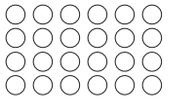
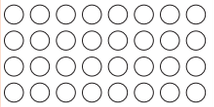
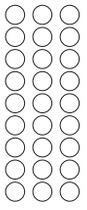
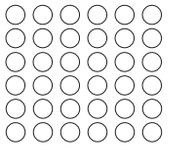
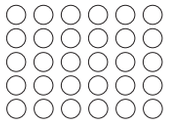
1 unit ⟶ 12 ÷ 3 = 4

2 units ⟶ 4 × 2 = 8

So, $\frac{2}{3}$ of 12 is 8.

### Activity 1:

**Circle equal groups to help you solve.**

| | | |
|---|---|---|
| 1. $\frac{1}{2}$ of 12  | 2. $\frac{3}{6}$ of 24  | 3. $\frac{3}{5}$ of 20  |
| 4. $\frac{4}{5}$ of 25  | 5. $\frac{2}{3}$ of 15  | 6. $\frac{5}{8}$ of 24  |
| 7. $\frac{1}{2}$ of 16  | 8. $\frac{1}{3}$ of 24  | 9. $\frac{3}{8}$ of 32  |
| 10. $\frac{4}{9}$ of 27  | 11. $\frac{4}{6}$ of 36  | 12. $\frac{2}{5}$ of 30  |



Chapter 8 Understanding Fractions.indd 78 13/04/18 1:40 PM

13. There are 16 marbles in a box. 4 of the marbles are blue and the rest are green. What fraction of the set of marbles is green?

14. There are 9 roses in a vase. Of the 9 roses, 6 are red and the rest are yellow. What fraction of the roses are red?

15. Jewel bought 12 biscuits packaged in bags of 4. $\frac{3}{4}$ of them were chocolate and the rest of them were vanilla. How many biscuits are vanilla?

16. Jia has 10 bills in her purse. She has four $1 bills and the rest are $5 bills. What fraction of the bills are $5 bills?

## Mixed Numbers and Improper Fractions

### Teaching Point 1:

*How can different fractions name the same amount?*



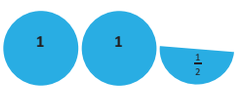
There is more than 1 orange.

There are 2 whole oranges and $\frac{1}{2}$ orange.

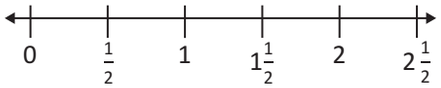
$$2 + \frac{1}{2} = 2\frac{1}{2}$$

$2\frac{1}{2}$ is a **mixed number**.

You can represent mixed numbers in different ways.




Mixed numbers can be represented on a number line.

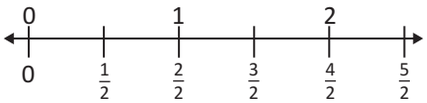



An **improper fraction** has a **numerator** that is greater than its **denominator**. Mixed numbers can be written as improper fractions.



$$\frac{2}{2} + \frac{2}{2} + \frac{1}{2} = \frac{5}{2}$$

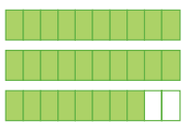
Improper fractions can be represented on a number line.

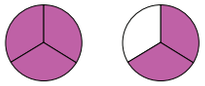



### Activity 1:

Write an improper fraction and a mixed number for the shaded portion of each model.

1. 

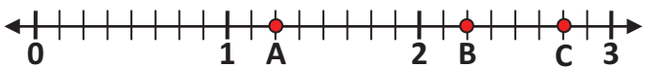
2. 

3. 



Chapter 8 Understanding Fractions.indd 79 13/04/18 1:40 PM

What improper fraction and mixed number represent each point on the number line?




**4.** Point A

**5.** Point B

**6.** Point C

Draw a number line to show each set of numbers. Then order the number from least to greatest.

| | |
|---|---|
| **7.** $\frac{3}{2}, \frac{9}{2}, \frac{5}{2}$ | **8.** $2\frac{1}{4}, 1\frac{3}{4}, 2\frac{2}{4}$ |
| **9.** $\frac{11}{5}, \frac{7}{5}, \frac{9}{5}$ | **10.** $2\frac{3}{10}, 1\frac{4}{10}, \frac{11}{10}$ |
| **11.** $1\frac{5}{6}, \frac{13}{6}, 2\frac{2}{6}$ | **12.** $\frac{13}{8}, \frac{9}{8}, 1\frac{3}{8}$ |

**13.** Dexter needs 6 strips of wood to make a frame. Each strip must be $\frac{1}{4}$ metre long. How much wood should Dexter buy to make the frame?

**14.** How many eighths are there in $2\frac{3}{8}$?

**15.** At the end of a party, $2\frac{2}{3}$ sponge cakes and $1\frac{1}{3}$ chocolate cakes remained. Mother cut the cakes into $\frac{1}{3}$ pieces. How many pieces did she get?

## Teaching Point 2:

*How are mixed numbers and improper fractions related?*

**Write $\frac{5}{2}$ as a mixed number.**

The **fraction bar** means 'divided by'.

So, $\frac{5}{2}$ means 5 divided by 2.

Divide the numerator by the denominator.

whole number → 2 **R** 1 ← numerator

$$\begin{array}{r} 2\,\overline{)\,5} \\ -4 \\ \hline 1 \end{array}$$

denominator

Use the quotient and the remainder to write a mixed number.

So, $\frac{5}{2} = 2\frac{1}{2}$.

**Write $2\frac{1}{2}$ as an improper fraction.**

$$2 \overset{+}{\underset{\times}{\rightleftarrows}} \frac{1}{2} = \frac{5}{2}$$

← total number of parts

← number of parts in the whole

First, multiply the denominator, or the number of parts in the whole, by the whole number.

$2 \times 2 = 4$

Then, add the numerator to your product.

$4 + 1 = 5$

So, $2\frac{1}{2} = \frac{5}{2}$.



Chapter 8 Understanding Fractions.indd 80 13/04/18 1:40 PM

## Activity 2:

**Write each mixed number as an improper fraction.**

| | | |
|---|---|---|
| **1.** $3\frac{1}{2}$ | **2.** $2\frac{3}{6}$ | **3.** $5\frac{3}{4}$ |
| **4.** $2\frac{4}{7}$ | **5.** $1\frac{6}{8}$ | **6.** $6\frac{2}{3}$ |
| **7.** $3\frac{11}{12}$ | **8.** $4\frac{1}{9}$ | **9.** $2\frac{1}{5}$ |
| **10.** $1\frac{7}{12}$ | **11.** $3\frac{1}{4}$ | **12.** $4\frac{2}{10}$ |

**Write each improper fraction as a mixed number.**

| | | |
|---|---|---|
| **13.** $\frac{7}{2}$ | **14.** $\frac{12}{5}$ | **15.** $\frac{17}{3}$ |
| **16.** $\frac{25}{6}$ | **17.** $\frac{21}{8}$ | **18.** $\frac{32}{7}$ |
| **19.** $\frac{51}{10}$ | **20.** $\frac{19}{4}$ | **21.** $\frac{15}{9}$ |
| **22.** $\frac{31}{12}$ | **23.** $\frac{11}{3}$ | **24.** $\frac{22}{4}$ |

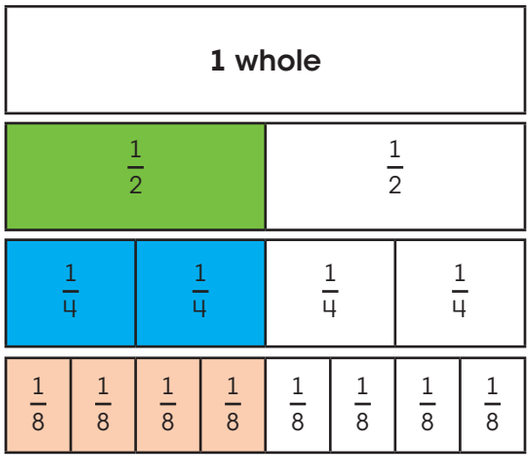
**25.** Kerry Ann needs to make a banner that is $2\frac{2}{4}$ metres long. She has strips of crepe paper that are $\frac{1}{4}$ metres long. How many $\frac{1}{4}$ strips will she need to make the banner?

**26.** $7\frac{3}{4}$ litres of water were consumed during a cricket match. If each player drank $\frac{1}{4}$ litre of water, how many players drank water?

# Equivalent Fractions

## Teaching Point 1:

*How can two or more fractions name the same part of a whole?*




The fractions $\frac{1}{2}$, $\frac{2}{4}$ and $\frac{4}{8}$ name the same part of the whole.

$\frac{1}{2}$ is **equal** to $\frac{2}{4}$ and $\frac{1}{2}$ is also **equal** to $\frac{4}{8}$.

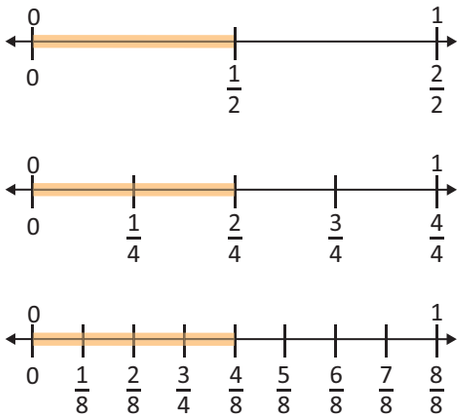
So, $\frac{1}{2}$, $\frac{2}{4}$ and $\frac{4}{8}$ are equivalent fractions.

**Equivalent fractions** are different fractions that name the same part of a whole.



Chapter 8 Understanding Fractions.indd 81 13/04/18 1:40 PM

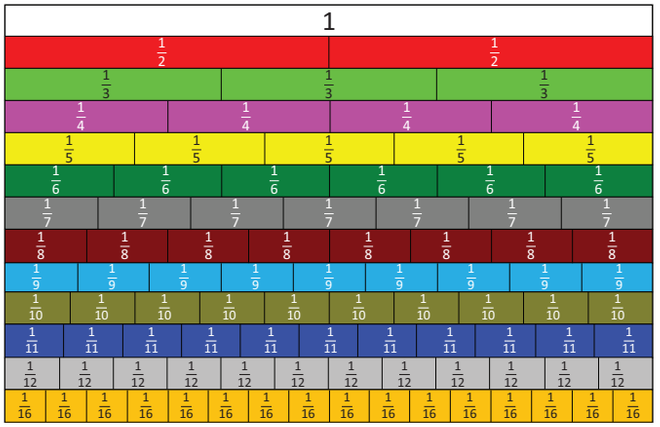
The number lines show equivalent fractions.




The number lines show $\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$.

## Activity 1:

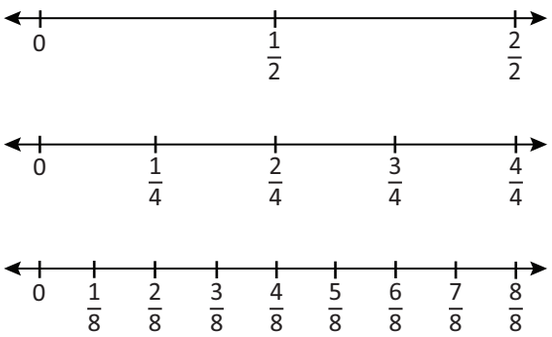
### Use the fraction chart below to complete the equivalent fractions.




| | | |
|---|---|---|
| **1.** $\frac{1}{2} = \frac{\square}{6}$ | **2.** $\frac{1}{8} = \frac{\square}{16}$ | **3.** $\frac{2}{3} = \frac{\square}{6}$ |
| **4.** $\frac{1}{4} = \frac{\square}{12}$ | **5.** $\frac{2}{4} = \frac{\square}{2}$ | **6.** $\frac{1}{3} = \frac{\square}{9}$ |

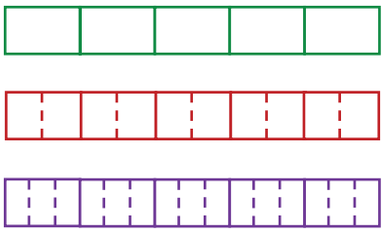
| | | |
|---|---|---|
| **7.** $\frac{2}{3} = \frac{\square}{12}$ | **8.** $\frac{2}{4} = \frac{\square}{2}$ | **9.** $\frac{1}{3} = \frac{\square}{9}$ |
| **10.** $\frac{2}{5} = \frac{\square}{10}$ | **11.** $\frac{6}{12} = \frac{\square}{2}$ | **12.** $\frac{3}{8} = \frac{\square}{16}$ |

### Use the number lines to find the equivalent fractions.




| | | |
|---|---|---|
| **13.** $\frac{1}{2} = \frac{\square}{8}$ | **14.** $\frac{2}{4} = \frac{\square}{8}$ | **15.** $\frac{3}{4} = \frac{\square}{8}$ |
| **16.** $\frac{\square}{4} = \frac{2}{8}$ | **17.** $\frac{\square}{4} = \frac{6}{8}$ | **18.** $\frac{\square}{2} = \frac{2}{4}$ |

### Use the fraction strips to find equivalent fractions.



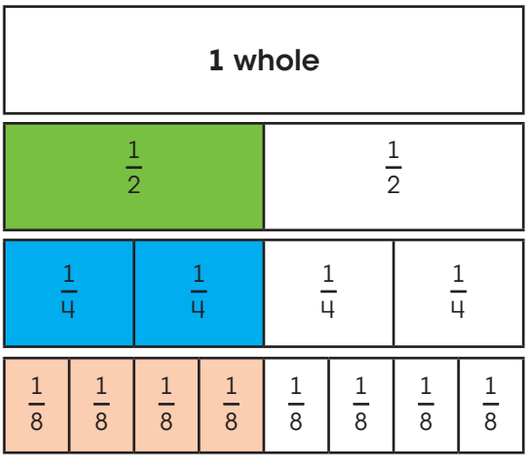
| | | |
|---|---|---|
| **19.** $\frac{2}{5} = \frac{\square}{10}$ | **20.** $\frac{\square}{5} = \frac{9}{15}$ | **21.** $\frac{4}{5} = \frac{\square}{15}$ |



Chapter 8 Understanding Fractions.indd 82 13/04/18 1:40 PM

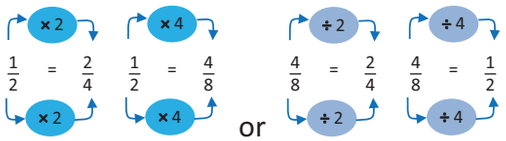
## Teaching Point 2:

*How can you use multiplication to find equivalent fractions?*




The fraction strips show that

$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$ or $\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$.




You can **multiply** or **divide** the numerator and denominator of a fraction by the same number to get **equivalent fractions**.

## Activity 2:

**Write two equivalent fractions for each fraction.**

| | | |
|---|---|---|
| **1.** $\frac{1}{4}$ | **2.** $\frac{1}{2}$ | **3.** $\frac{2}{5}$ |
| **4.** $\frac{2}{3}$ | **5.** $\frac{1}{6}$ | **6.** $\frac{1}{7}$ |
| **7.** $\frac{2}{6}$ | **8.** $\frac{3}{8}$ | **9.** $\frac{3}{9}$ |
| **10.** $\frac{1}{9}$ | **11.** $\frac{3}{4}$ | **12.** $\frac{2}{5}$ |

**Find the missing numerator or denominator to make the fractions equivalent.**

| | | |
|---|---|---|
| **13.** $\frac{4}{5} = \frac{\square}{10}$ | **14.** $\frac{\square}{3} = \frac{8}{12}$ | **15.** $\frac{3}{8} = \frac{6}{\square}$ |
| **16.** $\frac{4}{6} = \frac{\square}{18}$ | **17.** $\frac{\square}{7} = \frac{2}{14}$ | **18.** $\frac{6}{10} = \frac{18}{\square}$ |
| **19.** $\frac{3}{7} = \frac{\square}{28}$ | **20.** $\frac{8}{24} = \frac{1}{\square}$ | **21.** $\frac{6}{21} = \frac{\square}{7}$ |
| **22.** $\frac{7}{10} = \frac{21}{\square}$ | **23.** $\frac{5}{\square} = \frac{20}{36}$ | **24.** $\frac{\square}{63} = \frac{7}{9}$ |
| **25.** $\frac{2}{3} = \frac{\square}{21}$ | **26.** $\frac{4}{\square} = \frac{8}{12}$ | **27.** $\frac{5}{6} = \frac{15}{\square}$ |

## Activity 3:

**Solve the problems below.**

**1.** Where would $\frac{2}{3}$ be on the number line below?





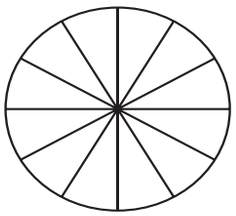

Chapter 8 Understanding Fractions.indd 83 13/04/18 1:40 PM

2. The table below shows equivalent fractions. Which fraction completes the table?

| | | | |
|---|---|---|---|
| $\frac{3}{5}$ | $\frac{6}{10}$ | $\frac{9}{15}$ | |

3. Kareem lives $\frac{4}{10}$ of a kilometre from the mall. His friend Bobby lives $\frac{1}{5}$ of a kilometre, and his other friend Jeremy lives $\frac{2}{5}$ of a kilometre from the mall. Who lives the same distance from the mall as Kareem?

4. A pizza is cut into 12 slices. Samantha ate $\frac{2}{3}$ of the pizza. Shade the amount of pizza Samantha ate.



5. Mark got 9 out of 10 test items correct. What is his score on the test out of 20?

6. The figure below is divided into equal parts.



How many more parts need to be shaded to have $\frac{3}{4}$ of the figure shaded?

7. Mr. James cuts a pizza in half. He cuts each half into 2 equal pieces and then each piece into 3 equal slices. He served 8 slices. What fraction of the pizza did Mr. Francis serve?

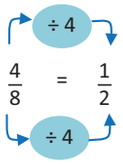
## Lowest Equivalent Form

### Teaching Point 1:

*How can you write a fraction in its lowest equivalent form?*

What is the simplest fraction equivalent to $\frac{4}{8}$?

**Use division to write a fraction in its lowest equivalent form.**




The lowest equivalent form of $\frac{4}{8}$ is $\frac{1}{2}$.

$\frac{1}{2}$ is the **simplest form** of $\frac{4}{8}$.

Writing a fraction in its lowest equivalent form is one way to "**write a fraction in its simplest form**".

### Activity 1:

**Write each fraction in its simplest form.**

| | | |
|---|---|---|
| 1. $\frac{4}{6}$ | 2. $\frac{10}{15}$ | 3. $\frac{12}{18}$ |
| 4. $\frac{6}{8}$ | 5. $\frac{9}{21}$ | 6. $\frac{2}{6}$ |
| 7. $\frac{40}{50}$ | 8. $\frac{12}{24}$ | 9. $\frac{9}{18}$ |

10. Fifteen out of 25 students in Mr. Ali's class are girls. In lowest equivalent form, what fraction of the class is girls?



Chapter 8 Understanding Fractions.indd 84 13/04/18 1:40 PM

## Compare and Order Fractions

### Teaching Point 1:

*How can you compare fractions?*

Daddy has two pieces of wood. One is $\frac{1}{4}$ metre long and the other is $\frac{5}{8}$ metres long. Which piece of wood is longer?

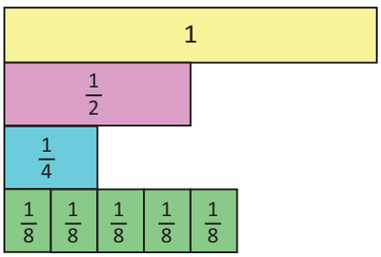
**Use benchmark fractions.**

**Use** fraction strips to compare both fractions to $\frac{1}{2}$.

$\frac{1}{4} < \frac{1}{2}$

$\frac{5}{8} > \frac{1}{2}$

So, $\frac{5}{8} > \frac{1}{4}$




How many eighths make $\frac{1}{2}$?

$\frac{4}{8}$ is equal to $\frac{1}{2}$. So, $\frac{5}{8} > \frac{1}{4}$.

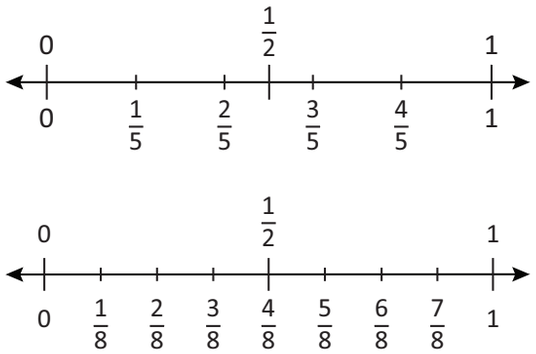
### Activity 1:

**Compare fractions using benchmarks. Write < or >.**

| | | |
|---|---|---|
| **1.** $\frac{4}{6} \bigcirc \frac{2}{10}$ | **2.** $\frac{1}{4} \bigcirc \frac{2}{3}$ | **3.** $\frac{2}{5} \bigcirc \frac{5}{10}$ |
| **4.** $\frac{7}{9} \bigcirc \frac{3}{8}$ | **5.** $\frac{11}{2} \bigcirc \frac{4}{8}$ | **6.** $\frac{5}{8} \bigcirc \frac{2}{5}$ |
| **7.** $\frac{4}{12} \bigcirc \frac{7}{3}$ | **8.** $\frac{5}{7} \bigcirc \frac{1}{3}$ | **9.** $\frac{3}{4} \bigcirc \frac{5}{12}$ |
| **10.** $\frac{2}{6} \bigcirc \frac{6}{10}$ | **11.** $\frac{8}{10} \bigcirc \frac{3}{4}$ | **12.** $\frac{7}{4} \bigcirc \frac{7}{8}$ |

**Find the numerator that makes each statement true.**

| | | |
|---|---|---|
| **13.** $\frac{4}{5} > \frac{\square}{10}$ | **14.** $\frac{2}{3} > \frac{\square}{12}$ | **15.** $\frac{3}{8} < \frac{\square}{7}$ |
| **16.** $\frac{4}{6} > \frac{\square}{9}$ | **17.** $\frac{2}{7} > \frac{\square}{14}$ | **18.** $\frac{6}{10} > \frac{\square}{18}$ |
| **19.** $\frac{10}{12} > \frac{\square}{4}$ | **20.** $\frac{2}{5} > \frac{\square}{12}$ | **21.** $\frac{4}{15} > \frac{\square}{6}$ |




**22.** Use the number lines above to compare $\frac{3}{5}$ and $\frac{2}{8}$.

**23.** Use the number lines above. When two fractions are between 0 and $\frac{1}{2}$ how do you know which fraction is greater?

**24.** Maria ate $\frac{4}{12}$ of a pizza and her brother, Jamie ate $\frac{3}{6}$ of a pizza of the same size. Who ate more pizza?

**25.** Arianne read $\frac{8}{10}$ of a book and Leanne read $\frac{2}{5}$ of the same book. Which girl read more of the book?



Chapter 8 Understanding Fractions.indd 85 13/04/18 1:40 PM

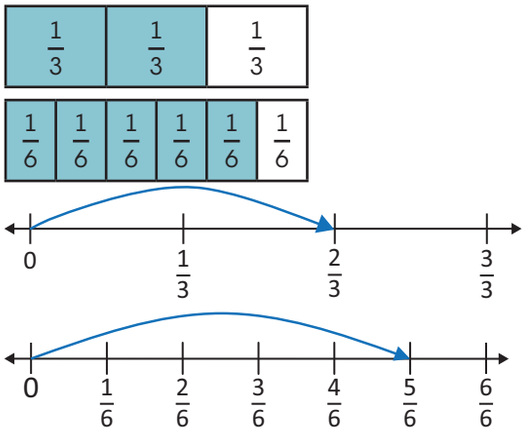
## Teaching Point 2:

*How can you compare fractions?*

In a box of cupcakes $\frac{2}{3}$ are chocolate and $\frac{5}{6}$ are vanilla. Are there more chocolate or vanilla cupcakes?

**Compare $\frac{2}{3}$ and $\frac{5}{6}$.**

**Use a model.**




So, $\frac{2}{3} < \frac{5}{6}$.

**Use equivalent fractions with the same denominator.**

6 is a **multiple** of 3. We can use 6 as the denominator.

$$\frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

Since $\frac{5}{6} > \frac{4}{6}$, there are more vanilla cupcakes than chocolate cupcakes.

## Activity 2:

**Compare the fractions. Write <, > or =.**

| | | | | | |
|---|---|---|---|---|---|
| **1.** | $\frac{1}{2} \bigcirc \frac{4}{6}$ | **2.** | $\frac{3}{4} \bigcirc \frac{2}{8}$ | **3.** | $\frac{3}{5} \bigcirc \frac{4}{10}$ |
| **4.** | $\frac{4}{9} \bigcirc \frac{2}{3}$ | **5.** | $\frac{1}{7} \bigcirc \frac{2}{14}$ | **6.** | $\frac{6}{8} \bigcirc \frac{2}{4}$ |
| **7.** | $\frac{3}{12} \bigcirc \frac{1}{6}$ | **8.** | $\frac{5}{7} \bigcirc \frac{10}{21}$ | **9.** | $\frac{2}{4} \bigcirc \frac{4}{12}$ |
| **10.** | $\frac{3}{5} \bigcirc \frac{12}{20}$ | **11.** | $\frac{8}{10} \bigcirc \frac{3}{5}$ | **12.** | $\frac{7}{18} \bigcirc \frac{1}{2}$ |

## Teaching Point 3:

*How can you compare fractions?*

Which is greater, $\frac{2}{3}$ *or* $\frac{3}{4}$?

**Compare $\frac{2}{3}$ and $\frac{3}{4}$.**

**Use equivalent fractions with common denominators.**

Find common multiples for 3 and 4.

Multiples of 3 are: 3, 6, 9, (12), 15...

Multiples of 4 are: 4, 8, (12)...

12 is a **common multiple** of 3 and 4. We can use 12 as a **common denominator**.

$$\frac{2 \times 4}{3 \times 4} = \frac{8}{12} \text{ and } \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

Since, $\frac{8}{12} < \frac{9}{12}$. Then, $\frac{2}{3} > \frac{3}{4}$.



Chapter 8 Understanding Fractions.indd 86 13/04/18 1:40 PM

## Activity 3:

**Compare the fractions. Write < or >.**

| | | |
|---|---|---|
| **1.** $\frac{1}{2} \bigcirc \frac{2}{3}$ | **2.** $\frac{3}{4} \bigcirc \frac{4}{5}$ | **3.** $\frac{3}{5} \bigcirc \frac{1}{2}$ |
| **4.** $\frac{4}{6} \bigcirc \frac{3}{4}$ | **5.** $\frac{3}{7} \bigcirc \frac{2}{3}$ | **6.** $\frac{6}{8} \bigcirc \frac{2}{3}$ |
| **7.** $\frac{3}{4} \bigcirc \frac{5}{7}$ | **8.** $\frac{3}{7} \bigcirc \frac{1}{3}$ | **9.** $\frac{2}{4} \bigcirc \frac{5}{9}$ |
| **10.** $\frac{3}{6} \bigcirc \frac{4}{9}$ | **11.** $\frac{8}{10} \bigcirc \frac{3}{4}$ | **12.** $\frac{6}{8} \bigcirc \frac{8}{10}$ |

**Solve the problems.**

**13.** Lennie had a carton of orange juice and a carton of apple juice. He drank $\frac{1}{5}$ of the orange juice and $\frac{3}{10}$ of the apple juice. Which carton has more juice left?

**14.** Which fraction below is **NOT greater** than $\frac{1}{2}$?

a) $\frac{7}{8}$ b) $\frac{4}{6}$

c) $\frac{3}{5}$ d) $\frac{5}{12}$

**15.** Jamie ran $\frac{3}{4}$ km on Sunday and $\frac{2}{3}$ km on Monday. On which day did Jamie run farther?

**16.** One-third of a garden has lettuce. Four twelfths of the same garden has peppers. Which fraction of the garden is smaller?

**17.** Mrs. Smith has 24 cupcakes. She sold $\frac{1}{3}$ of them on Monday and $\frac{2}{6}$ of them on Tuesday. On which day did she sell more cupcakes?

**18.** Mickey has one hour to get ready for school. He spends $\frac{3}{6}$ of the time taking a bath and $\frac{1}{4}$ of the time eating breakfast. Does Mickey spend more time taking a bath or eating breakfast?

**19.** Adanna eats $\frac{2}{5}$ of a pizza. Ricardo eats $\frac{1}{3}$ of the same pizza. Who ate more of the pizza?



**Pizza 1** **Pizza 2**

**20.** Pizza 1 and Pizza 2 are the same size. If seven slices of Pizza 1 and five slices of Pizza 2 were eaten, which had more pizza left?

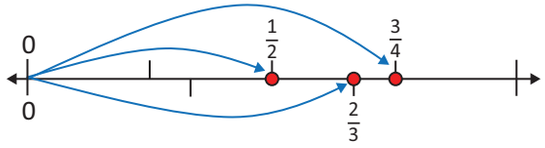
## Teaching Point 4:

*How can you order fractions?*

Order the fractions $\frac{2}{3}$, $\frac{1}{2}$ and $\frac{3}{4}$ from least to greatest ?

**Compare $\frac{2}{3}$, $\frac{1}{2}$ and $\frac{3}{4}$.**

**Use a number line.**






Chapter 8 Understanding Fractions.indd 87 13/04/18 1:40 PM

So, the fractions in order from least to greatest is: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$.

**Use equivalent fractions with common denominators.**

Find common multiples for 2, 3 and 4.

Multiples of 2 are: 2, 4, 6, 8, 10, 12 ...

Multiples of 3 are: 3, 6, 9, 12 15...

Multiples of 4 are: 4, 8, 12 ...

12 is a **common multiple** of 2, 3 and 4. We can use 12 as a **common denominator**.

$\frac{2 \times 3}{3 \times 4} = \frac{8}{12}$, $\frac{1 \times 6}{2 \times 6} = \frac{6}{12}$ and $\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

So, $\frac{1}{2}$ is the **smallest** fraction, and $\frac{3}{4}$ is the **largest** fraction.

The fractions in order from least to greatest is $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$.

## Activity 4:

**Order the fractions from least to greatest.**

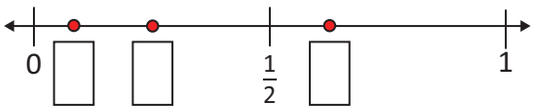
| | |
|---|---|
| **1.** $\frac{1}{2}, \frac{2}{3}, \frac{3}{5}$ | **2.** $\frac{5}{10}, \frac{1}{3}, \frac{3}{5}$ |
| **3.** $\frac{3}{4}, \frac{7}{8}, \frac{4}{6}$ | **4.** $\frac{2}{3}, \frac{1}{4}, \frac{5}{6}$ |
| **5.** $\frac{1}{2}, \frac{1}{5}, \frac{4}{10}$ | **6.** $\frac{4}{6}, \frac{7}{12}, \frac{5}{10}$ |
| **7.** $\frac{1}{8}, \frac{3}{6}, \frac{7}{12}$ | **8.** $\frac{3}{4}, \frac{7}{8}, \frac{1}{5}$ |
| **9.** $\frac{3}{8}, \frac{2}{5}, \frac{2}{10}$ | **10.** $\frac{3}{5}, \frac{2}{4}, \frac{1}{3}$ |

**Solve the problems below.**

**11.** Anton rode his bike $\frac{4}{6}$ km on Monday, $\frac{6}{12}$ km on Tuesday and $\frac{5}{8}$ km on Wednesday. Which day did he ride the farthest?

**12.** Alana has done $\frac{3}{4}$ of her Mathematics homework, $\frac{2}{3}$ of her Language homework and $\frac{4}{8}$ of her Science homework. Which subject is most complete?

**13.** Some students voted for their favourite sport. Cricket got $\frac{1}{4}$ of the votes, football got $\frac{5}{8}$ of the votes and swimming got $\frac{1}{12}$ of the votes. Use the number line below to show the fractions in order.




**14.** Rachel completed a race in $\frac{4}{6}$ of an hour, Karen in $\frac{1}{4}$ of an hour, and David in $\frac{1}{2}$ an hour. Order the runners from least to greatest amount of time taken to complete the race.



Chapter 8 Understanding Fractions.indd 88 13/04/18 1:40 PM

## Chapter Review

**Solve the problems below.**

1. $\frac{3}{9} = \frac{9}{\square}$

2. Compare the fractions $\frac{3}{6}$ and $\frac{3}{9}$. Which fraction is larger?

3. Express $\frac{11}{3}$ as a mixed number.

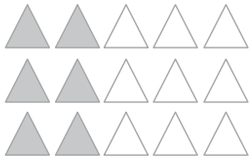
4. What fraction of the set below is white?



5. Write $\frac{12}{16}$ in its lowest equivalent form.

6. Write $2\frac{1}{6}$ as an improper fraction.

7. Complete the fraction to show the fraction of the set that is shaded.



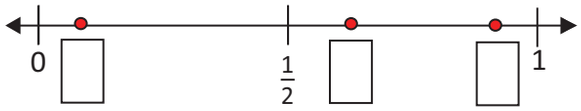
$\frac{\square}{5}$

8. A board is cut into 12 equal pieces. How many pieces together represent $\frac{3}{4}$ of the board? Explain how you arrived at your answer.

9. Amanda and Jacob made a banner. $\frac{2}{5}$ of the banner was blue, $\frac{1}{5}$ was red and the rest was white. What fraction of the banner was white?

10. Three boys ate a pizza. Jack ate $\frac{2}{4}$, Andrew ate $\frac{3}{8}$ and Mark ate $\frac{3}{24}$ of the pizza. Who ate most of the pizza?

11. Write each of the fractions $\frac{3}{5}$, $\frac{1}{12}$, and $\frac{9}{10}$ in the correct box on the number line below.



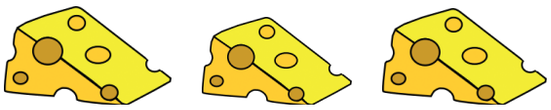

12. At Mount Hope Hospital 9 out of the 12 babies born on Christmas day were boys. In simplest form, what fraction of the babies born on Christmas day were girls?

13. Dylan needs to measure $\frac{1}{2}$ litre lemon juice to make lemonade. How many times should he fill his $\frac{1}{4}$ litre measuring cup?

14. Jayden ran $\frac{5}{8}$ of a kilometre and Keisha ran $\frac{3}{4}$ of a kilometre. Who ran farther?

15. Benjamin has enough money to buy less than $\frac{1}{2}$ kg of cheese. Which piece of cheese should Benjamin buy?

**Cheese 1** **Cheese 2** **Cheese 3**



$\frac{3}{8}$ kg $\frac{3}{4}$ kg $\frac{4}{7}$ kg

16. Each day for 7 days, Mr. Charles used $\frac{1}{2}$ can of paint. Write the mixed number that represents how much paint Mr. Charles used after 7 days.

17. Mrs. Lee cut a pizza in half. She cut each half into 2 equal pieces and



Chapter 8 Understanding Fractions.indd 89 13/04/18 1:40 PM

then each piece into 3 equal slices. She served 8 slices. What fraction of the pizza did Mrs. Lee serve?

**18.** Deandre bought 12 fruits. Four of the fruits were apples and the rest were oranges. What fraction of the fruits were oranges?

**19.** A box has a total of 15 chocolate and vanilla cupcakes. There are 5 more chocolate cupcakes than vanilla cupcakes. What fraction of cupcakes are vanilla?

**20.** Mr. Johnson ran $\frac{3}{4}$ km on Monday, $\frac{5}{8}$ km on Tuesday and $\frac{1}{2}$ km on Wednesday. On which day did he run the shortest distance?

**21.** $\frac{2}{5}$ of Maria's beads are red. If Maria has 10 red beads, how many beads does Maria have altogether?

**22.** Kyle's mother made a pone and a cake. She cut the pone into 6 equal parts and the cake into 8 equal parts. His family ate $\frac{3}{4}$ of the cake. If his family ate more pone than cake, what fraction of the pone could have been eaten?

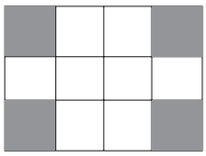


**23.** A class has 20 trays of poster paints. In each tray there are six colours. One of the colours is red. What fraction of the colours in the 20 trays is red?

**24.** A bag has 6 carrots, 2 cabbages and 8 tomatoes. What fraction of the vegetables are tomatoes?

**25.** Write a fraction with a denominator of 9. The fraction should be less than $\frac{1}{2}$.

**26.** Vinod wants to shade $\frac{2}{3}$ of the figure. He has shaded 4 squares. How many more squares must he shade?



**27.** Mother bought 12 fruits at the market. 4 of the fruits were apples and the rest were oranges. What fraction of the fruits were oranges?

**28.** A bouquet has 12 flowers. One sixth of them are roses and the rest are carnations. How many carnations are in the bouquet?

**29.** Javan ran 12 laps around the field to run a total of 1 kilometre on Sunday. How many laps will he need to run on Monday to run $\frac{4}{6}$ of a kilometre?

**30.** Lexi has 24 sweets. She gave $\frac{1}{2}$ of her sweets to Mia and $\frac{2}{3}$ of the remainder to her sister. How many sweets does she have left?

**31.** Mala has done $\frac{3}{4}$ of her Science homework, $\frac{6}{8}$ of her Mathematics homework, and $\frac{1}{2}$ of her Social Studies homework. Which subject is most complete? Which subject does she have the most left to do?

**32.** Miss Andrews cuts a cheese pizza and a vegetable pizza into a total of 25 equal slices. She cuts the vegetable pizza into 9 more pieces than the cheese pizza. Harry ate 4 slices of the vegetable pizza. What fraction of the vegetable pizza did he eat?



Chapter 8 Understanding Fractions.indd 90 13/04/18 1:40 PM

CHAPTER

9

# Add and Subtract Fractions

**Vocabulary:**

numerator
denominator
common multiple
unlike denominator
like denominator

**Chapter Outcomes:**

- Develop and apply procedures to solve problems involving fractions and the four operations.



When you work you have to be able to give clear instructions. Many of these instructions include accurate calculations in addition and subtraction of fractions. Workers in all areas must be able to calculate fractions. The workers who construct our roads and highways use addition and subtraction of fractions to calculate road lengths, amount of material and so on.

## Getting Ready for Chapter 9

**1. Choose the best term from the box.**

| | |
|---|---|
| common multiple | simplest form |
| numerator | denominator |

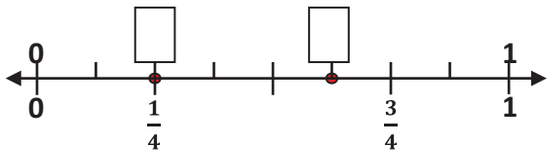
a) The multiple that two or more numbers have in common is called a _____.

b) The _____ represents the total number of parts in all.

c) The number above the fraction bar in a fraction is known as the _____.

---

**2.** Write the missing equivalent fractions.




**3.** What is $\frac{3}{6} + \frac{2}{6}$?

**4.** Subtract $\frac{2}{8}$ from $\frac{5}{8}$.

**5.** What is $\frac{1}{4}$ of 12?

---

## Add and Subtract Fractions with Like Denominators

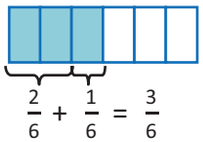
### Teaching Point 1:

*When can you add and subtract parts of a whole?*

Alina ate $\frac{2}{6}$ of a sandwich and Mark ate $\frac{1}{6}$ of the sandwich. How much of the sandwich did they eat in total?

Find $\frac{2}{6} + \frac{1}{6}$

**Use a model.**




**Use a rule.**

The denominators are the **same** so, **add** the numerators.

$\frac{2}{6} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6}$

They ate $\frac{3}{6}$ of the sandwich.

---

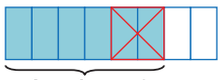
Mary used $\frac{6}{8}$ of a length of fabric and Jane used $\frac{2}{8}$ of the length of fabric. How much more fabric did Mary used than Jane?

Find $\frac{6}{8} - \frac{2}{8}$.



Chapter 9 Add and Subtract Fractions.indd 92 06/03/18 12:22 PM

**Use a model.**



$\frac{6}{8} - \frac{2}{8} = \frac{4}{8}$

**Use a rule.**

The denominators are the **same** so, **subtract** the numerators.

$\frac{6}{8} - \frac{2}{8} = \frac{6-2}{8} = \frac{4}{8}$

Mary used $\frac{4}{8}$ more of the fabric than Jane.

## Activity 1:

**Add or subtract.**

| | | |
|---|---|---|
| **1.** $\frac{3}{6} + \frac{2}{6} =$ | **2.** $\frac{1}{3} + \frac{1}{3} =$ | **3.** $\frac{5}{10} - \frac{3}{10} =$ |
| **4.** $\frac{1}{4} + \frac{2}{4} =$ | **5.** $\frac{3}{5} - \frac{2}{5} =$ | **6.** $\frac{6}{7} - \frac{2}{7} =$ |
| **7.** $\frac{1}{6} + \frac{4}{6} =$ | **8.** $\frac{4}{9} - \frac{2}{9} =$ | **9.** $\frac{2}{8} + \frac{4}{8} =$ |
| **10.** $\frac{2}{7} + \frac{3}{7} - \frac{1}{7} =$ | | **11.** $\frac{2}{8} + \frac{2}{8} + \frac{3}{8} =$ |

**12.** What is the sum of three fifths and one fifth?

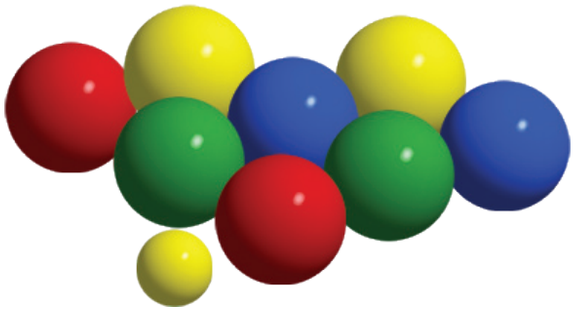
**13.** Find the missing value in the number statement below.

$\frac{4}{12} + \frac{\square}{12} - \frac{3}{12} = \frac{2}{12}$

**14.** Mother buys 6 oranges, 2 pawpaws and some mangoes. If she buys 12 fruits in all, what fraction of the fruits are mangoes?

**15.** Andrew had a whole pizza. He gave a fraction of the pizza to his friends. He now has $\frac{3}{12}$ of the pizza left. How much of the pizza did he give away?

**16.** Vinod painted $\frac{2}{7}$ of a wall, then he painted another $\frac{3}{7}$ of the wall. How much of the wall did he paint in all?



**17.** What fraction of the set of balls is either red or yellow?

**18.** A piece of ribbon is $\frac{9}{10}$ m long. A piece measuring $\frac{4}{10}$ m is cut off. What is the length of the remaining piece?

# Add Fractions to a Whole Number

## Teaching Point 1:

*How can you add a fraction to a whole number?*

Christian has 2 oranges and Mike has $\frac{1}{2}$ of an orange. How many oranges do they have altogether?

Find $2 + \frac{1}{2}$.



Chapter 9 Add and Subtract Fractions.indd 93 06/03/18 12:22 PM

| Use real objects. | Use a model. |
|---|---|
|  $1 + 1 + \frac{1}{2} = 2\frac{1}{2}$ |  $1 + 1 + \frac{1}{2} = 2\frac{1}{2}$ |

They have $2\frac{1}{2}$ oranges altogether.

## Activity 1:

**Add the fractions to the whole numbers.**

| | |
|---|---|
| **1.** $2 + \frac{3}{6} + \frac{2}{6} =$ | **2.** $\frac{1}{3} + \frac{1}{3} + 8 =$ |
| **3.** $\frac{1}{4} + 4 + \frac{2}{4} =$ | **4.** $1 + \frac{3}{5} + \frac{2}{5} =$ |
| **5.** $6 + \frac{1}{6} + 3 =$ | **6.** $\frac{4}{9} + 2 + \frac{2}{9} + 3 =$ |

**7.** What is the sum of 3 and $\frac{5}{7}$?

**8.** Mother made a fruit salad. She used 1 and $\frac{2}{4}$ pineapples, 1 pawpaw and $\frac{1}{4}$ of a watermelon. How much fruits did she use in total?

**9.** Rianna puts 2 and $\frac{2}{6}$ spoonfuls of rice on her plate. She puts 3 spoonfuls of rice on her sister's plate and $\frac{3}{6}$ of a spoonful on her brother's plate. How many spoonfuls did they all have on their plates?

**10.** Maria used $\frac{3}{10}$ kg of flour to make some cupcakes and 2 kg of flour to make bread. How much flour did she use in all?

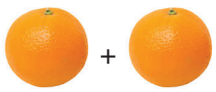
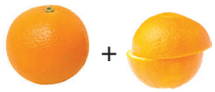
# Subtract Fractions from a Whole Number

## Teaching Point 1:

*How can you subtract a fraction from a whole number?*

Subtract $\frac{1}{2}$ from 2.

**Method 1:**

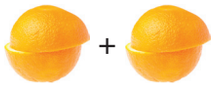
| First, change the whole number to mixed number. | Then, subtract like fractions. |
|---|---|
|  $2 = 1 + 1$  $2 = 1 + \frac{2}{2} = 1\frac{2}{2}$ |  $1\frac{2}{2} - \frac{1}{2} = 1\frac{1}{2}$ |

So, $2 - \frac{1}{2} = 1\frac{1}{2}$.



Chapter 9 Add and Subtract Fractions.indd 94 06/03/18 12:22 PM

**Method 2:**

| | |
|---|---|
|  $2 = \frac{2}{2} + \frac{2}{2} = \frac{4}{2}$ or $2 = \frac{2}{1} \overset{\times 2}{=} \frac{4}{2}$ | Convert the whole number to an improper fraction. |
|  $\frac{4}{2} - \frac{1}{2} = \frac{3}{2}$ | Subtract like fractions. |
|  $\frac{3}{2} = 1\frac{1}{2}$ | Convert the improper fraction to a mixed number. |

So, $2 - \frac{1}{2} = 1\frac{1}{2}$.

## Activity 1:

**Find each difference.**

| | |
|---|---|
| **1.** $2 - \frac{3}{7} =$ | **2.** $5 - \frac{4}{9} =$ |
| **3.** $4 - \frac{2}{4} =$ | **4.** $1 - \frac{3}{5} =$ |
| **5.** $6 - \frac{1}{6} =$ | **6.** $2 - \frac{2}{9} =$ |
| **7.** $1 - \frac{7}{12} =$ | **8.** $3 - \frac{4}{16} =$ |
| **9.** $8 - \frac{1}{3} + \frac{2}{3} =$ | **10.** $7 - \frac{1}{2} + \frac{1}{2} =$ |

**11.** A jug has 4 litres of juice. Andrew pours $\frac{3}{4}$ litre of juice in a glass. How much juice is left in the jug?

**12.** Hanifah's pencil is 7 cm long. Keisha's pencil is $\frac{6}{10}$ cm shorter than Hanifah's pencil. What is the length of Keisha's pencil?



5 kg



$\frac{2}{5}$ kg

**13.** What is the difference between the mass of the watermelon and the mass of the bananas?

**14.** Mrs. Ali bought 2 metres of fabric. She used $\frac{1}{2}$ metre to make a pillow case. How much of the fabric is left?



Chapter 9 Add and Subtract Fractions.indd 95 06/03/18 12:22 PM

15. Ming and Lin shared a pizza. Ming ate $\frac{3}{8}$ of the pizza and Lin ate $\frac{4}{8}$ of the pizza. What fraction of the pizza was left?

16. Alaina had 2 metres of ribbon. She cut off $\frac{3}{8}$ of a metre. What fraction of the ribbon is left?

17. Baby Matthew weighed 9 kg on his first birthday. One month before he was $\frac{7}{10}$ kg less. What was his weight one month before his first birthday?

18. On Sunday Tariq sold 4 buckets of mangoes. On Monday he sold $\frac{5}{8}$ of a bucket of mangoes. How much more mangoes did he sell on Sunday than on Monday?

## Add Fractions with One Denominator a Multiple of the Other

### Teaching Point 1:

*How can you use equivalent fractions to add fractions?*

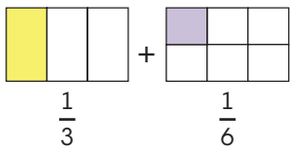
Pranaya ate $\frac{1}{3}$ of a pizza. Malika ate $\frac{1}{6}$ of the same pizza. What fraction of the pizza did they eat altogether?

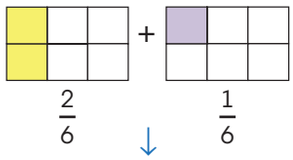
Find $\frac{1}{3} + \frac{1}{6}$.

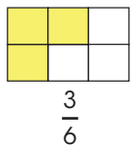
**Method 1: Model $\frac{1}{3} + \frac{1}{6}$.**

Use fraction models for $\frac{1}{3}$ and $\frac{1}{6}$.

Change the model for the $\frac{1}{3}$ so that the whole has the same number of parts as the model for the $\frac{1}{6}$.
Then add $\frac{1}{6}$ to the model for $\frac{2}{6}$.




$$\frac{2+1}{6} = \frac{3}{6}$$

**Method 2: Use an equivalent fraction.**

$$\frac{1}{3} + \frac{1}{6} = \frac{1 \times 2}{3 \times 2} + \frac{1}{6}$$

$$= \frac{2}{6} + \frac{1}{6}$$

$$= \frac{2+1}{6}, \text{ or } \frac{3}{6}$$

Find an **equivalent fraction** to $\frac{1}{3}$ that has the **same denominator** as $\frac{1}{6}$. Then **add**.

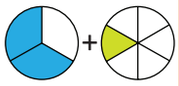
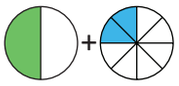
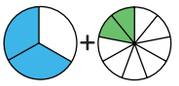
So, $\frac{2}{6} + \frac{1}{6} = \frac{3}{6}$.



Chapter 9 Add and Subtract Fractions.indd 96 06/03/18 12:22 PM

## Activity 1:

**Use a model to find each sum.**

| | | |
|---|---|---|
| **1.** $\frac{2}{3} + \frac{1}{6} =$  | **2.** $\frac{1}{2} + \frac{2}{8} =$  | **3.** $\frac{1}{3} + \frac{2}{9} =$  |
| **4.** $\frac{3}{8} + \frac{1}{4} =$ | **5.** $\frac{3}{12} + \frac{1}{3} =$ | **6.** $\frac{2}{5} + \frac{5}{10} =$ |
| **7.** $\frac{4}{10} + \frac{1}{5} =$ | **8.** $\frac{3}{7} + \frac{5}{21} =$ | **9.** $\frac{4}{24} + \frac{2}{6} =$ |
| **10.** $\frac{1}{5} + \frac{3}{10} + \frac{4}{20} =$ | **11.** $\frac{2}{8} + \frac{1}{4} + \frac{3}{16} =$ | |
| **12.** $\frac{2}{9} + \frac{3}{18} + \frac{1}{3} =$ | **13.** $\frac{1}{2} + \frac{2}{7} + \frac{1}{14} =$ | |

**Use any method to add.**

**14.** Find the sum of $\frac{1}{6}$ and $\frac{3}{12}$.

**15.** Add $\frac{1}{2}$, $\frac{2}{8}$ and $\frac{3}{16}$.

**16.** What is $\frac{2}{7} + \frac{4}{21}$?

**17.** Aman spent $\frac{1}{10}$ of his weekly allowance on a box of coloured pencils and $\frac{2}{5}$ of it on a colouring book. What fraction of Aman's allowance is this altogether?

**18.** A cake was cut into 8 equal-sized pieces. Stacy ate $\frac{1}{4}$ of the cake. Adam ate $\frac{3}{8}$ of the cake. What part of the cake did Stacy and Adam eat in all?

**19.** Ming uses $\frac{1}{4}$ metre of blue string and $\frac{3}{8}$ metre of red string for an art project. What is the total length of string Ming uses?

**20.** Anton filled $\frac{2}{6}$ of his plate with rice and $\frac{1}{3}$ of the plate with stewed chicken. He left the rest of the plate empty. How much of his plate did Anton fill with food?

**21.** Mrs. Smith used $\frac{1}{4}$ litre of orange juice, $\frac{1}{2}$ litre of grapefruit juice and $\frac{1}{8}$ litre of lime juice to make fruit punch. How much fruit juice did she use in total?

**22.** Maya makes a salad by combining $\frac{1}{3}$ cup of lettuce, $\frac{1}{4}$ cup of tomatoes, and $\frac{1}{12}$ cup of carrots. What is the total amount of vegetables in her salad?

**23.** A farmer plants $\frac{7}{10}$ of his garden in pumpkin. After a few weeks, the pumpkin spread to cover another $\frac{1}{5}$ of the garden. What fraction of the garden is now covered in pumpkin?

**24.** Mickell uses $\frac{1}{5}$ litre to water a small plant, and he uses $\frac{5}{10}$ litre to water a large plant. Now he has $\frac{2}{10}$ litre left in the pitcher. How much water did Mickell have in the beginning?

**25.** Malika measures the lengths of 3 ribbons. Ribbon A is $\frac{1}{3}$ metre long. Ribbon B is $\frac{3}{6}$ metre long, and Ribbon C is $\frac{2}{12}$ metre long. What is the total length of all three ribbons.



Chapter 9 Add and Subtract Fractions.indd 97 06/03/18 12:22 PM

## Subtract Fractions with One Denominator a Multiple of the Other

### Teaching Point 1:

*How can you use equivalent fractions to subtract fractions?*

Malik has $\frac{2}{3}$ of a cake. He gave away $\frac{3}{6}$ of the cake. What fraction of the cake did he have left?

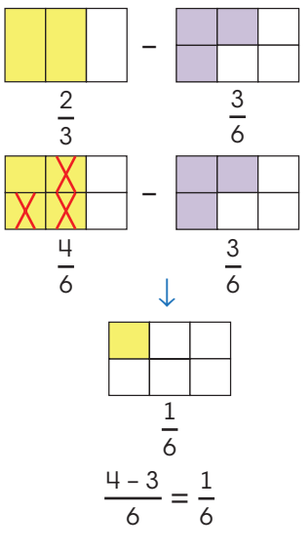
Find $\frac{2}{3} - \frac{3}{6}$.

**Method 1: Model** $\frac{2}{3} - \frac{3}{6}$.

Use fraction models for $\frac{2}{3}$ and $\frac{3}{6}$.

**Change** the model for the $\frac{2}{3}$ so that it has the same number of parts as the model for the $\frac{3}{6}$.

Then **remove** $\frac{3}{6}$ from the model for $\frac{4}{6}$.




$\frac{4-3}{6} = \frac{1}{6}$

**Method 2: Use an equivalent fraction.**

$\frac{2}{3} - \frac{3}{6} = \frac{2 \times 2}{3 \times 2} - \frac{3}{6}$

$= \frac{4}{6} - \frac{3}{6}$

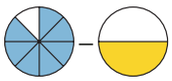
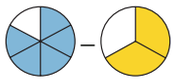
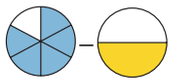
$= \frac{4-3}{6}$, or $\frac{1}{6}$

Find an **equivalent fraction** to $\frac{2}{3}$ that has the **same denominator** as $\frac{3}{6}$. Then **subtract**.

So, $\frac{2}{3} - \frac{3}{6} = \frac{1}{6}$.

### Activity 1:

**Use models to find each difference.**

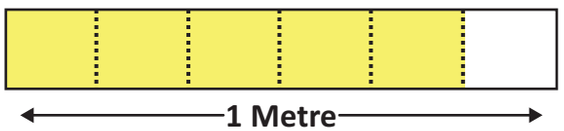
| | | |
|---|---|---|
| **1.** $\frac{7}{8} - \frac{1}{2} =$  | **2.** $\frac{5}{6} - \frac{2}{3} =$  | **3.** $\frac{5}{6} - \frac{1}{2} =$  |
| **4.** $\frac{5}{8} - \frac{1}{4} =$ | **5.** $\frac{3}{4} - \frac{4}{12} =$ | **6.** $\frac{3}{5} - \frac{5}{10} =$ |
| **7.** $\frac{4}{9} - \frac{1}{3} =$ | **8.** $\frac{9}{14} - \frac{2}{7} =$ | **9.** $\frac{9}{12} - \frac{3}{6} =$ |
| **10.** $\frac{7}{12} - \frac{2}{4} =$ | **11.** $\frac{14}{16} - \frac{3}{4} =$ | **12.** $\frac{8}{9} - \frac{2}{3} =$ |

**Use any method to add and subtract.**

**13.** Find $\frac{2}{6} + \frac{1}{3} - \frac{3}{12} =$ using a model or a common denominator.

**14.** Find $\frac{1}{2} - \frac{1}{4} + \frac{4}{8} =$ using a model or a common denominator.

**15.** Jervon ate $\frac{1}{2}$ of a pizza and Lauren ate $\frac{3}{8}$ of a same sized pizza. Who ate more pizza? How much more pizza?




**16.** The diagram above shows what Tina had left from a metre of fabric. She now uses $\frac{2}{3}$ metre of fabric to make



Chapter 9 Add and Subtract Fractions.indd 98 06/03/18 12:22 PM

a curtain. How much of the fabric does Tina have left after making the curtain?

**17.** Which fraction correctly completes the statement?

$$\frac{2}{3} - \frac{\square}{\square} = \frac{1}{6}$$

**18.** Danielle poured $\frac{3}{4}$ litre of water from a filled $\frac{7}{8}$ litre bucket of water. How much water is left in the bucket?

**19.** You use $\frac{3}{10}$ litre lime juice and $\frac{1}{2}$ litre grapefruit drink to make a punch. You drink $\frac{2}{10}$ litre. How much punch do you have left?

**20.** Aleem is making a jug of juice. He mixes $\frac{1}{4}$ litre of orange juice and $\frac{1}{2}$ litre of water.

**a)** How much juice did he make?

**b)** If he had $\frac{5}{8}$ litre of orange juice at first, how much is left after making the jug of juice?

**21.** Three friends share a pizza divided into eighths. If each person eats one slice, how many more slices must be eaten so that $\frac{1}{4}$ of the pizza remains?

**22.** Alina and Alex each ordered a medium pizza. Alina ate $\frac{3}{5}$ of her pizza for lunch and $\frac{2}{10}$ for a snack. Alex ate $\frac{1}{2}$ of his pizza for lunch and $\frac{4}{10}$ for a snack. How much more pizza did Alex eat?

**23.** Amara spent $\frac{1}{4}$ of her savings on a bicycle and $\frac{3}{12}$ of her savings on a gift for her family at Christmas. What fraction of her savings is left?

## Add and Subtract Fractions and Mixed Numbers

### Teaching Point 1:

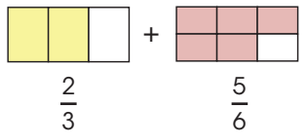
*How can you express the sum of fractions as a mixed number?*

Varun played football for $\frac{2}{3}$ of an hour on Sunday and $\frac{5}{6}$ of an hour on Monday. How long did Varun play on both days?

Find $\frac{2}{3} + \frac{5}{6}$.

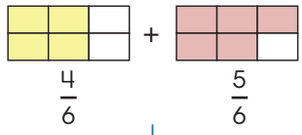
**Method 1: Model** $\frac{2}{3} + \frac{5}{6}$.

Use fraction models for $\frac{2}{3}$ and $\frac{5}{6}$.



$\frac{2}{3}$ $\frac{5}{6}$

Change the model for the $\frac{2}{3}$ so that it has the same number of parts as the model for the $\frac{5}{6}$.



$\frac{4}{6}$ $\frac{5}{6}$



Add the fractions.

$$\frac{4+5}{6} = \frac{9}{6}$$

Then Simplify.

$$\frac{9}{6} = \frac{6}{6} + \frac{3}{6}$$

$$= 1\frac{3}{6}$$



Chapter 9 Add and Subtract Fractions.indd 99 06/03/18 12:22 PM

**Method 2: Use an equivalent fraction to add.**

$\frac{2}{3} + \frac{5}{6} = \frac{2 \times 2}{3 \times 2} + \frac{1}{6}$

↓

$= \frac{4}{6} + \frac{5}{6}$

$= \frac{4 + 5}{6}$,

*or* $\frac{9}{6}$

The **denominator** 6 is a **multiple** of 3.
Write $\frac{2}{3}$ as $\frac{4}{6}$.
Then **add**.

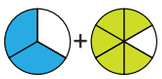
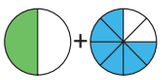
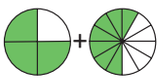
Express $\frac{9}{6}$ as $1\frac{3}{6}$.

$\frac{9}{6} = \frac{6}{6} + \frac{3}{6} = 1\frac{3}{6}$

So, Varun played for $1\frac{3}{6}$ hours.

## Activity 1:

**Find each sum. Express improper fractions as mixed numbers.**

| | | |
|---|---|---|
| 1. $\frac{2}{3} + \frac{5}{6} =$  | 2. $\frac{1}{2} + \frac{6}{8} =$  | 3. $\frac{3}{4} + \frac{7}{12} =$  |
| 4. $\frac{5}{8} + \frac{2}{4} =$ | 5. $\frac{9}{12} + \frac{2}{3} =$ | 6. $\frac{4}{5} + \frac{7}{10} =$ |
| 7. $\frac{8}{10} + \frac{3}{5} =$ | 8. $\frac{5}{7} + \frac{15}{21} =$ | 9. $\frac{6}{8} + \frac{9}{16} =$ |
| 10. $\frac{2}{5} + \frac{6}{10} + \frac{4}{5} =$ | | 11. $\frac{3}{8} + \frac{1}{2} + \frac{3}{4} =$ |
| 12. $\frac{6}{9} + \frac{3}{18} + \frac{2}{3} =$ | | 13. $\frac{1}{2} + \frac{3}{7} + \frac{4}{14} =$ |

14. Anisha rides $\frac{7}{10}$ of a kilometre to the park on her bicycle. Then she rides $\frac{4}{5}$ of a kilometre to the shop. How many kilometres did she ride in all?

15. Miss Browne sold 6 out of 12 slices of chocolate cake and 4 out of 6 slices of sponge cake at the bazaar. How much cake did she sell altogether?

16. The depth of the water in a tank is $\frac{3}{4}$ of a metre. Mark pours water into the tank and the depth increases by $\frac{1}{2}$ metre. How deep is the water in the tank now?

17. One recipe calls for $\frac{5}{8}$ of a litre of milk. Another recipe calls for $\frac{3}{4}$ of a litre of milk. You have $1\frac{1}{2}$ litres of milk at home. Do you have enough milk to make both recipes? Explain.

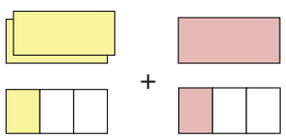
## Teaching Point 2:

*How can you add and subtract mixed numbers and fractions with like denominators?*

**Find $2\frac{1}{3} + 1\frac{1}{3}$.**

**Method 1: Model $2\frac{1}{3} + 1\frac{1}{3}$.**

1. Use **fraction models** for $2\frac{1}{3}$ and $1\frac{1}{3}$.

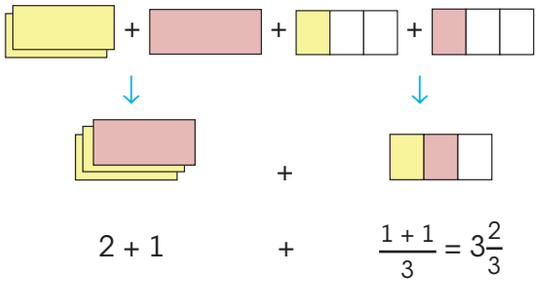


$2\frac{1}{3}$ + $1\frac{1}{3}$



Chapter 9 Add and Subtract Fractions.indd 100 06/03/18 12:22 PM

**2.** **Add** the **wholes** and add the **fractions**.



$2 + 1 + \frac{1+1}{3} = 3\frac{2}{3}$

So, $\mathbf{2\frac{1}{3} + 1\frac{1}{3} = 3\frac{2}{3}}$.

## Activity 2:

**Find each sum. Simplify.**

| | |
|---|---|
| **1.** $1\frac{2}{9} + 2\frac{1}{9} =$ | **2.** $3\frac{1}{4} + 3\frac{2}{4} =$ |
| **3.** $1\frac{2}{8} + 2\frac{1}{8} + 1\frac{3}{8} =$ | **4.** $\frac{3}{12} + 1\frac{2}{12} + 3\frac{2}{12} =$ |
| **5.** $\frac{5}{9} + 1\frac{3}{9} + 1\frac{4}{9} =$ | **6.** $1\frac{2}{10} + 3\frac{5}{10} + 2\frac{3}{10} =$ |
| **7.** $3\frac{4}{6} + 1\frac{2}{6} + 1\frac{5}{6} =$ | **8.** $\frac{2}{5} + 1\frac{3}{5} + 1\frac{1}{5} =$ |
| **9.** $2\frac{1}{7} + \frac{3}{7} + 1\frac{5}{7} =$ | **10.** $1\frac{1}{2} + 2\frac{1}{2} + 1\frac{1}{2} =$ |

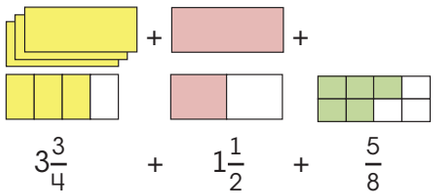
## Teaching Point 3:

*How can you add mixed numbers and fractions with unlike denominators?*

Vitali made a fruit punch with $3\frac{3}{4}$ litres of water, $1\frac{1}{2}$ litres of orange juice, and $\frac{5}{8}$ of a litre of lemon juice. How much fruit punch did he make?

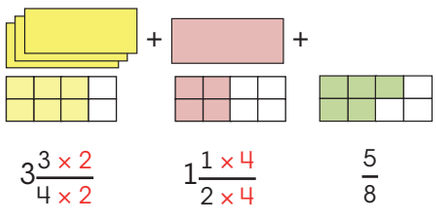
**Find $\mathbf{3\frac{3}{4} + 1\frac{1}{2} + \frac{5}{8}}$.**

**1.** Use **fraction models** for $3\frac{3}{4}$, $1\frac{1}{2}$ and $\frac{5}{8}$.



$3\frac{3}{4} + 1\frac{1}{2} + \frac{5}{8}$

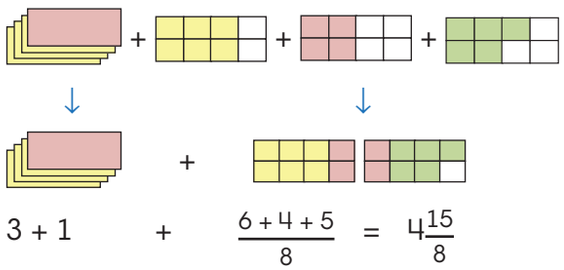
**2.** **Change** the **models** for the $\frac{3}{4}$ and $\frac{1}{2}$ so that they have the same number of parts as $\frac{5}{8}$.



$3\frac{3\times2}{4\times2} \quad 1\frac{1\times4}{2\times4} \quad \frac{5}{8}$

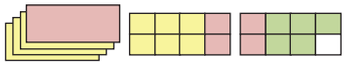
$3\frac{6}{8} + 1\frac{4}{8} + \frac{5}{8}$

**3.** **Add** the **wholes** and the **fraction**.



$3 + 1 + \frac{6+4+5}{8} = 4\frac{15}{8}$

**4.** **Simplify**. Change the improper fraction to a mixed number.



$4\frac{15}{8} = 4 + 1 + \frac{7}{8} = 5\frac{7}{8}$

So, Vitali made $5\frac{7}{8}$ litres of fruit punch.



Chapter 9 Add and Subtract Fractions.indd 101 06/03/18 12:22 PM

## Activity 3:

**Find the sum. Write your answer in simplest form.**

| | |
|---|---|
| **1.** $1\frac{2}{6} + 2\frac{1}{2} =$ | **2.** $3\frac{2}{4} + 1\frac{3}{8} =$ |
| **3.** $1\frac{2}{7} + 2\frac{3}{14} =$ | **4.** $\frac{7}{12} + 1\frac{2}{4} + 3\frac{1}{3} =$ |
| **5.** $\frac{5}{9} + 1\frac{2}{3} + 1\frac{4}{18} =$ | **6.** $1\frac{2}{10} + \frac{1}{2} + 2\frac{3}{5} =$ |
| **7.** $4\frac{1}{8} + 2\frac{2}{6} + 1\frac{4}{24} =$ | **8.** $5\frac{5}{6} + 2\frac{3}{4} + 1\frac{2}{12} =$ |
| **9.** $6\frac{3}{4} + 1\frac{5}{8} + 2\frac{1}{2} =$ | **10.** $1\frac{1}{4} + \frac{1}{2} + 3\frac{6}{8} =$ |

**Solve the problems.**

**11.** Mother had $4\frac{1}{2}$ kilograms of flour at home. She bought $2\frac{3}{4}$ kilograms more. How much flour does she have now?

**12.** A cake shop sold $4\frac{6}{12}$ chocolate cakes, $2\frac{1}{2}$ sponge cakes and 1 cheese cake. How many cakes did the shop sell altogether?

**13.** Alex jogged $3\frac{1}{3}$ times around the savannah on Monday and $4\frac{5}{6}$ times around the savannah on Tuesday. How many times did he jog around the savannah on both days?

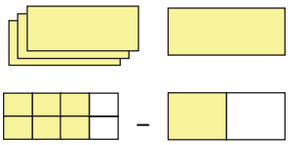
**14.** Alisha is making some juice. She mixes $2\frac{3}{4}$ litres of orange juice and $1\frac{1}{2}$ litres of grapefruit juice. How much water must she add to the juice to make 5 litres of juice?

**15.** Kris used $7\frac{8}{10}$ cm of tape to wrap her sister's gift and $6\frac{1}{2}$ cm more to wrap her brother's gift. What is the total amount of tape Kris used to wrap the gifts?

## Teaching Point 4:

*How can you subtract mixed numbers with unlike denominators?*

Javan has $2\frac{6}{8}$ litres of soft drink. He gave away $1\frac{1}{2}$ litres. How much soft drink does he have left?

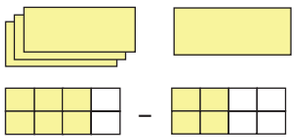


**Find $2\frac{6}{8} - 1\frac{1}{2}$.**

**1.** Use **fraction models** for $2\frac{6}{8}$ and $1\frac{1}{2}$.

$2\frac{6}{8}$ $\quad$ $1\frac{1}{2}$

**2.** **Change** the **model** for the $\frac{1}{2}$ so that it has the same number of parts as $\frac{6}{8}$.



$2\frac{6}{8} - 1\frac{1 \times 4}{2 \times 4}$

$\downarrow \qquad \downarrow$

$2\frac{6}{8} - 1\frac{4}{8}$

**3.** **Subtract** the **whole** and the **fraction**.



$2 - 1 = 1$ $\qquad$ $\frac{6-4}{8} = \frac{2}{8}$

$\downarrow$



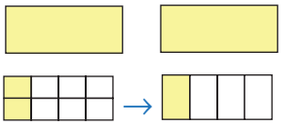
$1\frac{2}{8}$



Chapter 9 Add and Subtract Fractions.indd 102 06/03/18 12:22 PM

**4.** **Simplify** $\frac{2}{8}$.

Reduce $\frac{2}{8}$ to its lowest term.



$$1\frac{2 \div 2}{8 \div 2} \rightarrow 1\frac{1}{4}$$

So, Javan had $1\frac{1}{4}$ litres of soft drink left.

## Activity 4:

**Find each sum or difference. Simplify.**

| | |
|---|---|
| **1.** $2\frac{5}{6} - 2\frac{2}{3} =$ | **2.** $3\frac{2}{4} - 1\frac{3}{8} =$ |
| **3.** $4\frac{5}{7} - 2\frac{3}{14} =$ | **4.** $1\frac{3}{4} - \frac{4}{12} =$ |
| **5.** $7\frac{7}{10} - 2\frac{4}{20} =$ | **6.** $4\frac{6}{8} - 2\frac{1}{2} =$ |
| **7.** $6\frac{2}{3} - 1\frac{3}{9} =$ | **8.** $5\frac{1}{2} - 2\frac{2}{10} =$ |
| **9.** $4\frac{1}{8} + 2\frac{2}{4} - 2\frac{3}{8} =$ | **10.** $5\frac{1}{6} + \frac{2}{3} - 1\frac{3}{12} =$ |
| **11.** $6\frac{1}{5} + 1\frac{6}{10} - 4\frac{4}{10} =$ | **12.** $3\frac{1}{2} - 1\frac{1}{4} + 1\frac{1}{8} =$ |

**Solve the problems.**

Three students walk to school each day. The table shows the distances they walk to get to school.

| Distances Students Walk | |
|---|---|
| **Student** | **Distance in km** |
| Aliya | $1\frac{1}{2}$ km |
| Shenelle | $2\frac{4}{5}$ km |
| Aleke | $3\frac{5}{10}$ km |

**13.** How much farther does Aleke walk than Aliya?

**14.** What is the distance that the three children walked altogether?

**15.** If Shenelle walked her distance twice in one day, how much farther would she have walked than Aleke?

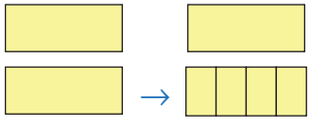
## Teaching Point 5:

*How can you subtract a fraction from a whole number?*

A cupboard is 2 metres tall. Vanna is $1\frac{1}{4}$ metres tall. How much taller is the cupboard than Vanna?

**Find** $2 - 1\frac{1}{4}$.

**1.** 0 quarters is less than $\frac{1}{4}$. **Convert** 2 to $1\frac{4}{4}$ to show more **quarters**.



$2 = 1\frac{4}{4}$



Chapter 9 Add and Subtract Fractions.indd 103 06/03/18 12:22 PM

**2.** **Subtract** the **whole** and the **fraction**.



$1 - 1 = 0$ $\quad \frac{4-1}{4} = \frac{3}{4}$

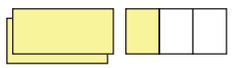
The cupboard is $\frac{3}{4}$ of a metre taller than Vanna.

---

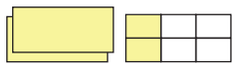
**Find** $2\frac{1}{3} - 1\frac{3}{6}$.

**1.** **Write an equivalent fraction.**

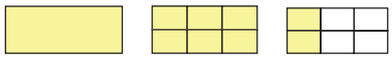
$2\frac{1}{3} - 1\frac{3}{6} = 2\frac{1 \times 2}{3 \times 2} - 1\frac{3}{6}$



$= 2\frac{2}{6} - 1\frac{3}{6}$

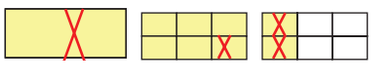


**2.** $\frac{2}{6}$ is less than $\frac{3}{6}$. So **convert** $2\frac{2}{6}$ to show more **sixths**.



$2\frac{2}{6} \rightarrow 1\frac{2+6}{6} = 1\frac{8}{6}$

**3.** **Subtract** the **whole** and the **fraction**.



$1 - 1 = 0$ $\quad \frac{8-3}{6} = \frac{5}{6}$

So, $2\frac{1}{3} - 1\frac{3}{6} = \frac{5}{6}$.

## Activity 5:

**Solve and write the answer in its simplest form.**

| | |
|---|---|
| **1.** $4 - 1\frac{7}{10} =$ | **2.** $5 - 2\frac{7}{8} =$ |
| **3.** $3 - 2\frac{7}{14} =$ | **4.** $3\frac{3}{4} - \frac{10}{12} =$ |
| **5.** $7\frac{2}{10} - 2\frac{9}{10} =$ | **6.** $4\frac{1}{4} - 2\frac{6}{8} =$ |
| **7.** $8\frac{2}{3} - 4\frac{7}{9} =$ | **8.** $3\frac{1}{2} - 1\frac{8}{10} =$ |
| **9.** $4\frac{1}{8} + 2\frac{1}{4} - 2\frac{6}{8} =$ | **10.** $3\frac{1}{6} + \frac{2}{3} - 1\frac{11}{12} =$ |

---

**11.** Mummy bought 5 kilograms of flour. She used $2\frac{3}{10}$ kilograms to make some bread. How much flour is left over?

**12.** Jenny lives $6\frac{1}{2}$ kilometres away from the school. She took a bus to go to school. After travelling $4\frac{6}{10}$ kilometres, of the distance, the bus broke down. How far does Jenny need to walk to get to school?

**13.** Miss Ali had 3 litres of oil. She used $\frac{7}{8}$ litre to make roti. How much oil had she left?

**14.** Mark spent $2\frac{1}{2}$ hours to do his chores. David spent $\frac{3}{4}$ of an hour less to do his chores. How much time did they spend altogether doing their chores?



Chapter 9 Add and Subtract Fractions.indd 104 06/03/18 12:22 PM

15. Three commercials are played in a row between two parts of a cartoon show. The three commercials fill exactly 4 minutes of time. If the first commercial uses $1\frac{1}{6}$ minutes, and the second uses $1\frac{1}{3}$ of a minute, how long is the third commercial?

16. Mother bought 5 litres of orange juice. She used $1\frac{2}{3}$ litres to make fruit punch and gave her children $1\frac{5}{6}$ litres to drink. How much juice does she have left?

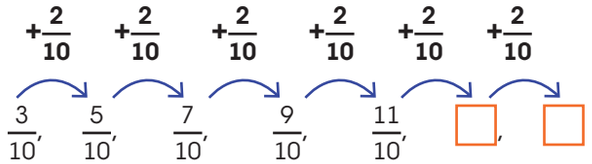
## Number Patterns with Fractions

### Teaching Point 2:

*How can you describe and use patterns?*

***Write the next two elements in the sequence.***

1. First find the **pattern rule**.




The **rule** is ***add*** $\frac{2}{10}$.

2. Then use the rule to find the missing elements.

Therefore, the missing elements are $\frac{13}{10}$ and $\frac{15}{10}$.

### Activity 1:

**Complete each pattern. Write the rule.**

1. $\frac{1}{4}, \frac{3}{4}, \frac{5}{4}, \square, \frac{9}{4}, \frac{11}{4}, \square$

2. $5\frac{1}{2}, 5, \square, 4, 3\frac{1}{2}, \square, 2\frac{1}{2}$

3. $\square, 1\frac{2}{3}, 2\frac{2}{3}, 3\frac{2}{3}, \square,$

4. $10\frac{1}{10}, 8\frac{3}{5}, 7\frac{1}{10}, 5\frac{3}{5}, \square, \square$

5. $\frac{16}{4}, \frac{14}{4}, \square, \square, \frac{8}{4}, \frac{6}{4}$

6. $\frac{2}{8}, \frac{4}{8}, \frac{6}{8}, \square, 1\frac{2}{8}, \square$

7. $\frac{5}{6}, 1\frac{3}{6}, \square, 2\frac{5}{6}, \square, 4\frac{1}{6}$

8. $2\frac{2}{3}, 2\frac{1}{3}, 2, \square, \square, \square$

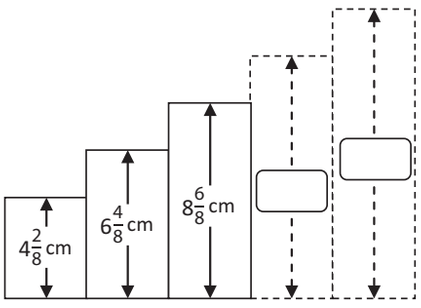
9. $6, 5\frac{2}{5}, \square, 4\frac{1}{5}, 3\frac{3}{5}, \square$

10. $3\frac{1}{2}, 4\frac{5}{6}, 6\frac{1}{6}, 7\frac{1}{2}, \square, \square$

**Solve the pattern problems.**

11. Kiara walked each day for a week. The first day she walked $\frac{1}{8}$ km, the second day she walked $\frac{3}{8}$ km, and the third day she walked $\frac{5}{8}$ km. By how much did she increase the distance she walked each day?

12. Mark is replacing 2 steps at the front a model house. The steps are shown below.






Chapter 9 Add and Subtract Fractions.indd 105 06/03/18 12:22 PM

If the height of each step rise by the same pattern as the first three, what would be the height of the last two steps.

13. Mother is making juice for dinner. She starts with 1 litre of water and adds $\frac{1}{4}$ litre of juice for each person. If she made $4\frac{3}{4}$ litres of juice, how many persons are having dinner?

## Chapter Review

**Solve the problems below.**

1. $3\frac{2}{8} - 1\frac{3}{4} =$

2. $2\frac{4}{5} + 1\frac{7}{10} =$

3. Calculate the sum of $1\frac{3}{4}$ and $\frac{1}{2}$.

4. Complete the number sequence below:
$4\frac{8}{12}$, ☐, 4, $3\frac{8}{12}$, ☐

5. Jane and David shared an apple. Jane ate $\frac{2}{5}$ of the apple and David ate $\frac{3}{10}$ of the apple. What fraction of the apple was left?

6. Mother has $2\frac{1}{4}$ kilograms of flour. She wants to make roti that calls for $4\frac{1}{2}$ kilograms of flour. How much more flour does she need?

7. In Mr. Gaya's class $\frac{1}{3}$ of the children walk to school and $\frac{1}{6}$ of the children drive to school with their parents and the others take the bus. What fraction of the class takes the bus?

8. Ishwar spends $\frac{1}{4}$ of his free time playing video games and $\frac{3}{8}$ of his free time watching television.
   a) What fraction of his free time is spent playing video games and watching television together?
   b) If the remaining time is spent on reading, what fraction is spent on reading?
   c) On which activity does Ishwar spend most of his free time?

9. A bucket has $4\frac{3}{4}$ litres of water in it. Today, $2\frac{1}{2}$ litres of the water is used. Then, the bucket is filled with another $6\frac{3}{4}$ litres of water. What is the amount of water in the bucket now?

10. The mall is $6\frac{2}{10}$ kilometres from Alisha's house. The nearest grocery is $3\frac{4}{5}$ kilometres from her house. How much farther is the mall than the grocery from Alisha's house?



11. Lianne and Javan are hiking the trail to the waterfall. They have already hiked $\frac{2}{8}$ of a kilometre. How much farther do they have to hike to reach the $\frac{3}{4}$ kilometre mark?

12. A craft store sold $7\frac{2}{9}$ metres of green ribbon to Mrs. Ali and $2\frac{1}{3}$ metres



Chapter 9 Add and Subtract Fractions.indd 106 06/03/18 12:22 PM

more red ribbon than green ribbon to Mrs. Thomas. How many metres of red ribbon did the store sell to Mrs. Thomas?



**13.** Three friends share a pizza. Marcus ate $\frac{3}{8}$ of the pizza. Huan ate $\frac{1}{4}$ of the pizza and Alex ate the rest of the pizza.

**a)** What fraction of the pizza did Alex eat?

**b)** Who ate most of the pizza? Use calculations to show how you arrived at your answer.

**14.** Michael's dog is 5 years old. Kristian's dog is $1\frac{1}{6}$ years younger. How old is Kristian's dog?

**15.** Alisha walked $\frac{1}{4}$ km on Monday, $\frac{3}{4}$ km on Tuesday, and $1\frac{1}{4}$ km on Wednesday. If the pattern continues, how many kilometres will she walk on Sunday?

**16.** Leanne mixed $4\frac{4}{6}$ litres of water, $3\frac{1}{3}$ litres of orange juice to make juice. She drank $1\frac{1}{2}$ litres of the juice. How much juice does she have left?

**17.** After a party, a caterer had several boxes, each with 2 sixth-size pieces of cake remaining. The caterer was able to combine these pieces to make 2 whole cakes. How many boxes did the caterer combine?

**18.** In one week, Lexi ran $2\frac{1}{4}$ km for five days. If she began running on Monday, on which day would she have completed 8 km?

**19.** Jared painted his room $\frac{1}{3}$ blue and $\frac{2}{6}$ white. What fraction of the room was not blue or white?

**20.** Marcus has 24 marbles. He gave $\frac{1}{4}$ of his marbles to Alex, and $\frac{1}{3}$ of the remainder to his brother. How many marbles did he have at the end?

**21.** An athlete drank 12 litres of water in three days. If he drank $2\frac{4}{5}$ litres of water on the first day, and $3\frac{7}{10}$ litres on the second day, how much does he drink on the third day?

**22.** During his vacation Michael hiked three days to a waterfall, which was 8 km away. On the first day he hiked $2\frac{2}{5}$ km. On the second day he hiked $1\frac{3}{10}$ km further than on the first day. On the third day he hiked the rest of the way. How far did he hike on the third day?



Chapter 9 Add and Subtract Fractions.indd 107 06/03/18 12:22 PM

CHAPTER

10

# Multiply and Divide Fractions

**Vocabulary:**

simplify
product
factor
reciprocal
inverse
operations

**Chapter Outcomes:**

- Develop and apply procedures to solve problems involving fractions and the four operations.




Multiplying and dividing fractions are used in many jobs and in everyday activities. Cooking, shopping, constructing homes and buildings cannot be done without the use of these operations. Even the fish vendor needs to use multiplication and division of fractions to figure out prices per kilogram at the market.

## Getting Ready for Chapter 10

**Find an equivalent fraction.**

| | | |
|---|---|---|
| **1.** $\frac{3}{4} = \frac{\square}{\square}$ | **2.** $\frac{2}{3} = \frac{\square}{\square}$ | **3.** $\frac{3}{5} = \frac{\square}{\square}$ |

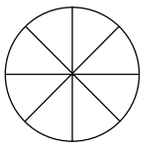
**Write each fraction in its simplest form.**

| | | |
|---|---|---|
| **4.** $\frac{4}{8}$ | **5.** $\frac{6}{9}$ | **6.** $\frac{15}{25}$ |

**Express each improper fraction as a mixed number.**

| | | |
|---|---|---|
| **7.** $\frac{14}{4}$ | **8.** $\frac{12}{5}$ | **9.** $\frac{14}{3}$ |

**10.** Shade $\frac{1}{2}$ of the shape on the right.



**11.** What are the common factors of 8 and 6?

**12.** Find the product of 12 and 5.

## Multiply Fractions by Whole Numbers

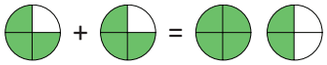
### Teaching Point 1:

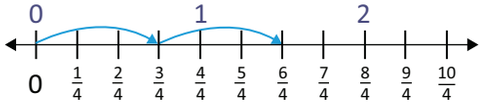
*What are some ways to multiply fractions and whole numbers?*

Two friends eat $\frac{3}{4}$ of a sandwich each. How many sandwiches did they eat?

Find the product of $2 \times \frac{3}{4}$.

**Method 1: Use repeated addition.**





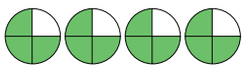
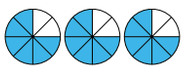
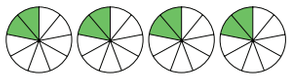

$\frac{3}{4} + \frac{3}{4} = \frac{3+3}{4} = \frac{6}{4}$ *or* $1\frac{2}{4}$

$1\frac{2}{4} = 1\frac{1}{2}$

So, they ate $1\frac{1}{2}$ sandwiches.

### Activity 1:

**Use models or repeated addition to multiply.**

| | |
|---|---|
| **1.** $3 \times \frac{1}{2}$  | **2.** $4 \times \frac{3}{4}$  |
| **3.** $5 \times \frac{2}{3}$  | **4.** $3 \times \frac{6}{8}$  |
| **5.** $4 \times \frac{2}{9}$  | **6.** $3 \times \frac{11}{12}$  |



Chapter 10 Multiply and Divide Fractions.indd 109 08/03/18 3:59 PM

**7.** $3 \times \frac{3}{5}$




**8.** $4 \times \frac{2}{3}$




| | | |
|---|---|---|
| **9.** $4 \times \frac{3}{5}$ | **10.** $10 \times \frac{4}{6}$ | **11.** $9 \times \frac{3}{7}$ |
| **12.** $5 \times \frac{5}{6}$ | **13.** $8 \times \frac{6}{8}$ | **14.** $6 \times \frac{5}{9}$ |

**15.** Jamal is making 5 glasses of juice. He needs $\frac{3}{10}$ litre of water for each glass. How many litres of water does he need?

## Teaching Point 2:

*What are some ways to multiply fractions and whole numbers?*

Find the product of $2 \times \frac{3}{4}$.

**Method 2: Use a rule.**

$2 \times \frac{3}{4}$ ← **Think:** I need to find 2 groups of 3 quarter sized pieces.

$2 \times \frac{3}{4} = \frac{2}{1} \times \frac{3}{4}$ ← Write the whole number 2 as a fraction. $2 \rightarrow \frac{2}{1}$.

$= \frac{2 \times 3}{1 \times 4}$ ← Multiply the numerator. ← Multiply the denominator.

$= \frac{6}{4}$

$= 1\frac{2}{4}$ *or* $1\frac{1}{2}$ ← Simplify your answer.

So, $2 \times \frac{3}{4} = 1\frac{1}{2}$

## Activity 2:

**Use any method to solve. Write the answer in simplest form.**

**1.** Each child eats $\frac{4}{6}$ of a small pizza. How many pizzas are needed to feed 12 children?

**2.** Narveen walks $\frac{4}{5}$ km each day to go to school. How many kilometres would he walk in 10 days?

**3.** The salt in one bag has a mass of $\frac{3}{4}$ kg. What is the mass of 7 of the same size bags of salt?

**4.** Kianna is making bread and wants to triple the recipe. The recipe calls for $\frac{2}{3}$ kg of flour. How much flour would she need?



Chapter 10 Multiply and Divide Fractions.indd 110 08/03/18 3:59 PM

5. Ameena jogs for $\frac{1}{2}$ hour each day for 6 days in a row. Altogether how many hours does she exercise during the 6 days?

6. One lap around the playground is $\frac{1}{4}$ km. Josiah ran around the playground 12 times. How far did he run?

7. Anika lives $\frac{5}{8}$ km from the school. Vinai lives three times as far as Anika from school. How many kilometres does Vinai live away from school?

8. The caterer wants to have enough chicken to feed 24 people. If he wants to provide $\frac{2}{8}$ of a chicken for each person, how much chicken does he need?

9. Kiara studied Science for $\frac{1}{4}$ hour every day last week and studied Mathematics for $\frac{3}{4}$ hour for five days last week. How many hours did Kiara study in total last week?

10. Sandra exercised $\frac{2}{3}$ hour every day for first two weeks of her vacation. Then she exercised $\frac{3}{6}$ hour every day for the next two weeks of her vacation. How many hours did Sandra exercise over the four weeks?

11. Priya uses $\frac{1}{2}$ of a lemon and $\frac{3}{4}$ of an orange to make one glass of juice. How many oranges and lemons will she need to make 8 glasses of juice?

## Fractional Parts of a Set

### Teaching Point 1:

*How can you find the fractional part of a group or collection?*

In a set of 10 marbles, $\frac{3}{5}$ of them are red. How many of the marbles are red?

Find $\frac{3}{5}$ of 10.

$\frac{3}{5} \times 10 = \frac{3 \times 10}{5}$ ← Think of the word "of" as a multiplication symbol.

$= \frac{30}{5}$ ← Simplify

$= 6$

So, 6 marbles are red.

Finding the **fractional part** of a number is the same as multiplying the number by that fraction.

### Activity 1:

| | | |
|---|---|---|
| 1. $\frac{1}{2}$ of 36 | 2. $\frac{2}{5}$ of 15 | 3. $\frac{2}{3}$ of 24 |
| 4. $\frac{3}{4}$ of 12 | 5. $\frac{4}{6}$ of 30 | 6. $\frac{3}{7}$ of 42 |
| 7. $\frac{4}{10}$ of 100 | 8. $\frac{3}{8}$ of 48 | 9. $\frac{6}{9}$ of 18 |
| 10. $\frac{5}{8}$ of 24 | 11. $\frac{2}{6}$ of 18 | 12. $\frac{3}{5}$ of 25 |



Chapter 10 Multiply and Divide Fractions.indd 111 08/03/18 3:59 PM

13. Lianne bought 21 rubber bands from a shop. She gave $\frac{2}{3}$ of them to her brother. How many rubber bands did she have left?

14. There are 30 students in Mr. Samuel's class. $\frac{4}{6}$ of the students are boys. How many of the students in the class are girls?

15. Marika spent $\frac{3}{8}$ of a day sleeping. How many hours did Marika spend sleeping?

16. Alisha had 10 days to do her Science project. She spent $\frac{3}{5}$ of the time collecting data. How much time did she have left to complete the project?

17. Huan had 18 stickers. She gave away $\frac{1}{3}$ of them to her friend. How many stickers does she have left?

18. Mrs. Ramroop bought 16 kg of flour. She used $\frac{3}{8}$ of the flour to make bread.
    a) How much flour did she use?
    b) How much flour does she have left?

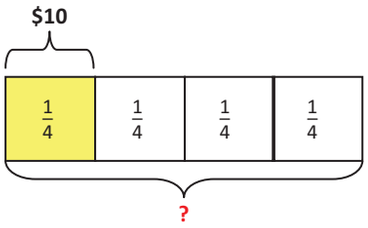
19. Jenny has 24 marbles. $\frac{1}{3}$ of them are blue. The rest of the marbles are either red or yellow. If $\frac{3}{4}$ of the rest are red, how many marbles are yellow?

## Teaching Point 2:

*How can you find the whole given a unit fraction?*

One quarter of Alisha's money is \$10. How much money does she Alisha have altogether?

Use **a model**.




**1 unit or** $\frac{1}{4} \rightarrow$ \$10

**4 units or** $\frac{4}{4} \rightarrow$ \$10 × 4 = \$40

So, Alisha has \$40 altogether.

## Activity 2:

**Use bar models to solve the following problems.**

1. Marissa spent $\frac{1}{6}$ of her daily allowance on a drink. The drink costs \$6. How much money did she have at first?

2. The 18 cans of sardine left on the grocery shelf is $\frac{1}{3}$ of the cans that were offered for sale. How many cans of sardines were offered for sale at the beginning?



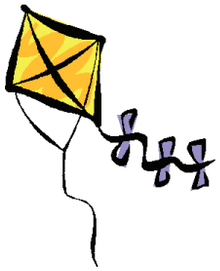
Chapter 10 Multiply and Divide Fractions.indd 112 08/03/18 3:59 PM

3. $\frac{1}{8}$ of the students of a class walk to school every day. If 3 children walk to school, how many children are in the class?

4. A glass contains a liquid mixture of water and grapefruit juice. The grapefruit juice makes up $\frac{1}{5}$ of the amount of the liquid mixture. There are 75 ml of grapefruit juice in the glass. How much water is in the glass?



5. $\frac{1}{5}$ of the weight of a ten year old boy is 6 kg. What is the total weight of the boy?



6. Doug has 13 metres of string, which is $\frac{1}{9}$ of the length of string that he needs to fly his kite. How many metres of string does he need to fly his kite?

7. $\frac{1}{9}$ of the students of a class each ate one banana during recess time. $\frac{1}{3}$ of remaining students ate one apple each and the rest ate one portugal each. If 3 bananas were eaten, how many students ate portugals?

## Multiply Fractions

### Teaching Point 1:

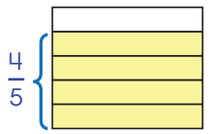
*How can you multiply fractions with models?*

Aleke has $\frac{4}{5}$ of a litre of juice. He shares $\frac{3}{4}$ of it with his friend Jamie. How much juice did he share?

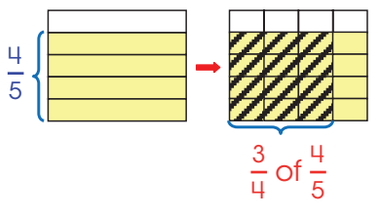
**Find** $\frac{3}{4}$ of $\frac{4}{5}$.

**Model** $\frac{3}{4} \times \frac{4}{5}$.

1. Draw a picture to represent fifths. Shade $\frac{4}{5}$.




2. Draw three vertical lines to show quarters. Draw stripes over $\frac{3}{4}$ of the shaded parts.




$\frac{3}{4} \times \frac{4}{5} = \frac{3}{4}$ of $\frac{4}{5}$

$= \frac{12}{20}$

$= \frac{3}{5}$

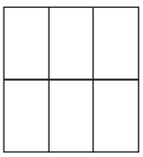
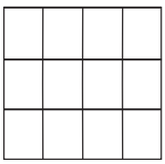
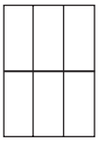
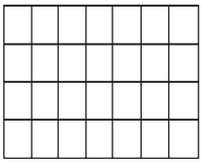
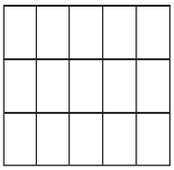
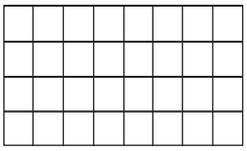
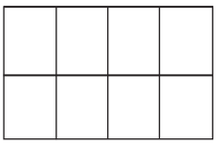
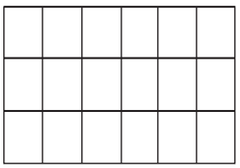
So, Aleke shared $\frac{3}{5}$ of his juice.



Chapter 10 Multiply and Divide Fractions.indd 113 08/03/18 3:59 PM

## Activity 1:

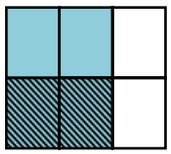
**Shade the models to find each product. Write in simplest form.**

| | |
|---|---|
| **1.** $\frac{1}{2} \times \frac{2}{3} =$  | **2.** $\frac{1}{4} \times \frac{2}{3} =$  |
| **3.** $\frac{2}{3} \times \frac{1}{2} =$  | **4.** $\frac{1}{4} \times \frac{2}{7} =$  |
| **5.** $\frac{1}{3} \times \frac{2}{5} =$  | **6.** $\frac{1}{4} \times \frac{4}{8} =$  |
| **7.** $\frac{3}{4} \times \frac{1}{2} =$  | **8.** $\frac{2}{3} \times \frac{4}{6} =$  |

**Draw models to find each product. Write each product in simplest form.**

| | | |
|---|---|---|
| **9.** $\frac{1}{3} \times \frac{5}{6} =$ | **10.** $\frac{2}{5} \times \frac{5}{10} =$ | **11.** $\frac{2}{6} \times \frac{6}{8} =$ |
| **12.** $\frac{1}{2} \times \frac{4}{9} =$ | **13.** $\frac{2}{7} \times \frac{3}{4} =$ | **14.** $\frac{1}{6} \times \frac{4}{5} =$ |
| **15.** $\frac{1}{2} \times \frac{3}{4} =$ | **16.** $\frac{3}{8} \times \frac{4}{6} =$ | **17.** $\frac{7}{8} \times \frac{1}{2} =$ |

**18.** A product of two fractions is represented by the model below. What are the fractions?



## Teaching Point 2:

*How can you multiply fractions without models?*

**Find** $\frac{3}{4} \times \frac{8}{9}$.

**Method 1: Multiply first. Then simplify.**

$\frac{3}{4} \times \frac{8}{9} = \frac{3 \times 8}{4 \times 9}$ Multiply the numerators and the denominator.

$= \frac{24 \div 12}{36 \div 12}$

$= \frac{2}{3}$ Simplify the fraction.

**Method 2: Simplify first. Then multiply.**

$\frac{3}{4} \times \frac{8}{9} = \frac{3 \div 3}{4} \times \frac{8}{9 \div 3}$ Divide **3** and **9** by the **common factor 3**.

$= \frac{1}{4 \div 4} \times \frac{8 \div 4}{3}$ Divide **4** and **8** by the **common factor 4**.

$= \frac{1 \times 2}{1 \times 3}$ Multiply.

$= \frac{2}{3}$



Chapter 10 Multiply and Divide Fractions.indd 114 08/03/18 3:59 PM

## Activity 2:

**Multiply. Write in simplest form.**

| | | |
|---|---|---|
| **1.** $\frac{4}{9} \times \frac{3}{8} =$ | **2.** $\frac{3}{5} \times \frac{10}{15} =$ | **3.** $\frac{5}{6} \times \frac{4}{5} =$ |
| **4.** $\frac{2}{5} \times \frac{5}{8} =$ | **5.** $\frac{5}{10} \times \frac{3}{9} =$ | **6.** $\frac{4}{10} \times \frac{5}{12} =$ |
| **7.** $\frac{4}{8} \times \frac{3}{6} =$ | **8.** $\frac{5}{7} \times \frac{7}{9} =$ | **9.** $\frac{7}{12} \times \frac{4}{6} =$ |
| **10.** $\frac{1}{2} \times \frac{4}{21} =$ | **11.** $\frac{2}{3} \times \frac{9}{12} =$ | **12.** $\frac{3}{4} \times \frac{6}{12} =$ |

**Solve the problems.**

**13.** Priya has $\frac{4}{8}$ of a chocolate bar. She eats $\frac{1}{2}$ of it. What fraction of the chocolate did she eat?

**14.** Mala had a piece of string that is $\frac{2}{3}$ metre long. She used $\frac{1}{2}$ of it to tie a package. What length of string did she use to tie the package?

**15.** Mother bought $\frac{8}{9}$ of a kilogram of chicken at the grocery. She cooked $\frac{3}{4}$ of the chicken for lunch. How much chicken did she cook for lunch?

**16.** Kimberley made $\frac{4}{5}$ litre of lemonade. She gave $\frac{1}{3}$ of this amount to her friends. How much lemonade did she give away?

**17.** Jamal spent $\frac{7}{10}$ of his allowance at the mall. If he bought a story book with $\frac{3}{5}$ of the money he spent at the mall, what fraction of all his money did he use to buy the story book?

**18.** Mr. Khan has a plot of land. He plants vegetables on $\frac{3}{4}$ of the land. $\frac{2}{3}$ of the vegetables are tomatoes. What fraction of the land is planted with tomatoes?

**19.** $\frac{1}{4}$ of the students of a class did not go on the field trip. Of the students who did not go, $\frac{3}{5}$ of them are boys and rest are girls. What fraction of the class are girls?

## Multiply Mixed Numbers

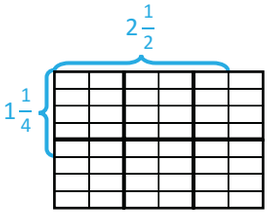
### Teaching Point 1:

*How can you multiply mixed numbers with models?*

Mark jogged $1\frac{1}{4}$ kilometres. His brother jogged $2\frac{1}{2}$ times the distance Mark jogged. How far did Mark's brother jog?

**Find** $1\frac{1}{4} \times 2\frac{1}{2}$.

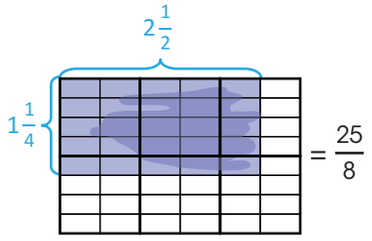
**1.** Use a **Model** to show $1\frac{1}{4} \times 2\frac{1}{2}$.



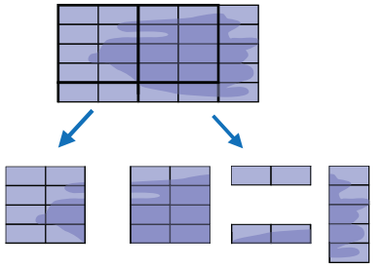



Chapter 10 Multiply and Divide Fractions.indd 115 08/03/18 3:59 PM

2. **Shade** the parts that represent the product. **Count** the shaded parts.




3. **Rearrange** the shaded parts.



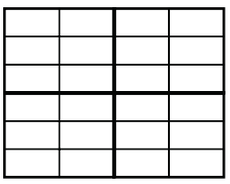
$$1 + 1 + \frac{9}{8} = 3\frac{1}{8}$$

So, Mark's brother jogged $3\frac{1}{8}$ kilometres.

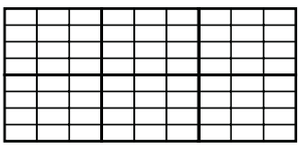
## Activity 1:

**Shade the models to find each product. Write in simplest form.**

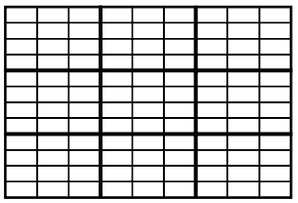
1. $1\frac{2}{3} \times 1\frac{1}{2} =$



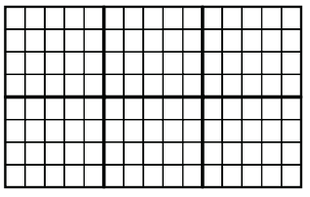
2. $1\frac{1}{4} \times 1\frac{1}{3} =$



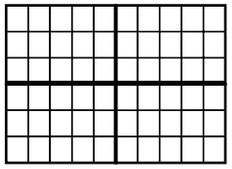
3. $2\frac{1}{4} \times 2\frac{2}{3} =$



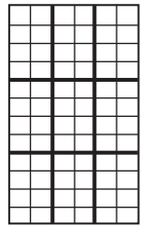
4. $1\frac{1}{4} \times 2\frac{2}{5} =$



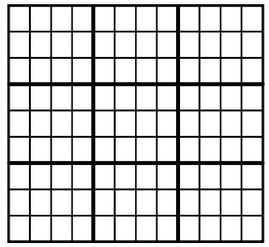
5. $1\frac{1}{3} \times 1\frac{2}{5} =$



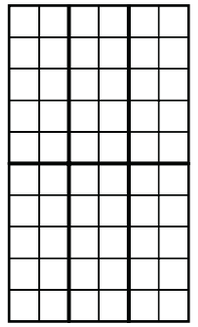
6. $2\frac{3}{4} \times 2\frac{1}{2} =$



7. $2\frac{1}{3} \times 2\frac{3}{4} =$



8. $1\frac{2}{5} \times 2\frac{1}{2} =$



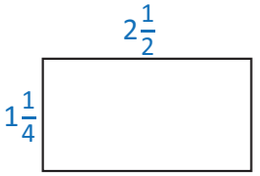
## Teaching Point 2:

*How can you multiply mixed numbers with area models?*

**Find** $1\frac{1}{4} \times 2\frac{1}{2}$.

1. Use an Area Model to show

$1\frac{1}{4} \times 2\frac{1}{2}$



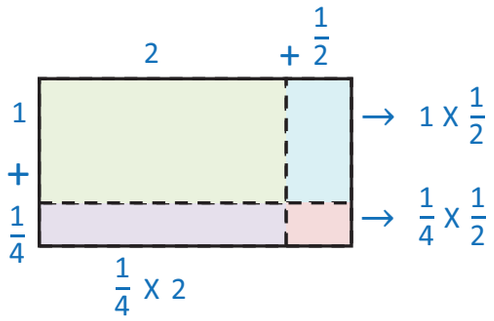

2. **Rewrite** each factor as the sum of a whole number and a fraction.

$1\frac{1}{4} = 1 + \frac{1}{4}$ and $2\frac{1}{2} = 2 + \frac{1}{2}$



Chapter 10 Multiply and Divide Fractions.indd 116 08/03/18 3:59 PM

3. **Label** area model to show how you broke apart the mixed numbers above.




4. Find the **area** of each section.

| | |
|---|---|
| $1 \times 2 = 2$<br>$1 \times \frac{1}{2} = \frac{1 \times 1}{1 \times 2} = \frac{1}{2}$ | $\frac{1}{4} \times 2 = \frac{1 \times 2}{4 \times 1} = \frac{2}{4}$<br>$\frac{1}{4} \times \frac{1}{2} = \frac{1 \times 1}{4 \times 2} = \frac{1}{8}$ |

5. **Add** the areas of each section to find the total area of the model.

$$2 + \frac{1}{2} + \frac{2}{4} + \frac{1}{8} = 2 + \frac{1 \times 4}{2 \times 4} + \frac{2 \times 2}{4 \times 2} + \frac{1}{8}$$

$$2 + \frac{4}{8} + \frac{4}{8} + \frac{1}{8} = 2\frac{9}{8} \text{ or } 2 + \frac{8}{8} + \frac{1}{8} \text{ or } 3\frac{1}{8}$$

So, $1\frac{1}{4} \times 2\frac{1}{2} = 3\frac{1}{8}$

## Activity 2:

**Use a model to find each product.**

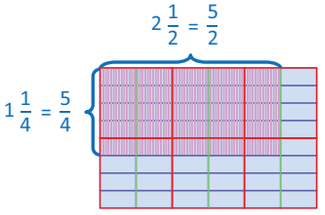
| | | |
|---|---|---|
| **1.** $1\frac{1}{4} \times 3\frac{5}{8} =$ | **2.** $2\frac{1}{2} \times 4\frac{3}{5} =$ | **3.** $1\frac{2}{3} \times 3\frac{3}{4} =$ |
| **4.** $2\frac{1}{4} \times 4\frac{1}{5} =$ | **5.** $1\frac{1}{3} \times 3\frac{2}{3} =$ | **6.** $1\frac{1}{4} \times 4\frac{2}{5} =$ |
| **7.** $2\frac{4}{5} \times 3\frac{1}{3} =$ | **8.** $1\frac{1}{4} \times 3\frac{3}{5} =$ | **9.** $1\frac{3}{4} \times 2\frac{7}{8} =$ |
| **10.** $1\frac{3}{9} \times 3\frac{6}{12} =$ | **11.** $2\frac{5}{8} \times 1\frac{2}{5} =$ | **12.** $1\frac{3}{4} \times 5\frac{4}{11} =$ |
| **13.** $1\frac{4}{6} \times 2\frac{3}{8} =$ | **14.** $3\frac{2}{6} \times 1\frac{6}{12} =$ | **15.** $3\frac{9}{10} \times 3\frac{5}{12} =$ |

## Teaching Point 3:

*How can you multiply mixed numbers without models?*

**Find** $1\frac{1}{4} \times 2\frac{1}{2}$.

1. **Write** each mixed number as an **improper fraction**.




2. **Multiply** the improper fractions.

$$\frac{5}{4} \times \frac{5}{2} = \frac{5 \times 5}{4 \times 2}$$

$$= \frac{25}{8}$$

3. **Simplify**.

$$\frac{25}{8} = 3\frac{1}{8}$$

So, $1\frac{1}{4} \times 2\frac{1}{2} = 3\frac{1}{8}$



Chapter 10 Multiply and Divide Fractions.indd 117 08/03/18 3:59 PM

## Activity 3:

**Solve the problems. Write in simplest form.**

1. What is $2\frac{3}{5} \times 3\frac{3}{4}$?

2. Mother bought $1\frac{1}{4}$ kilograms of sugar and flour that was $2\frac{3}{4}$ times the weight of the sugar. How much did the flour weigh?

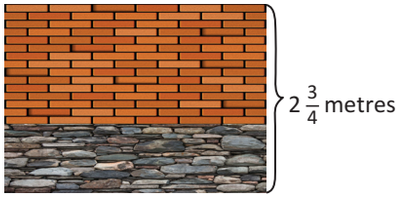
3. The living room rug is $2\frac{2}{5}$ metres long and $1\frac{1}{4}$ metres wide. What is the area of the rug?

4. Kevin's favourite movie is $1\frac{3}{4}$ hours long. He watched it $3\frac{1}{2}$ times. How many hours has Kevin spent watching the movie?

5. The height of a mango tree is $5\frac{4}{8}$ metres while the coconut tree is $2\frac{1}{4}$ the height of the mango tree. How tall is the coconut tree?

6. Jian is making a sign to advertise the school walkathon. The width of the sign is $1\frac{2}{3}$ metres. If the length is $4\frac{2}{10}$ times the width of the sign, what is the length of the sign?

7. The wall at the side of a building is shown below. If $1\frac{1}{4}$ of the height of the wall is made from brick, what is the height of the brick portion of the wall?




# Relate Fractions to Division

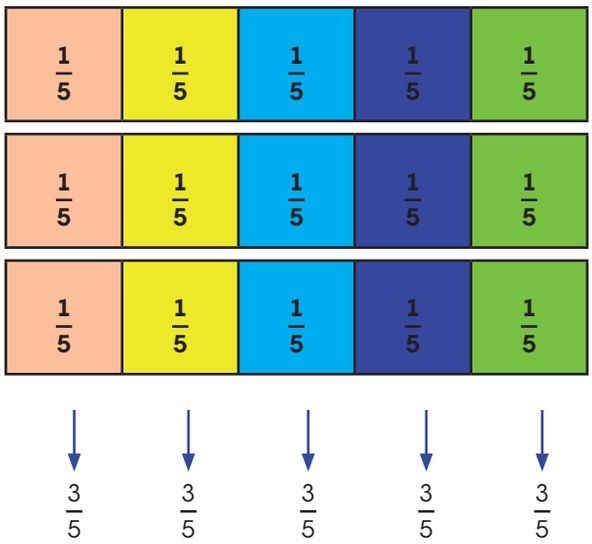
## Teaching Point 1:

*How do you divide a whole number by a unit fraction?*

Three chocolate bars are shared equally among 5 children. How many of the chocolate bars did each child eat?

**Find 3 ÷ 5.**

Use **a model** to represent **3 ÷ 5**. **Divide** each chocolate bar into 5 equal parts.

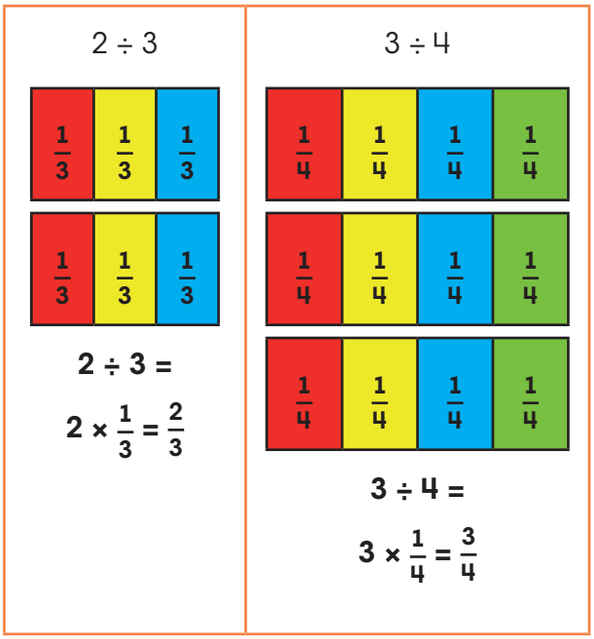



Each child's share of one chocolate bar is $\frac{1}{5}$. Since there are 3 chocolate bars, each child gets 3 of the $\frac{1}{5}$s, or $\frac{3}{5}$ of a whole chocolate bar.

$$3 \div 5 = 3 \times \frac{1}{5} = \frac{3}{5}$$



Chapter 10 Multiply and Divide Fractions.indd 118 08/03/18 3:59 PM




The denominator represents the number of shares, and the numerator represents the number of objects being shared.

## Activity 1:

**Tell what fraction each person gets.**

1. Three children share two sandwiches.
2. Two students share 1 sheet of paper.
3. Five friends share 2 chocolate bars.
4. Eight boys run an equal part of a 5 kilometre race.
5. Six friends share 5 bottles of water.

**Solve the problems below.**

6. A group of friends went on an outing. They shared 3 sandwiches equally. If each person got $\frac{3}{4}$ of a sandwich, how many friends were in the group?
7. Eight girls shared 4 metres of ribbon equally. What fraction did each girl get?
8. Mother had 3 packs of juice. She poured equal amounts of juice into 5 glasses for her children to drink. Which number sentence can be used to find the fraction of a bottle of juice that each child received?

   a) $3 \times 5 = \square$

   b) $3 \div 5 = \square$

   c) $5 \times 3 = \square$

   d) $5 \div 3 = \square$

# Divide A Whole Number by a Fraction

## Teaching Point 1:

*How do you divide a whole number by a **unit** fraction?*

Maria has a ribbon that is 2 metres long. She cuts the ribbon in $\frac{1}{5}$ metre pieces. How many pieces of ribbon will she get?

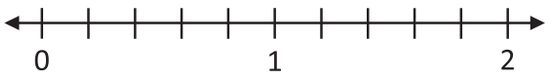
**Find $2 \div \frac{1}{5}$.**



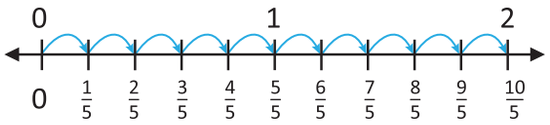
Chapter 10 Multiply and Divide Fractions.indd 119 08/03/18 3:59 PM

**Method 1:** Use **a model**.

1. **Draw** a fraction strip to represent the ribbon. **Divide** each metre into **fifths**.




2. **Skip-count** by fifths from 0 to 2 to find $2 \div \frac{1}{5}$.




Number of fifths in 1 whole = 5

Number of fifths in 2 wholes = 2 × 5

So, $2 \div \frac{1}{5} = 2 \times 5$ ← Write as a multiplication expression.

$= 10$

So, Maria gets 10 pieces of ribbon.

---

reciprocals

$2 \div \frac{1}{5} = 10$ and $2 \times 5 = 10$

same result

Dividing by $\frac{1}{5}$ and multiplying by 5 gives the same result. Two numbers whose **product** is **1** are called **reciprocals**. The reciprocal of 5 is $\frac{1}{5}$.

$$2 \div \frac{1}{5} = \frac{2}{1} \times \frac{5}{1} = 10$$

Use multiplication to check.

$$2 \div \frac{1}{5} = 10 \text{ because}$$

$$10 \times \frac{1}{5} = \frac{10 \div 5}{1} \times \frac{1}{5 \div 5} = 2$$

## Activity 1:

1. Draw four circles and cut them out. Divide each circle in half by cutting it.

   a) How many halves are there?

   b) Write the division number sentence to show what you have done.

2. Draw, divide and cut circles to complete the table below.

| Number of Circles | Fraction | Number of Pieces | Number Sentence |
|---|---|---|---|
| 2 | $\frac{1}{2}$ | ____ | $2 \div \frac{1}{2} = \square$ |
| 3 | $\frac{1}{4}$ | ____ | ____ |
| 5 | $\frac{1}{3}$ | ____ | ____ |
| 6 | $\frac{1}{5}$ | ____ | ____ |

3. What pattern do you observe between the number of circles and the number of pieces?

4. What happens when you divide a whole number by a fraction?

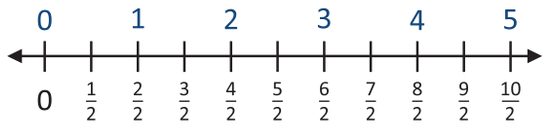
5. How are dividing a whole number by $\frac{1}{3}$ and multiplying by 3 related? Explain.

6. Find each quotient. Use a model. Check using multiplication.

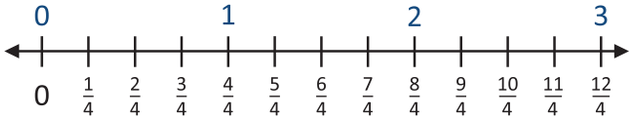
   a) $5 \div \frac{1}{2} = \square$ **Check** $\square \times \frac{1}{2} = \square$



Chapter 10 Multiply and Divide Fractions.indd 120 08/03/18 3:59 PM




**b)** $3 \div \frac{1}{4} =$ ☐ **Check** ☐ $\times \frac{1}{4} =$ ☐




**c)** $3 \div \frac{1}{3} =$ ☐ **Check** ☐ $\times \frac{1}{3} =$ ☐




**7.** Divide 4 by $\frac{1}{5}$.

**8.** How many $\frac{1}{4}$ of a kilogram of flour are there in 4 kilograms of flour?

**9.** Mother makes 3 sandwiches. Each sandwich is cut into halves. How many children can she serve if she gives each child $\frac{1}{2}$ of a sandwich?

**10.** Alex spends 4 hours washing cars. If he washes each car in $\frac{1}{4}$ of an hour. How many cars can he wash during that time?

**11.** Melissa uses $\frac{1}{5}$ can of dog food to feed her pet dog each day. How many servings will she get from the 5 cans of dog food?

**12.** Draw a picture and explain how dividing by $\frac{1}{4}$ and dividing by the number 4 is different.

**13.** A cake recipe calls for $\frac{1}{4}$ litre of milk. You have 4 litres of milk. How many cakes can you make with the milk that you have?

## Teaching Point 2:

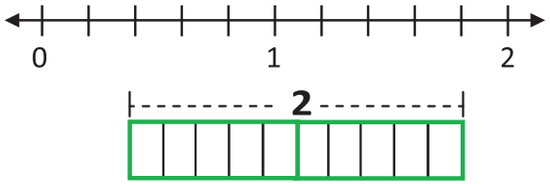
*How do you divide a whole number by a* ***non-unit*** *fraction?*

A baker cuts 2 cakes into pieces. Each piece represents $\frac{2}{5}$ of a cake. How many pieces of cake would he get?

**Find $2 \div \frac{2}{5}$.**

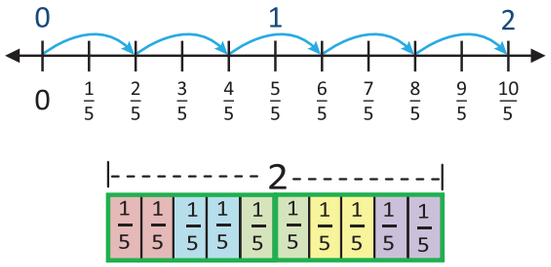
Use **a model** to represent $\mathbf{2 \div \frac{2}{5}}$.

**1.** Use a **model** to represent 2 wholes divided into fifths.




There are **10** parts in 2.

**2.** **Count** the groups of $\frac{2}{5}$s which take up the 10 parts.




There are **5** groups of $\frac{2}{5}$**s** in the 10 parts.

The baker will get 5 pieces of cake.



Chapter 10 Multiply and Divide Fractions.indd 121 08/03/18 3:59 PM

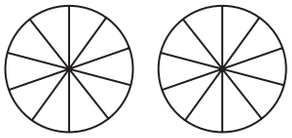
**Division** and **multiplication** are inverse operations. So check division problems using multiplication.

$2 \div \frac{2}{5} = 5$ because $5 \times \frac{2}{5} = \frac{\cancel{5}^{1} \times 2}{\cancel{5}_{1}} = \mathbf{2}$

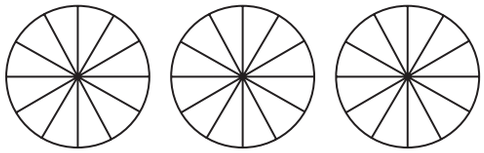
## Activity 2:

**Find each quotient. Use a model. Check using multiplication.**

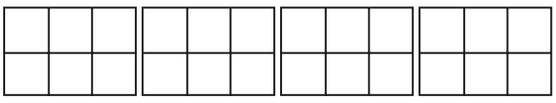
**1.** $2 \div \frac{2}{10} = \square$ **Check** $\square \times \frac{2}{10} = \square$



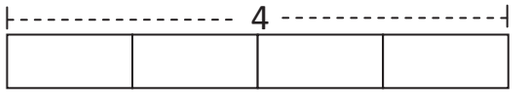
**2.** $3 \div \frac{9}{12} = \square$ **Check** $\square \times \frac{9}{12} = \square$



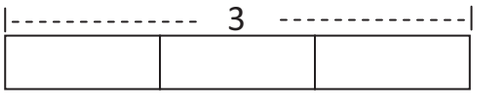
**3.** $4 \div \frac{3}{6} = \square$ **Check** $\square \times \frac{3}{6} = \square$



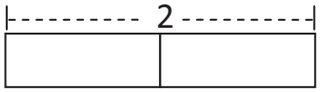
**4.** $4 \div \frac{2}{3} = \square$ **Check** $\square \times \frac{2}{3} = \square$



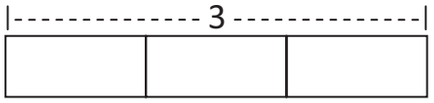

**5.** $3 \div \frac{3}{5} = \square$ **Check** $\square \times \frac{3}{5} = \square$




**6.** $2 \div \frac{2}{4} = \square$ **Check** $\square \times \frac{2}{4} = \square$




**7.** $3 \div \frac{2}{6} = \square$ **Check** $\square \times \frac{2}{6} = \square$




## Teaching Point 3:

*How do you divide a whole number by a **non-unit** fraction?*

**Find $6 \div \frac{2}{10}$.**

**Method 1:**

Since, **division** and **multiplication** are **inverse operations**:

$6 \div \frac{2}{10}$ is asking $\frac{2}{10} \times \square = 6$

**1.** First, we **divide** by the **numerator** to get a **unit fraction**.

$\frac{1}{10} \times \square = 6 \div 2$

↓

$\frac{1}{10} \times \square = 3$



Chapter 10 Multiply and Divide Fractions.indd 122 08/03/18 3:59 PM

2. Then **multiply** by the **denominator** to get the **whole**.

$\frac{10}{10} \times \square = 3 \times 10$

$\downarrow$

$= 30$

This dividing by the numerator and multiplying by the denominator is called "**multiplying by the reciprocal**".

**Method 2:**

$6 \div \frac{2}{10} = \frac{6}{1} \div \frac{2}{10} =$ Write 6 as $\frac{6}{1}$

$= \frac{6}{1} \times \frac{10}{2}$ Change $\frac{2}{10}$ to its reciprocal $\frac{10}{2}$ and multiply.

$= \frac{60}{2}$ Simplify

$= 30$

Dividing by a number is the same as multiplying by the **reciprocal** of the number.

## Activity 3:

**Write the reciprocal of each number.**

| | | |
|---|---|---|
| **1.** $\frac{5}{8} =$ | **2.** $\frac{2}{3} =$ | **3.** $\frac{1}{2} =$ |
| **4.** $\frac{3}{4} =$ | **5.** $\frac{4}{9} =$ | **6.** $\frac{7}{12} =$ |

**Find each quotient. You can use a model to solve.**

| | | |
|---|---|---|
| **7.** $12 \div \frac{2}{3} =$ | **8.** $6 \div \frac{4}{8} =$ | **9.** $8 \div \frac{2}{7} =$ |
| **10.** $15 \div \frac{5}{9} =$ | **11.** $9 \div \frac{3}{6} =$ | **12.** $24 \div \frac{8}{10} =$ |
| **13.** $16 \div \frac{3}{8} =$ | **14.** $18 \div \frac{9}{12} =$ | **15.** $14 \div \frac{7}{10} =$ |

**16.** How many $\frac{3}{4}$ of a metre are in 15 metres? Draw a diagram that models the problem.

**17.** Mrs. Chin has a 6 metres length of ribbon that she wants to cut to make bows. Each bow will take $\frac{2}{6}$ of a metre of ribbon. How many bows will she be able to make?

**18.** Daddy buys a board that is 8 metres long. He wants to cut it into pieces that are $\frac{4}{8}$ metre each. How many pieces will daddy have after he cuts the board?

**19.** How many $\frac{3}{5}$ are in 4? What is left over?

**20.** Lee said that the answer to 8 divided by $\frac{2}{3}$ is a whole number. Is Lee correct? Explain your answer.

## Divide Fractions by Whole Numbers

### Teaching Point 1:

*How do you divide a fraction by a whole number?*



Chapter 10 Multiply and Divide Fractions.indd 123 08/03/18 3:59 PM

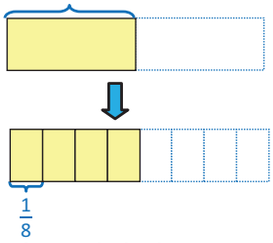
$\frac{1}{2}$ of a chocolate is shared equally among four persons. What fraction of the chocolate did each person get?

**Find $\frac{1}{2} \div 4$.**

**Method 1: Use a Model.**

Model the chocolate that is shared by the friends. **Divide** each half into 4 equal parts.

$\frac{1}{2}$ of a chocolate bar




Each fraction is $\frac{1}{8}$ of the chocolate bar.

**Method 2: Find a fraction of the fraction.**

Each part is $\frac{1}{4}$ *of* $\frac{1}{2}$

$\frac{1}{2} \div 4 = \frac{1}{4}$ of $\frac{1}{2}$

$= \frac{1}{4} \times \frac{1}{2}$

$= \frac{1}{8}$

Each fraction is $\frac{1}{8}$ of the chocolate bar.

**Method 3: Multiply by the reciprocal.**

$\frac{1}{4}$ is the **reciprocal** of $\frac{4}{1}$ or 4.

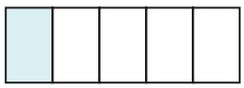
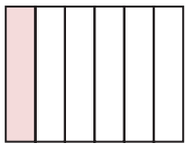
$\frac{1}{2} \div \frac{4}{1} = \frac{1}{2} \times \frac{1}{4}$ ← Multiply by the reciprocal.

$= \frac{1}{8}$

Each fraction is $\frac{1}{8}$ of the chocolate bar.

## Activity 1:

**Use a model to divide.**

| | |
|---|---|
| **1.** $\frac{1}{5} \div 2 =$  | **2.** $\frac{1}{4} \div 3 =$  |
| **3.** $\frac{1}{6} \div 2 =$  | **4.** $\frac{1}{2} \div 4 =$  |
| **5.** $\frac{1}{3} \div 5 =$ | **6.** $\frac{1}{8} \div 3 =$ |
| **7.** $\frac{1}{10} \div 3 =$ | **8.** $\frac{1}{4} \div 4 =$ |
| **9.** $\frac{2}{3} \div 6 =$ | **10.** $\frac{2}{4} \div 2 =$ |
| **11.** $\frac{2}{5} \div 4 =$ | **12.** $\frac{6}{8} \div 3 =$ |
| **13.** $\frac{2}{3} \div 8 =$ | **14.** $\frac{2}{4} \div 12 =$ |
| **15.** $\frac{8}{9} \div 4 =$ | **16.** $\frac{6}{7} \div 3 =$ |

## Activity 2:

**Solve. Write the answer in its simplest form.**

**1.** Analise cuts $\frac{4}{6}$ metre of wood into 8 equal parts. What is the length of each part?



Chapter 10 Multiply and Divide Fractions.indd 124 08/03/18 3:59 PM

2. Mother has $\frac{1}{2}$ litre of juice to share equally among her 3 children. How much juice did each child get?

3. Myron shares $\frac{1}{3}$ of a pizza equally among his 4 friends. What fraction of the pizza did each friend get?

4. Three friends share $\frac{1}{4}$ of a pineapple equally. What fraction of a whole pineapple does each friend get?

5. Miss Thomas has $\frac{1}{2}$ a kilogram of nuts. She divides the nuts equally into 5 bags. What fraction of a kilogram of nuts is in each bag?

6. Mother bought $\frac{3}{4}$ kilogram of minced beef. She divided it equally into 6 smaller bags.
   a) What is the weight of each bag?
   b) If she used 2 bags to make burgers, how much minced beef was left over?

7. You want to cut a $\frac{3}{4}$ metre of fabric into 9 equal pieces. What will be the length of each piece?



8. $\frac{6}{8}$ of a pizza is shared equally among 3 boys. What fraction of the whole pizza did each boy get?

## Divide a Fraction by a Fraction

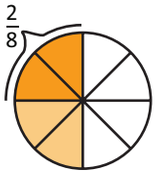
### Teaching Point 1:

*How can you divide a fraction by a fraction?*

You have $\frac{1}{2}$ of a cake left over. You cut it into pieces, each of which is $\frac{2}{8}$ of the whole cake. How many pieces did you cut?

Number of pieces $\frac{1}{2} \div \frac{2}{8}$.

**Use a model.**




There are 2 two-eighths in $\frac{1}{2}$.

So, $\frac{1}{2} \div \frac{2}{8} = 2$

You can solve this problem another way:

$\frac{1}{2} \div \frac{2}{8} = \frac{1}{2} \times \frac{8}{2}$ ← Multiply by the **reciprocal**.

$= \frac{8}{4}$ ← Simplify.

$= 2$

So, you cut 2 pieces.

---

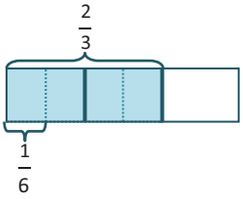
Share $\frac{2}{3}$ litre of juice into $\frac{1}{6}$ litre paper cups. How many paper cups can you fill?

How many $\frac{1}{6}$s are there in $\frac{2}{3}$ or $\frac{2}{3} \div \frac{1}{6}$.



Chapter 10 Multiply and Divide Fractions.indd 125 08/03/18 3:59 PM

Use **a model**.




There are 4 sixths in $\frac{2}{3}$.

$\frac{2}{3} \div \frac{1}{6} = \frac{2}{3} \times \frac{6}{1}$ ← Multiply by the **reciprocal**.

$= \frac{12}{3}$ ← Simplify.

$= 4$

So, I can fill 4 paper cups.

## Activity 1:

**Divide. Express the quotient in simplest form.**

| | |
|---|---|
| 1. $\frac{2}{3} \div \frac{1}{9} =$ | 2. $\frac{3}{5} \div \frac{2}{10} =$ |
| 3. $\frac{3}{4} \div \frac{2}{8} =$ | 4. $\frac{4}{6} \div \frac{3}{12} =$ |
| 5. $\frac{4}{5} \div \frac{2}{15} =$ | 6. $\frac{1}{3} \div \frac{2}{9} =$ |
| 7. $\frac{2}{3} \div \frac{1}{9} =$ | 8. $\frac{2}{3} \div \frac{3}{9} =$ |
| 9. $\frac{1}{6} \div \frac{2}{3} =$ | 10. $\frac{3}{4} \div \frac{1}{2} =$ |

**Solve the problems below.**

11. How many $\frac{1}{8}$ metre pieces of ribbon can be cut from a $\frac{1}{2}$ metre ribbon.



12. Maya has $\frac{3}{4}$ of a cake to share with her friends. If she gave each friend $\frac{3}{12}$ of the cake, how many friends will get a piece of cake?

13. Anton had $\frac{5}{8}$ of a pizza. He cut it into pieces that were $\frac{1}{16}$ of the whole pizza. How many pieces did he get?

14. A bottle contains $\frac{4}{5}$ litre of soft drink. If mummy fills two $\frac{4}{10}$ litre cups with soft drink from the bottle, what fraction of a litre of soft drink is left in the bottle?

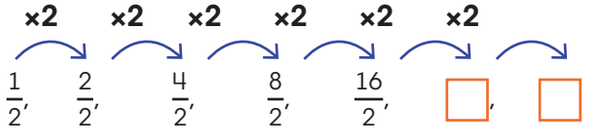
# Number Patterns with Fractions

## Teaching Point 1:

*How can you describe and use patterns?*

This is an **increasing** pattern.

Find the **pattern rule**.




The **rule** is × **2**.

Use the rule to complete the pattern.

So, the missing elements are $\frac{32}{2}$ and $\frac{64}{2}$.



Chapter 10 Multiply and Divide Fractions.indd 126 08/03/18 3:59 PM

## Activity 1:

**Complete each pattern. Write the rule.**

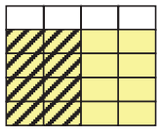
1. $\frac{1}{3}, \frac{2}{6}, \square, \frac{8}{24}, \frac{16}{48}, \square$
2. $\frac{96}{144}, \frac{48}{72}, \square, \frac{12}{18}, \square$
3. $\frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \square, \square, \frac{1}{128}$
4. $\frac{1}{9}, \square, 1, 3, 9, \square$
5. $\frac{1}{2}, \frac{1}{4}, \square, \frac{1}{16}, \frac{1}{32}, \square$
6. $\frac{1}{4}, \frac{1}{12}, \square, \frac{1}{108}, \square$
7. $\frac{3}{4}, \frac{6}{12}, \frac{12}{36}, \square, \frac{48}{324}$
8. $\frac{3}{8}, \frac{3}{2}, \square, 24, 96$

## Chapter Review

**Express the quotient in simplest form. Use models to help you.**

1. $\frac{3}{8}$ of 24
2. $1\frac{1}{4} \times 3\frac{5}{8}$
3. $\frac{2}{5} \div 16$
4. Complete the number pattern:

   $\frac{1}{3}, \square, 3, 9, 27, 81$
5. Write the multiplication number sentence that the model on the right represents?



6. Asha is $\frac{3}{8}$ of her father's age. If her father is 32 years old, how old is Asha?
7. Share 3 chocolates among 5 children. How much chocolate would each child get?



8. A vendor has a watermelon that weighs 5 kilogram. He wants to cut it into $\frac{1}{5}$ kilogram pieces for sale. How many pieces will he get?
9. Jian spent 6 hours on Sunday playing games, watching television and studying. He spent $\frac{1}{6}$ of the time watching television and $\frac{1}{3}$ of the time studying. What fraction of the time did he spend playing games?



10. Every day you drink $\frac{1}{4}$ litre of milk.

    Your baby brother drinks 5 times as much. How much milk does your baby brother drink?
11. Alex spends 2 hours a day studying. His sister, Amanda spends $\frac{6}{8}$ as much time studying. What is the exact amount of time that his sister spends studying?



Chapter 10 Multiply and Divide Fractions.indd 127 08/03/18 3:59 PM

12. The banner for the bazaar is 3 metres long. If Mala sews a red strip on each $\frac{1}{6}$ metre section, how many strips will she sew?

13. A jug holds 4 litres of fruit punch. Each paper cup holds $\frac{1}{4}$ litre. How many paper cups can be filled?

14. Maria used a vehicle to travel to school on $\frac{3}{4}$ of the days last month. On $\frac{1}{2}$ of those days she took the bus.

    a) What fraction of those days last month did Maria take the bus?

    b) If Maria went to school for 16 days last month, how many days did she take the bus?



15. Mr. Khan has 48 plants in his vegetable garden. $\frac{2}{3}$ of the plants are tomatoes and $\frac{1}{4}$ are cucumbers. The rest of the plants are pumpkin. How many pumpkin plants are in the garden?




16. Mother has a 2 kilogram package of flour. She uses $\frac{1}{2}$ of the flour to make bread. She then uses $\frac{1}{4}$ of the remaining flour to make a cake. What fraction of the flour is left?

17. Jonathan spends $\frac{1}{2}$ of his vacation at summer camp. He spends $\frac{2}{3}$ of the remaining time at his granny's house. The remaining 8 days of his vacation he spent at the beach with his parents. How many days of vacation did Jonathan have?

18. Alisha had $60. She spent $\frac{2}{5}$ of it on a toy, and $\frac{1}{2}$ of it on a book and saved the remainder.

    a) What fraction did she spend on the toy and the book?

    b) How much money did she save?

19. While unpacking 50 bundles of dasheen bush at the market, a vendor found that $\frac{1}{10}$ of them were damaged.

    a) How many bundles of dasheen bush were damaged?

    b) Of the bundles that were not damaged the vendor sold $\frac{3}{4}$ of them in the morning. How many bundles remained?

20. In a class $\frac{3}{5}$ of the students are girls. $\frac{1}{6}$ of these girls wear glasses. If $\frac{3}{4}$ of the boys wear glasses, what fraction of the students wear glasses?

21. In a bag of fruits $\frac{5}{9}$ of them are mangoes and the rest are oranges. $\frac{3}{10}$ of the mangoes are green. There are 15 green mangoes. How many fruits are in the basket?

22. $\frac{3}{5}$ of the children at a party were boys. There were 15 boys at the party. How many children were at the party?



Chapter 10 Multiply and Divide Fractions.indd 128 08/03/18 3:59 PM

CHAPTER

11

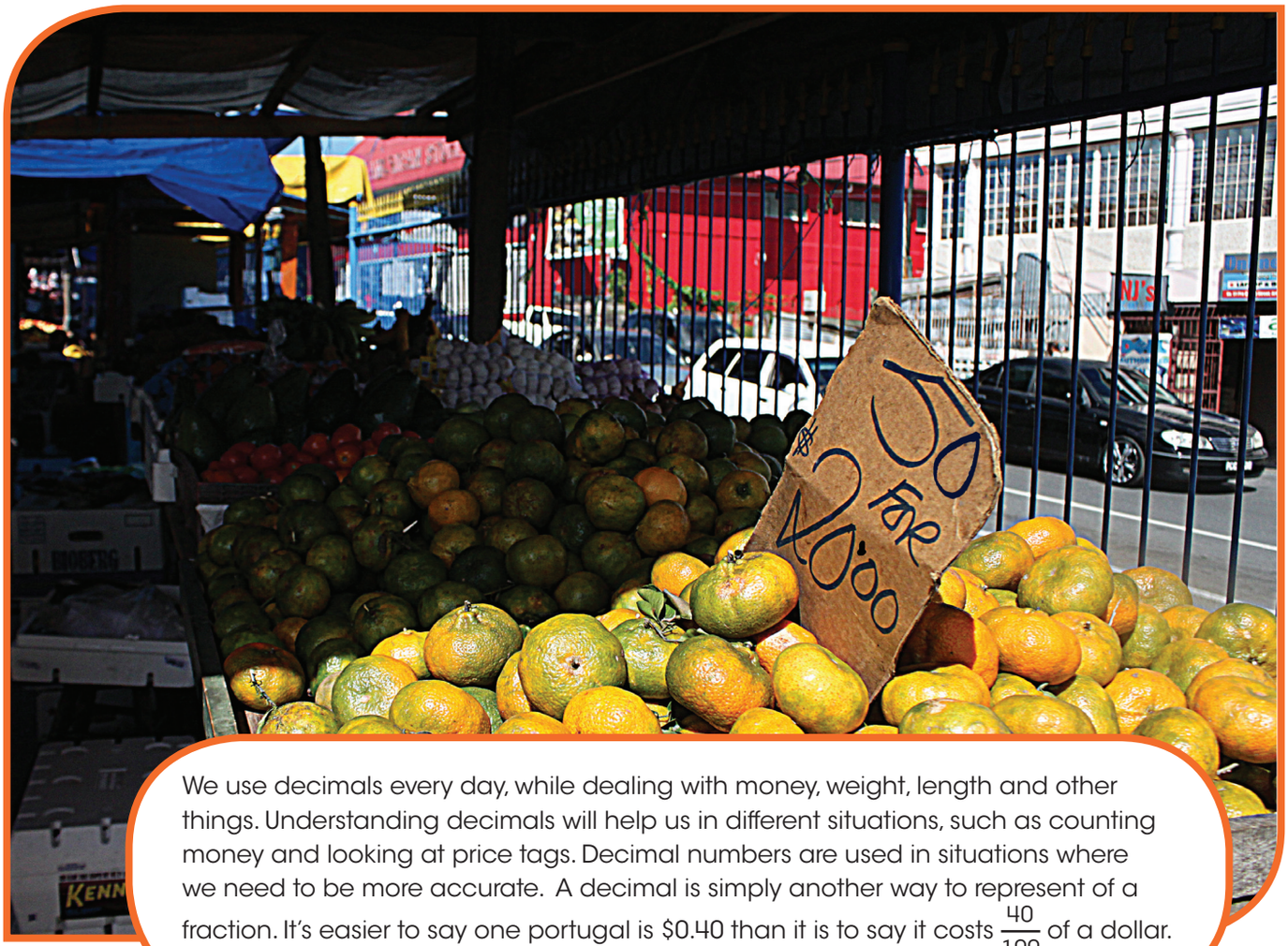
# Understanding Decimals

**Vocabulary:**

decimal
decimal point •
tenths
hundredths

**Chapter Outcomes:**

- Demonstrate an understanding of decimals up to hundredths.
- Develop an understanding of the comparison of decimals.
- Develop an understanding of rounding to whole numbers and tenths.

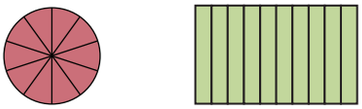



We use decimals every day, while dealing with money, weight, length and other things. Understanding decimals will help us in different situations, such as counting money and looking at price tags. Decimal numbers are used in situations where we need to be more accurate. A decimal is simply another way to represent of a fraction. It's easier to say one portugal is $0.40 than it is to say it costs $\frac{40}{100}$ of a dollar.

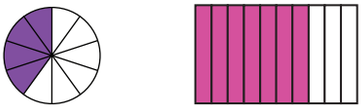
## Getting Ready for Chapter 11

**Compare. Write >, < or =.**

1. 1 808 ◯ 1 880
2. 21 367 ◯ 21 376
3. Name the equal parts of each whole.



4. What fraction of each whole is shaded?



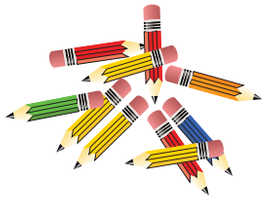
5. Write 120 046 in expanded notation form.
6. Show the number 2 301 in a place value chart.
7. One thousand is equal to ____ hundreds.

## Fractions and Decimals - Tenths

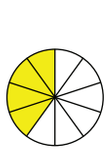
### Teaching Point 1:

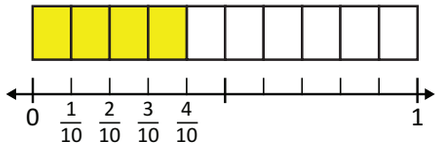
*How are fractions and decimals related?*

Maya has ten pencils. Four of the pencils are yellow. What fraction of the pencils are yellow?



$\frac{4}{10}$ of the pencils are yellow.






Four parts out of 10 is $\frac{4}{10}$ or four tenths.

Write $\frac{4}{10}$ as 0.4 in **decimal form**.

**Tenths** can be written as a fraction or a decimal.

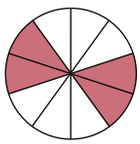
**0.4**
↑
**decimal point**
Read 0.4 as four tenths. Its value is 4 tenths.

A **decimal point** (.) is a dot that is used to separate ones from tenths in a number.

A decimal is a number with a decimal point, and digits to the **right** of the decimal point.

### Activity 1:

**Write the fraction of the shaded and un-shaded parts of each in words and symbols.**

1. 

shaded part: four tenths, $\frac{4}{10}$ or 0.4
**un-shaded part**: six tenths, $\frac{6}{10}$ or 0.6

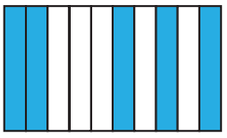
2. 

shaded part:
un-shaded part:



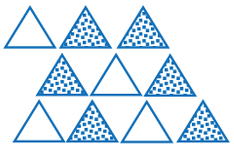
Chapter 11 Understanding Decimals.indd 130 06/03/18 2:11 PM

**3.**



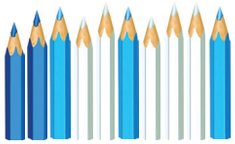
shaded part:
un-shaded part:

**4.**



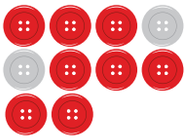
shaded part:
un-shaded part:

**5.**



shaded part:
un-shaded part:

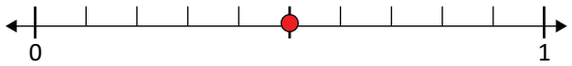
**6.**



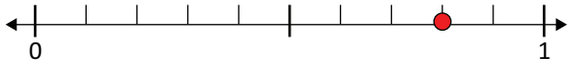
shaded part:
un-shaded part:

**Write the decimal that names each point on the number lines.**

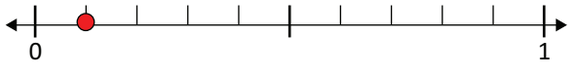
**7.**



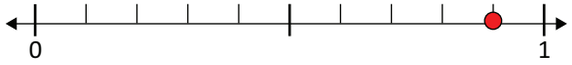

**8.**




**9.**

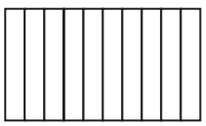



**10.**



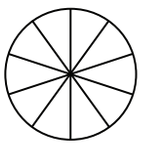

**Represent each decimal on the model.**

**11.**



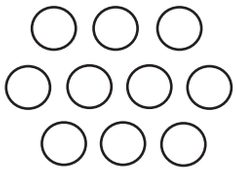
0.7

**12.**



0.5

**13.**



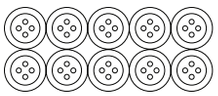
0.6

**14.**



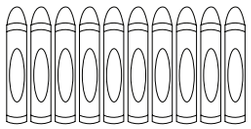
0.1

**15.**



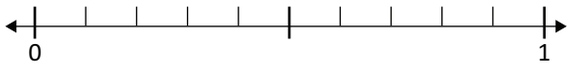
0.8

**16.**

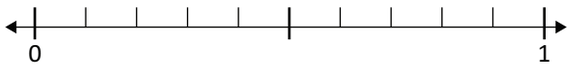


0.2

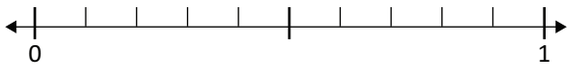
**17.** 0.4



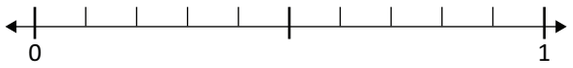

**18.** 0.7



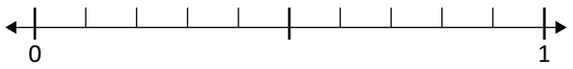

**19.** 0.5




**20.** 0.9



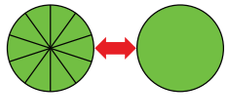

**21.** 0.8



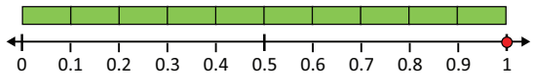

## Teaching Point 2:

*How can you relate fractions and decimals?*

**Equivalent tenths and ones**



$\frac{10}{10}$ = 1 whole





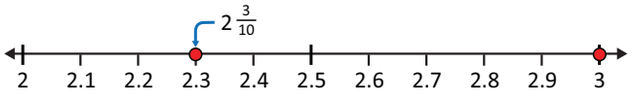

Chapter 11 Understanding Decimals.indd 131 06/03/18 2:11 PM

### Mixed numbers as decimals

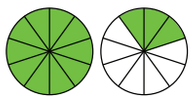


$1 + 1 + \frac{3}{10} = 2\frac{3}{10}$

$2\frac{3}{10}$ = 2 ones and 3 tenths = 2.3




### Improper fractions as decimals



$\frac{10}{10} + \frac{3}{10} = \frac{13}{10}$

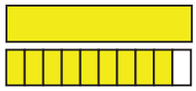
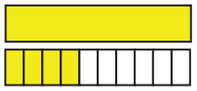
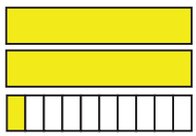
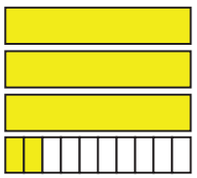
$\frac{13}{10}$ = 13 tenths

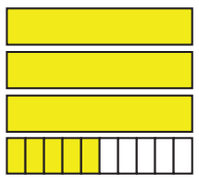
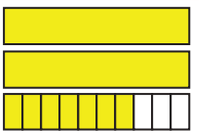
$\frac{13}{10}$ = 1 one and 3 tenths = 1.3

Decimals are another way of writing fractions and mixed numbers.

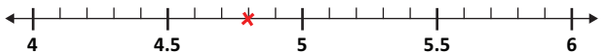
## Activity 2:

**Write the decimals that the shaded parts represent.**

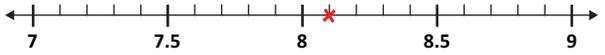
| | |
|---|---|
| 1.  | 2.  |
| 3.  | 4.  |

| | |
|---|---|
| 5.  | 6.  |

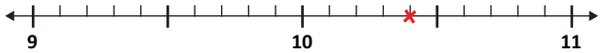
**Write the decimal that each point (✗) represents.**

7. 


8. 


9. 


10. 

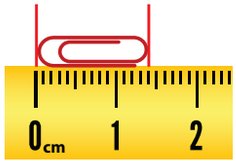

11. 

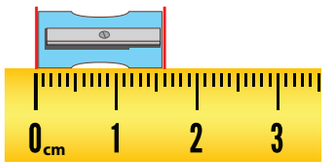

12. 


**Express each of these as decimals.**

| | |
|---|---|
| 13. 14 tenths = | 14. 3 ones 5 tenths = |
| 15. 25 tenths = | 16. $2\frac{6}{10}$ = |
| 17. $3\frac{8}{10}$ = | 18. $\frac{26}{10}$ = |
| 19. $\frac{11}{10}$ = | 20. 9 ones 1 tenth = |

**Express the length of each object as a mixed number and as a decimal.**

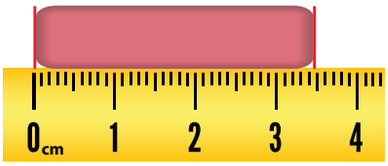
21. 


22. 




Chapter 11 Understanding Decimals.indd 132 06/03/18 2:11 PM

**23.**




**Express the amount of liquid as a mixed number and as a decimal.**

**24.**




___L

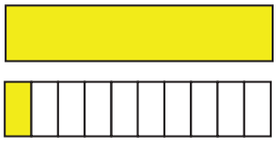
**25.**




___L

**26.** Mark rode his bicycle $1\frac{6}{10}$ kilometre. What decimal describes how far he rode his bicycle?

**27.** Use the model below to explain how 1 is more than 0.1.



## Decimal Place Value - Tenths

### Teaching Point 2:

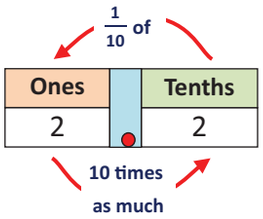
*How can you find the value of a digit using its place-value position?*

The weight of a 1-cent coin is about 2.2 grams.

**Word form**

two and two tenths

**Place Value Chart**




**Expanded form**

2 + 0.2

**Expanded notation form**

$(2 \times 1) + \left(2 \times \frac{1}{10}\right)$

### Activity 1:

**Write each number in a place value chart and write it in words.**

| | | |
|---|---|---|
| **1.** 4.9 | **2.** 14.1 | **3.** 20.5 |
| **4.** 11.2 | **5.** 17.8 | **6.** 127.4 |
| **7.** 6 780.3 | **8.** 308.6 | **9.** 93.7 |
| **10.** 12 678.2 | **11.** 75.6 | **12.** 1 000.1 |
| **13.** 3.7 | **14.** 45.4 | **15.** 368.5 |

**Write the missing numbers.**

**1.** 0.7 = ☐ tenths

**2.** 4.8 = ☐ ones + ☐ tenths

**3.** 19.6 = ☐ tens + ☐ ones + ☐ tenths

**4.** 30.1 = ☐ tens + ☐ ones + ☐ tenths



Chapter 11 Understanding Decimals.indd 133 06/03/18 2:11 PM

5. 129.3 = ☐ hundred + ☐ tens + ☐ ones + ☐ tenths

6. $2.8 = 2 + \frac{\square}{10}$

7. $34.7 = \square + 4 + \frac{\square}{\square}$

8. $506.4 = 500 + \square + \square + \frac{4}{10}$

**Write each decimal fraction in expanded notation form.**

| | | |
|---|---|---|
| 9. 7.1 | 10. 5.5 | 11. 32.3 |
| 12. 16.2 | 13. 210.8 | 14. 109.4 |
| 15. 600.3 | 16. 269.7 | 17. 42.9 |

**Convert each expanded notation to its decimal fraction.**

18. $(2 \times 1) + \left(2 \times \frac{1}{10}\right)$

19. $(3 \times 10) + (4 \times 1) + \left(5 \times \frac{1}{10}\right)$

20. $(6 \times 10) + (0 \times 1) + \left(1 \times \frac{1}{10}\right)$

21. $(1 \times 100) + (6 \times 10) + (1 \times 1) + \left(8 \times \frac{1}{10}\right)$

22. $(7 \times 100) + (0 \times 10) + (0 \times 1) + \left(9 \times \frac{1}{10}\right)$

23. $\left(7 \times \frac{1}{10}\right) + (2 \times 10) + (4 \times 1)$

## Activity 2:

**Write the value of each underlined digit in each decimal fraction.**

| | | |
|---|---|---|
| 1. 3.9 | 2. 25.6 | 3. 39.7 |
| 4. 102.8 | 5. 90.2 | 6. 421.3 |
| 7. 2 350.5 | 8. 830.1 | 9. 45.4 |

**What is the place value of the 2 in each decimal fraction.**

| | | |
|---|---|---|
| 10. 12.6 | 11. 2.7 | 12. 7.2 |
| 13. 351.2 | 14. 20.1 | 15. 207.5 |
| 16. 620.5 | 17. 89.2 | 18. 2 491.3 |

19. Write a decimal fraction that has 3 in the tenths place and 6 in the ones place.

20. In July 2016, Trinidad and Tobago received 25.4 cm of rain. What is the value of the digit 4 in 25.4?

# Fractions and Decimals - Hundredths

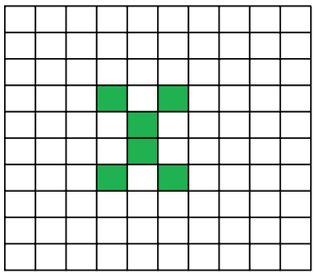
## Teaching Point 1:

*How are fractions and decimals related?*

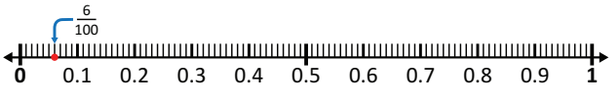
There are 100 tiles on the floor of a room. 6 of those tiles are green. What fraction of the tiles are green?



Chapter 11 Understanding Decimals.indd 134 06/03/18 2:11 PM



$\frac{6}{100}$ of the tiles are green.




Both the number line and the square have 100 equal parts.

Each part is $\frac{1}{100}$ or one hundredth.

Six parts out of 100 is $\frac{6}{100}$ or six hundredths.

**Hundredths** can be written as a fraction or a decimal.

Write $\frac{6}{100}$ as 0.06 in **decimal form**.

Read 0.06 as six hundredths.

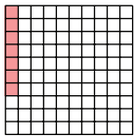
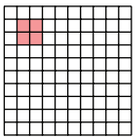
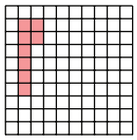
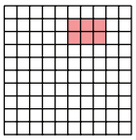
Its value is 6 hundredths.

## Activity 1:

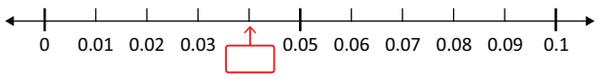
### Express each of these as a decimal fraction.

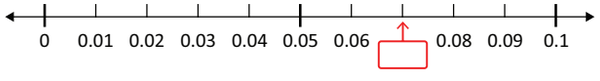
| | |
|---|---|
| 1. $\frac{4}{100}$ metre = | 2. $\frac{6}{100}$ metre = |
| 3. $\frac{7}{100}$ = | 4. $\frac{9}{100}$ = |
| 5. 9 hundredths = | 6. 3 hundredths = |

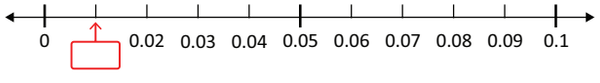
### Write the decimal fraction that each shaded part represents.

| | |
|---|---|
| 7.  | 8.  |
| 9.  | 10.  |

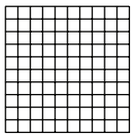
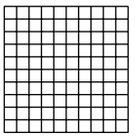
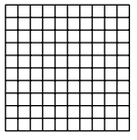
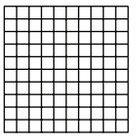
### Write the decimal fraction for each point on the number line.

11. 

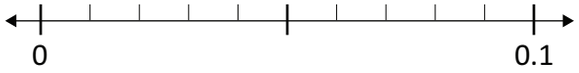

12. 


13. 


### Represent each decimal on the model.

| | |
|---|---|
| 14.  0.06 | 15.  0.05 |
| 16.  0.01 | 17.  0.04 |

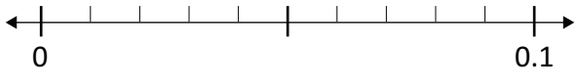
18. 0.09



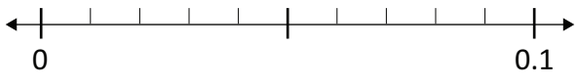



Chapter 11 Understanding Decimals.indd 135 06/03/18 2:11 PM

**19.** 0.02



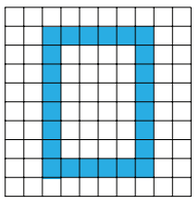

**20.** 0.08



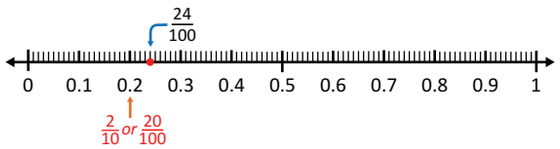

## Teaching Point 3:

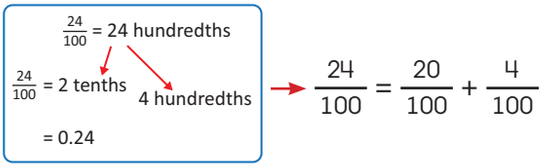
*How can you relate fractions and decimals?*

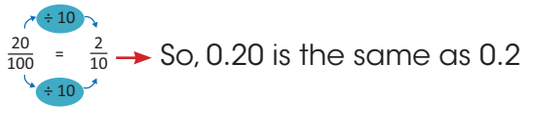
Kevin has 100 tiles. He tiles the room with the tiles. What fraction of the tiles are blue?



$\frac{24}{100}$ of the tiles are blue.



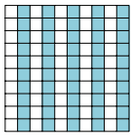
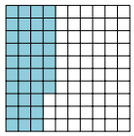
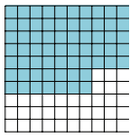
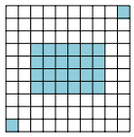
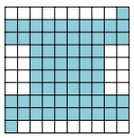
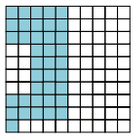




2 tenths + 4 hundredths = 0.24

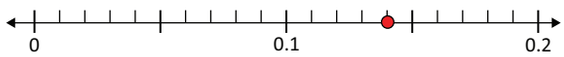
0.24 is twenty-four hundredths

## Activity 1:

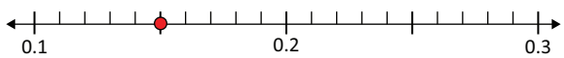
**Write the decimal of each shaded part.**

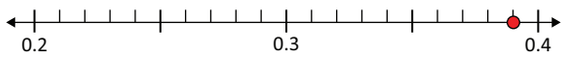
| | |
|---|---|
| **1.**  | **2.**  |
| **3.**  | **4.**  |
| **5.**  | **6.**  |

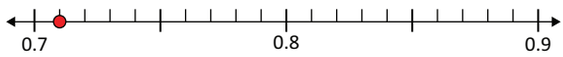
**Write the decimal fraction for the point on each number line below.**

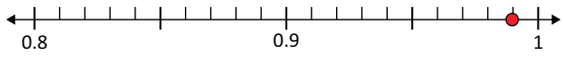
**7.** 

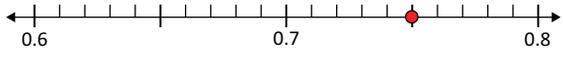

**8.** 


**9.** 


**10.** 


**11.** 


**12.** 


**13.** 


**Express each as a decimal fraction.**

| | | |
|---|---|---|
| **14.** $\frac{16}{100}$ | **15.** $\frac{32}{100}$ | **16.** $\frac{25}{100}$ |
| **17.** 11 hundredths = | | |



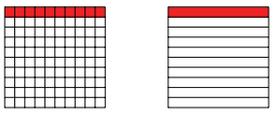
Chapter 11 Understanding Decimals.indd 136 06/03/18 2:11 PM

| | | |
|---|---|---|
| **18.** 30 hundredths = | | |
| **19.** 5 tenths 8 hundredths = | | |
| **20.** $\frac{16}{100}$ | **21.** $\frac{32}{100}$ | **22.** $\frac{40}{100}$ |
| **23.** $\frac{59}{100}$ | **24.** $\frac{25}{100}$ | **25.** $\frac{98}{100}$ |

## Teaching Point 3:

*How can you relate fractions and decimals?*

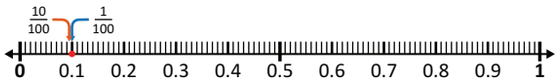
### Equivalent tenths and hundredths



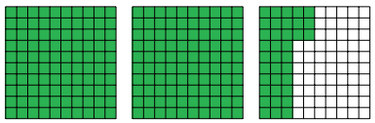
$\frac{10}{100} = \frac{1}{10}$

10 hundredths = 1 tenth

$\frac{10}{100} = \frac{1}{10}$ or 0.1

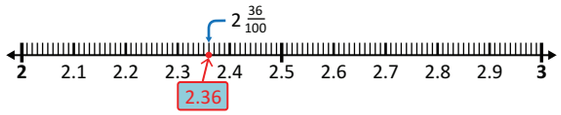



### Mixed numbers as decimals

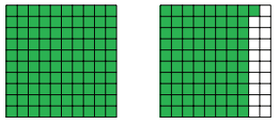


$1 + 1 + \frac{36}{100} = 2\frac{36}{100}$

$2\frac{36}{100}$ = 2 ones and 36 hundredths or 2.36




### Improper fractions as decimals



$\frac{100}{100} + \frac{81}{100} = \frac{181}{100}$

$\frac{181}{100}$ = 181 hundredths

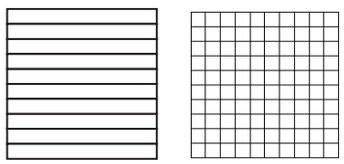
$\frac{181}{100}$ = 1 one and 81 hundredths

1 one and 81 hundredths = 1.81

## Activity 2:

**Write each fraction as an equivalent fraction. Shade the models to show that the fractions are equivalent. Write each fraction as a decimal fraction.**

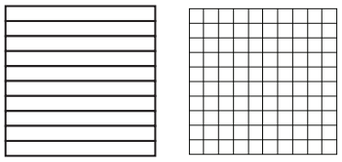
**1.** $\frac{4}{10} = \frac{\square}{100}$



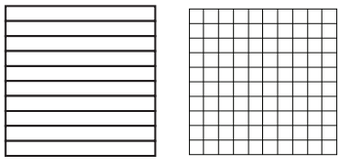


Chapter 11 Understanding Decimals.indd 137 06/03/18 2:11 PM

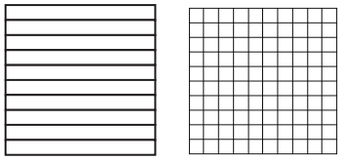
2. $\frac{2}{10} = \frac{\square}{100}$



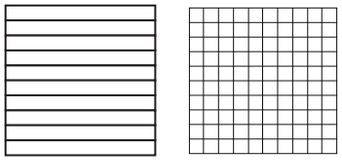
3. $\frac{9}{10} = \frac{\square}{100}$



4. $\frac{3}{10} = \frac{\square}{100}$



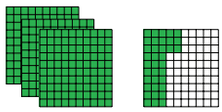
5. $\frac{6}{10} = \frac{\square}{100}$

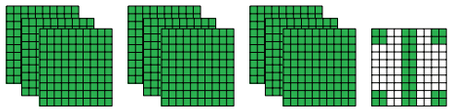


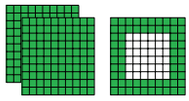
6. Three children are walking from school to the playground. Keisha walked 8 hundredths of the distance, Lee walked 2 hundredths of the distance and Alex walked 9 hundredths of the distance. Write the decimal fractions to show the distance each child walked.

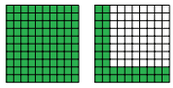
## Activity 3:

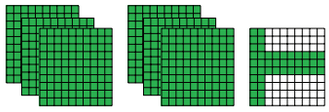
**Write the decimal fraction that the shaded parts represent.**

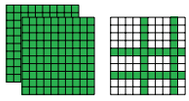
1. 

2. 

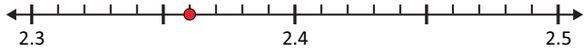
3. 

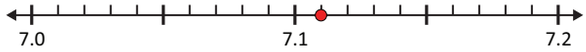
4. 

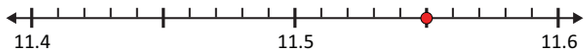
5. 

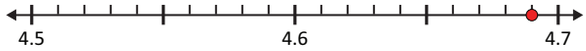
6. 

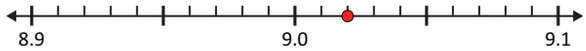
**Write the decimal fraction for each point (●) on each number line.**

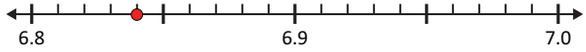
7. 

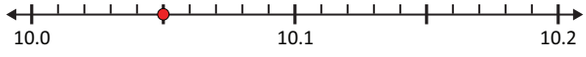

8. 


9. 


10. 


11. 


12. 


13. 




Chapter 11 Understanding Decimals.indd 138 06/03/18 2:11 PM

**Express each mixed number as a decimal fraction.**

| | | |
|---|---|---|
| **14.** $3\frac{13}{100}$ | **15.** $1\frac{4}{100}$ | **16.** $9\frac{7}{100}$ |
| **17.** $7\frac{54}{100}$ | **18.** $10\frac{3}{100}$ | **19.** $26\frac{59}{100}$ |
| **20.** $2\frac{5}{100}$ | **21.** $40\frac{1}{100}$ | **22.** $8\frac{10}{100}$ |

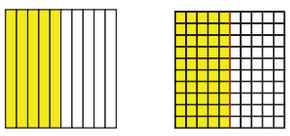
**Express each as a decimal fraction.**

| | |
|---|---|
| **23.** $\frac{126}{100}$ = | **24.** 345 hundredths = |
| **25.** $\frac{234}{100}$ km = ___km | **26.** $\frac{103}{100}$ = |

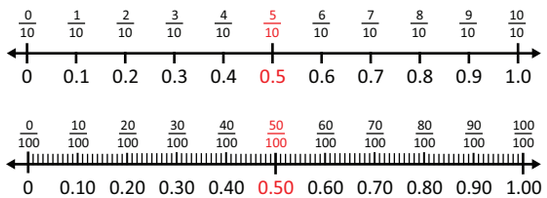
## Common Fractions and Decimal Equivalents

### Teaching Point 1:

*How can you express common fractions as decimals?*



$0.5 = \frac{5}{10} = \frac{1}{2}$ or $0.50 = \frac{50}{100} = \frac{1}{2}$







What fraction and decimal describes the shaded part?



$\frac{1}{5} = \frac{1 \times 2}{5 \times 2} = \frac{2}{10}$ ← Change fifths to tenths.

$\frac{2}{10} = 0.2$

So, $\frac{1}{5}$ and 0.2 describes the shaded part.

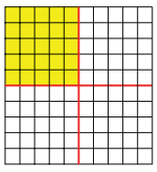
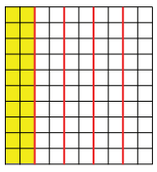
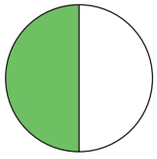
To find a decimal that is equivalent to a fraction, write the fraction with a denominator of 10 or 100.

Some other common fractions and decimal equivalents are:

$\frac{1}{2} = 0.5$, $\frac{1}{4} = 0.25$, $\frac{2}{4} = 0.50$, $\frac{3}{4} = 0.75$

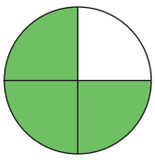
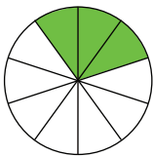
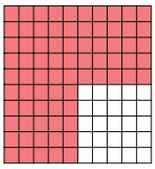
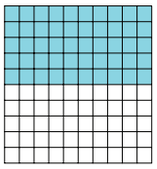
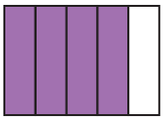
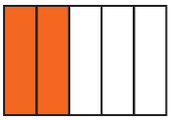
### Activity 4:

**Write a common fraction and decimal to describe the shaded part of each model.**

| | |
|---|---|
| **1.**  | **2.**  |
| **3.**  | **4.**  |



Chapter 11 Understanding Decimals.indd 139 06/03/18 2:11 PM

| | |
|---|---|
| 5.  | 6.  |
| 7.  | 8.  |
| 9.  | 10.  |

**Write each fraction as a decimal.**

| | | |
|---|---|---|
| 11. $\frac{3}{5}$ | 12. $\frac{6}{10}$ | 13. $\frac{1}{5}$ |
| 14. $\frac{50}{100}$ | 15. $\frac{7}{10}$ | 16. $\frac{2}{4}$ |
| 17. $\frac{2}{25}$ | 18. $\frac{5}{20}$ | 19. $\frac{4}{50}$ |

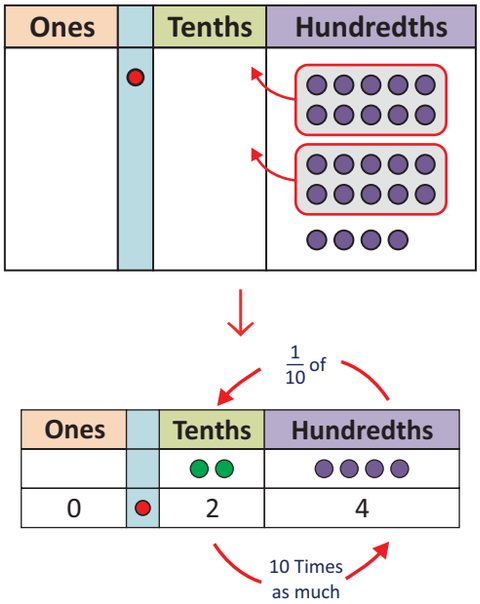
## Decimal Place Value - Hundredths

### Teaching Point 1:

*How can you represent decimals in different ways?*

How many ways can you represent 0.24?

**Regroup** hundredths as **tenths** and **hundredths** in a **Place Value Chart**.



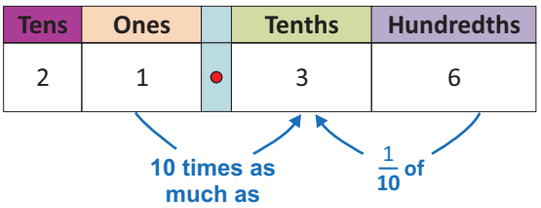

**Word Form**: twenty four hundredths

**Expanded Form**: 0.2 + 0.04

**Expanded Notation Form**:

$$\left(2 \times \frac{1}{10}\right) + \left(4 \times \frac{1}{100}\right)$$

What are some ways to represent 21.36?




**Word Form:**
twenty-one and thirty-six hundredths

**Expanded Form**: 20 + 1 + 0.3 + 0.06

**Expanded Notation Form**:

$$(2 \times 10) + (1 \times 1) + \left(3 \times \frac{1}{10}\right) + \left(6 \times \frac{1}{100}\right)$$



Chapter 11 Understanding Decimals.indd 140 06/03/18 2:11 PM

## Activity 1:

**Express each of the following as a decimal fraction.**

1.

| Ones | | Tenths | Hundredths |
|---|---|---|---|
| | | ○○○○ ○○ | ○○○ |

2.

| Ones | | Tenths | Hundredths |
|---|---|---|---|
| ○○○○ ○ | | | ○○○○○ ○○○○ |

3.

| Ones | | Tenths | Hundredths |
|---|---|---|---|
| | | ○ | ○ |

4.

| Ones | | Tenths | Hundredths |
|---|---|---|---|
| ○○○○ ○○ | | ○○○ ○○○ | ○○○○○ |

5.

| Tens | Ones | | Tenths | Hundredths |
|---|---|---|---|---|
| ○○○○ ○ | ○○○○ ○ | | ○○○ | ○○○○ |

6.

| Tens | Ones | | Tenths | Hundredths |
|---|---|---|---|---|
| ○○ | | | | ○○○○○ ○○○○ |

7.

| Hundreds | Tens | Ones | | Tenths | Hundredths |
|---|---|---|---|---|---|
| 5 | 0 | 0 | | 0 | 7 |

**Represent each decimal on a place value chart.**

| | | |
|---|---|---|
| **8.** 0.47 | **9.** 8.03 | **10.** 10.90 |
| **11.** 72.81 | **12.** 20.06 | **13.** 103.51 |
| **14.** 135.01 | **15.** 300.09 | **16.** 2 305.04 |

**Use a place value chart to complete the table below.**

| Decimal | 10 times as much as | $\frac{1}{10}$ of |
|---|---|---|
| **17.** 0.3 | 3 | 0.03 |
| **18.** 0.4 | | |
| **19.** 0.1 | | |
| **20.** 5.0 | | |

## Activity 2:

**Write each decimal fraction in words.**

| | | |
|---|---|---|
| **1.** 0.12 | **2.** 0.06 | **3.** 0.66 |
| **4.** 0.41 | **5.** 0.15 | **6.** 0.70 |
| **7.** 6.08 | **8.** 7.12 | **9.** 9.99 |
| **10.** 12.67 | **11.** 203.60 | **12.** 310.09 |
| **13.** 4 012.02 | **14.** 50.03 | **15.** 775.25 |

**Write the decimals for the words below.**

**16.** sixty-seven hundredths.

**17.** twelve hundredths.

**18.** fifty-five hundredths.

**19.** ninety-two hundredths.

**20.** six hundredths.

**21.** one hundredths.

**22.** seven and twelve hundredths.

**23.** sixty and nine hundredths.

**24.** two hundred and fifty and eighty-one hundredths.



Chapter 11 Understanding Decimals.indd 141 06/03/18 2:11 PM

25. one thousand and five and three hundredths.

26. Seven hundred and forty-seven and fifty hundredths.

## Activity 3:

**Write the missing numbers to complete each number sentence.**

1. 0.49 = ☐ tenths + ☐ hundredths

2. $0.58 = \frac{\square}{10} + \frac{8}{100}$

3. $0.16 = \frac{1}{\square} + \frac{6}{\square}$

4. $\frac{27}{100} = 0.2 + \square$

5. $\frac{34}{100} = \square + 0.04$

6. 0.25 = ☐ + 0.05

7. 0.10 = 0.1 + ☐

8. 2.51 = ☐ ones + ☐ tenths + ☐ hundredths

9. 41.08 = ☐ + 1 + ☐ + ☐

10. $10.27 = 10 + \square + \frac{2}{10} + \square$

11. 305.02 = ☐ + 5 + ☐

12. 8.91 = ☐ ones + ☐ hundredths

13. 430.71 = ☐ tens + ☐ hundredths

14. $510.01 = \square + \square + \frac{1}{100}$

**Express each expanded form as a decimal fraction.**

| | |
|---|---|
| 15. 0.2 + 0.06 = | 16. 0.1 + 0.01 = |
| 17. 0.6 + 0.04 = | 18. 0.9 + 0.03 = |
| 19. 0.8 + 0.02 = | 20. 0.1 + 0.05 = |
| 21. 0.4 + 0.06 = | 22. 0.7 + 0.07 = |
| 23. 20 + 0.08 = | 24. 8 + 0.6 = |
| 25. 20 + 0.03 = | 26. 700 + 1 + 0.02 = |
| 27. 90 + 2 + 0.9 + 0.01 = | |
| 28. 3 000 + 2 + 0.4 + 0.08 = | |
| 29. 1 000 + 400 + 0.7 + 0.09 = | |

## Activity 4:

**Write each decimal fraction in expanded notation form.**

| | | |
|---|---|---|
| 1. 0.33 | 2. 0.73 | 3. 0.56 |
| 4. 0.08 | 5. 0.74 | 6. 0.39 |
| 7. 0.27 | 8. 0.19 | 9. 0.98 |
| 10. 7.09 | 11. 20.51 | 12. 809.4 |
| 13. 21.97 | 14. 600.02 | 15. 231.67 |
| 16. 1 097.11 | 17. 291.84 | 18. 0.06 |
| 19. 301.04 | 20. 7.91 | 21. 400.02 |

**Write the decimal for each expanded notation form.**

22. $\left(1 \times \frac{1}{10}\right) + \left(4 \times \frac{1}{100}\right) =$



Chapter 11 Understanding Decimals.indd 142 06/03/18 2:11 PM

23. $\left(3 \times \frac{1}{10}\right) + \left(6 \times \frac{1}{100}\right) =$

24. $\left(0 \times \frac{1}{10}\right) + \left(9 \times \frac{1}{100}\right) =$

25. $\left(0 \times \frac{1}{10}\right) + \left(8 \times \frac{1}{100}\right) =$

26. $\left(6 \times \frac{1}{10}\right) + \left(0 \times \frac{1}{100}\right) =$

27. $\left(4 \times \frac{1}{10}\right) + \left(5 \times \frac{1}{100}\right) =$

28. $\left(9 \times \frac{1}{10}\right) + \left(2 \times \frac{1}{100}\right) =$

29. $\left(1 \times 100\right) + \left(5 \times \frac{1}{100}\right) =$

30. $(4 \times 1\,000) + (9 \times 1) + \left(8 \times \frac{1}{10}\right) =$

31. $(7 \times 10) + \left(3 \times \frac{1}{10}\right) + \left(5 \times \frac{1}{100}\right) =$

## Activity 5:

**What is the VALUE of the underlined digit in each decimal fraction.**

| | | |
|---|---|---|
| **1.** 0.0<u>7</u> | **2.** 0.<u>2</u>9 | **3.** 0.<u>5</u>0 |
| **4.** 12.0<u>5</u> | **5.** <u>1</u>.92 | **6.** <u>3</u>9.11 |
| **7.** <u>6</u>0.02 | **8.** 8.2<u>4</u> | **9.** 921.3<u>5</u> |
| **10.** 1 7<u>8</u>0.05 | **11.** 2 067.<u>9</u>3 | **12.** 101.<u>1</u>6 |

**What is the PLACE VALUE of the underlined digit in each decimal fraction**

| | | |
|---|---|---|
| **13.** 0.6<u>7</u> | **14.** 0.0<u>1</u> | **15.** 0.<u>1</u> |
| **16.** 40.0<u>1</u> | **17.** <u>8</u>0.21 | **18.** 431.<u>7</u> |
| **19.** 10<u>3</u>.05 | **20.** 7.6<u>2</u> | **21.** 4<u>1</u>0.1 |
| **22.** 37.<u>6</u>0 | **23.** 3 090.<u>2</u> | **24.** 910.6<u>8</u> |

## Activity 6:

**Solve the problems below.**

1. Usain Bolt won the 2016 Olympic 100m race in 9.81 seconds. What is the value of the digit 8 in 9.81?

2. There are one hundred sticks of chalk in a box. Fifteen sticks of chalk are broken.

   a) What decimal fraction shows the fraction of the chalk that is broken?

   b) What decimal fraction shows the fraction of the chalk that is not broken?

3. Alisha earned eighty-nine out of 100 marks in the Mathematics test. What decimal fraction shows the part of the marks she made?

4. A cafeteria opened a bottle of 100 sweets and sold 48 of them. What decimal fraction shows the part of the sweets that was left?

5. On a video game Isaiah scored 92 out of a possible 100 points. What part of the possible points did he score?

6. The distance between Arun's home and the school is seventy-five hundredths of a kilometre. Write this distance as a decimal fraction.



Chapter 11 Understanding Decimals.indd 143 06/03/18 2:11 PM

**Use the table below to answer questions 7 and 8.**

| Distances Mark Walked | |
|---|---|
| Days | Distances (in Kilometres) |
| Monday | 0.52 |
| Wednesday | 0.48 |
| Friday | 0.5 |

7. On which day did Mark walk five tenths of a kilometre?

8. Write in words how far Mark walked on Wednesday?

9. There are 10 questions on a test. Mathias answered 6 of them correctly. Write a decimal fraction to show what part of the test he answered correctly.

10. How many times is 0.2 more than 0.02?

11. In the decimal 2.77, how many times is the value of the 7 in the hundredths place contained in the value of the 7 in the tenths place?

12. Write a number with a 4 in the tens place and a 3 in the hundredths place.

13. Write a decimal that is ten times as much as 0.04.

14. Write a decimal that is $\frac{1}{10}$ of 0.9.

15. Explain how one whole, one tenth, and one hundredth are related.

## Relate Decimals and Money

### Teaching Point 2:

*How are decimals and fractions related to money?*




How can you pay for the pack of orange juice?

**Remember**

1 dollar = 100 cents

You can use the bill and coins below.
















| 5 dollars | 25¢ | 10¢ | 5¢ | 1¢ |
|---|---|---|---|---|
| $5 or $5.00 | $0.25 | $0.10 | $0.05 | $0.01 |

**$5.36**

| Ones | Tenths | Hundredths |
|---|---|---|
| ○○○○○ | ● | ○○○ | ○○○○○ ○ |

Think: $5.36 = 5 ones and 36 hundredths

Think: $5.36 → 500¢ + 36¢ = 536¢




is $\frac{25}{100}$ or $\frac{1}{4}$ of a dollar = $0.25




is $\frac{10}{100}$ or $\frac{1}{10}$ of a dollar = $0.10




is $\frac{5}{100}$ or $\frac{1}{20}$ of a dollar = $0.05




is $\frac{1}{100}$ of a dollar = $0.01



Chapter 11 Understanding Decimals.indd 144 06/03/18 2:11 PM

## Activity 1:

**Write each total money amount as a decimal fraction.**

**1.**




**2.**




**3.**




**4.**




**5.**




**6.**




**7.**




**8.**




**9.**




**10.**




**Express each amount using a dollar sign and decimal point.**

**11.** 4 dollars and 5 cents.

**12.** 7 dollars and 40 cents.

**13.** 48 dollars and 9 cents.



Chapter 11 Understanding Decimals.indd 145 06/03/18 2:11 PM

14. 350 dollars and 12 cents.

15. 45 dollars and 6 cents.

16. 103 dollars and 10 cents.

17. Seventeen dollars and twelve cents.

18. 125 cents.

| | | |
|---|---|---|
| 19. 43¢ | 20. 6¢ | 21. 20¢ |
| 22. 125¢ | 23. 760¢ | 24. 1 034¢ |
| 25. 2 301¢ | 26. 507¢ | 27. 20 158¢ |

## Activity 2:

**Solve the problems.**

1. Kim spent $\frac{50}{100}$ of a dollar on a snack. Write as a money amount the amount she has left.

**The table shows the coins that 3 children have in their Piggy Banks.**

| Coins in Piggy Banks | | | | |
|---|---|---|---|---|
| Name | 1 CENT | 10 CENTS | 5 CENTS | 25 CENTS |
| Alex | 6 | 2 | 3 | 2 |
| Mark | 1 | 0 | 3 | 3 |
| Keva | 9 | 3 | 1 | 1 |

**Use the table on the left for questions 2 – 3.**

2. Write the total amount of money that Keva has as a decimal in terms of dollars.

3. Mark spent $\frac{40}{100}$ of a dollar on a snack. Write the amount of money he has left as a decimal in terms of dollars.

4. David has $0.68 left after buying lunch at school. Write the money amount as a fraction in terms of dollars?

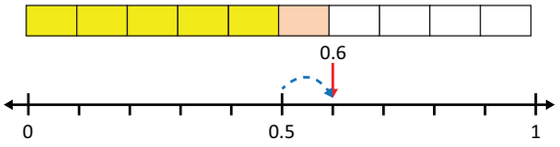
5. Che has $\frac{50}{100}$ of a dollar. He has at least two different types of coins in his pocket. Draw two possible sets of coins that Che could have.

# Compare and Order Decimals

## Teaching Point 1:

*How can you compare and order decimal fractions?*

What is **0.1** more than **0.5**?



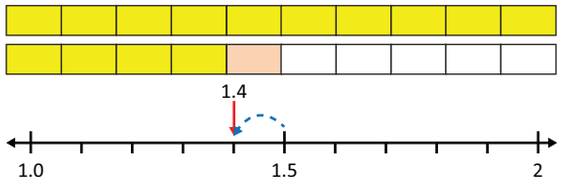

Each part is 0.1 → 0.5 + 0.1 = 0.6

0.6 is 0.1 more than 0.5.



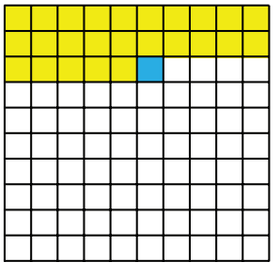
Chapter 11 Understanding Decimals.indd 146 06/03/18 2:11 PM

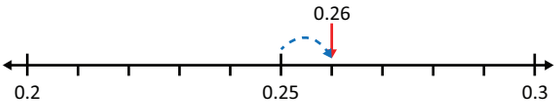
What is **0.1** less than **1.5**?




0.5 – 0.1 = 0.4 → 1.4 is 0.1 less than 1.5

What is **0.01** more than **0.25**?

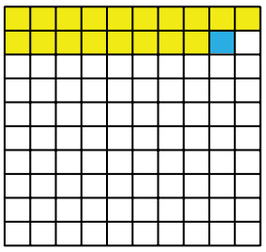


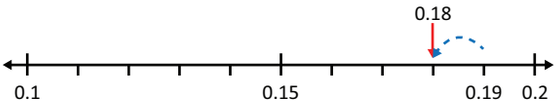



Each part is 0.01 → 0.25 + 0.01 = 0.26

0.01 more than 0.25 is 0.26.

What is **0.01** less than **0.19**?






0.19 – 0.01 = 0.18 → 0.18 is 0.01 less than 0.19.

## Activity 1:

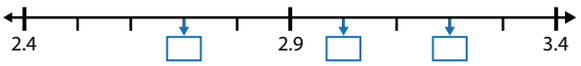
**Complete.**

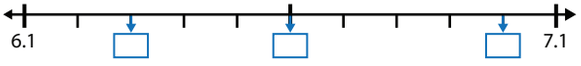
1. What number is 0.1 more than 2.3?
2. 0.2 more than 0.6 is ☐.
3. 0.04 less than 1.38 is ☐.
4. What number is 0.01 less than 5.64?
5. 0.03 more than 3.09 is ☐.

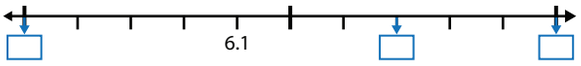
**Insert the next 3 decimal numbers in the sequence.**

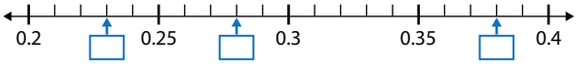
6. 0.1, 0.2, 0.3, _____, _____, _____
7. 0.4, 0.6, 0.8, _____, _____, _____
8. 7.8, 8.0, 8.2, _____, _____, _____
9. 2.09, 2.11, 2.13, _____, _____, _____
10. 4.45, 4.50, 4.55, _____, _____, _____
11. 1.24, 1.30, 1.36, _____, _____, _____

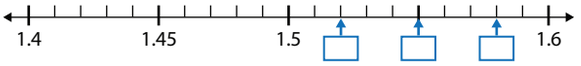
**Write the missing decimals on each number line.**

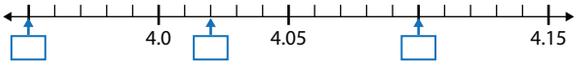
12. 


13. 


14. 


15. 


16. 


17. 




Chapter 11 Understanding Decimals.indd 147 06/03/18 2:11 PM

## Teaching Point 2:

*How can you compare and order decimal fractions?*




A paperclip is about 1.06g, a push pin is about 1.2g and a toothpick is about 0.84g. Which object has the greatest mass?

**Use a place value chart.**

| | Ones | | Tenths | Hundredths |
|---|---|---|---|---|
| **1.06 =** | ● | ● | | ●●●●● ● |
| **1.2 =** | ● | | ●● | |
| **0.84 =** | | | ●●●●● ●●● | ●●●● |

**First**, compare **ones** because it's the digit with the greatest value. There is 0 ones in 0.84 and 1 one in both 1.06 and 1.2.

So, 0.84 is the smallest number.

**Next**, compare the **tenths**.

2 **tenths** is greater than 0 **tenths**.

1.2 > 1.06.

The masses written in order from **least to greatest** are: 0.84g, 1.06g, 1.2g.

The masses written in order from **greatest to least** are: 1.2g, 1.06g, 0.84g.

So, the push pin has the **greatest** mass.

## Activity 2:

**Compare. Use < or >.**

| | |
|---|---|
| **1.** 0.54 ◯ 0.8 | **2.** 1.54 ◯ 1.45 |
| **3.** 1.0 ◯ 0.1 | **4.** 0.01 ◯ 0.1 |
| **5.** 1.5 ◯ 0.51 | **6.** 0.3 ◯ 0.13 |
| **7.** 2.5 ◯ 0.52 | **8.** 3.5 ◯ 5.3 |
| **9.** 2.52 ◯ 2.25 | **10.** 0.75 ◯ 1.01 |

**Order these decimal fractions from least to greatest.**

**11.** 0.2, 0.8, 0.5, 0.3

**12.** 1.4, 1.8, 1.2, 1.7

**13.** 4.2, 4.5, 4.9, 4.3

**14.** 7.1, 7.7, 7.6, 7.3

**15.** 0.8, 1.7, 0.31, 0.71

**16.** 1.04, 0.04, 0.14, 1.4

**17.** 0.20, 2.02, 2.2, 0.22

**Order these decimal fractions from greatest to least.**

**18.** 1.5, 5.1, 0.15, 0.51

**19.** 0.83, 8.3, 0.8, 0.38

**20.** 0.25, 0.2, 0.24, 0.21

**21.** 0.49, 0.4, 0.53, 0.35

**22.** 2.8, 2.08, 2.28, 2.88

**23.** 4.32, 4.23, 3.24, 3.43

**24.** Order the amounts of money below, from least to greatest.
$4.88, $5.19, $4.83, $5.02



Chapter 11 Understanding Decimals.indd 148 06/03/18 2:11 PM

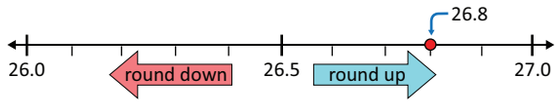
# Round Decimals

## Teaching Point 2:

*How can you round decimals?*

**Round to the nearest whole number.**

A bunch of plantains has a mass of 26.8 kilograms. Round 26.8 to the nearest kilogram.

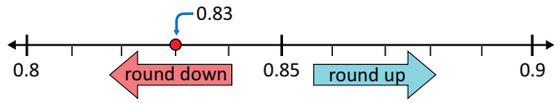



26.5 is halfway between 26 and 27.
To round to the nearest whole number, look at the **tenths** digit.
Since, the tenths digit is **greater than 5, round up**.

So, 26.8kg rounded to the nearest whole number is 27kg.

**Round to the nearest tenth.**

Danielle's height is 0.83 metres. Round 0.83 metres to the nearest tenth of a metre.




0.83 = 8 tenths 3 hundredths
0.83 is between 8 tenths and 9 tenths
It is nearer to 8 tenths than 9 tenths.
To round to the nearest tenths, look at the **hundredths** digit.
Since, the hundredths digit is **less than 5, round down**.

So, 0.83m rounded to the nearest tenth is 0.8m.

## Activity 1:

**Round each to the nearest whole number.**

| | | |
|---|---|---|
| **1.** 2.3 | **2.** 5.7 | **3.** 1.5 |
| **4.** 7.18 | **5.** 4.64 | **6.** 3.39 |
| **7.** 8.07 | **8.** 0.89 | **9.** 0.58 |
| **10.** 10.09 | **11.** 20.41 | **12.** 809.6 |

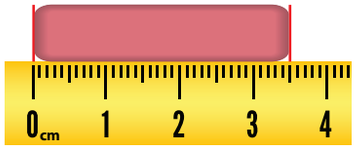
**Round each to the nearest tenth.**

| | | |
|---|---|---|
| **13.** 0.37 | **14.** 0.14 | **15.** 0.85 |
| **16.** 1.18 | **17.** 3.64 | **18.** 7.39 |
| **19.** 4.13 | **20.** 8.35 | **21.** 25.94 |
| **22.** 67.28 | **23.** 10.61 | **24.** 204.52 |

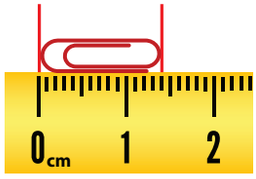
**25.** What is $35.90 rounded to the nearest dollar?

**26.** A dinner mint costs 85¢ and a toffee costs 73¢. What is the cost of both sweets rounded to the nearest dollar?

**27.** What is the length of the eraser rounded to the nearest centimetre?




**28.** What is the length of the paperclip rounded to the nearest centimetre?






Chapter 11 Understanding Decimals.indd 149 06/03/18 2:11 PM

**Use the table below to answer questions 29 to 31.**

**Mr. Johnson's Class**

| Students | Grade |
|---|---|
| Alex | 92.53 |
| Vanessa | 88.27 |
| Alyah | 76.81 |
| Kiesha | 87.59 |
| Dana | 84.53 |
| Rianna | 84.49 |

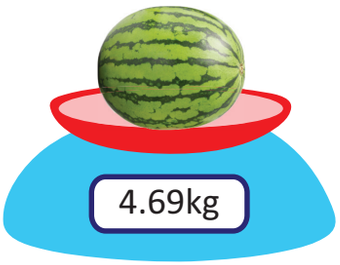
**29.** Mr. Johnson rounds his students' grades to the nearest whole number. For a student to get an A he or she must achieve 93 or above. Will Alex get an A?

**30.** To the nearest whole number, which two students earned the same grade?

**31.** To the nearest whole number, who earned a higher score, Dana or Rianna?

**32.** Mr. Charles wants to buy a hose that costs $195.25. About how much does the hose cost to the nearest dollar?

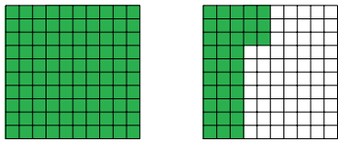
**33.** What is the mass of the watermelon rounded to the nearest tenth of a kilogram?




## Chapter Review

**Solve the problems below.**

**1.** What decimal is shown on the model below?



**2.** Express 120.07 in words.

**3.** Write the value of the underlined digit in the number 8.9<u>1</u>

**4.** Which of the following has 9 in the hundredths place?

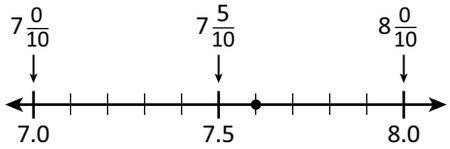
65.91, 28.79, 19.88, 926.7

**5.** Write each mixed number as a decimal.

**a)** $4\frac{5}{10}$

**b)** $16\frac{6}{100}$

**6.** Look at the number line.




Which decimal represents the point shown on the number line?

**7.** Express as a decimal:

$(4 \times 1\,000) + (9 \times 1) + \left(8 \times \frac{1}{10}\right) + \left(1 \times \frac{1}{100}\right) =$

**8.** What is 0.04 more than 2.19?



Chapter 11 Understanding Decimals.indd 150 06/03/18 2:11 PM

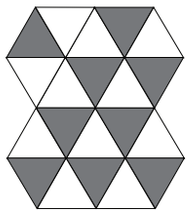
**Use the table to answer questions 9 and 10.**

| Distances Mark Walked | |
|---|---|
| **Days** | **Distances (In Kilometres)** |
| Monday | 1.5 |
| Wednesday | 5.4 |
| Friday | 0.5 |

**9.** On which day did Mark walk five tenths of a kilometre?

**10.** Write in words how far Mark walked on Wednesday?

**11.** State as a decimal the portion of the diagram that is shaded.



**12.** Write 3.49 to the nearest tenth.

**13.** Write 0.75 as a common fraction.

**14.** Write the following numbers in order of size, starting with the LARGEST.

0.20, 0.12, 0.21

**15.** On Sports Day, Mike runs 100 metres in 13.89 seconds and Neal runs the same distance in 13.01 seconds. Who is the FASTER runner?

**16.** Write the following numbers in ASCENDING order (smallest first):

0.25, 0.16, 0.09

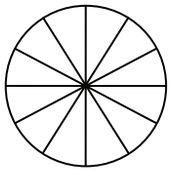
**17.** Isaiah has 12 coins. One half are 1 cent coins. One third are 5 cent coins. The rest are 25 cent coins. Write the value of Isaiah coins as a decimal in terms of a dollar.

**18.** Which number below is greater than 7.23 and less than 7.55?

7.59 7.17 7.6 7.3

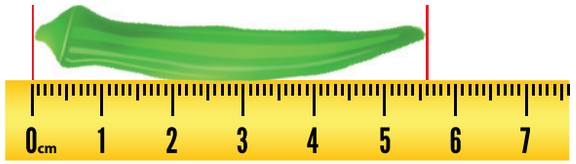
**19.** Mother gave Alyssa, Allyann, and Aleena the same allowance. Alyssa saved $\frac{2}{5}$ of her allowance. Allyann saved 0.35 of hers. Alyssa saved 0.3 of hers. Who saved the most money?

**20.** A pizza is cut into 12 equal slices as shown below.



Shade 0.25 of the pizza.

**21.** The length of an ochro is measured below.




What is its length to the nearest centimetre?

**22.** A baker uses 2.37 kilograms of flour for muffins. Which amount is closest to 2.37 kilograms?

**a)** 2.3 kg

**b)** 2.42 kg

**c)** 3.32 kg

**d)** 2.4 kg



Chapter 11 Understanding Decimals.indd 151 06/03/18 2:11 PM

**23.** Sharon has 4 coins on her desk. They have a total value $0.50. Two of the coins are shown in the diagram below.



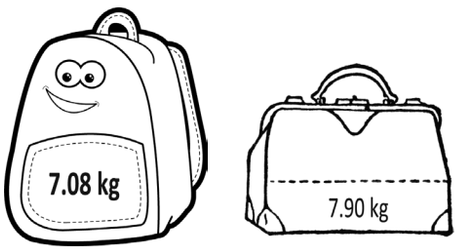

Write the correct value on EACH of the other 2 coins.

**24.** Mickell has a total of $8.00 in his piggy bank. If he only saves 10¢ coins and 25¢ coins, what possible combination of coins can he have?

**25.** A fruit vendor has 160 fruits in his stall. Of these 40 of them are apples and the rest are oranges. Express the number of oranges as a DECIMAL fraction.

**26.** A video lasts 6.44 minutes. About how long does the video last, rounded to the nearest minute?

**27.** At the airport check-in counter, Alisha checked in the bag with the greater mass, shown below.




What was the mass of the bag that she checked in?

**28.** Avinash saves 15 coins. All the coins have the same value. He exchanged the coins for an equivalent of $0.75. What is the value of each coin?

**29.** Maria has a seven10-cent coins and twice as many 25-cent coins. Express the amount of money she has with a dollar sign and a decimal point.

**30.** Which one has the same value as $1 + \frac{4}{25}$?

**a)** 1.04

**b)** 1.16

**c)** 1.25

**d)** 1.4

**31.** Mia has three quarters of dollar. She has two different types of coins. Draw the coins that Mia has.

**32.** Harry's pencil is 6 cm when rounded to the nearest whole number. What could be the actual length of his pencil?



Chapter 11 Understanding Decimals.indd 152 06/03/18 2:11 PM

CHAPTER

12

# Operations with Decimals

**Chapter Outcomes:**

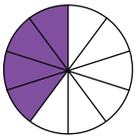
- Develop and apply procedures to solve problems involving the addition and subtraction of decimals.
- Develop estimation skills.
- Develop and apply the procedures to multiply decimals by whole numbers and decimals (limited to tenths by tenths) and to divide a decimal by a whole number (up to hundredths) to solve problems.



Performing operations with decimals is essential, especially in measurement and money. Imagine you are shopping for a bicycle with your birthday money. You know the cost of the bicycle but without doing some operations with decimals, there is no way to know if you have enough money. In addition, those calculations can also help you to find out the amount of change you will get back, if you purchase the bicycle.

## Getting Ready for Chapter 12

1. Write the decimal fraction of the shaded part.



2. What is the value of 8 in the number 4.08?

**Compare. Write >, < or =.**

| | |
|---|---|
| 3. 1.14 ◯ 1.41 | 4. 0.91 ◯ 0.19 |

5. Order the numbers below from least to greatest.

   2.41, 4.12, 1.24, 4.21

6. Round 15.6 to the nearest whole number.

7. Write 230.09 is expanded notation form.

## Estimate Decimal Sums and Differences

### Teaching Point 1:

*How do you estimate when you add and subtract decimals?*

Mark wants to buy a pants that cost $45.65 and a shirt that costs $25.15 at D Barn Men's Store. Estimate the cost of both items.

**Use rounding to estimate.**

Round each decimal to the nearest whole number. Then add.

$45.65 ⟶ **$ 46**

+$24.15 ⟶ +**$ 24**

**$ 70**

The cost of both items is about $70.

The same pants cost $62.38 at the Match Men's Store. About how much more does the pants cost at this store than at D Barn Men's Store?

Round each decimal to nearest whole number. Then subtract.

$62.38 ⟶ **$ 62**

−$45.65 ⟶ −**$ 46**

**$ 16**

The pants cost about $16 more at Match Men's Store.

### Activity 1:

**Round each to the nearest whole number to estimate each sum or difference.**

| | |
|---|---|
| 1. 0.56 + 3.29 = | 2. 17.45 − 6.85 = |
| 3. $23.56 + $3.29 = | 4. 3.4 + 5.1 + 1.8 = |
| 5. 97.12 − 54.72 = | 6. $12.38 − $9.19 = |
| 7. 9.3 + 6.9 + 2.2 = | 8. 3.2 + 2.93 + 4.5 = |
| 9. $26.55 − $6.85 = | 10. 401.4 − 90.8 = |



Chapter 12 Operations with Decimals.indd 154 06/03/18 2:21 PM

| | |
|---|---|
| **11.** 21.05<br>+ 7.82<br>_____ | **12.** 18.26<br>−14.09<br>_____ |
| **13.** 136.21<br>− 68.71<br>_____ | **14.** 89.39<br>+2 781.50<br>_____ |
| **15.** 149.02<br>7 368.16<br>+ 25.73<br>_____ | **16.** 9.72<br>68.16<br>+53.90<br>_____ |
| **17.** 207.08<br>−183.57<br>_____ | **18.** 38.84<br>−27.64<br>_____ |
| **19.** 401.23<br>− 99.89<br>_____ | **20.** 66.44<br>+ 5.76<br>_____ |

**21.** Meena uses 3.43 metres of blue ribbon, 0.94 metres of red ribbon and 4.16 metres of white ribbon to decorate the room. Estimate the total length of ribbon she uses for the decorations.

**22.** Sanjo has $25.00 to spend at the Bazaar. He wants to buy an ice-cream for $5.50, a hot dog for $6.25 and a drink for $3.95. Estimate the amount of money he would have left after he buys these things.

**Use the table and estimation to answer questions 23-24.**

| Grams of Protein per Serving | |
|---|---|
| Food | Grams of Protein |
| 1 boiled egg | 6.29 |
| A glass of milk | 8.22 |
| A bowl of oatmeal | 11.45 |
| 2 slices of whole wheat bread | 8.53 |

**23.** Gina had a boiled egg, 2 slices of bread and a glass of milk for breakfast. About how many grams of protein did Gina have at breakfast?

**24.** Vinod had a bowl of oatmeal, a glass of milk, and one other item for breakfast. He had about 25 grams of protein. What was the third item Vinod had for breakfast?

**25.** Neesha downloads a song that is 4.32 minutes long and one that is 8.28 minutes long. About how many minutes will it take all of her songs to play if she already has 13.8 minutes of songs?

**26.** Mickey spends $45.40 on a present for his mom and a $60.95 on a present for his dad. If Mickey started with $120, about how much money does he have left?



Chapter 12 Operations with Decimals.indd 155 06/03/18 2:21 PM

# Add and Subtract Decimals through Hundredths

## Teaching Point 1:

*How can you add decimals through hundredths?*

Mia has 0.4m of red fabric and 0.5m of blue fabric. How much fabric does Mia have in all?

**Model 0.4m + 0.5m.**



0.4 + 0.5 + 0.9

| Ones | | Tenths |
|---|---|---|
| | • | |
| | • | |
| 0 | • | 9 |

| | Ones | | Tenths |
|---|---|---|---|
| 0.4 | | • | |
| +0.5 | | • | |
| 0.9 | 0 | • | 9 |

Mia cut 0.9 metres of fabric in total.

**Find 19.6 + 4.71.**

1. Line up the decimal points. Add a 0 so that both numbers end in the same value.

19.60 +
+ 4.71

| T | O | | Tths | Hths |
|---|---|---|---|---|
| 1 | 1 9 | • | 6 | 0 |
| | 4 | • | 7 | 1 |
| 2 | 4 | • | 3 | 1 |

1

1
19.60
+ 4.71
.31

11
19.60
+ 4.71
4.31

11
19.60
+ 4.71
24.31

2. Add the digits in each place value. Regroup if necessary.

3. Bring down the decimal point.

**Estimate for reasonableness:**
20 + 5 = 25.
The sum 24.31 is close to 25.
So, the answer is reasonable.

So, 19.6 + 4.71 = 24.31

## Teaching Point 2:

*How can you subtract decimals through hundredths?*

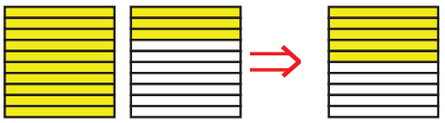
Subtract 0.8 from 1.3.

**Model 1.3 – 0.8**

3 tenths is less than 8 tenths.

**Regroup** 1 ones and 3 tenths.

1 one 3 tenths = 13 tenths



13 tenths – 8 tenths = 5 tenths

| Ones | Tenths |
|---|---|
| | |
| 0 | 5 |

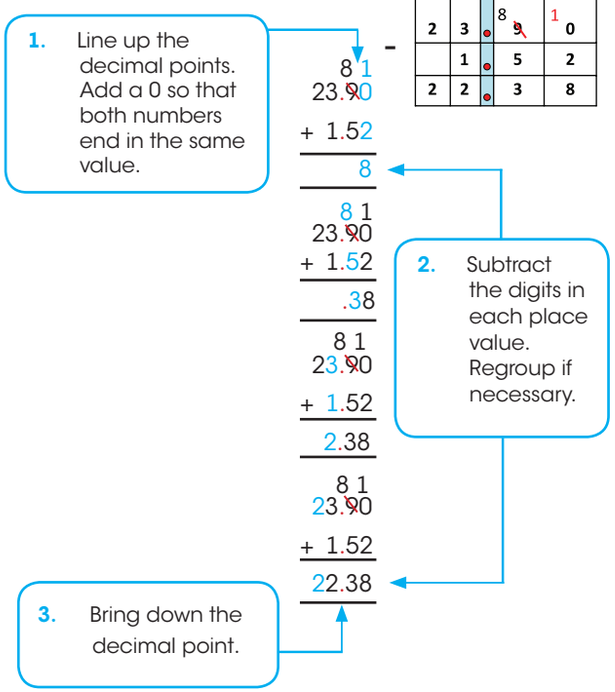
| | Ones | Tenths |
|---|---|---|
| 0 1 | | |
| 1.3 | | |
| −0.8 | | |
| 0.5 | 0 | 5 |

So, 1.3 – 0.8 = 0.5



Chapter 12 Operations with Decimals.indd 156 06/03/18 2:21 PM

**Find 23.9 – 1.52.**




**Estimate for reasonableness:**
24 – 2 = 22.

The sum 22.38 is close to 22.

So, the answer is reasonable.

So, 23.9 – 1.52 = 22.38.

## Activity 1:

**Copy and complete the following.**

| | |
|---|---|
| **1.** 0.6 + 0.9 = | **2.** 0.7 + 0.8 = |
| **3.** 0.6 + 0.4 + 0.9 = | **4.** 0.2 + 0.6 + 0.7 = |
| **5.** 0.4 + 0.57 = | **6.** 0.93 + 0.6 = |
| **7.** 0.87 + 0.29 = | **8.** 0.15 + 0.78 = |

| | |
|---|---|
| **9.** 2.5 + 13.38 = | **10.** 16.8 + 7.76 = |
| **11.** 2.5 + 6 + 7.59 = | **12.** 8.1 + 11.45 + 9.6 = |
| **13.** 5.5<br>+ 0.82 | **14.** 0.17<br>+ 0.94 |
| **15.** 1.05<br>+ 7.82 | **16.** 2.41<br>+ 0.58 |
| **17.** $21.05<br>+$47.69 | **18.** $129.05<br>+$ 62.79 |

**Solve the problems below. Check for reasonableness of answer.**

**19.** Jamie is jogging from the park to the school. He has jogged 1.62km so far. He has 0.38km left to jog. How far is the park located away from the school?

**20.** Abby practiced the piano for 3.5 hours on Sunday and 1.8 hours on Monday. How long did she practice over the two days?

**21.** Three of the decimals shown below have a sum equal to 14.04. Which number below does not belong with the other three?
1.15 2.57 5.03 6.44



Chapter 12 Operations with Decimals.indd 157 06/03/18 2:21 PM

**Use the bill below to answer questions 21 – 23.**

| Family Lunch | |
|---|---|
| Rice | – $22.55 |
| Curry Chicken | – $85.95 |
| Dahl | – $26.10 |
| Fresh Salad | – $15.69 |

**22.** What is the total cost of the family lunch?

**23.** What would be the total cost of the Rice, Curry Chicken and Fresh Salad?

**24.** If one family member bought one roti-skin that costs $6, what will be the total cost of the lunch now?

**25.** A litre of milk costs $8.32 and a litre of orange juice costs $5.95. Mother buys two litres of milk and two litres of orange juice. How much does mother spend?

**26.** For a party Mrs. Smith buys 2.75 litres of orange juice and 4.26 litres of apple juice. How much juice does Mrs. Smith buy in total?

## Activity 2:

**Copy and complete the following.**

| | |
|---|---|
| **1.** 0.8 – 0.6 = | **2.** 0.7 – 0.2 = |
| **3.** 1.4 – 0.2 = | **4.** 2.8 – 0.5 = |
| **5.** 5.2 – 1.4 = | **6.** 14.6 – 9.7 = |
| **7.** 12.09 – 4.8 = | **8.** 36.6 – 15.07 = |
| **9.** 23.7 – 18.29 = | **10.** 158.01 – 18.96 = |
| **11.** 0.45<br>+0.22<br>_____ | **12.** 6.01<br>–0.45<br>_____ |
| **13.** 7.6<br>–2.75<br>_____ | **14.** 39.57<br>–18.98<br>_____ |
| **15.** $23.50<br>+$17.59<br>_____ | **16.** $450.00<br>+$ 76.99<br>_____ |

**Solve the problems below. Check for reasonableness of answer.**

**17.** Mark finished the road race in 21.39 minutes. Alex took 19.59 minutes to finish. How much longer did Mark take to finish the race than Alex?

**18.** The sum of two numbers is 4.04. One number has a 4 in the tenths place and a 1 in the hundredths place. What are the two numbers?

**19.** Maya uses ribbons to decorate packages. She has a total of 3.75m of ribbon. If she uses 0.48m of ribbon to wrap one package, how much ribbon does Maya have left?



Chapter 12 Operations with Decimals.indd 158 06/03/18 2:21 PM

## Activity 3:

**Solve the real-world problems below.**

1. Dana spends $13.02 on snacks, $9.85 on a drink, and $15.20 on a sandwich. How much change does she receive from $50?
2. Alysha adds 3.24, 4.29, and 2.07. How much more than 5.31 is the sum?
3. Varun and Vinod want to buy a pack of pencils. The pack of pencils costs $10.68. They each have $5.25 to spend. How much more money do they need to buy the pencils?
4. Sandra has $75 in her bank account. On Monday, she deposits $19.75 in the account. If Sandra buys a meal for $40.35, about how much money does Sandra have left in her account?
5. The mass of a watermelon is 5.6kg. A pumpkin has a mass that is 0.34 less than the watermelon. What is the total mass of the watermelon and the pumpkin?
6. A piece of fabric 6m long is cut into two pieces. The first piece is 2.74m long. How much longer is the second piece?
7. A jug contains 1.75 litres of water. A bucket contains 15.2 litres more water than the jug. How much water does the bucket contain?
8. Peter is 0.08m taller than Ali. Jamiah is 0.16m shorter than Peter. If Jamiah is 1.65m tall, what is Ali's height?

# Multiply Decimals and Whole Numbers

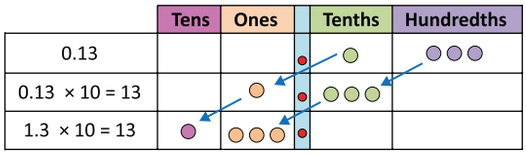
## Teaching Point 1:

*How can patterns help you place the decimal point in a product?*

| *Multiply by* | *Move the decimal point to the right* |
|---|---|
| 1 | 0 places |
| 10 | 1 place |
| 100 | 2 places |

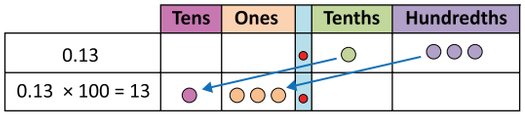
Multiply 0.13 by 10.

$0.13 \times 10 = 0.13 = 1.3$ ← 1 decimal place to the right.




Multiply 0.13 by 100

$0.13 \times 100 = 0.13 = 13$ ← 2 decimal places to the right.






Chapter 12 Operations with Decimals.indd 159 06/03/18 2:21 PM

When you need to move the decimal point beyond the number of digits in the number you are multiplying, place 1 or more zeros.

Moving the decimal point to the **right** increases the number's value.

## Activity 1:

**Move the decimal point to find each product.**

| | |
|---|---|
| **1.** 0.4 × 10 = | **2.** 0.3 × 10 = |
| **3.** 0.17 × 10 = | **4.** 0.01 × 10 = |
| **5.** 5.4 × 10 = | **6.** 10.5 × 10 = |
| **7.** 6.81 × 10 = | **8.** 8.03 × 10 = |
| **9.** 60.7 × 10 = | **10.** 40.09 × 10 = |
| **11.** 0.15 × 100 = | **12.** 0.06 × 100 = |
| **13.** 18.16 × 100 = | **14.** 28.33 × 100 = |
| **15.** 0.8 × 100 = | **16.** 0.2 × 100 = |
| **17.** 3.8 × 100 = | **18.** 30.1 × 100 = |
| **19.** 51.01 × 100 = | **20.** 25.6 × 100 = |

Use the table below to answer questions **21** and **22**.

**Coins In Arianne's Piggy Bank**

| Type of Coin | Number of Coins |
|---|---|
|   | 10 |
|   | 100 |
|   | 10 |
|   | 100 |

**21.** Write in dollar notation the total value of each type of coin that is in the piggy bank.

**22.** What is the total value of coins in Arianne's piggy bank?

**23.** Sally wants to buy 100 plums. She can buy plums at $0.45 each or 10 plums for $3.55.

**(a)** How much money would she spend if she buys the plums at $0.45 each.

**(b)** How much money would she spend if she buys the plums at 10 plums for $3.55



Chapter 12 Operations with Decimals.indd 160 06/03/18 2:21 PM

## Teaching Point 2:

*How can you multiply decimals by multiples of 10?*

Multiply 0.3 by 20.

Break apart whole numbers to multiply.

$3 \times 20 = (3 \times 2) \times 10$

$= 6 \times 10$

$= 60$

---

Use the same rule for multiplying 3 by 20.

$0.3 \times 20 = (0.3 \times 2) \times 10$

$= 0.6 \times 10$

$= 6.0$ or $6$

## Activity 2:

**Find each product.**

| | |
|---|---|
| **1.** $0.5 \times 20 =$ | **2.** $0.8 \times 80 =$ |
| **3.** $0.25 \times 30 =$ | **4.** $0.06 \times 70 =$ |
| **5.** $1.6 \times 40 =$ | **6.** $20.4 \times 50 =$ |
| **7.** $2.4 \times 90 =$ | **8.** $8.07 \times 20 =$ |
| **9.** $30.1 \times 60 =$ | **10.** $50.03 \times 80 =$ |
| **11.** $41.32 \times 40 =$ | **12.** $25.05 \times 70 =$ |

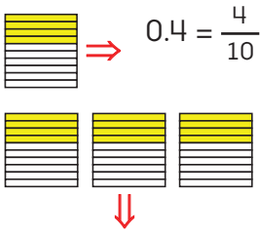
**13.** Which is greater: 20.46 x 200 or 24.06 x 20?

## Teaching Point 3:

*How do you multiply whole numbers and decimals?*

Multiply 0.4 by 3.

**Use a Model**

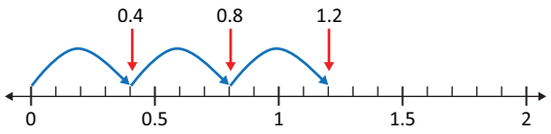


$0.4 = \frac{4}{10}$

$0.4 \times 3 = \frac{4}{10} \times \frac{3}{1}$ ← Multiply the fractions.

$= \frac{12}{10}$ ← Change to a mixed number.

$= 1\frac{2}{10}$ ***or*** $1.2$ ← Change to a decimal.




$0.4 + 0.4 + 0.4 = 0.4 \times 3$

4 tenths x 3 = 12 tenths

Regroup the tenths

12 tenths = 1 one and 2 tenths or 1.2

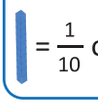


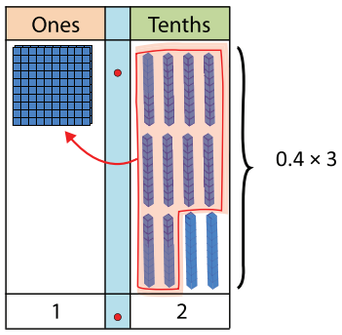
Chapter 12 Operations with Decimals.indd 161 06/03/18 2:21 PM

### Use a Place Value Chart

Use base ten blocks

 = 1 one

 = $\frac{1}{10}$ of 1 one




So, 0.4 × 3 = 1.2

$$\begin{array}{r} {\scriptstyle 1}\\ 0.4\\ \times\ 3\\ \hline 1.2 \end{array}$$

1. Multiply the tenths by 3.
4 tenths × 3 = 12 tenths
Regroup the tenths.
12 tenths = 1 one 2 tenths

2. Line up the decimal point.

## Activity 3:

**Find the product. Use a model.**

| | |
|---|---|
| 1. 0.3 × 2 = | 2. 0.8 × 1 = |
| 3. 0.4 × 3 = | 4. 0.6 × 7 = |
| 5. 0.8 × 4 = | 6. 0.7 × 5 = |
| 7. $\begin{array}{r} 1.6\\ \times\ 5\\ \hline \end{array}$ | 8. $\begin{array}{r} 5.4\\ \times\ 9\\ \hline \end{array}$ |
| 9. $\begin{array}{r} 8.5\\ \times\ 3\\ \hline \end{array}$ | 10. $\begin{array}{r} 2.8\\ \times\ 4\\ \hline \end{array}$ |

| | |
|---|---|
| 11. $\begin{array}{r} 15.9\\ \times\ 8\\ \hline \end{array}$ | 12. $\begin{array}{r} 13.2\\ \times\ 7\\ \hline \end{array}$ |
| 13. $\begin{array}{r} 34.2\\ \times\ 15\\ \hline \end{array}$ | 14. $\begin{array}{r} 20.1\\ \times\ 12\\ \hline \end{array}$ |
| 15. $\begin{array}{r} 53.7\\ \times\ 11\\ \hline \end{array}$ | 16. $\begin{array}{r} 61.8\\ \times\ 13\\ \hline \end{array}$ |

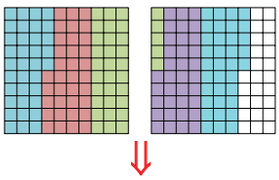
## Teaching Point 4:

*How do you multiply whole numbers and decimals?*

Maya bought 5 dinner mints at $0.35 each. How much did she pay in all?

$0.35 × 5 = ?

**Use a Model**



0.35 × 5 = 0.35 + 0.35 + 0.35 + 0.35 + 0.35

= 1.75

Maya paid $1.75 for the dinner mints.



Chapter 12 Operations with Decimals.indd 162 06/03/18 2:21 PM

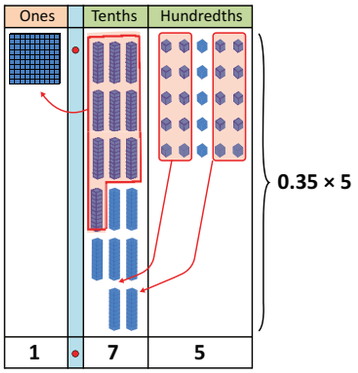
## Use a Place Value Chart

Use base ten blocks

= 1 one

= $\frac{1}{10}$ of 1 one

= $\frac{1}{100}$ of 1 one




1 2
**0.35**
× 5
**1.75**

1. **Multiply** the hundredths by 5.
   5 hundredths × 5 = 25 hundredths
   **Regroup** the hundredths.
   25 hundredths = 2 tens 5 hundredths

2. **Multiply** the tenths by 5.
   3 tenths × 5 = 15 tenths
   Add the tenths.
   15 tenths + 2 tenths = 17 tenths
   **Regroup** the tenths.
   17 tenths = 1 one 7 tenths.

So, 0.35 x 5 = 1.75.

## Activity 4:

**Multiply.**

| | |
|---|---|
| 1. 0.36 × 2 = | 2. 0.48 × 3 = |
| 3. 0.74 × 5 = | 4. 0.06 × 7 = |
| 5. 0.18 × 4 = | 6. 0.97 × 8 = |
| 7. 1.36 × 5 = | 8. 4.08 × 6 = |
| 9. 10.19 × 4 = | 10. 26.91 × 9 = |
| 11. $5.02 × 7 = | 12. $27.18 × 3 = |
| 13. $150.95 × 6 = | 14. $404.05 × 8 = |
| 15. 22.34 × 11 = | 16. 41.87 × 13 = |

## Activity 5:

**Solve the problems below.**

1. A piece of wood is 6.5 m long. What is the total length of 7 pieces of wood of similar lengths?
2. Kiara measures the length of her desk with 12 handspans. If her handspan is 6.7 cm long, what is the length of her desk?
3. Samantha works at a restaurant for 15 hours a week. At this rate, how many hours will she work after 7.5 weeks?



Chapter 12 Operations with Decimals.indd 163 06/03/18 2:21 PM

4. Jared had a puppy that weighed 1.45 kg. Melissa had a dog that weighed 4 times as much as Jared's puppy. How much did Melissa's dog weigh?

5. Issa walks his dog 4 times farther than Maya walks her dog. Maya walks her dog 0.23 km. How far does Issa walk his dog?

6. Mark has 9 twenty-five cent coins. How much money does he have?

7. Joy drinks 4 bottles of water each day. If each bottle contains 0.56 litres of water, how much water does she drink daily?

8. Shania bought 6 copy books for $1.45 each. How much do they cost altogether?

9. A glass is filled with 0.25 litres of water. Liann fills a jug with 7 times as much water. How much water is in Liann's jug?

10. What is the weight of 5 bags of cement if each bag weighs 55.95 kg?

11. Kavita measures her notebook by using paper clips that are each 1.6 cm long. Kavita's notebook is 16 paper clips long. What is the length of Kavita's notebook?

12. Mrs. Brown buys 7 bottles of liquid soap. The cost of each bottle is $14.65. She gives the cashier $110. How much change does she get?

Use the table below to answer questions 13 and 14.

| Sporting Item | Cost |
|---|---|
| Ball | $25.95 |
| Hoop | $15.68 |
| Cricket Bat | $115.65 |

13. How much money is needed to buy 5 balls and 10 hoops?

14. A teacher has $200 and wants to buy a cricket bat and 4 balls. How much more money does she need?

15. Javan has a card with the product of 4 × 0.06 written on it. Hayley has a card with a number that is 0.04 less than the product of Javan's number. What is Hayley's number?

16. Carrie has 0.73 litres of juice in a jug. Sara's jug has 2 times as much juice as Carrie's jug. Lee's jug has 4 times as much juice as Sara's jug. Sara and Lee pour all their juice into a large bowl. How much juice is in the bowl?

17. Vanna bought 3 pens and a package of paper from the stationery store. Each pen costs $5.85 and the paper costs $35.80. How much did she spend?

18. Hannah saved $12.15. Jayley saved 3 times as much as Hannah. Sarah saved $24.50 more than Jayley. How much money did Sarah save?



Chapter 12 Operations with Decimals.indd 164 06/03/18 2:21 PM

# Multiply Decimals by Decimals

## Teaching Point 1:

*How do you multiply decimals?*

Multiply 0.6 by 0.4.

**Use Fractions**

$0.6 \times 0.4 = \frac{6}{10} \times \frac{4}{10} \Rightarrow$ Express decimals as fractions

$= \frac{24}{100} \Rightarrow$ Multiply

$= 0.24 \Rightarrow$ Express as a decimal.

## Activity 1:

**Use fractions to find each product.**

| | |
|---|---|
| **1.** $0.3 \times 0.2 =$ | **2.** $0.6 \times 0.4 =$ |
| **3.** $0.9 \times 0.1 =$ | **4.** $0.7 \times 0.7 =$ |
| **5.** $0.8 \times 0.5 =$ | **6.** $0.6 \times 0.5 =$ |
| **7.** $0.2 \times 0.9 =$ | **8.** $0.4 \times 0.7 =$ |
| **9.** $1.2 \times 0.4 =$ | **10.** $2.5 \times 0.9 =$ |

**11.** Carla lives a 0.8 km distance from the school. She gets a ride with her uncle part of the way and walks 7 tenths of the distance. How far does Carla walk to school?

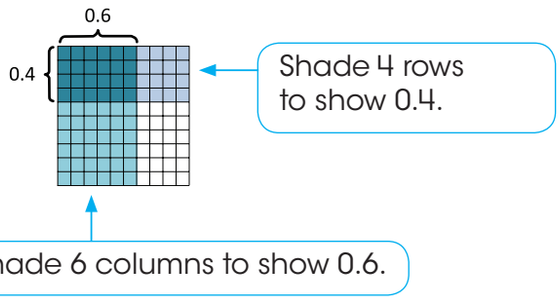
**12.** A jug contains 0.8 litres of juice. A glass has 0.5 times the juice as the jug. How much more juice does the jug contain than the glass?

## Teaching Point 2:

*How do you multiply decimals?*

Multiply 0.6 by 0.4.

**Use a Model**

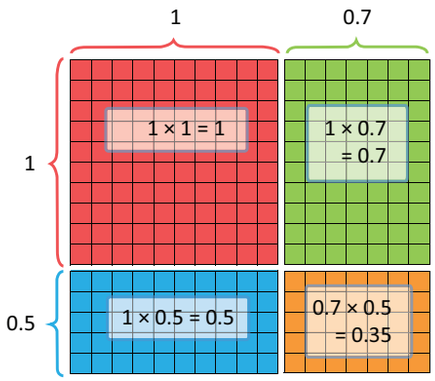



The shadings overlap 24 squares.
This represents 24 hundredths, or 0.24.
$0.6 \times 0.4 = 0.24$

One pack of split peas weighs 1.7 kg. How many kilograms would 1.5 packs weigh?

Find $1.7 \times 1.5$.

**Use a Model**






Chapter 12 Operations with Decimals.indd 165 06/03/18 2:21 PM

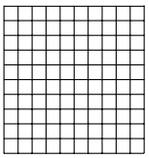
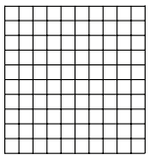
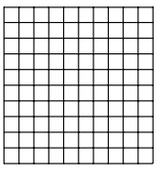
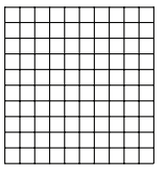
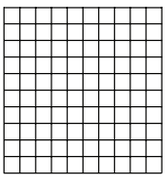
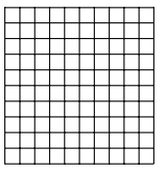
The **model** represents: 1 whole + 7 tenths + 5 tenths + 35 hundredths

1 + 0.7 + 0.5 + 0.35 = 2.55

So, the weight of 1.5 packs is 2.55 kg.

## Activity 2:

**Use each grid below to find each product.**

| | |
|---|---|
| **1.** 0.4 × 0.2 =  | **2.** 0.7 × 0.6 =  |
| **3.** 0.8 × 0.3 =  | **4.** 0.6 × 0.6 =  |
| **5.** 0.4 × 0.7 =  | **6.** 0.8 × 0.9 =  |

**Draw models to find each product.**

| | |
|---|---|
| **7.** 1.4 × 0.2 = | **8.** 2.3 × 0.4 = |
| **9.** 1.6 × 1.9 = | **10.** 1.5 × 1.3 = |
| **11.** 2.1 × 1.5 = | **12.** 2.6 × 1.7 = |

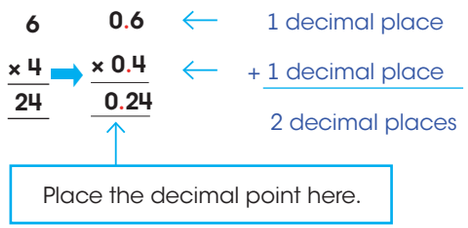
**13.** Ayesha's baby brother weighs 4.6 kg. Ayesha weight is 5.4 times more than her baby brother. How much does Ayesha weigh?

**14.** My bedroom window is 1.3 metres wide. The living room window is 1.5 times as wide as the bedroom window. What is the width of the living room window?

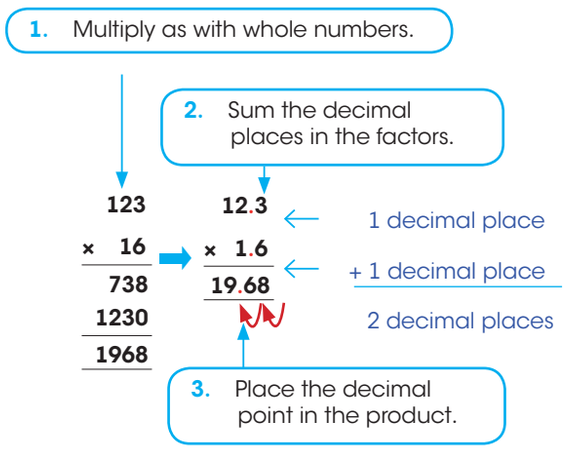
## Teaching Point 3:

*How can you place a decimal point in a product when multiplying decimals?*

Multiply 0.6 by 0.4.




Multiply 12.3 by 1.6




12.3 x 1.6 = 19.68



Chapter 12 Operations with Decimals.indd 166 06/03/18 2:21 PM

**Estimate** to place the decimal point in the product.

12.3 × 1.6 =

↓ ↓

12 × 2 = 24

Since 24 is close to 19.68, the decimal point is in the correct place.

## Activity 3:

**Estimate first. Then find each product.**

| | |
|---|---|
| **1.** 9.3 × 4.1 = | **2.** 0.7 × 1.8 = |
| **3.** 16.6 × 0.5 = | **4.** 137.3 × 0.9 = |
| **5.** 4.6 × 3.5 = | **6.** 2.3 × 2.4 = |
| **7.** 12.6 × 0.2 = | **8.** 8.3 × 10.6 = |
| **9.** 19.1 × 8.5 = | **10.** 0.4 × 15.1 = |
| **11.** 9.1 × 11.6 = | **12.** 0.06 × 15 = |
| **13.** 18.1 × 3.7 = | **14.** 28.3 × 6.4 = |
| **15.** 6.8 × 7.2 = | **16.** 0.21 × 29 = |
| **17.** 123.8 × 1.3 = | **18.** 106.1 × 4.7 = |
| **19.** 250.2 × 5.8 = | **20.** 25.6 × 7.9 = |

**Solve.**

**21.** Javan rode his bike 7 times around the savannah. The perimeter of the savannah is 0.6 km. How many kilometres did he ride?

**22.** Emily drank 2.5 bottles of water during the day. If each bottle contains 1.3 litres of water, how much water did Emily drink?

**23.** The width of a window is 9.2 metres. The length is 3.4 times the width. What is the length of the window?

**24.** On Monday Mr. Khan measured a pumpkin vine in his garden and it was 3.6 m long. When it was measured on Friday, it was 2.1 times as long. How long was the vine on Friday?

# Divide Decimals by Whole Numbers

## Teaching Point 1:

*How can patterns help you place the decimal point in a quotient?*

Divide 13 by 100.

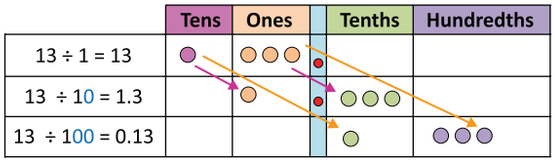
Look for a pattern in these quotients.

13 ÷ 1 = 13

13 ÷ 10 = 1.3 ← 1 decimal place to the left.

13 ÷ 100 = 0.13 ← 2 decimal places to the left.

So, 13 ÷ 100 = 0.13.






Chapter 12 Operations with Decimals.indd 167 06/03/18 2:21 PM

| Divide by | Move the decimal point to the left |
|---|---|
| 1 | 0 places |
| 10 | 1 place |
| 100 | 2 places |

Moving the decimal point to the **left** decreases the number's value.

## Activity 1:

**Find each quotient.**

| | |
|---|---|
| **1.** 4.4 ÷ 10 = | **2.** 12 ÷ 10 = |
| **3.** 24.6 ÷ 10 = | **4.** 10.9 ÷ 10 = |
| **5.** 0.6 ÷ 10 = | **6.** 0.1 ÷ 10 = |
| **7.** 18.3 ÷ 10 = | **8.** 109.1 ÷ 10 = |
| **9.** 49 ÷ 100 = | **10.** 127 ÷ 100 = |
| **11.** 6 549 ÷ 100 = | **12.** 210 ÷ 100 = |
| **13.** 1 ÷ 100 = | **14.** 9 ÷ 100 = |

**15.** Vanessa has a bottle full of ten cent coins. The total amount of money in the bottle is $25.00. How many ten cent coins does she have?

**16.** Isaiah is saving to buy a video game. The video game costs $135.00. He has 10 weeks to save for it. How much money should he save each week?

**17.** How is dividing 420 by 10 the same as dividing 4 200 by 100. Explain.

**18.** Daddy drives 24.5 km to his mother's house. He drives one-tenth as many kilometres to his brother's house. How many kilometres does daddy drive to his brother's house?

**19.** Elena shared a total of 25.8 kilograms of sugar into 10 bags. If each bag had equal amounts of sugar, how much sugar was in each bag?






**20.** Lia used 15 kg of white flour to make bread. She used one-tenth as many kilograms of whole wheat flour as kilograms of white flour. She used one-hundredth as many kilograms of margarine as kilograms of white flour.

**(a)** How much whole wheat flour did Lia use?

**(b)** How much margarine did Lia use?

**(c)** What was the total weight of all three ingredients?

**21.** Elena sews beads on a costume for a play. She sews 100 beads end-to-end along the width of the skirt.
The skirt is 250 centimetres wide. What is the length of one bead?



Chapter 12 Operations with Decimals.indd 168 06/03/18 2:21 PM

## Teaching Point 2:

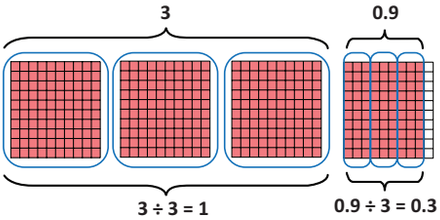
*How do you divide a decimal by a whole number?*

Three friends share 6.9 sandwiches equally. How many sandwiches did each friend get?

Find, 3.9 ÷ 3 = ?

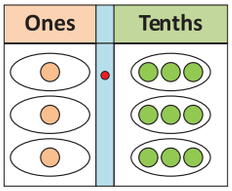
### Use a Model

Shade the grids to show 3.9. Separate the grids into 3 equal groups.




So, each friend got 1.3 sandwiches.

### Use a Place Value Chart




1. Write the decimal point in the quotient directly above the decimal point in the dividend.
2. **Divide** the ones by **3**. 3 ones ÷ 3 = 1 ones
3. **Divide** the tenths by 3. 9 tenths ÷ 3 = 3 tenths

$$\begin{array}{r} 1.3 \\ 3\overline{)\,3.9} \\ -3 \\ \hline 09 \\ -\ 9 \\ \hline 0 \end{array}$$

So, 3.9 ÷ 3 = 1.3

## Activity 2:

**Find each quotient.**

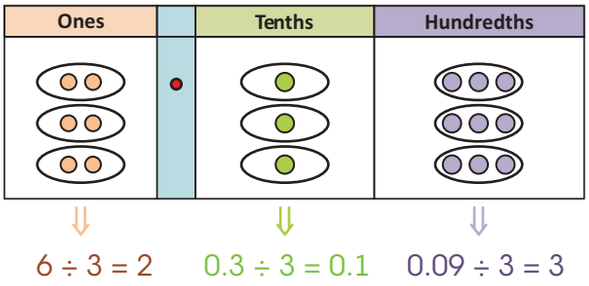
| | |
|---|---|
| **1.** 0.4 ÷ 2 = | **2.** 12.63 ÷ 3 = |
| **3.** 24.6 ÷ 6 = | **4.** 50.5 ÷ 5 = |
| **5.** 45.9 ÷ 9 = | **6.** 308.7 ÷ 7 = |
| **7.** 96.8 ÷ 8 = | **8.** 344.8 ÷ 4 = |
| **9.** 99.9 cm ÷ 9 = | **10.** 224.4 cm ÷ 4 = |
| **11.** 824.8 ÷ 8 = | **12.** 1 265.5 ÷ 5 = |
| **13.** 528.9 ÷ 3 = | **14.** 714.7 ÷ 7 = |

## Teaching Point 2:

*How do you divide a decimal by a whole number?*

Divide 6.39 by 3

### Model on a Place Value Chart




So, 6.39 ÷ 3 = 2.13



Chapter 12 Operations with Decimals.indd 169 06/03/18 2:21 PM

**Follow a rule.**

| Step 1 | Step 2 | Step 3 |
|---|---|---|
| **Divide the ones by 3** | **Divide the tenths by 3** | **Divide the hundredths by 3** |
| **2**<br>3 ⟌ 6.39<br>**–6**<br>6 ones ÷ 3 = 2 ones | **2.1**<br>3 ⟌ 6.39<br>–6<br>3<br>**–3**<br>3 tenths ÷ 3 = 1 tenth | **2.13**<br>3 ⟌ 6.39<br>–6<br>3<br>–3<br>9<br>**–9**<br>9 hundredths ÷ 3 = 3 hundredths |

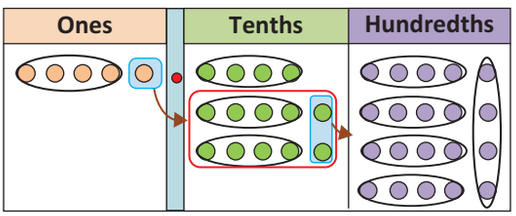
So, 6.39 ÷ 3 = 2.13

## Teaching Point 3:

*How do you divide a decimal by a whole number?*

Divide 5.4 by 4

**Model on a Place Value Chart**




**Follow a rule.**

**Step 1**

**Divide** the ones by 4.

5 ones ÷ 4 = 1 one **R 1 one**

**1**
4 ⟌ 5.4
**–4**
1

**Step 2**

**Regroup** the remainder 1 one
1 one = 10 tenths
**Add the tenths:** 10 tenths + 4 tenths = 14 tenths
**Divide** the tenths by 4.
14 tenths ÷ 4 = 3 tenths **R 2 tenths**

**1.3**
4 ⟌ 5.4
–4
1 4
**–1 2**
2

**Step 3**

**Regroup** the remainder 2 tenths
2 tenths = 20 hundredths
**Divide** the hundredths by 4
20 hundredths ÷ 4 = 5 hundredths

**1.35**
4 ⟌ 5.4**0**
–4
14
–12
20
**–20**

You can add a zero at the end of 5.4 to continue dividing.

So, 5.4 ÷ 4 = 1.35



Chapter 12 Operations with Decimals.indd 170 06/03/18 2:21 PM

## Activity 3:

**Find each quotient.**

| | |
|---|---|
| **1.** 0.28 ÷ 2 = | **2.** 0.84 ÷ 4 = |
| **3.** 24.66 ÷ 3 = | **4.** 50.55 ÷ 5 = |
| **5.** 824.08 ÷ 8 = | **6.** 48.04 ÷ 4 = |
| **7.** 36.93 ÷ 3 = | **8.** 900.09 ÷ 9 = |
| **9.** 0.7 ÷ 5 = | **10.** 0.5 ÷ 2 = |
| **11.** 0.6 ÷ 4 = | **12.** 0.2 ÷ 4 = |
| **13.** 4.5 ÷ 3 = | **14.** 3.2 ÷ 8 = |
| **15.** 71.4 ÷ 7 = | **16.** 68.8 ÷ 8 = |
| **17.** $4.35 ÷ 5 = | **18.** $207.12 ÷ 6 = |
| **19.** $60.52 ÷ 2 = | **20.** $272.68 ÷ 4 = |

## Activity 4:

**Solve the problems below.**

1. Mother bought 15 apples at the market for $101.25. If each apple costs the same amount of money, what was the price of one apple?

2. Five friends went for lunch and shared the bill, which was $78.45, equally. What was each friend's share?

3. If one dozen of the avocados, each of the same mass, weigh 7.2 kg. What does 1 avocado weigh?

4. Marlon earned a total of $128.60 for walking the neighbour's dog in five days. How much did he earn each day, if he earned the same amount each day?

5. A 3 kilogram package of meat costs $38.67. How much does 1 kilogram of meat costs?

6. Miss Peters used 6.25 litres of juice to serve 25 children. If each child received the same amount of juice, how much juice was in each serving?

7. A 360 m fence has a flag on each post. There are posts at each end and at equal distances along the fence. If there are 16 flags along the fence, what is the distance between two posts?

8. Mother made an overseas phone call for 31 minutes which cost $57.35. How much did the call cost per minute?

9. A mini box of cereal has a mass of 23 grams and costs $5.98. A small box of the same cereal has a mass of 300 grams and costs $24.00. Which has a greater cost per gram?

10. Cupcakes cost $35.40 for a dozen or $18.78 for a half dozen. Which is the better buy? Explain.

11. Ayesha worked 20 hours last week and earned $145.80. Aleena worked 15 hours last week and earned $112.50. How much more does Aleena earn per hour?



Chapter 12 Operations with Decimals.indd 171 06/03/18 2:21 PM

## Decimal Patterns

### Teaching Point 1:

***Write the missing elements in the number pattern.***

×2 ×2 ×2 ×2 ×2

3.1, 6.2, 12.4, 24.8, ☐, 99.2

The **rule** is ***multiply by 2***.

Therefore, the missing number is **49.6**.

### Activity 1:

**Complete the patterns. Find the pattern rule.**

1. 14.5, 12.5, 10.5, ☐, 6.5, 4.5
2. 5.95, ☐, 5.75, 5.65, 5.55, 5.45
3. 1, 1.3, 1.6, ☐, ☐, 2.5
4. 100, 99.95, ☐, 99.85, ☐, 99.75
5. 0.02, 0.04, 0.06, ☐, ☐, ☐
6. 1.01, 3.03, 9.09, ☐, ☐
7. 49.6, 24.8, ☐, ☐, 3.1
8. 0.89, ☐, 0.83, 0.80, ☐, 0.74
9. 125 300, 12 530, 1 253, ☐, 12.53
10. 0.01, 0.1, ☐, 10, 100, ☐

## Chapter Review

**Solve the problems below.**

1. 4.35 + 12 + 1.4 =
2. 15.2 – 9.68 =
3. 12.3 × 15 =
4. 0.5 × 0.9 =
5. 23.15 ÷ 5 =
6. Write the missing numbers in the sequence below.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1.1 | 1.1 | 2.2 | 3.3 | 5.5 | | |

What will be the 10th term in the pattern?

7. Express as a single decimal fraction $\frac{7}{10} \times 12$.
8. What is the decimal that is exactly in the middle of 2 and 2.5?
9. Mother has 6.55 metres of ribbon. She wants to cut it into 2 metre pieces. How many pieces of ribbon can she get?
10. Two containers are shown below. How much more does the water container hold than the orange juice container?






Chapter 12 Operations with Decimals.indd 172 06/03/18 2:21 PM

11. A piece of rope 6.54 metres long is cut into two pieces. One piece is twice as long as the other. What is the length of the longest piece?

12. A box containing 24 cricket balls has a mass of 7.45 kg. The box, when empty, has a mass of 0.25 kg. find the mass of each ball.

13. The sum of two numbers is 80.6. One of the numbers is 9 times the other. What are the two numbers?

14. Mother wants to buy 3 watches at a cost of $55.75 each. Estimate the least number of $10 bills she needs to buy the watches.

15. Jehue ran the following distances over a 2-week period while training for the World Games.

| Week | Distance Ran |
|---|---|
| 1 | 4.5 km |
| 2 | 3.25 km |

What is the TOTAL distance covered by Jehue over the two weeks?

16. Jane bought the 3 items shown below at the book store.









$8.25 $15.09 $9.99

(a) What is the total cost of the 3 items?

(b) Calculate Jane's exact change if she paid for the items with a $50.00 bill?

17. At the meat shop, Jason bought 3 kg of ground beef for $9.60 per kilogram. He bought 4 kg of ground chicken for $4.60 per kilogram. How much more did Jason spend on beef than on chicken?

18. Mother used 7.2 kilograms of gauvas to make guava jam. She used one-tenth as many kilograms of sugar as kilograms of guavas. How many kilograms of sugar did Mother use?

19. A 6-pack of socks costs $48.78. This is $3.96 less than the cost of buying 6 individual pairs of socks. If each pair of socks costs the same amount, how much does each pair of socks cost when purchased individually?

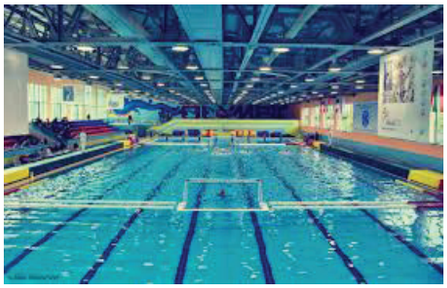
20. Ann bought 3 kg of bananas that cost $4.50 per kg at the grocery. Amy went to the market and purchased 3.5 kg of bananas at $4 per kg. How much money did they spend in total?




21. Javan drank a total of 5.6 litres of water on Monday and Tuesday. If he drank 0.74 litres more water on Tuesday than Monday, how much water did he drink on Monday?



Chapter 12 Operations with Decimals.indd 173 06/03/18 2:21 PM



**22.** The width of 8 lanes in swimming pools used for competitions is 21.92 metres. The width of 9 lanes is 21.96 metres. How much wider is each lane when there are 8 lanes than when there are 9 lanes?

**23.** Kristian buys 6 tickets to go to the movies. He pays $8.50 for a bag of popcorn. His total cost is $103.60. What is the cost of each ticket?

**24.** A box of 8 packs of chocolate bars costs $76.48. A single bar of chocolate costs $11.75. What is the savings on each chocolate bar if you buy a box of 8 chocolate bars?

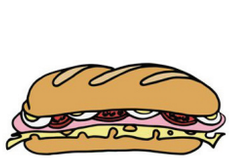
**25.** Mr. Lee grows tomatoes and cucumbers. He harvests 49.92 kilograms of tomatoes and 65.28 kilograms of cucumbers. He distributes the tomatoes and cucumbers into 32 packages.

**(a)** How many kilograms of cucumbers are there in one package?

**(b)** If Mr. Lee sells one kilogram of tomatoes for $8 and one kilogram of cucumbers for $6, from the sale of which vegetable would he earn more money?

**26.** Avinash spent $15.00 on an equal number of mangoes and oranges. Each mango costs $2 and each orange $1. How many fruits did he buy altogether?

**27.** The diagrams below show the cost of a sandwich, a cup cake and a drink at a food shop.



$15.95 $5.55 $3.50

**(a)** James has 1 sandwich, two cupcakes and 1 drink. Calculate the cost of his meal.

**(b)** David got exactly $50.00 change from a $100.00 note after purchasing items from the food shop. What possible combination of the THREE items did he buy?

_____ sandwich(es) $ _____
_____ cupcake(s) $ _____
_____ drink(s) $ _____
Total $ _____



Chapter 12 Operations with Decimals.indd 174 06/03/18 2:21 PM

CHAPTER

13

# Rates

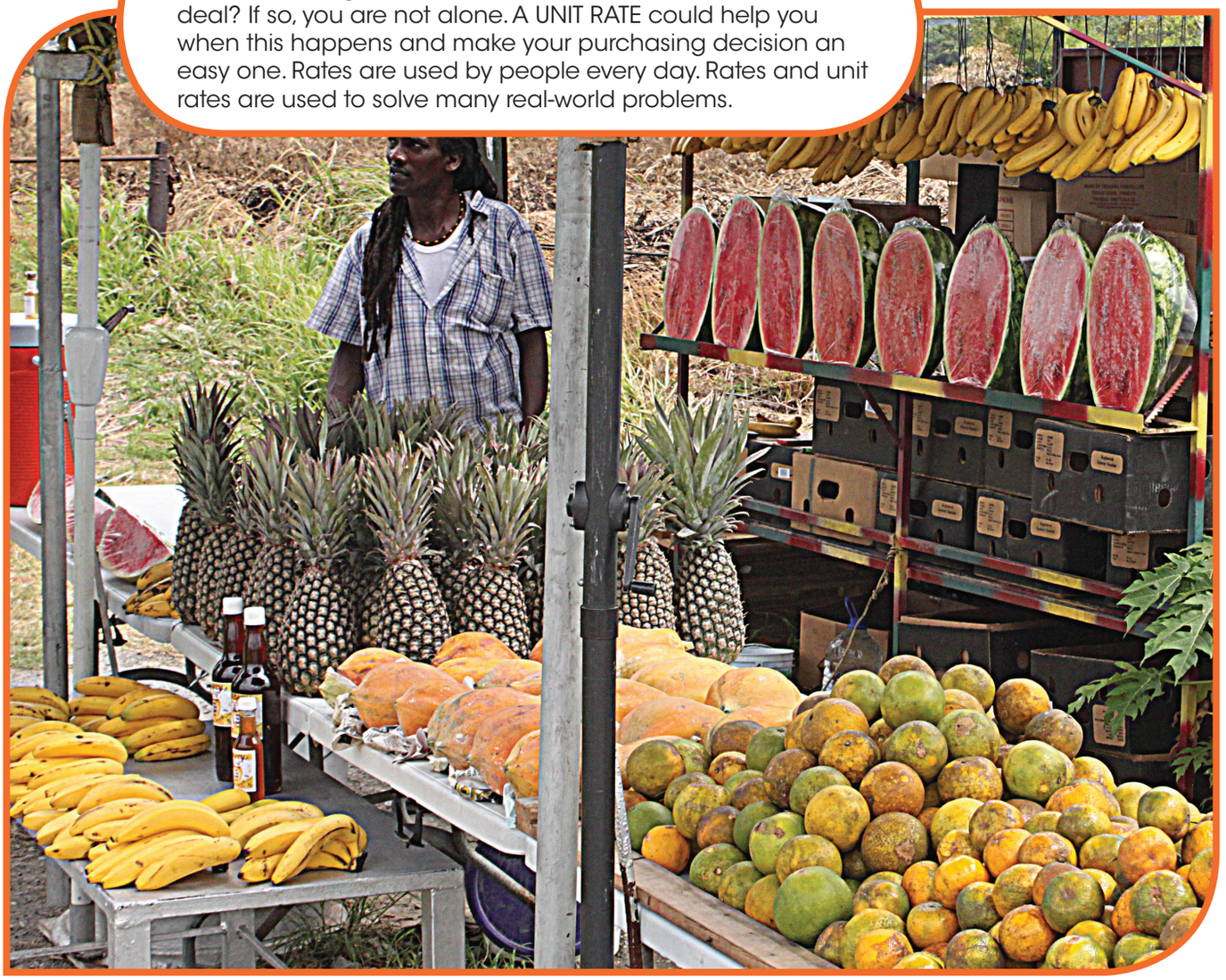
**Vocabulary:**

rate
unit rate

**Chapter Outcomes:**

- Create and solve one-step and multi-step problems involving whole numbers, fractions, mixed numbers, decimal, percents including money using algorithms, mental strategies and other problem solving strategies.

Have you ever been to the market and stood, staring, at two stalls with oranges and wondered which one is the better deal? If so, you are not alone. A UNIT RATE could help you when this happens and make your purchasing decision an easy one. Rates are used by people every day. Rates and unit rates are used to solve many real-world problems.



## Getting Ready for Chapter 13

**Write each fraction in its simplest form.**

| | | |
|---|---|---|
| **1.** $\frac{4}{10}$ | **2.** $\frac{32}{48}$ | **3.** $\frac{14}{21}$ |
| **4.** $\frac{15}{25}$ | **5.** $\frac{7}{28}$ | **6.** $\frac{30}{35}$ |
| **7.** $\frac{12}{36}$ | **8.** $\frac{8}{48}$ | **9.** $\frac{16}{54}$ |

**Solve the problems below. Write the answer in its simplest form.**

| | | |
|---|---|---|
| **10.** $\frac{1}{5} \times \frac{3}{4}$ | **11.** $7 \div \frac{4}{14}$ | **12.** $\frac{5}{8} \times \frac{2}{10}$ |
| **13.** $\frac{3}{12} \times \frac{6}{9}$ | **14.** $\frac{4}{9} \div 12$ | **15.** $5 \div \frac{15}{16}$ |
| **16.** $\frac{2}{6} \div \frac{3}{8}$ | **17.** $\frac{4}{7} \times \frac{1}{2}$ | **18.** $\frac{1}{8} \div 4$ |

**Find the next three values in each pattern.**

**19.** 4, 7, 10, 13, ____, ____, ____

**20.** 62, 66, 70, 74, ____, ____, ____

**21.** 1.8, 2.4, 3.0, 3.6, ____, ____, ____

## Rates

### Teaching Point 1:

*How can you use rates to solve problems?*

A **rate** compares two quantities with different kinds of units.

**Dollars** and **pencils** are different kinds of units.

**$12 for 6 pencils**

When the comparison is to 1 unit, the rate is called the **unit rate**.

Find how much for 1 pencil.

**Step 1** → **Write** the cost of the 6 pencils **as a rate**.

$12 for 6 pencils

$$\frac{\$12}{6 \text{ pencils}}$$

**Step 2** → **Divide** to find the **unit rate**.

1 pencil → $12 ÷ 6 = $2

So, 1 pencil will cost $2.

Unit rates answer the question, **"How many for one?**



Chapter 13 Rates.indd 176 06/03/18 2:24 PM

## Activity 1:

**Write each statement as a rate.**

1. It took Liann 32 minutes to run 4 laps.
2. $24.60 for 1 dozen eggs
3. A car uses 8 litres of gasoline to travel 100 km
4. Vanessa burned 120 calories in 20 minutes while hiking.
5. Josiah bought 10 pencils for $12.50.
6. Rachael solved 6 mathematics problems in 18 minutes.
7. John buys 3 shirts for $60.
8. The seamstress sews 12 buttons in 6 minutes.
9. A tap left running for 5 minutes wasted 30 litres of water.
10. 8 hours for $160.00

## Activity 2:

**Find the unit rate for each.**

| | |
|---|---|
| 1. $\frac{150\ snacks}{50\ students}$ | 2. $\frac{\$120}{5\ hours}$ |
| 3. $\frac{110\ km}{11\ litres}$ | 4. $\frac{6\ pages}{3\ minutes}$ |

| | |
|---|---|
| 5. $\frac{24\ eggs}{6\ cakes}$ | 6. $\frac{12\ loaves}{4\ kg\ flour}$ |
| 7. $\frac{\$48}{24\ bottles\ of\ water}$ | 8. $\frac{410\ heart\ beats}{5\ minutes}$ |
| 9. $\frac{180\ words}{3\ minutes}$ | 10. $\frac{200\ children}{8\ classes}$ |
| 11. $\frac{880\ calories}{8\ servings}$ | 12. $\frac{1\ 000\ ml}{4\ glasses}$ |

13. Anton's heart beats 320 times in 4 minutes. How many times does his heart beat in 1 minute.
14. A printer took 5 minutes to print 25 pages. What is the rate of pages per minute?
15. Tamara earned 15 points for every 5 books she read. If she read only 1 book, how many points would she have earned?



16. A pencil company uses 30 grams of rubber to make 3 pencils. What is the rate of grams per pencil?



17. A carpenter used 2 boxes of nails to build 6 doors. How many boxes of nails did he use to build each door?
18. Mother bought 6 notebooks for $96.48. How much did she pay for 1 notebook?



Chapter 13 Rates.indd 177 06/03/18 2:24 PM

## Teaching Point 2:

*How can you use unit rates to solve problems?*

A farmer picks 12 fruits in 3 minutes. How many fruits will he pick in 1 hour if he picks the fruits at the same rate?

**Step 1: Find the unit rate.**

$\frac{12 \text{ fruits}}{3 \text{ minutes}}$ or $\frac{12}{3}$

$\frac{12 \div 3}{3 \div 3} = \frac{4}{1}$

The unit rate is 4 fruits in 1 minute.

**Step 2: Solve the problem with the unit rate.**

1 minute → 4 fruits

60 minutes → 60 × 4 = 240 fruits

The farmer could pick 240 fruits in 1 hour

## Activity 3:

**Solve the problems below.**



1. A florist made 16 bouquets in 4 hours. How many hours will the florist take to make 20 bouquets if they are made at the same rate?

2. Mark can mow 4 lawns in 8 hours. How many lawns can he mow in 12 hours?

3. A builder installs 10 windows in 5 hours. How long will he take to install 18 windows if he works at the same rate?



4. Water leaks from a tap at a rate of 200 ml every 4 minutes.

   (a) At this rate, how much water will leak from the tap in 10 minutes.

   (b) At this rate, how long will it take to collect 2 litres of water?

5. Lauren took 3 hours to read a 60-page book. At this rate, how long will it take her to read a 120-page book?

6. An empty bucket is filled with water at a rate of 2 litres per minute. How long will it take to fill the bucket with 20 litres of water?



7. A farmer is able to fill 120 crates of eggs in 1 hour. At this rate, how many crates can he fill in 10 minutes?



Chapter 13 Rates.indd 178 06/03/18 2:24 PM

8. A Standard 4 class sold 24 barbecue tickets in 12 days. At this rate, how long will it take for them to sell 36 tickets?

## Teaching Point 3:

*How can you compare rates?*

Jerry reads 48 pages in 3 hours. Mark reads 24 pages from the same book in 2 hours. Who is the faster reader?

**Step 1: Find each unit rate.**

Jerry's rate $\rightarrow \frac{48 \text{ pages}}{3 \text{ hours}}$ or $\frac{48}{3}$

$$\frac{48 \div 3}{3 \div 3} = \frac{16}{1}$$

Jerry's unit rate is 16 pages per hour.

Mark's rate $\rightarrow \frac{23 \text{ pages}}{2 \text{ hours}}$ or $\frac{24}{2}$

$$\frac{24 \div 2}{2 \div 2} = \frac{12}{1}$$

Mark's unit rate is 12 pages per hour.

**Step 2: Compare unit rates.**

16 pages > 12 pages

So Jerry reads faster than Mark.

## Activity 4:

**Compare the rates. Write which is greater.**

1. 35 points in 5 seconds or 64 points in 8 seconds.
2. 12 laps in 6 minutes or 16 laps in 10 minutes.
3. 32 runs in 4 overs or 12 runs in 2 overs.
4. 220 km on 10 litres or 160 km on 8 litres.
5. 360 visitors in 24 hours or 300 visitors in 20 hours.
6. 12 text messages in 4 minutes or 8 text messages in 2 minutes.
7. 4 hours to fill a 320 litre tank or 3 hours to fill a 270 litre tank.
8. 288 points in 12 games or 182 points in 7 games.

**Solve the problems below.**

9. Dwayne scored 96 runs in 3 cricket matches and Adesh scored 48 runs in 2 matches. Which of the two batsmen scored less runs per match?
10. Tap A can fill a 24 litre water cooler in 8 minutes. Tap B can fill a 40 litre water cooler in 10 minutes. Which tap will take the shorter time to fill a 20 litre container?

## Chapter Review

**Solve the problems below.**

1. A tailor can sew 16 pants in 8 days. How many pants can he sew in one day?
2. Four litres of gasoline cost $16.80. What is the price per litre?

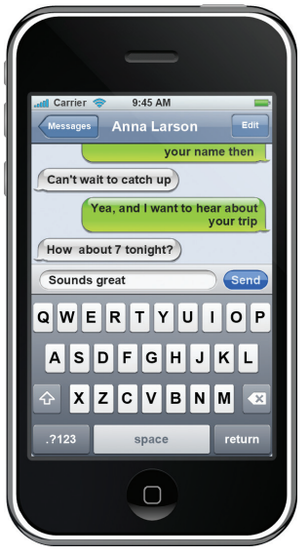


Chapter 13 Rates.indd 179 06/03/18 2:24 PM

3. In 12 games, Jeffrey scored 252 points. What is his scoring rate in points per game?

4. Kianna reads 40 pages in 2 hours. At this rate, in how many hours will she have read 100 pages?

5. Mother baked a dozen cupcakes with 2 cups of flour. How many cups of flour will she need to make 36 cupcakes?




6. Leanna can text at a rate of 24 words in 3 minutes.

   (a) At this rate, how many words can she text in 5 minutes?

   (b) At this rate, how many minutes would she take to text 360 words?

7. Maria jogged for 30 minutes and burned 150 calories. Jason walked for 1 hour and burned 180 calories. Who burned the most calories per hour?



Tap A



Tap B

8. Tap A leaks 450 ml in 10 minutes. Tap B leaks 360 ml in 9 minutes. Which tap leaks at a faster rate?

9. A bakery can bake 160 loaves of bread in 5 hours.

   (a) How many loaves can they bake in 1 hour?

   (b) How long will they take to bake 200 loaves?

10. Mr. Smith lays 20 cm square tiles. He lays 20 of these tiles in 2 hours.

    (a) At this rate, how many tiles can he lay in 5 hours?

    (b) If he works 8 hours every day, how long would he take to tile a room that is 4 metres long and 3 metres wide?

11. A baker can make 48 muffins per hour.

    (a) At this rate, how many muffins can he make in 6 hours.

    (b) At this rate, how long will he take to make 120 muffins?

12. In one week Jenny was paid $55 for 11 hours of baby sitting, Chrissy was paid $48 for 4 hours of baby sitting and Lexi got $54 for baby sitting 6 hours on Friday. Whose rate of pay was the highest?



Chapter 13 Rates.indd 180 06/03/18 2:24 PM

CHAPTER

14

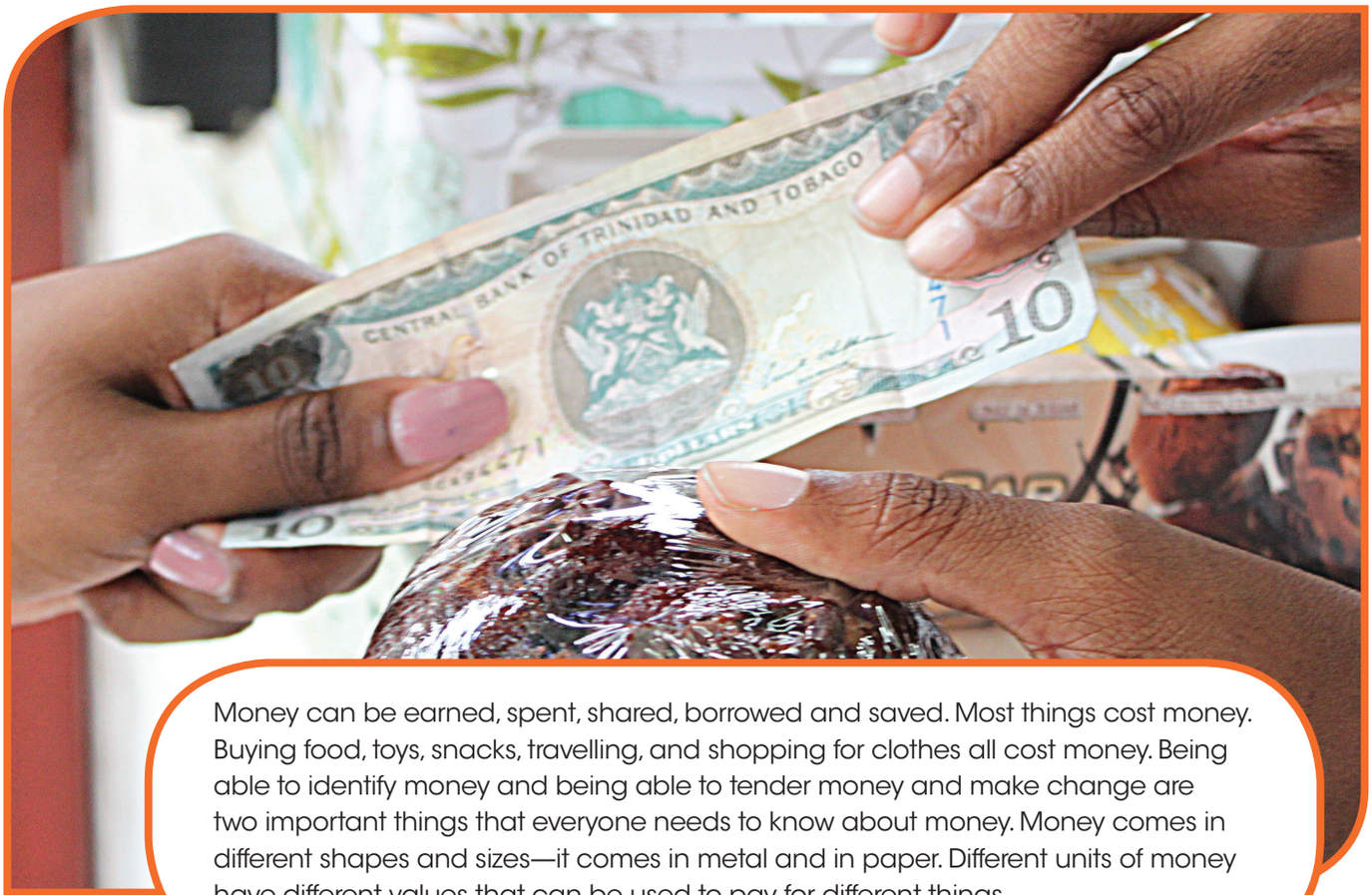
# Money and Money Transactions

**Vocabulary:**

currency
multi-item bills
best buy
unit price
profit
loss

**Chapter Outcomes:**

- Create and solve one-step and multi-step problems involving whole numbers, fractions, mixed numbers, decimal, percents including money using algorithms, mental strategies and other problem solving strategies.




Money can be earned, spent, shared, borrowed and saved. Most things cost money. Buying food, toys, snacks, travelling, and shopping for clothes all cost money. Being able to identify money and being able to tender money and make change are two important things that everyone needs to know about money. Money comes in different shapes and sizes—it comes in metal and in paper. Different units of money have different values that can be used to pay for different things.

## Getting Ready for Chapter 14

**Write the total amount of money for each shown below.**

1. 


2. 


3. 


4. 


5. $45.26
+$ 6.98
_____

6. $100.00
−$ 1.63
_____

7. Express 4 dollars and 5 cents using a dollar sign and decimal point.

8. How do you write 125 cents using a dollar sign and a decimal point?

9. Ian spent $\frac{55}{100}$ of a dollar on a dinner mint. Write the amount of money he has left as a decimal in terms of dollars.

10. Maria has a total of 50¢ in her pocket. She has at LEAST two DIFFERENT types of coins. Draw TWO possible sets of coins that Maria could have.

## Money

### Teaching Point 1:

*How do find an amount of money with coins and bills?*

Arianna has some coins and bills in her wallet. The money is shown below. How much money does she have?







**Step 1: Find the value of each type of bill.**

The value of **one** $100 bill is **$100**

The value of **two** $20 bills is **$40**

The value of **one** $5 bill is **$5**

The value of **two** $1 bills is **$2**

The total value of the bills is:

**$100** + **$40** + **$5** + **$2** = **$147**



Chapter 14 Money and Money Transactions.indd 182 06/03/18 2:57 PM

**Step 2: Find the value of each type of coin.**

The value of **three** 25¢ coins is **75¢**

The value of **one** 10¢ coin is **10¢**

The value of **one** 5¢ coin is **5¢**

The value of **two** 1¢ coins is **2¢**

The total value of the coins is:

**75¢ + 10¢ + 5¢ + 2¢ = 92¢**

**Step 3: Add the values of the coins and the bills.**

Total Value of the bills: $147.00

Total Value of the coins: +$ 0.92

Total Value: $147.92

So, Arianna has $147.92 in her wallet.

## Activity 1:

**Write the value of each sum of money shown below.**

1.




2.




3.




4.




5.




6.




7.






Chapter 14 Money and Money Transactions.indd 183 06/03/18 2:58 PM

**8.**




**9.**




**10.**




## Activity 2:

**Use the table below to answer the questions 1 to 4.**

**Coins and Bills in Children's Wallets**

| Names | Bills | | | | Coins | | | |
|---|---|---|---|---|---|---|---|---|
| | $20 | $10 | $5 | $1 | 25¢ | 10¢ | 5¢ | 1¢ |
| Alex | 2 | 1 | 3 | 4 | 1 | 0 | 1 | 9 |
| Jane | 1 | 3 | 1 | 6 | 2 | 3 | 2 | 1 |
| Mary | 4 | 2 | 3 | 1 | 4 | 3 | 0 | 2 |
| Bill | 2 | 6 | 1 | 4 | 3 | 0 | 5 | 4 |
| Ana | 3 | 0 | 0 | 10 | 0 | 7 | 3 | 8 |
| Sam | 1 | 5 | 1 | 1 | 2 | 3 | 1 | 1 |
| Benny | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

1. Calculate the sum of money that each child has.
2. Which child has the most money?
3. Which child has the least amount of money?
4. Sam and Benny are brothers. Their father gave them $100 to share equally between themselves. Calculate how much money each of them would now have.

5. How many 10¢ coins can I get from $7.00?
6. A cashier gives a customer change of one 25¢, two 10¢, and three 1¢ coins. What is the value of the change?
7. How many 25¢ coins are equivalent to $5?
8. Shania took a bag of 5¢ coins to the bank to exchange for bills. The bank teller gave her: two $10 bills and three $1 bills. How many 5¢ coins did Shania take to the bank?
9. Vanessa has a total of $8.00 in her piggy bank. If she only saves 10¢ coins, how many coins does she have?
10. Rianna has 10 coins, that have a value of $1.50, on her desk. Some of her coins are shown below.




Write the value on the missing coins.



Chapter 14 Money and Money Transactions.indd 184 06/03/18 2:58 PM

11. Kevin has 5 coins worth $0.65. All the coins are either 25¢ or 10¢. How many of each coin does he have?




12. David has exactly enough money to buy the notebook. He has one $10 bill, two $1 bills and seven coins. What coins does he have?

13. Arnez bought a sandwich for $11.58 and gave the shopkeeper $100.00. What is the LEAST number of bills and coins he could get as change?

## Bills

### Teaching Point 1:

*How can you calculate multi-item bills and change?*

**Price List**

| Cone | Popcorn | Cupcake |
|---|---|---|
|  |  |  |
| **$8.50** | **$6.00** | **$3.00** |

Mother bought 4 bottles of water, 2 cones and 1 bag of popcorn.

**(a)** How much money did mother spend?

**(b)** If she paid with a $50.00 bill, how much change did she get?

4 bottles of water → $3.00 × 4 = $12.00

2 cones → $8.50 × 2 = $17.00

1 bag of popcorn → $6.00

**Shopping Bill**

| Item | Quantity | Cost | Amount Paid |
|---|---|---|---|
| Water | 4 | $3.00 | $12.00 |
| Cone | 2 | $8.50 | $17.00 |
| Popcorn | 1 | $6.00 | $ 6.00 |
| **Total** | | | **$35.00** |

**Change** → $50.00 – $35.00 = $15.00

So, mother spent $35.00 and received $15.00 change.

### Activity 1:

**Solve the problems below.**

1. Tishelle buys one pack of biscuits for $7.35. How much change should she get if she pays with a $20.00 bill?

2. Darren bought lunch for $47.82 and a piece of cake for $11.36. If Darren had $100 before his purchase, how much money does he have left now?

3. Maria buys one book for $28.95 and one ruler for $4.29 at the book store. She gives the cashier at the store two $20 bills. How much change should Maria receive?



Chapter 14 Money and Money Transactions.indd 185 06/03/18 2:58 PM



4. Daddy went to the hardware and bought 5 lengths of PVC pipe at $48.95 per length and 2 rolls of tape at $15.65 each. How much did he pay for the items?

5. One notebook and six pens cost $44.48. If the notebook costs $15.98, what is the cost of one pen?

| carnations | roses | lilies |
|---|---|---|
|  |  |  |
| $5.99 each | $20.75 each | $7.26 each |

6. A bouquet is made with 3 carnations, 2 more roses than carnations, and twice as many lilies as roses. How much did the flowers in the bouquet cost?

**Questions 8 to 11 are based on the price list below.**

**Farmer Brown's Price List**

| lettuce | cucumbers | peppers |
|---|---|---|
|  |  |  |
| $5.00 each | $10.00 for 5 | 3 for $12.00 |
| **coconut** | **limes** | **corn** |
|  |  |  |
| $6.00 each | $6.00 for 4 | $20.00 for 5 |

7. Mrs. John bought 2 heads of lettuce, 10 cucumbers, and 8 limes. Calculate how much change she would receive if she pays with a one hundred dollar bill.

8. Kerwin bought 1 lime, 1 corn, and 1 pepper. He gave Mr. Brown $20.00. What was his change?

9. Mr. Lewis bought 5 cucumbers, 6 peppers, 8 limes and 3 coconuts. If he received $6.00 change, how much money did he pay the farmer?



10. A caterer has to make corn soup for 200 persons at a party. One corn can make 4 servings of corn soup. Calculate the amount of money the caterer should spend on corn for 200 servings.

**Salina's**

| roti | drink | water |
|---|---|---|
|  |  |  |
| $16.00 | $4.50 | $5.00 |

11. Teanna bought 3 rotis for herself and her friends, 2 drinks and 1 bottle of water at Salina's. Calculate how much money she spent.

12. Mr. Ali bought food and drink at Salina's and paid for it with a $100 bill. He received $23 change after



Chapter 14 Money and Money Transactions.indd 186 06/03/18 2:58 PM

paying the bill. What is a possible combination of the THREE items that he bought?

___ roti(s) $_____

___ drink(s) $_____

___ bottle(s) of water $_____

TOTAL $_____

**13.** Complete Kiana's shopping bill below.

| Item | Quantity | Unit Cost | Amount Paid |
|---|---|---|---|
| oranges | 5 | $5.50 each | |
| mangoes | | $3.00 each | |
| | | **Total** | **$63.50** |

## Profit and Loss

### Teaching Point 1:

*How can you determine if you make a profit or a loss?*

**Cost Price:** *The price at which an item is purchased. It is written as* **C.P.**

**Selling Price:** *The price at which an item is sold. It is written as* **S.P.**

When the **selling price** of an item is more than its **cost price**, then there is a **profit**.

*Anton bought a pants at $120.00 and sold it for $135.00. How much profit did he make?*

**Method: Determine the Profit**

S.P. – C.P. = **Profit**

$135.00 – $120.00 = $15.00

So, Anton will make $15.00 in profit.

When the **selling price** of an item is less than its **cost price**, then there is a **loss**.

A dealer buys a watch for $150.00. If he sells the watch for $140.00, find his loss.

**Method: Determine the Loss**

C.P. – S.P. = **Loss**

$150.00 – $140.00 = $10.00

So, the dealer will have a loss of $10.00.

If C.P. or S.P. is given for many items, find the C.P. or S.P. for each unit. Then, calculate the porfit or loss.

**Find the Selling Price**

**S.P.** = C.P. + **Profit** → **If there is a profit.**

**S.P.** = C.P. – **Loss** → **If there is a loss.**

**Find the Cost Price**

**C.P.** = S.P. – **Profit** → **If there is a profit.**

**C.P.** = S.P. + **Loss** → **If there is a loss.**



Chapter 14 Money and Money Transactions.indd 187 06/03/18 2:58 PM

## Activity 1:

**Solve the problems below.**

| Cost Price | Selling Price | Profit | Loss |
|---|---|---|---|
| 1. $1.20 | $1.50 | $0.30 | |
| 2. $2.90 | $3.60 | | |
| 3. $24.70 | $23.50 | | |
| 4. $100.00 | $78.00 | | |
| 5. $65.94 | $70.00 | | |
| 6. $34.20 | $45.50 | | |
| 7. $230.00 | | $40.28 | |
| 8. $600.00 | | | $3.25 |
| 9. | $105.79 | $6.00 | |
| 10. | $340.12 | | $2.10 |
| 11. $698.15 | | | $10.89 |
| 12. $156.87 | | $5.50 | |
| 13. | $125.95 | $16.79 | |

## Activity 2:

**Solve.**

1. Mark bought a table for $1 689.00 and sold it for $1 895.00. Calculate his PROFIT or LOSS on the transaction.
2. Keva bought a bicycle for $1 465.00. She kept the bicycle for 5 years and sold it for $999.99. Calculate her PROFIT or LOSS.
3. Mikaela bought a blouse for $80.00 and sold it at a loss of $4.68. What was the selling price of the blouse?
4. A book store bought 6 dozen copy books at $9.00 per dozen and sold them $1.50 each. What was the profit, made by the book store?
5. A school cafeteria bought a case of 24 bottles of water for $48.00. They sold each bottle of water for $5.00. Calculate the PROFIT or LOSS.
6. A clothing store sold 35 pairs of socks for $840. Each pair cost $6.22. How much profit did the store make?
7. The cost price of a stove is $2 400. Mother bought a stove but later sold it. If mother sold the stove at a loss of $72.00, what was the selling price of the stove?
8. A vendor bought 100 limes for $45.00 and sold them in heaps of 5 at $15.00 a heap. What was his PROFIT or LOSS after the sale of the limes?



9. A furniture store sells chairs at $987.98 each. If the profit on each chair is $53.00, what is the cost price of each chair?
10. Logan bought a dozen pens for $60.00 and sold them at a profit of $36.00. If the selling price of each pen is the same, what is the price of each pen?
11. A fruit vendor bought 50 kg of bananas for $250.00. If he wants to make a profit of $50.00, at what price per kg must he sell the bananas?





Chapter 14 Money and Money Transactions.indd 188 06/03/18 2:58 PM

**12.** A vendor bought 6 dozen eggs from a poultry farm at $18.00 per dozen. The vendor realized that $\frac{1}{6}$ of each dozen eggs were broken.



**(a)** How much money did the vendor spend on broken eggs?

**(b)** At how much should the vendor sell each egg for if he wants to make a profit of $24.00?

**13.** A school bought 12 bags of hotdog buns at $8.00 a bag and 10 packs of hotdog sausages at $24.00 a pack.

**(a)** How much money did the school spend on hotdog buns and sausages?

**(b)** If each bag had 10 buns and each pack had 12 sausages, what was the cost price of each hotdog sandwich?

**(c)** If the school sold a hotdog for $5.00, how much profit did the school make?

## Unit Cost

### Teaching Point 1:

*How can you use unit rates to solve problems?*



**3 for $9.00**

**(a)** How much would 15 peppers cost?

**(b)** If you had $30, how many peppers can you buy?

**Step 1: Find the cost per unit.**

3 peppers → $9

1 pepper → $9 ÷ 3 = $3

**Step 2: Solve the problem with the unit cost.**

1 pepper → $3

15 peppers → $3 × 15 = $45.00

So, 15 peppers cost $45.00

$3 → 1 pepper

$30 → $30 ÷ $3 =10 peppers

So, $30 will buy 10 peppers.

### Activity 1:

**Find the unit cost for each item in the table.**

| | Items | Unit Cost |
|---|---|---|
| 1. | 3 balloons for $27.00 | |
| 2. | 5 pencils for $6.50 | |
| 3. | 10 notebooks for $120.90 | |
| 4. | 1 dozen pens for $60.48 | |
| 5. | 7 rulers for $34.93 | |



Chapter 14 Money and Money Transactions.indd 189 06/03/18 2:58 PM

| | | |
|---|---|---|
| 6. | 8 sharpeners for $29.44 | |
| 7. | 9 erasers for $8.91 | |
| 8. | 24 markers for $190.80 | |
| 9. | 13 charts for $195.00 | |
| 10. | 20 buttons for $18.00 | |

## Activity 2:

**Solve the problems below.**



1. Three shirts cost $65.43. What is the cost of 5 shirts?

2. Mother bought 5 books for $15.00. How many books can she buy with $24.00?



3. If 4 ice cream cones cost $36.00. How many ice cream cones can we buy with $136.00?

4. A plumber pays $24.60 for 60 centimetres of pipe. How much would he pay for 100 centimetres of the same kind of pipe?

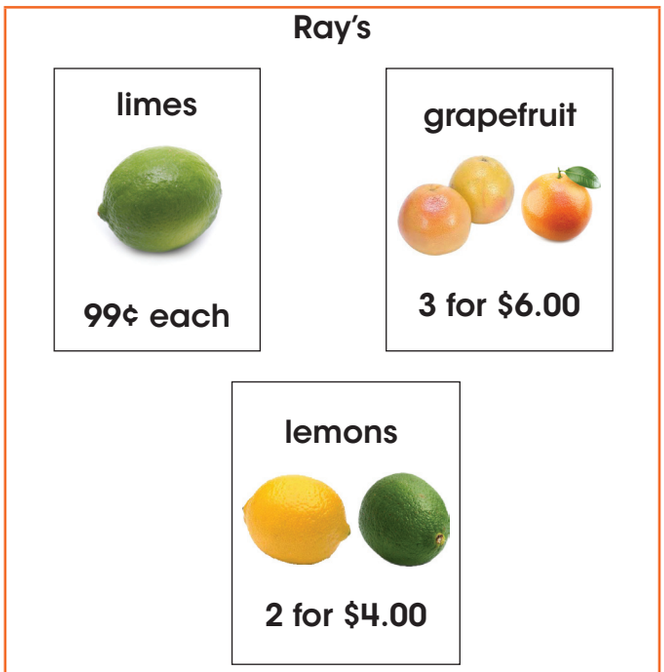
5. The bakery sells hops at the price shown below.




   (a) How much does each hops cost?

   (b) Mother wants to buy one dozen hops. How much would she pay?

6. Ray sells items at the prices shown below.




   Maria wants to buy 1 lemon, 5 limes and 12 grapefruits

   (a) How much would she pay for the items?

   (b) If Maria gave Ray $40.00 and used the change to buy more lemons, how many more lemons can she buy?

7. Marika bought 7 tickets to go to a football game. She gave the cashier six $50-dollar bills and received $20.35 in change. How much did each ticket cost?

8. Rianna bought 9 similar notebooks. She gave the cashier $50.00 and received $0.50 change. What was the cost of 1 notebook?

9. A school principal bought 10 folders and some pens. He paid $22.50 for the



Chapter 14 Money and Money Transactions.indd 190 06/03/18 2:58 PM

folders. Each pen costs 5 times as much as a folder. What is the cost of a pen?

**10.** Meena bought 2 kg of rice and ½ kg of split peas from the grocery. The cost of 5 kg of rice is $22.00. Meena spent $14.50 in all. How much did the split peas cost?

**11.** Tickets for the zoo are sold in different ways.

| Ticket A | Ticket B | Ticket C |
|---|---|---|
| 1 Child | 1 Adult | 4 Children |
| $25.00 | $50.00 | $90.00 |

| Ticket D | Ticket E |
|---|---|
| 2 Adults plus 2 Children | 4 Adults |
| $140.00 | $160.00 |

**(a)** What is the cheapest option for a group of 3 adults and 6 children?

**(b)** A group of 6 adults and 6 children spent $390.00. Which tickets did they buy?

## Best Buy

### Teaching Point 1:

*How can you use unit rates to compare?*

**Joe's Fruit Stall**



**4 for $5.00**

**Ben's Fruits**



**3 for $6.00**

**Betty's Mangoes**



**6 for $9.00**

Mark bought 4 mangoes at Joe's Fruit Stall, Ana bought 3 mangoes at Ben's Fruits and Jian bought 6 mangoes at Betty's Mangoes. Who bought mangoes at the cheapest rate?

**Step 1: Find each unit rate.**

**Mark's mangoes**

4 mangoes → $5.00

1 mango → $5.00 ÷ 4 = $1.25

**Ana's mangoes**

3 mangoes → $6.00

1 mango → $6.00 ÷ 3 = $2.00

**Jian's mangoes**

6 mangoes → $9.00

1 mango → $9.00 ÷ 6 = $1.50

**Step 2: Compare the rates.**

$1.25 is less than $1.50 and $2.00.

So, Mark bought mangoes at the cheapest rate.



Chapter 14 Money and Money Transactions.indd 191 06/03/18 2:58 PM

## Activity 1:

**Solve the problems below.**

1. At which store in the table below will a buyer get the best deal for each item?

| Price List for Three Stores | | |
|---|---|---|
| Best Price | Value Mart | Better Deal |
| 3 light bulbs for $15.45 | 2 light bulbs for $10.98 | 6 light bulbs for $29.40 |
| 10 pens for $39.50 | 4 pens for $15.60 | 12 pens for $48.00 |
| 4 batteries for $24.00 | 2 batteries for $17.30 | 8 batteries for $47.60 |
| 1 dozen rulers for $12.96 | 6 rulers for $6.00 | 18 rulers for $18.90 |
| 6 erasers for $13.80 | 4 erasers for $8.48 | 10 erasers for $20.20 |
| 6 toilet rolls for $14.40 | 4 toilet rolls for $12.56 | 24 toilet rolls for $62.88 |

2. Which container of juice is the better buy?




3. Super Mart sells a case of 24 bottles of Springs Water for $54.00. The Corner Shop sells a 12 pack of Springs Water for $27.96. Which is the better buy?

4. Fun Movies is offering a deal of 6 movies for $42. If 1 movie normally costs $10, how much will you save by taking advantage of this movie deal?

5. Ultracell sells a 100-minute prepaid phone card for $21.00. Callco sells a prepaid 50-minute phone card for $10.00. What is the better buy?

6. Two shops, Just Deserts and Sweet Stuff, both sell cupcakes.

**Just Deserts**

**cupcakes**



**6 for $5.10**

**Sweet Stuff**

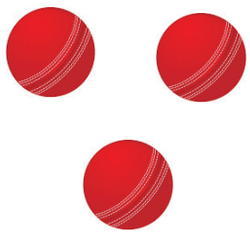
**cupcakes**



**12 for $9.00**

At which shop are the cupcakes sold at a better value for money?

7. A cricket coach wants to buy 24 cricket balls. Cricket balls are offered for sale at a store for the following prices:



**3 for $4.95**



**4 for $6.00**

How much money will the coach save by purchasing the 24 cricket balls in the offer with the lower unit price compared to the higher unit price?



Chapter 14 Money and Money Transactions.indd 192 06/03/18 2:58 PM

8. Danielle can buy a package of 10 folders for $12.00 or a package of 8 folders for $11.20. Which is the better buy?

9. The regular price of a notebook is $12.00 each. Two book stores have a special offer on these notebooks.

| *Books-R-Us* | Value Books |
|---|---|
| **Special Offer** | **Special Offer** |
| Buy **2** **notebooks** at the regular price and get 1 **FREE.** | Buy notebooks at $\frac{1}{4}$ off the regular price. |

Kevin wants to buy 6 notebooks. At which store will he get the better deal?

10. Shanna wants some tennis balls. Brand A costs $6.99 for a package of 3 and Brand B costs $33.00 for a dozen. Which is the better buy?

11. The table below shows the costs of meats per kilogram at the market.

| Type of Meat | Amount Purchased | Amount Paid | Cost per kilogram |
|---|---|---|---|
| Beef | 4 kg | $82.00 | |
| Goat | 5 kg | $76.80 | |
| Fish | 3 kg | $66.54 | |

(a) Complete the table.

(b) Which meat costs the most per kilogram?

## Time and Payment Rates

### Teaching Point 1:

*How can you use rates to calculate payments?*

Ali makes a 15 minute telephone call and is charged $12.00. What is the cost of the call per minute?

**Find the unit rate.**

15 minutes → $12.00

1 minute → $12.00 ÷ 15 = $0.80

So, the cost of the call per minute is $0.80.

Jason rented a car for 5 days at a rate of $120.00 a day. How much did Jason pay for the rental?

**Use the unit rate to solve.**

1 day → $120.00

5 days → $120.00 × 5 = $600.00

So, Jason paid $600.00 for the rental of the car.

### Activity 1:

**Solve.**

1. A phone call costs $4.50 for 3 minutes. What is the cost of the call per minute?

2. A library charges 50¢ per book per day for overdue books. Jenny returned a book that she had borrowed 12 days late. Calculate the amount of money she will pay.



Chapter 14 Money and Money Transactions.indd 193 06/03/18 2:58 PM

3. A video club rents a movie for $4.00 per day. What would be the cost of renting 3 movies for 5 days?

4. Royal Hotel rents its hall at $2 000 for the first 4 hours and $150 for every additional hour. A wedding party rents the hall for 8 hours. How much money will they pay?

5. The table shows the fees for a parking lot.

| | |
|---|---|
| **Hourly Rate** | **$5.00** |
| **Daily Rate** | **$20.00** |

(a) Mr. John parked his car on Monday from 9 a.m. to 2 p.m. How much did he pay for parking?

(b) Mrs. Ali paid $140.00 for parking. How long did she park her car at the lot?

The table below shows the charges for mobile phone calls. Use the table to answer **questions 4** to **6**.

| | |
|---|---|
| **Day Rate (6:00 a.m. to 6:00 p.m.)** | $1.20 per minute |
| **Evening Rate (6:00 p.m. to 6:00 a.m.)** | 50¢ per minute |
| **Weekend Rate (Saturday and Sunday)** | 50¢ per minute |

6. Alisha makes a phone call during the day that lasts 90 seconds. Calculate the cost of the call.

7. Ben made 3 calls on Saturday that altogether lasted 6½ minutes and 1 call on Monday night that lasted 45 seconds. What was the total cost of Ben's calls?

8. Jing used up $10.00 on his phone card. He made 5 one-minute calls at the day rate and the rest of the calls on the weekend. How long was his weekend calls?

9. Mr. Lee Ping stayed at the resort advertised below:




**Monday to Thursday**

**$150 per night**

**Friday to Sunday**

**$200 per night**

Calculate the amount of money he spent if he stayed Thursday, Friday and Saturday nights.

## Chapter Review

**Solve the problems below.**

1. Kimberly exchanged 25¢ coins for a $10.00 bill at the bank. How many coins did she take to the bank?

2. Arcadia counts the bills in her wallet. She has three $20-dollar bills, six $10-dollar bills, and four $5-dollar bills. She has twice as many $1-dollar bills than the number of $20-dollar bills



Chapter 14 Money and Money Transactions.indd 194 06/03/18 2:58 PM

and $10-dollar bills combined. How much money does Arcadia have?

3. Garvin works 9 hours every day. His daily earnings is $148.50. How much does Garvin earn per hour?

4. Isaiah has an EQUAL number of 25¢, 10¢, 5¢ and 1¢ coins in his pocket.

   (a) What is the LEAST amount of money that Isaiah could have?

   (b) If Isaiah has $1.23, how many of EACH type of coin does Isaiah have?

5. Mr. Rattan wants to buy 3 books at a cost of $65.95 each. Estimate the least number of $5 bills he needs to buy the books?

6. Three children bought wallets at the mall. Zara's wallet costs $22.15. Mala's wallet costs 3 times as much as Zara's. Zion's wallet costs $14.00 more than Mala's. How much did Zion's wallet cost?

7. 4 cartons of juice costs $13.80. Find the cost of 6 cartons of juice?

8. A ball was bought for $300.00 and sold for $350.00. Calculate in DOLLARS, the profit made.

9. Andell has $200. His money includes one or more of each of the bills in the table below.

| Bills | $100 | $50 | $20 | $10 | $5 | $1 |
|---|---|---|---|---|---|---|
| Number of Bills | | | | | | |

   (a) Complete the table below to show the LEAST number of bills that Andell can have.

   (b) Andell bought lunch for $25.00 and used up all of his $1-dollar bills, How many of each type of bills can he now have?

10. A drink costs $2.95. What is the greatest number of drinks Jared can buy with $75.00?

11. Socks are 3 pairs for $36.00. Miss James spent $120.00 on socks. How many pairs of socks did she buy?

12. Sugar is sold at 2 kg for $12.

   (c) How much would you pay for 16 kg of sugar?

   (d) How much sugar can you buy with $40?

13. Two fruit vendors sell apples at the prices shown below.

**Betty's**



**$24 for 3 apples**

**Joe's**



**$28 for 4 apples**

Sam bought one dozen apples at Joe's while Jack bought one dozen apples at Betty's.

   (a) Who paid more for the apples?

   (b) Betty and Joe buy apples at the same cost price. If Betty made a profit of $2 on each apple sold, what was the profit on the sale of apples to Sam?



Chapter 14 Money and Money Transactions.indd 195 06/03/18 2:58 PM

14. Jordan bought a shirt for $14.56. Nico bought a shirt for three times as much money as Jordan. Avery bought a shirt for $5.25 more than Nico. How much money did they spend altogether?

15. Shania bought some items at the book store.

(a) Complete Shania's shopping bill below.

| Item | Quantity | Unit Cost | Amount Paid |
|---|---|---|---|
| pencils | 10 | $1.50 each | |
| erasers | | $2.00 each | |
| | | **Total** | **$27.00** |

(b) If Shania paid for the items with one $20 bill and two $5 bills, how much change did she receive?

**party hat**



**$5.50 each**

**noisemaker**



**$6.00 each**

16. Mother bought 10 party hats and some noisemakers for a party. The noisemakers cost $23.00 more than the party hats.

(a) How much did Mother pay for the party hats?

(b) How many noisemakers did Mother buy?

17. 24 copy books were bought at $1.00 each and sold at 2 for $3.00. What is the profit made?

18. Mr. Jones rented a lawn mower for 7 days at $50.00 per day. He spent $25.00 for gas. How much did it cost him altogether?

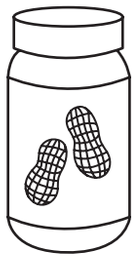
19. At the market a 2 kilograms of bananas cost $14.00. At a supermarket 5 kilograms of the same type of bananas cost $36.00.

(a) Which is the better buy?

(b) How much can you save by buying 10 kg of the bananas that are the better buy?

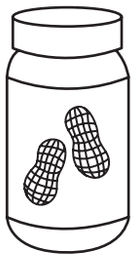
20. Alisha paid $60.00 for 10 kilograms of peanuts. She divided the peanuts equally into 2 bottles as shown below.

**Botte A**



**$7.50 per kg**

**Bottle B**



**$8.50 per kg**

(a) How much money did Alisha earn after selling all the peanuts?

(b) Calculate her profit or loss after the sale of the peanuts?



Chapter 14 Money and Money Transactions.indd 196 06/03/18 2:58 PM

CHAPTER

15

# Percent

**Vocabulary:**

percent %
percentage

**Chapter Outcomes:**

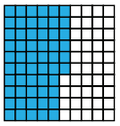
- Demonstrate an understanding of percent concretely, pictorially and symbolically.
- Demonstrate an understanding of the relationships between fractions and percents.
- Apply understanding of fractions, decimals and percents to solve problems.




Percentages are a part of our daily lives. Whether you are eating, interested in sports, or using your cellphone, you have used percentages. The amount of life left in your cellphone's battery is shown as a percent. The food labels on packets, tins and bottles display percents for a certain serving size. If you can calculate percentages, you can determine how much of the food you need to eat or drink in order to get the full, or 100%, recommended daily intake.

## Getting Ready for Chapter 15

1. What fraction of the square is shaded?

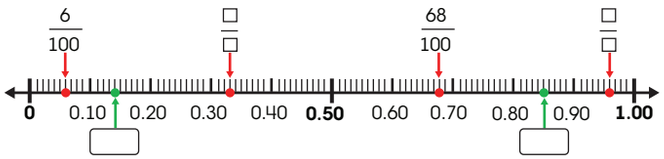


2. Write $\frac{12}{100}$ as a decimal.

3. Write $\frac{50}{100}$ in its simplest form.

4. Write the missing denominators and numerators for $\frac{2}{5} = \frac{10}{\square} = \frac{\square}{100}$.

5. Write the missing fractions and decimals.

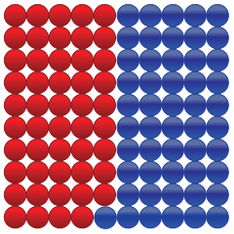



## Percent, Fractions and Decimals

### Teaching Point 1:

*How are fractions and percents related?*

Compare the number of red buttons with the total number of buttons.



There are 100 buttons.

49 of them are red.

So *49 out of 100* buttons are red.

$$\frac{\textit{Number of red buttons}}{\textit{Total number of buttons}} = \frac{49}{100}$$

There are three ways to represent this.

| As a Fraction | As a Decimal | As a Percent |
|---|---|---|
| $\frac{49}{100}$ | 0.49 | 49% |

Percent compares a number to 100. The word ***percent*** means ***out of one hundred***.

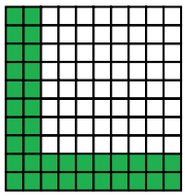
Percent is another way of writing the number of hundredths that represent the part of a whole. The percent symbol is **%**

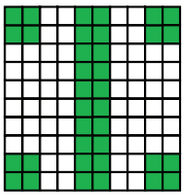
Read 49% as 49 percent.

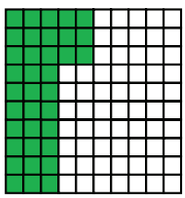
49% means 49 *out of 100*.

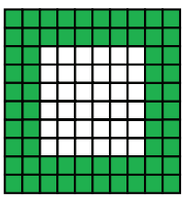
### Activity 1:

**Write the percent that is shaded for each model.**

1. 

2. 

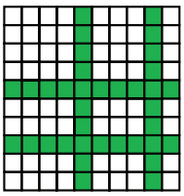
3. 

4. 

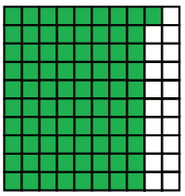


Chapter 15 Percent.indd 198 06/03/18 4:24 PM

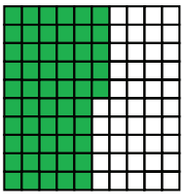
**5.**



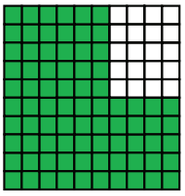
**6.**



**7.**

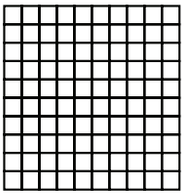


**8.**



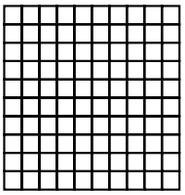
**Shade each model to represent each percent.**

**9.**



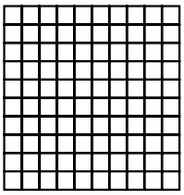
35%

**10.**



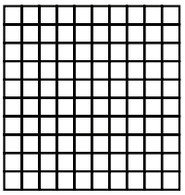
19%

**11.**



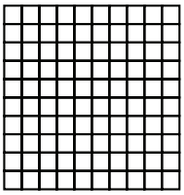
67%

**12.**



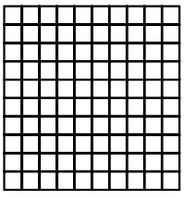
70%

**13.**



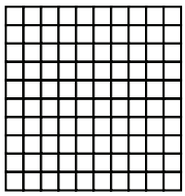
12%

**14.**



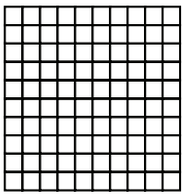
99%

**15.**



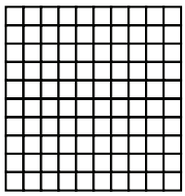
45%

**16.**



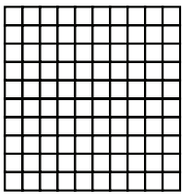
60%

**17.**



32%

**18.**

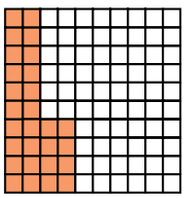


19%

## Activity 2:

**Complete.**

**1.**



28 out of the 100 equal parts are shaded.

$\frac{28}{100}$ of the whole is shaded.

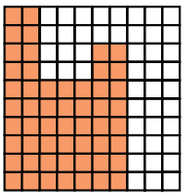
28% of the whole is shaded.

$\frac{72}{100}$ of the whole is not shaded.

72% of the whole is not shaded.



Chapter 15 Percent.indd 199 06/03/18 4:24 PM

**2.** 

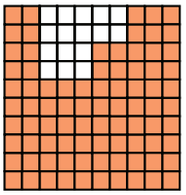
☐ out of the 100 equal parts are shaded.

$\frac{\square}{\square}$ of the whole is shaded.

☐ % of the whole is shaded.

$\frac{\square}{\square}$ of the whole is not shaded.

☐ % of the whole is not shaded.

**3.** 

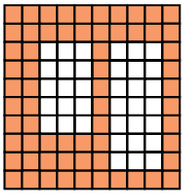
☐ out of the 100 equal parts are shaded.

$\frac{\square}{\square}$ of the whole is shaded.

☐ % of the whole is shaded.

$\frac{\square}{\square}$ of the whole is not shaded.

☐ % of the whole is not shaded.

**4.** 

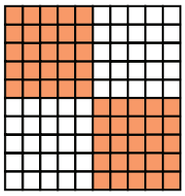
☐ out of the 100 equal parts are shaded.

$\frac{\square}{\square}$ of the whole is shaded.

☐ % of the whole is shaded.

$\frac{\square}{\square}$ of the whole is not shaded.

☐ % of the whole is not shaded.

**5.** 

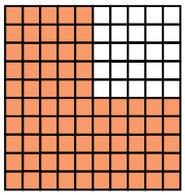
☐ out of the 100 equal parts are shaded.

$\frac{\square}{\square}$ of the whole is shaded.

☐ % of the whole is shaded.

$\frac{\square}{\square}$ of the whole is not shaded.

☐ % of the whole is not shaded.

**6.** 

☐ out of the 100 equal parts are shaded.

$\frac{\square}{\square}$ of the whole is shaded.

☐ % of the whole is shaded.



Chapter 15 Percent.indd 200 06/03/18 4:24 PM

$\frac{\square}{\square}$ of the whole is not shaded.

$\square$ % of the whole is not shaded.

## Activity 3:

**Express each as a percent.**

| | |
|---|---|
| **1.** 73 out of 100 | **2.** 57 out of 100 |
| **3.** 81 out of 100 | **4.** 95 out of 100 |
| **5.** 64 out of 100 | **6.** 5 out of 100 |
| **7.** 1 out of 100 | **8.** 13 out of 100 |
| **9.** 34 out of 100 | **10.** 54 out of 100 |
| **11.** 80 oranges per 100 | **12.** 2 marks per 100 |
| **13.** \$15 per \$100 | **14.** 91 workers per 100 |
| **15.** 85 books per 100 | **16.** 42 girls per 100 |
| **17.** 90 pupils per 100 | **18.** 7 men per 100 |
| **19.** 11 hours per 100 | **20.** 25 minutes per 100 |

## Activity 4:

**Express each fraction as a percent.**

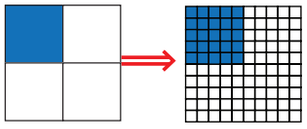
| | |
|---|---|
| **1.** $\frac{25}{100} = \square$ % | **2.** $\frac{3}{100} = \square$ % |
| **3.** $\frac{80}{100} = \square$ % | **4.** $\frac{32}{100} = \square$ % |
| **5.** $\frac{11}{100} = \square$ % | **6.** $\frac{99}{100} = \square$ % |
| **7.** $\frac{6}{100} = \square$ % | **8.** $\frac{81}{100} = \square$ % |
| **9.** $\frac{7}{100} = \square$ % | **10.** $\frac{31}{100} = \square$ % |
| **11.** $\frac{1}{100} = \square$ % | **12.** $\frac{10}{100} = \square$ % |
| **13.** $\frac{50}{100} = \square$ % | **14.** $\frac{96}{100} = \square$ % |
| **15.** $\frac{13}{100} = \square$ % | **16.** $\frac{67}{100} = \square$ % |
| **17.** $\frac{20}{100} = \square$ % | **18.** $\frac{45}{100} = \square$ % |
| **19.** $\frac{84}{100} = \square$ % | **20.** $\frac{90}{100} = \square$ % |

## Teaching Point 2:

*How are fractions and percents related?*

Mia spent $\frac{1}{4}$ of her money on snacks.

What percent of her money was spent on snacks?



$$\frac{1}{4} = \frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 25\%$$

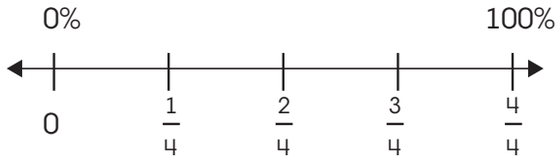
The whole is $\frac{4}{4}$ or 100%



Chapter 15 Percent.indd 201 06/03/18 4:24 PM

1 whole → 100%

1 part → 100% ÷ 4 = 25%




$\frac{1}{4} \times 100\% = 25\%$. So 25% of Mia's money was spent on snacks.

*What do you do when the denominators of fractions are not factors or multiples of 100?*

Express $\frac{2}{3}$ as a percent.

$\frac{2}{3} = \frac{2}{3} \times 100\%$ ← Multiply the fraction by 100.

$= \frac{200}{3}$

$= 66\frac{2}{3}$ ← Write the improper fraction as a mixed number.

$100\% = \frac{100}{100} = 1$

So, $\frac{2}{3} \times 100\%$ has the same value as $\frac{2}{3} \times 1$.

## Activity 5:

**Express each fraction as an equivalent fraction and a percent.**

| | |
|---|---|
| **1.** $\frac{2}{10} = \frac{\square}{100} = \square\,\%$ | **2.** $\frac{4}{10} = \frac{\square}{100} = \square\,\%$ |
| **3.** $\frac{2}{5} = \frac{\square}{100} = \square\,\%$ | **4.** $\frac{1}{4} = \frac{\square}{100} = \square\,\%$ |
| **5.** $\frac{3}{4} = \frac{\square}{100} = \square\,\%$ | **6.** $\frac{4}{25} = \frac{\square}{100} = \square\,\%$ |
| **7.** $\frac{7}{50} = \frac{\square}{100} = \square\,\%$ | **8.** $\frac{1}{2} = \frac{\square}{100} = \square\,\%$ |
| **9.** $\frac{7}{20} = \frac{\square}{100} = \square\,\%$ | **10.** $\frac{12}{25} = \frac{\square}{100} = \square\,\%$ |

**Write each fraction as a percent.**

| | | |
|---|---|---|
| **11.** $\frac{1}{8}$ | **12.** $\frac{1}{6}$ | **13.** $\frac{1}{3}$ |
| **14.** $\frac{1}{9}$ | **15.** $\frac{1}{7}$ | **16.** $\frac{1}{6}$ |
| **17.** $\frac{5}{11}$ | **18.** $\frac{3}{16}$ | **19.** $\frac{3}{8}$ |
| **20.** $\frac{5}{12}$ | **21.** $\frac{2}{9}$ | **22.** $\frac{2}{7}$ |

## Teaching Point 3:

*How are fractions and percents related?*

Out of 500 children, 350 of them are boys.

**(a)** What percentage of them are boys?

Fraction that are boys:

$\frac{350}{500} = \frac{350 \div 5}{500 \div 5} = \frac{70}{100}$



Chapter 15 Percent.indd 202 06/03/18 4:24 PM

Percentage that are boys:

$\frac{70}{100} \times 100\% = 70\%$

So 70% of them are boys.

**(b)** What percentage of them are girls?

Percentage that are girls:

$100\% - 70\% = 30\%$

So, 30% of them are girls.

## Activity 6:

**Express each fraction as an equivalent fraction and a percent.**

| | |
|---|---|
| **1.** $\frac{128}{400} = \frac{\square}{100} = \square\,\%$ | **2.** $\frac{256}{400} = \frac{\square}{100} = \square\,\%$ |
| **3.** $\frac{124}{200} = \frac{\square}{100} = \square\,\%$ | **4.** $\frac{99}{300} = \frac{\square}{100} = \square\,\%$ |
| **5.** $\frac{300}{400} = \frac{\square}{100} = \square\,\%$ | **6.** $\frac{450}{900} = \frac{\square}{100} = \square\,\%$ |
| **7.** $\frac{280}{400} = \frac{\square}{100} = \square\,\%$ | **8.** $\frac{120}{200} = \frac{\square}{100} = \square\,\%$ |
| **9.** $\frac{350}{700} = \frac{\square}{100} = \square\,\%$ | **10.** $\frac{72}{200} = \frac{\square}{100} = \square\,\%$ |
| **11.** $\frac{150}{300} = \frac{\square}{100} = \square\,\%$ | **12.** $\frac{237}{300} = \frac{\square}{100} = \square\,\%$ |
| **13.** $\frac{260}{400} = \frac{\square}{100} = \square\,\%$ | **14.** $\frac{240}{800} = \frac{\square}{100} = \square\,\%$ |
| **15.** $\frac{88}{800} = \frac{\square}{100} = \square\,\%$ | **16.** $\frac{210}{300} = \frac{\square}{100} = \square\,\%$ |

**Solve. Show your working.**

**17.** A baker had 25 kg of flour. He used 10 kg to make bread. What percentage of the flour was used to make bread?

**18.** In a class of 20 children, 4 of them have difficulty reading. What percentage of the children read well?

**19.** About $\frac{23}{25}$ of a watermelon is water. What percentage of the watermelon is water?

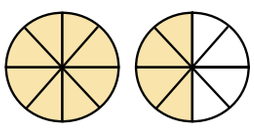
**20.** Maria's baby sister sleeps for $\frac{8}{10}$ of a day. About what percentage of the baby's day is spent sleeping?

**21.** A football team played 20 games. The team lost 4 games, drew 2 and won the others. What percentage of games did they win?

## Teaching Point 4:

*How are fractions, mixed numbers and percents related?*

Jenny and her friends ate $1\frac{4}{8}$ of pizzas for lunch. What percentage of pizza was eaten by Jenny and her friends?



$\Rightarrow 1\frac{4}{8}$ or $1\frac{1}{2}$

$1\frac{1}{2} = \frac{3}{2}$ ← Write $1\frac{1}{2}$ as an improper fraction.



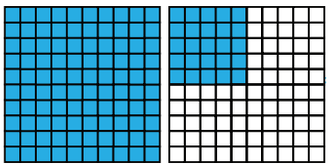
Chapter 15 Percent.indd 203 06/03/18 4:24 PM

$\frac{3}{2} = \frac{3 \times 50}{2 \times 50} = \frac{150}{100} = 150\%$

So, $\frac{150}{100}$ or 150% of pizza was eaten.

Convert 125% to a common fraction.

125% means 125 for every hundred.



$\Rightarrow$ **125% = $1\frac{1}{4}$**

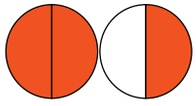
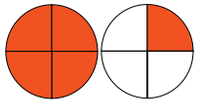
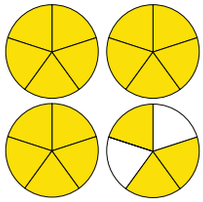
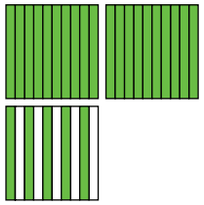
$125\% = \frac{125}{100}$ ← Define the percent.

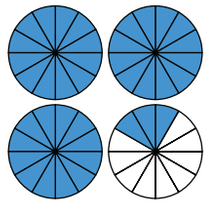
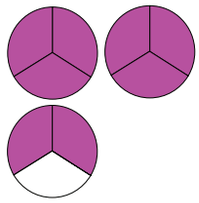
$= 1\frac{25}{100}$ ← Write as a mixed number.

$= 1\frac{25 \div 25}{100 \div 25} = 1\frac{1}{4}$ ← Simplify.

## Activity 7:

**Write each of the following as a percent.**

| | |
|---|---|
| **1.**  | **2.**  |
| **3.**  | **4.**  |
| **5.**  | **6.**  |

| | |
|---|---|
| **7.**  | **8.**  |
| **9.** $\frac{3}{5}$ | **10.** $\frac{10}{20}$ |
| **11.** $3\frac{3}{4}$ | |
| **12.** $\frac{5}{2}$ | **13.** $\frac{12}{10}$ |
| **14.** $\frac{10}{4}$ | |
| **15.** $\frac{15}{10}$ | **16.** $3\frac{1}{2}$ |
| **17.** $1\frac{3}{5}$ | |
| **18.** $\frac{12}{8}$ | **19.** $\frac{15}{6}$ |
| **20.** $2\frac{15}{50}$ | |
| **21.** $2\frac{5}{10}$ | **22.** $1\frac{7}{10}$ |
| **23.** $2\frac{4}{25}$ | |

## Activity 8:

**Write each percent as a fraction or mixed number.**

| | | |
|---|---|---|
| **1.** 120% | **2.** 80% | **3.** 1% |
| **4.** 12% | **5.** 210% | **6.** 75% |
| **7.** 50% | **8.** 33% | **9.** 169% |
| **10.** 56% | **11.** 3% | **12.** 16% |
| **13.** 145% | **14.** 203% | **15.** 189% |

### Teaching Point 5:

*How are fractions, mixed numbers and percents related?*

Express $33\frac{1}{3}\%$ as a fraction in its simplest form.



Chapter 15 Percent.indd 204 06/03/18 4:25 PM

$33\frac{1}{3}\% = \frac{100}{3}$ ← Write the mixed number as an improper fraction.

$= \frac{100}{3} \div 100$ ← Divide by 100 to express the percent as a fraction.

$= \frac{100}{3} \times \frac{1}{100}$ ← Rewrite using the reciprocal of the divisor.

$= \frac{100}{300}$ ← Multiply

$= \frac{1}{3}$ ← Simplify

So, $33\frac{1}{3}\% = \frac{1}{3}$

## Activity 9:

**Express each percent as a fraction in simplest form.**

| | | |
|---|---|---|
| **1.** $33\frac{1}{3}\%$ | **2.** $37\frac{1}{2}\%$ | **3.** $66\frac{2}{3}\%$ |
| **4.** $83\frac{1}{3}\%$ | **5.** $12\frac{1}{2}\%$ | **6.** $87\frac{1}{2}\%$ |
| **7.** $16\frac{2}{3}\%$ | **8.** $16\frac{2}{3}\%$ | **9.** $8\frac{1}{3}\%$ |
| **10.** $6\frac{1}{4}\%$ | **11.** $7\frac{1}{2}\%$ | **12.** $2\frac{1}{2}\%$ |

### Fractions, Decimals and Percentages

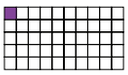
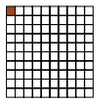
| Common Fraction | Decimal Fraction | Percentage |
|---|---|---|
| $\frac{1}{2}$  | 0.5 | 50% |

| Common Fraction | Decimal Fraction | Percentage |
|---|---|---|
| $\frac{1}{3}$  | 0.33 | $33\frac{1}{3}\%$ |
| $\frac{2}{3}$  | 0.66 | $66\frac{2}{3}\%$ |
| $\frac{1}{4}$  | 0.25 | 25% |
| $\frac{3}{4}$  | 0.75 | 75% |
| $\frac{1}{5}$  | 0.2 | 20% |
| $\frac{2}{5}$  | 0.4 | 40% |
| $\frac{3}{5}$  | 0.6 | 60% |
| $\frac{4}{5}$  | 0.8 | 80% |
| $\frac{1}{10}$  | 0.1 | 10% |
| $\frac{2}{10}$  | 0.2 | 20% |
| $\frac{9}{10}$  | 0.9 | 90% |
| $\frac{1}{20}$  | 0.05 | 5% |
| $\frac{9}{20}$  | 0.45 | 45% |
| $\frac{1}{25}$  | 0.04 | 4% |
| $\frac{3}{25}$  | 0.12 | 12% |



Chapter 15 Percent.indd 205 06/03/18 4:25 PM

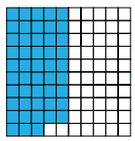
## Fractions, Decimals and Percentages

| Common Fraction | Decimal Fraction | Percentage |
|---|---|---|
| $\frac{1}{50}$  | 0.02 | 2% |
| $\frac{1}{100}$  | 0.01 | 1% |

## Teaching Point 6:

*How can you relate percents to decimals?*

Express 48% as a decimal.



$\Rightarrow \frac{48}{100}$

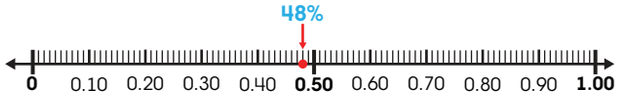
**Method 1:**

$48\% = \frac{48}{100} = 0.48$

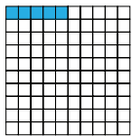
**Method 2:**

$48\% = 48 \div 100$ ← Divide the percentage by 100.

$= 0.48$ ← Move the decimal point 2 places to the left.




Express 0.05 as a percentage.

**0.05** ⇒ 

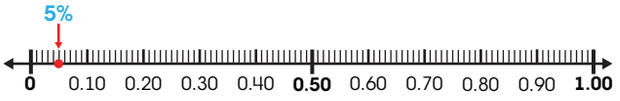
**Method 1:**

$0.05 = \frac{5}{100} = 5\%$

**Method 2:**

$0.05 = 0.05 \times 100$ ← Multiply the decimal by 100.

$= 5\%$ ← Move the decimal point 2 places to the right.




## Activity 10:

### Change these percentages to decimals

| | | |
|---|---|---|
| **1.** 28% | **2.** 4% | **3.** 12% |
| **4.** 60% | **5.** 11% | **6.** 5% |
| **7.** 7% | **8.** 49% | **9.** 125% |
| **10.** 241% | **11.** 600% | **12.** 120% |
| **13.** 225% | **14.** 7% | **15.** 9% |
| **16.** 10% | **17.** 3% | **18.** 2% |

### Change these decimals to percentages.

| | | |
|---|---|---|
| **19.** 0.12 | **20.** 0.89 | **21.** 0.65 |
| **22.** 0.01 | **23.** 0.09 | **24.** 0.02 |
| **25.** 0.1 | **26.** 0.7 | **27.** 0.2 |
| **28.** 1.09 | **29.** 4.75 | **30.** 3.04 |
| **31.** 0.4 | **32.** 0.8 | **33.** 0.1 |
| **34.** 15.3 | **35.** 16.8 | **36.** 11.2 |



Chapter 15 Percent.indd 206 06/03/18 4:25 PM

## Activity 11:

**Mark × on the number lines to show where each percent is located.**

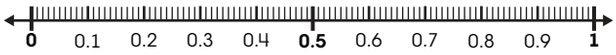
1. 28%




2. 49%




3. 63%




4. 90%




5. 50%




6. 25%




7. 67%




**Solve the problems.**

8. About 70% of the human body is water. What decimal is equivalent to 70%?



9. Melissa spent 25% of her savings on a car. What fraction of her savings was spent on the car?

10. In Mr. James' class 40% of the students are girls. What decimal fraction represents the portion of the class that are boys?

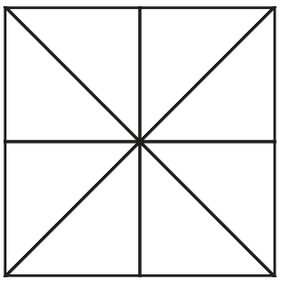
11. Allyann's favourite clothing store is having a 30% sale. What fraction represents the 30%?

12. Of the 250 cartons of juice sold at a grocery, 225 of them were orange juice. The rest of them were apple juice.

    **(a)** What percentage of them were apple juice?

    **(b)** If $\frac{24}{50}$ of the orange juice were sold to students, what percentage of the orange juice was not sold to students?

13. Shade 75% of the shape below.



14. Complete the table below.

| Fraction | Decimal | Percentage |
|---|---|---|
| $\frac{1}{2}$ | _____ | _____ |
| _____ | 0.2 | _____ |
| _____ | _____ | 25% |
| $\frac{1}{10}$ | _____ | _____ |



Chapter 15 Percent.indd 207 06/03/18 4:25 PM

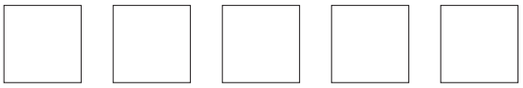
15. In Jamal's class, 7 out of 25 students travel to school by bus. What percentage of the class travel to school by bus?

16. A bag contains red and blue marbles. Given that $\frac{18}{20}$ of the marbles are blue. What percentage of the marbles are red?

17. Michael answered 0.7 questions correctly on his test. What percentage of the questions did Michael answer correctly?

18. In the 2015 general elections, 67% of eligible adults voted. What is 67% written as a decimal?

19. A bakery sold 60% of their cakes on Monday. Represent this percent by shading in the squares.



20. China accounts for 0.21 of the world's population. What percentage of the world's population lives in China?

21. Some children spend about 25% of the day watching television. What fraction of the day is this?



22. Mummy made sandwiches with $\frac{2}{5}$ of a loaf of bread. What percentage of the loaf of bread remained?

23. In the morning a tank contained 10 L of water. At lunch time it contained 7 L of water. What percentage of water was used from the tank?



24. Jonathan scored 14 goals in 20 attempts in soccer this season. About what percentage of his attempts were goals?

## Compare and Order Fractions, Decimals and Percents

### Teaching Point 1:

*How can you compare and order numbers that are written as fractions, decimals and percents?*

Which number is the greatest?

$\frac{2}{5}$, 0.5, 30%

**Method 1:**

Change all the numbers to fractions with common denominators. Then compare.

$0.5 = \frac{5}{10}$

$30\% = \frac{30}{100}$ or $\frac{3}{10}$

$\frac{2}{5} = \frac{4}{10}$

So, 0.5 is the greatest number.



Chapter 15 Percent.indd 208 06/03/18 4:25 PM

**Method 2:**

Change all numbers to decimals. Then compare.

$\frac{2}{5} = \frac{4}{10}$ or 0.4

30% = $\frac{30}{100}$ or $\frac{3}{10}$ or 0.3

So, 0.5 is the greatest number.

**Method 3:**

Change all numbers to percents. Then compare.

$\frac{2}{5} = \frac{4}{100}$ = or 40%

0.5 = $\frac{50}{100}$ or 50%

So, 0.5 is the greatest number.

## Activity 1:

**Compare the numbers below. Write <, > or = in the circle.**

| | |
|---|---|
| **1.** 0.12 ◯ 24% | **2.** 0.25 ◯ 25% |
| **3.** $\frac{2}{10}$ ◯ 0.16 | **4.** 2% ◯ 0.2 |
| **5.** 0.1 ◯ $\frac{1}{100}$ | **6.** $\frac{3}{5}$ ◯ 0.45 |
| **7.** $\frac{7}{10}$ ◯ 1.01 | **8.** 1.5 ◯ 150% |
| **9.** 10% ◯ 0.09 | **10.** 0.25 ◯ $\frac{1}{4}$ |

**Arrange the following in order of size (smallest first).**

**11.** $\frac{1}{2}$, 46%, 0.64

**12.** 0.19, 4%, $\frac{1}{5}$

**13.** 10%, $\frac{1}{2}$, 0.8

**14.** $\frac{3}{4}$, 0.79, 9%

**15.** 0.25, 40%, $\frac{3}{5}$

**Write the numbers in descending order.**

**16.** $\frac{1}{2}$, 0.75, 65%

**17.** 0.23, 15%, $\frac{1}{5}$

**18.** 40%, $\frac{1}{4}$, 0.35

**19.** $\frac{4}{10}$, 0.44, 39%

**20.** 0.5, 61%, $\frac{7}{10}$

**Solve the problems below.**

**21.** A packet of mixed nuts is 15% peanuts, $\frac{1}{4}$ almonds and 0.6 cashew nuts. Which type of nuts is most?

**22.** Jenna sleeps for $\frac{1}{3}$ of a day and watches television for 50% of the same day. Which activity does she spend more time doing?

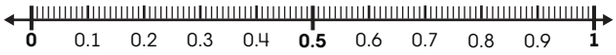


Chapter 15 Percent.indd 209 06/03/18 4:25 PM

**23.** You spent 75% of your allowance. Your sister spent $\frac{13}{20}$ of her allowance and your friend spent 0.7 of his allowance. Who spent the most out of their allowance?

**24.** Use the number line below to order the numbers from least to greatest.

$$38\%, \frac{8}{25}, 0.41$$



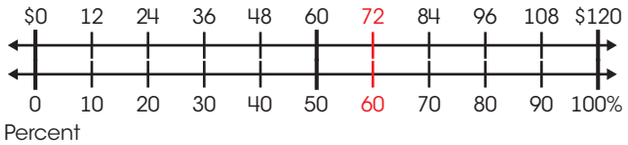

## Percent of a Quantity

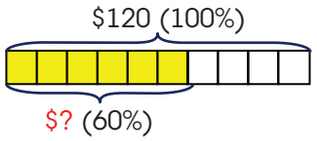
### Teaching Point 1:

*How can you find the percent of a given number?*

Liana bought a dress that was on sale. She paid 60% of the original price of $120. How much did Liana pay for the dress?

**Method 1: Use a model.**




100% → $120.00

1% → 120.00 ÷ 100 = $1.20

60% → $1.20 × 60 = $72.00

So, Liana paid $72.00 for the dress.

**Method 2: Write the percent as a fraction.**

$60\% = \frac{60}{100}$ ← Write percentage as a fraction.

$\frac{60}{100}$ of $120 = \frac{60}{100} \times 120$ ← Change 'of' to '×' and multiply.

$= 72$

So, Liana paid $72.00 for the dress.

**Method 3: Write the percent as a decimal.**

$60\% = \frac{60}{100}$ or 0.6

0.6 of 120 = 0.6 x 120

$= 72$

So, Liana paid $72.00 for the dress.

### Teaching Point 2:

*How can you find the percent of a given number?*

Find $12\frac{1}{2}$ % of 48

**Method 1: Use mental strategies.**

100% → 48

1% → 48 ÷ 100 = 0.48

10% → 0.48 x 10 = 4.8

2% → 0.48 x 2 = 0.96

$\frac{1}{2}$% → 0.48 ÷ 2 = 0.24

$12\frac{1}{2}$% → 4.8 + 0.96 + 0.24 = 6

So, $12\frac{1}{2}$ % of 48 is 6.



Chapter 15 Percent.indd 210 06/03/18 4:25 PM

**Method 2: Write the percent as a fraction.**

**1. Change the percent to a fraction.**

$12\frac{1}{2}\% = \frac{25}{2}\%$ ← Write the mixed number as an improper fraction.

$= \frac{25}{2} \div 100$ ← Divide by 100 to express the percent as a fraction.

$= \frac{25}{2} \times \frac{1}{100}$ ← Rewrite using the reciprocal of the divisor.

$= \frac{25}{200}$

**2. Find the fraction of the quantity.**

$12\frac{1}{2}\%$ of $48 = \frac{25}{200} \times 48$ ← Multiply.

$= \frac{25 \div 25}{200 \div 25} \times \frac{48}{1}$ ← Simplify.

$= \frac{1}{8 \div 8} \times \frac{48 \div 8}{1}$

$= 6$

So, $12\frac{1}{2}\%$ of 48 is 6.

## Activity 1:

**Work out the following.**

**Number**

| | | | |
|---|---|---|---|
| **1.** | 25% of 100 | **2.** | 12% of \$4800.00 |
| **3.** | 70% of 420 | **4.** | $12\frac{1}{2}\%$ of 192 |
| **5.** | 125% of 200 | **6.** | $33\frac{1}{3}\%$ of 12 |
| **7.** | 5% of \$4.00 | **8.** | 30% of 90 |
| **9.** | 75% of \$600.00 | **10.** | 50% of 45 |
| **11.** | 1% of 5 000 | **12.** | 10% of 360 |
| **13.** | 25% of \$4 400 | **14.** | 2% of \$900 |
| **15.** | 21% of 400 | **16.** | 87% of \$35 |

**Time**

| | | | |
|---|---|---|---|
| **1.** | 5% of 3 hr | **2.** | 25% of 4 hr |
| **3.** | 10% of 5 hr 20 min | **4.** | 75% of 60 months |
| **5.** | 120% of 120 sec | **6.** | 20% of 4 wks 2 days |
| **7.** | 20% of 40 min | **8.** | 50% of 5 hr |

**Length**

| | | | |
|---|---|---|---|
| **1.** | 15% of 40 m | **2.** | 20% of 4 km 800 m |
| **3.** | 50% of 6 m 50 cm | **4.** | 25% of 1 m |
| **5.** | 10% of 2 km | **6.** | 80% of 14 km 400 m |
| **7.** | $33\frac{1}{3}\%$ of 6 km | **8.** | 60% of 4 cm 5 mm |
| **9.** | 10% of 240 mm | **10.** | 80% of 500 cm |



Chapter 15 Percent.indd 211 06/03/18 4:25 PM

### Mass

| | | | |
|---|---|---|---|
| **1.** | 10% of 12 kg | **2.** | 5% of 30 g |
| **3.** | 75% of 1 kg | **4.** | $33\frac{1}{3}$% of 300 g |
| **5.** | 40% of 8 kg 800 g | **6.** | 35% of 7 kg 500 g |

### Capacity

| | | | |
|---|---|---|---|
| **1.** | 150% of 3 L | **2.** | 25% of 200 ml |
| **3.** | $33\frac{1}{3}$% of 6 L | **4.** | 20% of 80 ml |
| **5.** | 90% of 5 L | **6.** | 15% of 400 ml |

## Activity 2:

**Solve.**

**1.** Dianne had $600.00. She spent 20% of her money. How much money did she spend?

**2.** In a school of 450 students, 60% of them are boys. How many are girls?

**3.** At Easter 800 persons visited the zoo, and 75% of the visitors were children. How many children visited the zoo at Easter?

**4.** Tamara has a box that held 64 markers. She is missing 25% of the markers. How many markers are missing?

**5.** In a survey 240 persons were asked their favourite colour, and 15% of the persons chose red. How many persons chose red?

**6.** In a Mathematics test of 50 questions, Jamie got 80% correct. How many questions did he get wrong?

**7.** A bookstore received a delivery of 5 000 notebooks. If 4% of the books were defective, how many good books were in the delivery?

**8.** Rhys monthly salary is $6 000. He spends 25% of his salary on rent and 20% on food.

**(a)** What percentage of his salary is left?

**(b)** How much of his salary is left?



**9.** In a 250 g fruit salad, 22% of the fruits in the salad are watermelon, 28% are pineapples and 44% are apples. The rest are pawpaw.

**(a)** What percentage of the fruit salad are pawpaw?

**(b)** What is the mass of the pawpaw?

**10.** Mr. James has 1 200 animals on his farm. 60% are chickens, 30% are ducks and the rest are cows. How many cows are on the farm?

**11.** The mass of Jeremy's book bag is 20% of his body weight. Jeremy weighs 40 kg.

**(a)** Calculate the mass of Jeremy's book bag?

**(b)** Jeremy added some more books to his bag and the bag is now 25% of his body weight. What is the mass of the books that he added?



Chapter 15 Percent.indd 212 06/03/18 4:25 PM

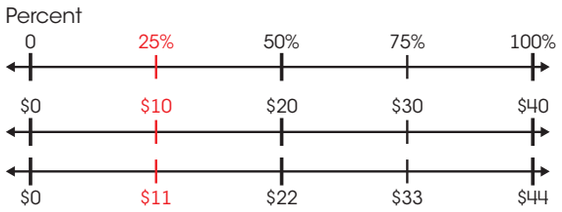
## Compare Percentages of Quantities

### Teaching Point 1:

*How can you explain differences in percentages of different amounts?*

Mark had $40 and Mia had $44. They both spent 25% of their money on food. Who spent more money?

**Method 1: Use a model.**




Mark's 25% → $10

Mia's 25% → $11

So, Mia spent more money.

**Method 2:**

$$25\% \text{ of } \$40 = \frac{25}{100} \times \$40$$

$$= \$10$$

$$25\% \text{ of } \$44 = \frac{25}{100} \times \$44$$

$$= \$11$$

So, Mia spent more money.

### Activity 1:

**Compare both percents. Explain which is less.**

| | |
|---|---|
| **1.** 20% of $40<br>20% of $60 | **2.** 25% of 800 m<br>25% of 1 km |
| **3.** 10% of 60<br>15% of 60 | **4.** 50% of 8 L<br>25% of 16 L |
| **5.** 75% of 4 hr<br>50% of 4 hr | **6.** 40% of $120<br>30% of $90 |

**Compare both percents. Explain which is more.**

| | |
|---|---|
| **7.** 15% of 60 m<br>15% of 6 km | **8.** 80% of $100<br>80% of $60 |
| **9.** 60% of 100 min<br>80% of 60 min | **10.** 12% of 200 L<br>20% of 100 L |
| **11.** 3% of $900<br>10% of $150 | **12.** 6% of 100 g<br>2% of 400 g |

**Use < or > to compare each of the following.**

**13.** $\frac{1}{4}$ of 32 ◯ 0.5 of 30

**14.** 35% of 20 ◯ 0.2 of 25

**15.** $4 \times \frac{1}{6}$ ◯ $3 \times 0.25$

**16.** 20% of 1 hr ◯ 15 min

**17.** 20% of 30 ◯ 100% of 15

**18.** 0.1 of 2 m ◯ 60 cm

**19.** 200 ◯ 50% of 300

**20.** 25% of $24 ◯ $\frac{2}{10}$ of 20

**21.** $\frac{1}{3}$ of 48 ◯ 20% of 60

**22.** 75% of 36 ◯ $\frac{1}{3}$ of 45



Chapter 15 Percent.indd 213 06/03/18 4:25 PM

23. Mark says that 15% of 60 is the same as 60% of 15. Is Mark correct? Show your working.

24. Myron and Victor saves 2% of their allowance each week. Myron's weekly allowance is $24.00 and Victor's allowance is $20.00. What is the difference between their savings at the end of 4 weeks?



**$6.00**

25. After Easter a shop sells three chocolate eggs for the price of two or one chocolate egg for 40% less of the original price of $5. Which offer is cheaper?

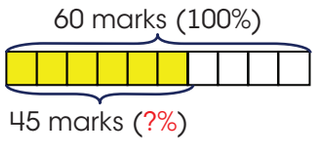
## Quantity as Percentage of Another

### Teaching Point 1:

*How can you express a quantity as a percentage of another quantity?*

In a test Aria scores 45 marks out of a possible total of 60 marks. What percent of the total marks did Aria score?

**Method 1: Use a model.**




60 marks → 100%

1 mark → $\frac{100}{60}\%$

45 marks → $45 \times \frac{100}{60}\% = 75\%$

So, Aria scored 75% of the total marks.

**Method 2:**

Aria's fraction of the total marks:

$\frac{\text{Aria's Marks}}{\text{Total Marks}} = \frac{45}{60}$ or $\frac{3}{4}$ ← Simplify.

$\frac{3}{4}$ of $100\% = \frac{3}{4} \times 100$

$= 75\%$

So, Aria scored 75% of the total marks.

### Activity 1:

**Express the following as both a fraction and percentage of the total.**

1. $40 out of a total of $200
2. 24 girls out of a total 30 children
3. 30 out of a total of 100
4. $10 out of a total of $50
5. 3 L out of a total of 12 L
6. 3 out of a total of 5
7. 14 g out of a total of 28 g
8. 30 ml out of a total of 200 ml
9. $60 out of a total of $80
10. 20 cents out of $5
11. 14 days out of 5 weeks
12. 15 cm removed from a total length of 3 metres



Chapter 15 Percent.indd 214 06/03/18 4:25 PM

13. 3 seconds taken from a world record of 5 minutes

14. 180 g of a total of 9 kg

15. 500 cm from a total of 0.6 km

**Write each shaded part as both a fraction and percentage of the total area.**

16. 

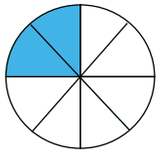
17. 

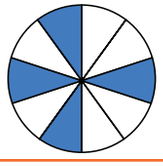
18. 

19. 

20. 

21. 

22. 

23. 

## Activity 2:

**Solve.**



1. After a game the players drank 12 L of water from the 36 L water cooler. What percentage of the water from the water cooler did they drink?

2. 5 of the 25 students in a class are left handed. What percentage of the students in the class are left handed?

3. In a survey of 500 voters, 300 of them said they would vote for the same candidate again. What percentage of the voters would vote the same way again?

4. A pants that normally costs $160 is on sale for $120. What percentage of the regular price is the sale price?

5. On Thursday morning a restaurant served tea to 35 of its 140 customers. What percentage of the customers ordered tea?

6. Of 20 students, 10 play cricket and 2 play football. The rest play musical instruments. What percentage of students play musical instruments?

7. Mrs. Ramroop made 80 L of fruit punch for the graduation. She used 52 L of fruit juice and the rest is water.

   (a) What percentage of the punch is fruit juice?

   (b) What percentage of the punch is water?

8. Ayesha had $60. She spent $36 on a shirt and the rest on socks.

   (a) What percentage of the money did she spend on the shirt?

   (b) What percentage of the money did she spend on the socks?

9. For a class test, Ria scored 45 out of 60 and Melissa scored 72 out of 100. Use percentages to show who obtained the higher mark.

10. Mark spent $36 and had $12 left. What percent of his money did he spend?



Chapter 15 Percent.indd 215 06/03/18 4:25 PM

11. Joanne pays $120 tax out of her income of $3 000. What percentage of her income does she keep?

## Use Mental Strategies

### Teaching Point 1:

*How can you use mental strategies to solve percent problems?*

What is 40% of 50?

**Mental strategy 1:**

10% of 50 is 5 ← Dividing by 10.

So, 40% of 50 is 20 ← Multiplying 10% by 4.

What is 4% of $400?

1% of $400 is 4 ← Dividing by 100.

So, 4% of $400 is 16 ← Multiplying 1% by 4.

What is 35% of $300?

**Mental strategy 2:**

10% of $300 is $30 ← Dividing by 10.

30% is $90 ← Multiplying 10% by 3.

5% is $15 ← Halving 10%.

So, 35% of $300 is $105.

What is 50% of 26 L?

**Mental strategy 3:**

50% of 26 is 13. ← Finding half of 26.

So, 50% of 26 L is 13.

### Activity 1:

**Use mental strategies to find each percentage.**

| | |
|---|---|
| 1. 25% of 48 | 2. 50% of $800 |
| 3. 10% of $500 | 4. 1% of $7 500 |
| 5. 20% of 15 L | 6. 50% of 48 |
| 7. 25% of $200 | 8. 15% of 60 m |
| 9. 90% of 1 km | 10. 40% of 400 g |
| 11. 7% of 500 | 12. 2% of 300 ml |

**Use mental strategies to solve the problems below.**

13. A gardener picked 360 cucumbers for sale at the market. 20% of the cucumbers were not fit for sale. How many of the cucumbers were not fit for sale?

14. One hundred children went to a football game. 80% of them were boys. How many of them were girls?



15. 50% of a box of 200 apples are bad. How many apples are good?

16. Maria spent 90% of her allowance on snacks and saved the rest. If her allowance was $60, how much money did she save?



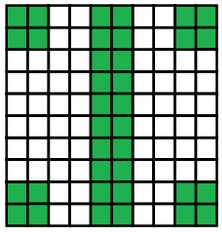
Chapter 15 Percent.indd 216 06/03/18 4:25 PM

17. There are 40 students in a class. At the end of the year, 10% of them left the class and 3 new students joined the class. What is the new enrolment of the class?

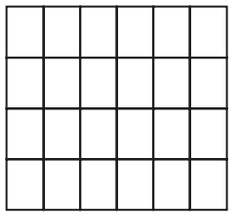
## Chapter Review

**Solve the problems below.**

1. Express the shaded part as a percentage of the whole shape?



2. Shade 25% of the shape below.



3. When peeling a banana, the skin which is 8% of its mass, is discarded. What percentage is left?

4. Complete the table below.

| Common Fraction | Percentage | Decimal |
|---|---|---|
| | 75% | |
| $\frac{2}{5}$ | | |

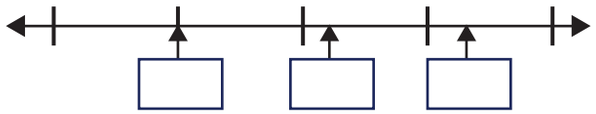
5. What percentage is 56 hundredths?

6. John lives 2 km away from the school. He walks 500 m and takes the bus the rest of the way. Calculate the percentage of the bus ride to his school.

7. A man mixed 8 L of fruit juice with 4 L of water to make a fruit punch. What is the percentage of water in the fruit punch?

8. Order the three numbers below by writing them in the correct box on the number line.

$0.8, \frac{1}{4}, 60\%$



9. Mark and 4 friends shared a pizza equally. What percentage of the pizza did each person get?

10. What percent of $1 is 15 cents?

11. In a box of pencils 0.6 of the pencils were yellow and the rest were red. What percentage of the pencils was red?

12. Maria spent 75% of her allowance. Write × on the number line to show how much of her allowance she spent.




13. A pair of sneakers are on sale as shown. The original price was $240. What percent of the original price is the sale price?






Chapter 15 Percent.indd 217 06/03/18 4:25 PM

14. From a bag containing 44 kg of beans, a shopkeeper sold all but 25% of the beans. How many kilograms of beans did he sell?

15. In a mental competition, Ameena was given 20 items to solve. She got 15 of the items correct.

    (a) What percentage of the total items did she solve correctly?

    (b) Ameena must get at least 80% of the items correct to move on to the final round of the competition. How many items should she solve correctly to qualify?

16. In a school of 480 students, 288 of them are boys. What percentage of them are girls?

17. A box has 60 marbles that are either red, blue or green in colour. There are 30 red marbles, and equal numbers of blue and green marbles. Calculate the percentage of marbles that are green.

18. Avia's brother is 16 years old. In four years time Avia will be 50% of her brother's age. How old is Avia now?

19. The table shows the membership of a sports club.

| Type of membership | Adult | Child |
|---|---|---|
| Number of members | 120 | 80 |

    (a) What percentage of the membership are adults?

    (b) What percentage of the membership are children?

20. Alisha went to the Easter Fair with \$60.00. She spent $\frac{1}{4}$ of her money on lunch, $\frac{1}{5}$ on snacks and the rest on games. What percentage of her money did she spend on games?

21. Ashton had some marbles. 20% of them were red and the rest were blue. He gave all the red marbles and 25% of the blue marbles to his friends. If he had 40 marbles how many marbles did he give away?

22. There are 320 students in a school. 180 students are girls. 45% of the boys play sports. How many boys do not play sports?



Chapter 15 Percent.indd 218 06/03/18 4:25 PM

CHAPTER

16

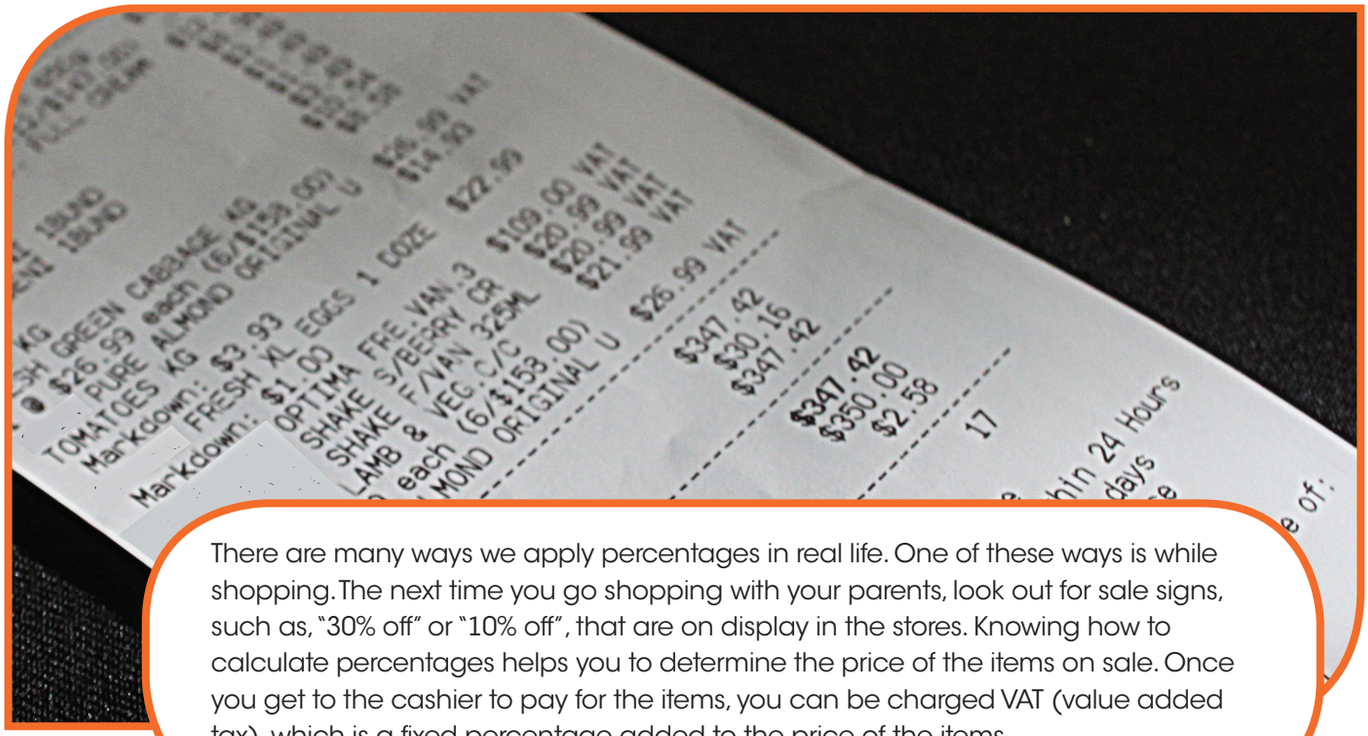
# Applying Percentages

**Vocabulary:**

discount
commission
sale price
savings
loans
simple interest
principal
rate
VAT - Value Added Tax
tax
vat inclusive
vat exclusive
per annum

**Chapter Outcomes:**

- Create and solve one-step and multi-step problems involving whole numbers, fractions, mixed numbers, decimal, percents including money using algorithms, mental strategies and other problem solving strategies.
- Apply understanding of fractions, decimals and percents to solve problems.



There are many ways we apply percentages in real life. One of these ways is while shopping. The next time you go shopping with your parents, look out for sale signs, such as, "30% off" or "10% off", that are on display in the stores. Knowing how to calculate percentages helps you to determine the price of the items on sale. Once you get to the cashier to pay for the items, you can be charged VAT (value added tax), which is a fixed percentage added to the price of the items.

## Getting Ready for Chapter 16

1. Write the total amount as a decimal fraction.




2. One shirt costs $25. How much do 5 shirts cost?

**Estimate. Then solve.**

| | |
|---|---|
| 3. 2.35 × 10 = | 4. 2.18 + 3.32 = |
| 5. 9.34 − 4.89 = | 6. 3.9 ÷ 3 = |

## Discount

### Teaching Point 1:

*How can you find discounts and selling price?*




The original price of a shirt is $40. The **discount** is 20%. What is the sale price?

A **discount** is a decrease in the original price of an item.

**Method 1:**

1. **Find the discount.**

$$20\% \text{ of } \$40 = \frac{20}{100} \times \$40$$

$$= \$8$$

2. **Next, find the sale price.**

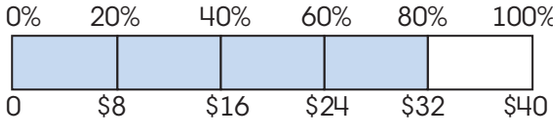
Sale Price = Original Price − Discount

$$= \$40 - \$8$$

$$= \$32$$

So, the sale price is $32.

**Method 2:**




1. **Find the discounted percent.**

$$100\% - 20\% = 80\%$$

2. **Next, find the sale price.**

$$80\% \text{ of } \$40 = \frac{80}{100} \times \$40$$

$$= \$32$$

So, the sale price is $32.

### Activity 1:

**Copy and complete the table.**

| | Original Price | Discount | Sale Price |
|---|---|---|---|
| 1. | $80.00 | 20% | |
| 2. | $120.00 | 10% | |
| 3. | $112.00 | 50% | |
| 4. | $82.00 | 5% | |
| 5. | $75.00 | 15% | |



Chapter 16 Applying Percentages.indd 220 08/03/18 12:02 PM

| | | | |
|---|---|---|---|
| **6.** | \$52.60 | 30% | |
| **7.** | \$95.00 | 25% | |

**8.** What will I pay for an item marked \$5.50 if I get a 10% discount?

**9.** A clothing store gives a discount of $12\frac{1}{2}$%. How much will you pay for a pants marked \$84.80?

**10.** What will I pay for a pen that has an original price of \$18.60, if I get a 25% discount?

**11.** David bought a table for \$1 200 in March. In June, Mark bought the same kind of table at a discount of 25%. How much did Mark pay for the table?

**12.** A soca CD that has a marked price of \$125.50 is on sale at a 20% discount. What is the sale price of the CD?

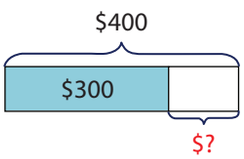
**13.** A discount of 16% was given for each cash purchase at a book store. How much will Vanna pay for a Mathematics text marked at \$64.00?

## Teaching Point 2:

*How can you find discounts and selling price?*

A suit with a marked price of \$400, is marked down to \$300 in a sale.

**(a)** What was the amount of discount on the suit?



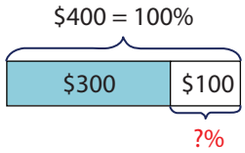

Marked Price → \$400

Discount → \$400 – \$300 = \$100

So, the amount of discount is \$100.

**(b)** What was the percentage discount on the suit?

**Method 1:** **Use a model.**




\$400 → 100%

\$1 → $\frac{100}{400}$%

\$100 → $100 \times \frac{100}{400} = \frac{100}{1} \times \frac{100 \div 100}{400 \div 100}$

$= \frac{100 \div 4}{1} \times \frac{1}{4 \div 4}$

= 25%

So, the percentage discount is 25%.

**Method 2:** **Use mental strategies.**

Marked Price → \$400 or 100%.

Discount → \$100 or $\frac{1}{4}$ of Marked Price.

Percentage → $\frac{1}{4}$ of 100% = 25%.

So, the percentage discount is 25%.



Chapter 16 Applying Percentages.indd 221 08/03/18 12:02 PM

## Activity 2:

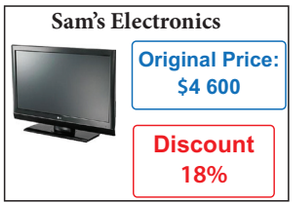
**Copy and complete the table.**

| | Original Price | Sale Price | Discount | Discount Percent |
|---|---|---|---|---|
| 1. | $200 | $150 | $50 | 25% |
| 2. | $400 | $240 | ___ | ___ |
| 3. | $920 | $782 | ___ | ___ |
| 4. | $1 000 | $900 | ___ | ___ |
| 5. | $1 500 | ___ | $750 | ___ |
| 6. | $360 | $306 | ___ | ___ |
| 7. | $3 500 | $2 800 | ___ | ___ |
| 8. | $890 | ___ | $89 | ___ |
| 9. | $3 000 | ___ | $150 | ___ |

**Solve the problems below.**

10. The regular price of a cell phone was $1 200. Vienna paid $900 for the phone during a sale. Calculate the **PERCENT DISCOUNT** that Vienna received.




11. (a) At which of the stores above will the television be cheaper?

(b) What will be the difference between both sale prices for the television?

# Commission

### Teaching Point 1:

*How can you find commission on sales?*

A salesman gets 3% commission on all the furniture he sells. If he sells an armchair for $6 000.00, how much commission will he receive on this sale?

A **commission** is a percent of total sales earned by a salesperson.

**Method 1:**

1. **Find the commission.**

$$3\% \text{ of } \$6\,000 = \frac{3}{100} \times \$6\,000$$

$$= \$180$$

So, his commission is $180.

## Activity 1:

**Copy and complete the table.**

| | Sales | Percent | Commission |
|---|---|---|---|
| 1. | $2 400.00 | 2% | |
| 2. | $1 830.00 | 3% | |
| 3. | $4 800.00 | 4% | |
| 4. | $8 245.00 | 5% | |
| 5. | $7 650.00 | 3% | |
| 6. | $5 600.00 | 2% | |
| 7. | $9 000.00 | 3% | |



Chapter 16 Applying Percentages.indd 222 08/03/18 12:02 PM



8. Sarah sold a total of $4 684.00 in sports products and received 4% commission. How much money did she earn?



9. A salesperson receives 10% commission on the sale of appliances. If he sells a refrigerator for $4 598.00, what is his commission?

10. Mrs. Smith earns a 3% commission based on the vacation packages she sells. On one day she sold 3 vacation packages. What was her total commission?

| Vacation Package #1 | Vacation Package #2 | Vacation Package #3 |
|---|---|---|
| $2 375 | $3 950 | $2 725 |

11. Peter earns $3 000 a month plus some money by commission. He gets a commission of 5% on everything he sells. If Peter sold $7 500 worth of items this month, what is his salary for the month?

12. Jack works in a sport store for a salary of $450 per week, plus 6% commission on his total sales. One week his sales were $3 390. What was his income for that week?

13. Mr. James makes money by commission sales. He gets 15% of everything he sells. If he sells $2 300 in goods each week, what will be his monthly salary?

## Taxes

### Teaching Point 1:

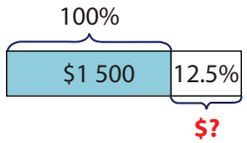
*How can solve problems involving taxes?*

**VAT (Value Added Tax)** is a type of sales tax that is added to the price of a product at the time of purchase. In Trinidad and Tobago VAT is a fixed rate of $12\frac{1}{2}\%$ or 12.5%.

The cost price of a chair is $1 500. VAT is calculated at 12.5% of the cost price. Calculate the amount of VAT.

**Find 12.5% *of $1 500*.**

**Method 1:**




100% → $1 500

1% → $1 500 ÷ 100 = $15

12.5% → $15 × 12.5

= $187.50

So, the VAT is $187.50.



Chapter 16 Applying Percentages.indd 223 08/03/18 12:02 PM

**Method 2:**

$$12.5\% \text{ of } \$1\,500 = \frac{12\frac{1}{2}}{100} \times 1\,500$$

$$= \frac{\frac{25}{2}}{100} \times 1\,500$$

$$= \frac{25}{200} \times 1\,500$$

$$= \frac{25 \div 25}{200 \div 25} \times \frac{1\,500}{1}$$

$$= \frac{1}{8 \div 8} \times \frac{1\,500 \div 8}{1}$$

$$= 187.5$$

So, the VAT is \$187.50.

## Activity 1:

**Copy and complete the table.**

| | Cost of Item before VAT | VAT at a rate of 12.5% | Cost of Item with VAT |
|---|---|---|---|
| 1. | \$20 | \$2.50 | \$22.50 |
| 2. | \$100 | ___ | ___ |
| 3. | \$50 | ___ | ___ |
| 4. | \$170 | ___ | ___ |
| 5. | \$2 300 | ___ | ___ |
| 6. | \$5 460 | ___ | ___ |
| 7. | \$9 000 | ___ | ___ |
| 8. | \$420 | ___ | ___ |
| 9. | \$256 | ___ | ___ |
| 10. | \$894 | ___ | ___ |

**Solve the problems.**

11. Shanice and her family had lunch at a restaurant. The total cost of the food bill was \$98.00. If VAT is 12.5%, calculate the VAT to be paid?



12. A television set valued at \$4 800 was taxed at 12.5% VAT. Calculate the amount that would have to be paid.

13. A stove was advertised as shown below.




(a) How much will be the VAT?

(b) What will be the total cost of the stove?

14. Daddy's salary for the month of January was \$10 400. He paid 25% of this as income tax. Calculate daddy's salary after the income-tax deduction.

15. Mr. Peters bought a camera that costs \$450. In addition, he had to pay 12.5% VAT. How much did Mr. Peters pay for the camera?

16. The price of a cell phone is \$1 600 subject to 12.5% VAT

(a) Calculate the amount of VAT.

(b) Calculate the VAT inclusive price of the cell phone.



Chapter 16 Applying Percentages.indd 224 08/03/18 12:02 PM







**17.** What is the difference between the VAT that will be paid for a pants bought at Abel's Men Store and one bought at The Barn, if VAT is 12.5%?



**18.** Mother bought baby car seat at an online store for $200. She shipped it to Trinidad and was charged 12.5% VAT and an online purchase tax of 7%.

**(a)** Calculate how much VAT she paid on the baby car seat.

**(b)** The online purchase tax of 7% is charged after the VAT is added to the cost of the item. Calculate the amount of the online purchase tax.

**19.** The price of a sofa, VAT exclusive, is $3 600. How much will a customer pay for the sofa if she gets a 20% discount but pays a 12.5% VAT?

**20.** A customer buys the following items at the grocery.




**(a)** What is the total VAT that he has to pay on the three items if VAT is 12.5%

**(b)** Calculate the total cost of the three items.

## Simple Interest

### Teaching Point 1:

*How does simple interest relate to percentage problems?*

Simple Interest ($) = Principal ($) × Interest Rate (% per year) × Time (years)

**Principal (P)** is the initial amount of money deposited or borrowed.

**Simple Interest (SI)** is the amount of money paid or earned for the use of money.

**The interest rate (R)** is a percent used to calculate interest on the principal.

Arnez has $500 in a savings account that pays 5% simple interest. (a) How much interest will he earn in 3 years? (b) What is the balance after 3 years?

#### Finding Interest Earned

**Method 1:**

**(a)** $SI = \frac{PRINCIPAL}{1} \times \frac{RATE}{100} \times \frac{TIME}{1}$

$= \frac{500}{1} \times \frac{5}{100} \times \frac{3}{1}$

$= \frac{500 \times 5 \times 3}{100}$

$= \$75$



Chapter 16 Applying Percentages.indd 225 08/03/18 12:02 PM

**(b)** Balance = Principal + Simple Interest

= \$500 + \$75

= \$575

**Method 2:**

**SI** = \$500 × 0.05 × 3 ← Change the rate to a decimal.

= \$75

Balance = Principal + Simple Interest

= \$500 + \$75

= \$575

## Finding the Interest Rate

Maya put \$1 000 in an account. The account earns \$160 in simple interest in 4 years. What is the annual interest rate?

$$\text{Rate} = \frac{\textit{Simple Interest} \times 100}{\textit{Principal} \times \textit{Time}}$$

$$= \frac{160 \times 100}{1\,000 \times 4}$$

$$= 4$$

So, the annual interest rate is 4%

## Finding the Amount of Time

How long will it take an account with a principal of \$800 to earn \$240 interest if the annual interest rate is 6%?

$$\text{Time} = \frac{\textit{Simple Interest} \times 100}{\textit{Principal} \times \textit{Rate}}$$

$$= \frac{240 \times 100}{800 \times 6}$$

$$= 5$$

So, the time is 5 years.

## Finding the Principal

Peter took a loan from the bank for 3 years at an annual interest rate of 10%. After 3 years he had repaid the bank \$1 800 in interest. What was the initial sum of money that he had borrowed?

$$\text{Principal} = \frac{\textit{Simple Interest} \times 100}{\textit{Rate} \times \textit{Time}}$$

$$= \frac{1\,800 \times 100}{10 \times 3}$$

$$= \$6\,000$$

So, the principal is \$6 000.

## Activity 1:

Copy and complete the table.

| | Principal | Rate | Time | Simple Interest |
|---|---|---|---|---|
| 1. | \$200 | 5% | 1 year | |
| 2. | \$600 | 2% | 5 years | |
| 3. | \$350 | 3% | 10 years | |
| 4. | \$900 | 3% | 3 years | |
| 5. | \$500 | 4% | 12 months | |
| 6. | \$800 | 2% | 6 years | |
| 7. | \$1 000 | 4% | 6 months | |
| 8. | \$1 500 | 10% | 18 months | |

**Find the annual interest rate.**

9. Interest = \$60, Principal = \$400, Time = 3 years

10. Interest = \$20, Principal = \$1 000, Time = 6 months



Chapter 16 Applying Percentages.indd 226 08/03/18 12:02 PM

11. Interest = $225, Principal = $2 500, Time = 18 months

**Find the amount of time.**

12. Interest = $30, Principal = $500, Rate = 3%

13. Interest = $720, Principal = $1 000, Rate = 9%

**Find the amount of Principal.**

14. Interest = $18, Rate = 4%, Time = 6 months

15. Interest = $54, Rate = 3%, Time = 2 years

## Activity 2:

**Solve the problems below.**

1. A savings account earns a 5% simple interest per year. If the principal is $2 000, what is the balance after 3 years?

2. You put $1 200 in an account. The account earns $54 simple interest in 18 months. What is the annual interest rate?

3. A family used a credit card to pay for their $5 000 vacation in Tobago. The simple interest rate on the credit card is 15%. The charge was paid after 1 year. What is the total amount paid for the vacation?

4. Mr. Peters borrowed $9 000 from the bank to pay for tuition. He paid simple interest at a rate of 10% for a period of 4 years.

   (a) How much simple interest did Mr. Peters pay?

   (b) How much money must Mr. Peters repay the bank at the end of 4 years?

5. Mr. Gaya borrows $3 500 from his bank to buy a refrigerator. The loan has a 7% annual simple interest rate. If it takes Mr. Gaya two years to pay back the loan, what is the total amount he would be paying?

6. Isaiah invests $5 000 for 3 years and earns $750.

   (a) What was the simple interest rate?

   (b) How much money will he have after the 3 years?

   (c) If Isaiah's goal is to earn $2 000 after 5 years, at the same interest rate, how much money should he have invested?

7. Andell took a loan of $5 000 from the bank at a rate of 10% per annum for 2 years.

   (a) What is the simple interest on the loan?

   (b) What is the total amount he repaid?

   (c) If he repaid 24 equal monthly instalments, what was his monthly instalment?

## Chapter Review

**Solve the problems below.**

1. Calculate the simple interest on $820 at a rate of 5% per annum for 2 years.

2. A television bought during a sale had a sale price of $4 500. At the end of



Chapter 16 Applying Percentages.indd 227 08/03/18 12:02 PM

the sale the same television costs $5 000. What was the discount percent during the sale?

3. A laptop computer displayed at a store costs $3 000. A VAT of 12.5% is added to the price. What is the total cost of the laptop computer?




4. A digital camera costs $2 300. The camera is on sale for 30% off, and you have a discount card for an additional 5% off the sale price. What is the final price?

5. A salesman weekly wage is $1 500 plus a 4% commission on all sales. If his sales for the week was $2 000, what is his wage?

6. Mrs. Moore borrows $9 000 for 5 years from the bank. She pays 8% interest annually.

   (a) Calculate the interest per year.

   (b) Calculate the interest for 5 years.

   (c) Calculate the total amount she has to repay the bank.










7. Marvin wants to buy shoes for school. Three stores have the brand that he wants as advertised. What is the sale price of the shoes at:

   (a) Shoe Factory?

   (b) Shoez?

   (c) Which of the three stores will give Marvin the **best buy**?

8. Mother bought some items at the book store. Her bill is shown below.

**Jerome's Book Store**

| Quantity | Item | Unit Cost | Cost |
|---|---|---|---|
| 4 pairs | Socks | $10.00 | $ 40.00 |
| 2 | Shirts | $30.00 | $ 60.00 |
| 2 | Pants | $80.00 | $160.00 |
| | | Total before VAT | $260.00 |
| | | VAT 12.5% | |
| | | Total Cost after VAT | |

   (a) Calculate the VAT on her total bill.

   (b) Calculate the total cost after VAT.



Chapter 16 Applying Percentages.indd 228 08/03/18 12:02 PM

CHAPTER

17

# Wages and Salary

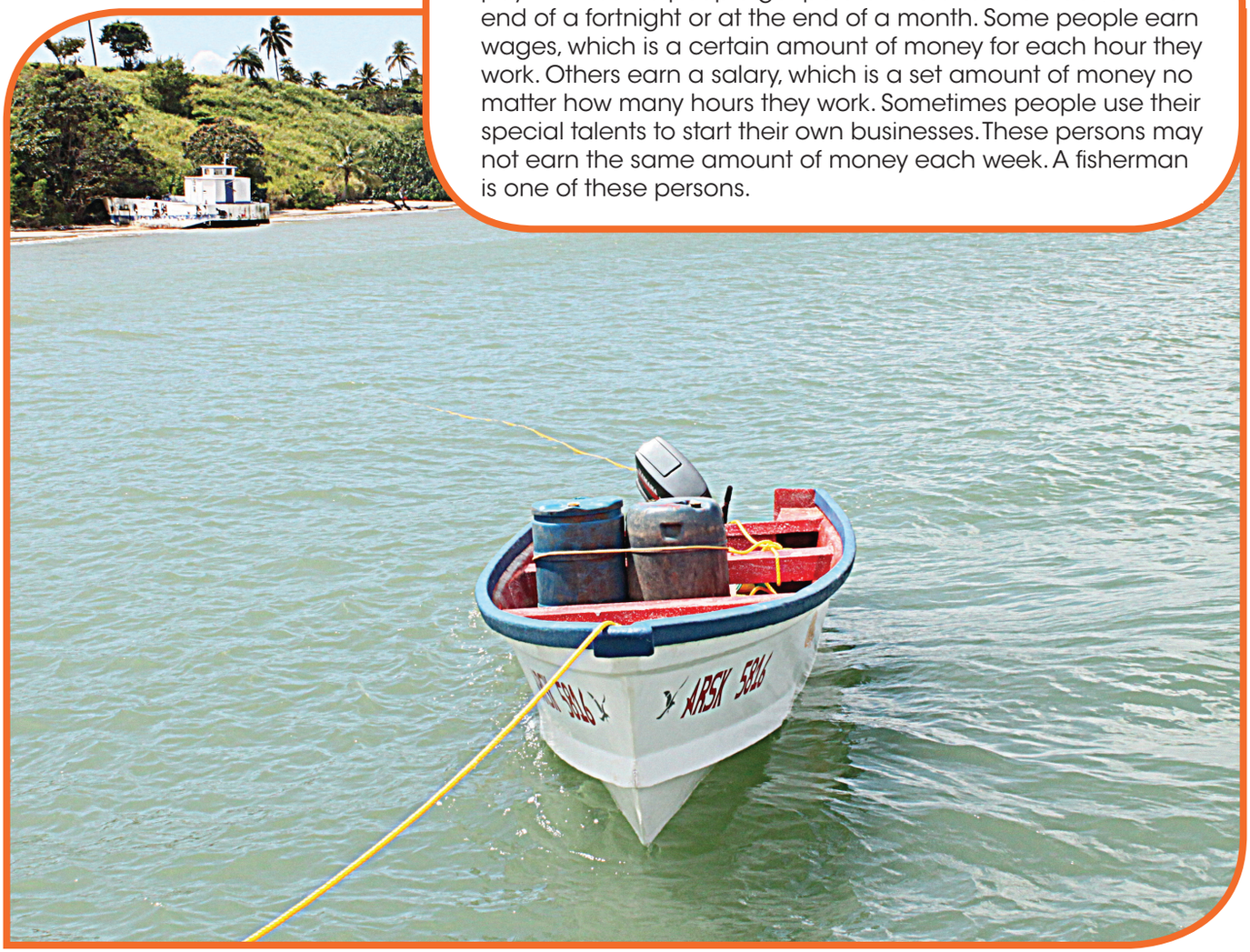
**Vocabulary:**

wages
salary
overtime
fortnight
hourly rate
weekly rate

**Chapter Outcomes:**

- Create and solve one-step and multi-step problems involving whole numbers, fractions, mixed numbers, decimal, percents including money using algorithms, mental strategies and other problem solving strategies.

Money has to first be earned before it can be spent. People earn money by doing different jobs for various methods of payment. Some people get paid at the end of a week, at the end of a fortnight or at the end of a month. Some people earn wages, which is a certain amount of money for each hour they work. Others earn a salary, which is a set amount of money no matter how many hours they work. Sometimes people use their special talents to start their own businesses. These persons may not earn the same amount of money each week. A fisherman is one of these persons.



## Getting Ready for Chapter 17

**Multiply.**

1. $45.00 × 8 = _____

2. $15.20 × 4 = _____

**Divide.**

3. 12 ⟌480

4. $507.50 ÷ 35 =

**Find each product. Express the product in simplest form.**

5. $1\frac{1}{2} \times \$40.00$

6. $\$69 \times \frac{3}{4}$

**Find each quotient. Express the quotient in simplest form.**

7. $\frac{6}{7} \div 30$

8. $72 \div \frac{9}{10}$

**Solve.**

15. The ice cream shop sells one soft serve ice cream cone for $5.95. What would be the cost of 12 such ice cream cones?

16. If 5 notebooks cost $12.00, how much would 1 notebook cost?

## Hourly Rates and Daily Pay

### Teaching Point 1:

*How can you use rates to calculate wages and salary?*

Some people are paid at an **hourly rate** for the number of hours they work.

Mr. Ali works from 7:30 a.m. to 3:30 p.m. at a rate of $20.00 per hour. Calculate Mr. Ali's wages.

**Step 1: Find total hours worked.**

From 7:30 a.m. to 3:30 p.m. → 8 hours

**Step 2: Find the wages earned.**

hourly rate × hours worked = wages earned

$20.00 × 8 = $160.00

So, Mr. Ali's daily pay is $160.00.

Mr. Brown works 8 hours every day. At the end of 5 days Mr. Brown was paid $800.00 Calculate Mr. Brown's hourly rate of pay.

**Step 1: Find the daily rate.**

5 days → $800.00

1 day → $800.00 ÷ 5 = $160.00

**Step 2: Find the hourly rate.**

wages earned ÷ hours worked = hourly rate

$160.00 ÷ 8 = $20.00

So, Mr. Brown's hourly rate is $20.00



Chapter 17 Wages and Salary.indd 230 07/03/18 10:40 AM

## Activity 1:

**Complete the table. Calculate the missing values.**

| Number of hours worked | Hourly rate | Wages Earned |
|---|---|---|
| 1. 4 | $12.50 | |
| 2. 7 | $20.00 | |
| 3. $12\frac{1}{2}$ | $25.00 | |
| 4. 5 | | $70.00 |
| 5. | $10.00 | $120.00 |
| 6. 16 | | $296.00 |
| 7. $9\frac{1}{2}$ | $11.64 | |
| 8. $6\frac{1}{2}$ | | $156.00 |
| 9. | $15.00 | $270.00 |
| 10. $1\frac{1}{2}$ | | $150.00 |

## Activity 2:

**Solve.**

1. Maria's job as a cleaner pays her $15.00 an hour. If she worked for 6 hours, how much money did she earn?
2. Michael works 6 hours a day. His earnings for the day is $99.00. What is his hourly rate of pay?
3. A baby sitter charges her clients $25.00 an hour. She works from 3:30 p.m. to 6:00 p.m. daily. Calculate her daily earnings?
4. John makes $10.50 per hour. He works 25 hours. What does he earn?



5. A painter worked the following hours:
   Sunday – 9:00 a.m. to 5:30 p.m.
   Monday – 10:00 a.m. to 5:30 p.m.
   Wednesday – 1:00 p.m. to 5:00 p.m.
   Calculate his wage for the three days at an hourly rate of $35.00.
6. Mark was paid at an hourly rate of $16.00 to wash dishes. He received $240.00. Calculate the number of hours he worked.



7. If Jenny's salary for 5 days was $880.00 and she worked 8 hours each day, what does she earn per hour?
8. Minimum wage is now $20.00 per hour. How much does a person make who works 40 hours per week?
9. Harry works 8 hours every day. At the end of 5 days Harry was paid $600.00 Calculate Harry's daily pay rate.
10. A technician earns $17.00 per hour. He works $7\frac{1}{2}$ hours daily from Monday to Thursday and 5 hours on Friday. What would be his earnings for the five days?



Chapter 17 Wages and Salary.indd 231 07/03/18 10:40 AM

11. Henry starts work at 9:00 a.m. each day. He is paid at a rate of $25.00 per hour and earns $200.00 a day.

    (a) How many hours does he work per day?

    (b) If he works 6 days a week, how much money will he have earned at the end of the week?

## Weekly Rates

### Teaching Point 2:

*How can you use rates to calculate wages and salary?*

Some people work a fixed number of hours per week and are paid at a **weekly rate**.

Maria's job pays her $1 500 a month. What is her weekly wage?

**Step 1: Find total weeks worked.**

1 month → 4 weeks

**Step 2: Find the weekly wage.**

4 weeks → $1 500

1 week → $1 500 ÷ 4 = $375.00

So, Maria's weekly wage is $375.00.

Henry is paid $1 200 per week. How much would he be paid every fortnight?

A **fortnight** is equal to two weeks.

**Step 1: Find his fortnightly salary.**

1 week → $1 200.00

2 weeks → $1 200.00 × 2 = $2 400.00

So, Henry will be paid $2 400.00 every fortnight.

### Activity 1:

**Complete the table. Calculate the missing values.**

| Number of hours worked per week | Hourly rate | Weekly wage |
|---|---|---|
| 1. 40 | $20.50 | |
| 2. 35 | $12.00 | |
| 3. 26 | $14.25 | |
| 4. 40 | | $840.00 |
| 5. | $24.00 | $768.00 |
| 6. 16 | | $608.00 |
| 7. 15 | | $765.00 |
| 8. | $38.00 | $456.00 |
| 9. $10\frac{1}{2}$ | | $630.00 |

### Activity 2:

**Solve.**

1. John makes $15.50 per hour. He works 40 hours per week. What does he earn each week?



Chapter 17 Wages and Salary.indd 232 07/03/18 10:40 AM

2. Mrs. Jones earns $25.00 an hour and works 8 hours each day. If she works from Monday to Friday each week, how many weeks will it take for her to earn $6 000?

3. Isabel drives a truck for $16.75 an hour. If she works 40 hours a week, what would be her fortnightly earnings?

4. Rosa works 8 hours Monday through Friday. Her hourly wage is $18.75.

   (a) Find how many hours she works in one week.

   (b) Calculate her pay for that week.

5. Sandra's weekly wage is calculated using the rate shown in the table below. Sandra works for 8 hours daily.

| Wage Rates |
| --- |
| $40 per hour during the week (Monday to Friday) |
| $55 per hour during the weekends (Saturday and Sunday) |

   (a) During a certain week Sandra worked on Monday, Tuesday, Wednesday, and Sunday. How many hours did Sandra work in that week?

   (b) Using the rates in the table above, calculate Sandra's wage for that week.

   (c) Sandra received a wage of $2 160.00 for a particular week. She worked 16 hours over the weekend. How many HOURS did she work from Monday to Friday?

## Overtime Payment

### Teaching Point 2:

*How can you use rates to calculate overtime payments?*

Overtime is a payment to workers at

**$1\frac{1}{2}$ times** (time and a half) or **2 times**

(double time) their usual hourly rate. Overtime is usually paid as a compensation to work on weekends, public holidays or in excess of normal work hours.

Dave works for eight hours each day and is paid $15 per hour.

(a) If he works on Sunday, he is paid $1\frac{1}{2}$ times the week-day rate. How much is Dave's rate per hour on Sunday?

(b) Dave works for 2 times the week-day rate on a public holiday. What does he earn on Christmas Day?

**(a) Calculate $1\frac{1}{2}$ times rate.**

**hourly rate × 1.5 = time-and-a-half rate**

$15 × 1.5 = $22.50

So, Dave's rate of pay per hour is $22.50.



Chapter 17 Wages and Salary.indd 233 07/03/18 10:40 AM

**(b) Calculate double-time earnings.**

hourly rate × 2 = double-time rate

$15 × 2 = $30

Overtime pay → $30 × 8 = $240.00

So, Dave earns $240.00 on Christmas Day.

## Activity 1:

**Find time-and-a half and double-time rates for these hourly rates.**

| | | |
|---|---|---|
| 1. $12.10 | 2. $9.72 | 3. $15.00 |
| 4. $23.50 | 5. $25.60 | 6. $11.90 |
| 7. $16.00 | 8. $19.00 | 9. $35.20 |
| 10. $100.00 | 11. $50.30 | 12. $45.86 |

**Solve the following problems.**

13. Sam earns $12 per hour. He worked 40 hours at the regular rate, 2 hours at time and a half, and 3 hours at double time. Calculate Sam's total wages.

14. Bill makes $24 per hour for 40 hour work week. He earns time-and-a-half for every hour worked over 40 hours during that week.

    (a) If Bill earned $1 140 last week, how much money did he earn in overtime?

    (b) How many overtime hours did he work?

15. Steve worked 48 hours over 5 days. He is paid based on an 8-hour day with time-and-a-half for daily overtime. If Stanley's hourly pay rate is $14.50 per hour, what wages did he earn last week?

16. Mickell's hourly pay rate is $12.00. He receives time-and-a-half pay for all the hours he works over 40 hours a week. Last week he worked 45 hours.

    (a) How many overtime hours did Mickell worked?

    (b) What was his overtime pay?

17. Paul is paid $15.00 per hour, time and a half for all hours worked over 40 during the week, and double time on Sundays. He worked the following hours this week:

| Days | Hours Worked |
|---|---|
| Monday | 9 |
| Tuesday | $9\frac{1}{4}$ |
| Wednesday | $8\frac{3}{4}$ |
| Thursday | 9 |
| Friday | 8 |
| Sunday | 6 |

    (a) How many hours did Paul work?

    (b) Calculate his total pay for the week?

## Chapter Review

**Solve the problems below.**

1. Ameer earns $12 per hour. How much money will he earn in 8 hours?

2. During the vacation, a student worked for 5 days each week. In a week he



Chapter 17 Wages and Salary.indd 234 07/03/18 10:40 AM

earned $360.00. How much was he paid for each day of work?

3. A plumber earns $180 for 4 hours of work. How much does the plumber earn per hour?

4. Alan earned $608 for 8 hours work. How much will Alan earn for 20 hours of work?

5. Nalisha worked 20 hours last week and earned $360. Jenya worked 15 hours last week and earned $300. How much more does Jenya earn per hour?

6. Frank regular hourly pay rate is $16.50 an hour. His overtime pay rate is time-and-a-half. How much is Frank paid per hour for overtime work?

7. Christian was paid $15 an hour for 46 hours of work last week at his full-time job. He also worked 7 hours last week at a part-time job that pays $11 an hour. What is the total pay he earned last week from both jobs?

8. A painter was paid at the minimum wage of $12.50 per hour to do a job that lasted 12 hours.

   **(a)** What would be his earnings for the job?

   **(b)** If the minimum wage increases to $15.00 an hour, how much more money he would he receive for the same job?

9. There are 10 workers in a factory. Each worker works 30 hours a week and is paid $15.50 an hour. How much does the company pay the workers altogether each week?

10. Complete the paysheet below.

| Worker | Rate of Pay | Wages ($) |
|---|---|---|
| Mark | 3 days wages at $75 per day | $ |
| John | ☐ days wages at $80 per day | $640.00 |
| Jenny | 6 days wages at $ ☐ per day | $510.00 |
| | TOTAL | $ |

11. In one week George worked 4 hours a day, Monday through Friday at his after-school job. He is paid $8.20 an hour.

   **(a)** How many hours did Greg work for the week?

   **(b)** What was his earnings for the week?

12. Isaiah worked these hours in five days:

   $8\frac{1}{4}$, 7, 10, $8\frac{3}{4}$ and 8 hours. Overtime is calculated on time in excess of an 8-hour workday.

   **(a)** How many regular hours and overtime hours did he work in the five days?

   **(b)** If he is paid $15 for regular time and time and a half for overtime, what was his pay for the 5 days?



Chapter 17 Wages and Salary.indd 235 07/03/18 10:40 AM

CHAPTER

18

# Direct Proportion

**Vocabulary:**

direct proportion

**Chapter Outcomes:**

- Solve problems involving direct proportion.



Direct proportion is a relationship that occurs very often in real life. It happens in the number of items bought and number of dollars spent, the number of kilometres travelled and number the number of litres of gasoline used, the number of food servings to the number of persons and so on. Therefore, if one person bought one desert that cost $40, four persons will pay a proportional sum of money for four of the same kind of desert.

## Getting Ready for Chapter 18

**Write each fraction in simplest form.**

| | | |
|---|---|---|
| **1.** $\frac{2}{8}$ | **2.** $\frac{15}{45}$ | **3.** $\frac{12}{16}$ |

**Solve.**

**4.** $\$12.00 \div 4 =$

**5.** $26 \times 6 =$

**6.** Five apples cost $25.00. How much does one apple cost?

**7.** Twelve shirts cost $480. If the price of each shirt is the same, what is the cost of one shirt?

**8.** Anna reads 12 pages in 2 hours. If she reads at the same rate, how many pages would she read in 1 hour?

**9.** The cost of a food item at two different shops are shown below.

**Shop A:** $15.50 for 5 packs of corn curls.

**Shop B:** $12.60 for 3 packs of corn curls.

**(a)** What is the unit price for the item at each shop?

**(b)** At which shop does the item cost less?

## Direct Proportion

### Teaching Point 1:

*How can you solve problems involving direct proportions?*

**Direct proportion** is when **two quantities** are directly related; an **increase** in one quantity results in **proportionally similar increase** in the other quantity.

If 3 oranges sell for $12, find the selling price for 18 oranges.

**Method: Use the Unitary Method**

Find the selling price of 1 orange; then the selling price of any quantity of oranges.

S.P. of 3 oranges = $12

S.P. of 1 orange = $\frac{\$12}{3}$ ← Divide to find for 1.

S.P. of 18 oranges = $\frac{\$12}{3} \times \frac{18}{1}$ ← Multiply to find for 18.

$= \$72$

So, the selling price for 18 oranges is $72.

### Activity 1:

**Solve.**

**1.** Five pens cost $19.75. What is the cost of:

**(a)** 1 pen **(b)** 10 pens **(c)** 20 pens

**2.** 4 packets of balloons cost $48.00. What is the cost of $7 packets of balloons?



Chapter 18 Direct Proportion.indd 237 10/08/17 4:43 PM

3. Seven tickets to a concert cost $175.00. How much do 4 tickets cost?

4. You can buy 6 metres of fabric for $66.00. How many metres of the same material could you buy with $84.00?

5. Find the cost of 8 cartons of juice if 10 cartons cost $45.00.

6. A worker is paid $800 a week if he works 40 hours. How much money should he receive if he works 32 hours?

7. A man receives $390 for the 3 days that he works. How much should he receive if he works 15 days?



8. Two limes are used to make 4 glasses of juice. How many glasses of juice can be made with 6 limes?

9. Peanuts are filled in packets for sale. The table below shows the total grams of peanuts in various numbers of packets.

| **Number of packets** | 2 | 4 | ___ |
|---|---|---|---|
| **Grams of peanuts** | 90 g | ___ | 270 g |

Complete the table.

10. To make orange juice, you need 1.5 litres of orange concentrate, 2 litres of water, and 100 grams of sugar. Orange concentrate is sold in 3-litre packs. How much water and sugar will I need to add to a 3 litre pack of concentrate?

11. To make cupcakes for 4 persons you need the following ingredients:

200 grams flour
160 grams sugar
100 grams of butter
4 eggs

**(a)** How much of each ingredient do you need to make cupcakes for 10 persons?

**(b)** If you only had 100 grams of flour how much of each ingredient would you now need?

12. The exchange rate for the Trinidad and Tobago dollar to the United States dollar is shown below:

| **Country** | **Exchange Rate to United States $1.00** |
|---|---|
| Trinidad and Tobago | TT$6.77 |

How many Trinidad and Tobago dollars must be exchanged for:

**(a)** US$5 **(b)** US$8 **(c)** US$10

13. At the hardware, 4 m of wood cost $54.

**(a)** What is the cost of 8 m of wood?

**(b)** How much wood can you buy with $135?

14. Mother uses one loaf of sliced bread to make 12 cheese sandwiches. Each loaf has 24 slices of bread.

**(a)** How many slices of bread would she use to make 200 sandwiches?

**(b)** How many loaves of bread would she need to buy?



Chapter 18 Direct Proportion.indd 238 10/08/17 4:43 PM

CHAPTER

19

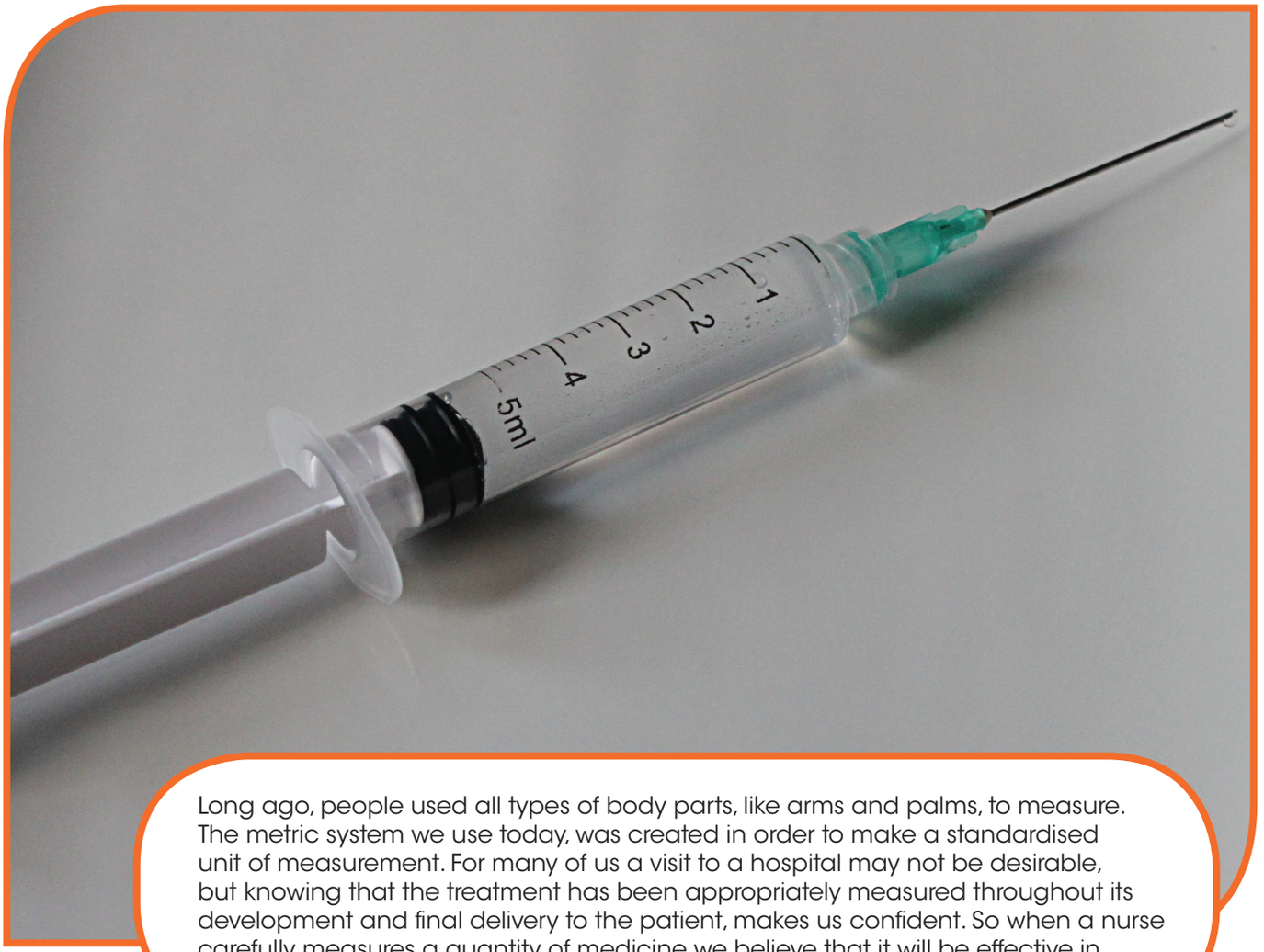
# Understanding the Metric System

**Vocabulary:**

milli
centi
kilo
millimetre
gram
litre

**Chapter Outcomes:**

- Demonstrate an understanding of the relationship between standard units and their sub-parts to solve practical problems.




Long ago, people used all types of body parts, like arms and palms, to measure. The metric system we use today, was created in order to make a standardised unit of measurement. For many of us a visit to a hospital may not be desirable, but knowing that the treatment has been appropriately measured throughout its development and final delivery to the patient, makes us confident. So when a nurse carefully measures a quantity of medicine we believe that it will be effective in making us get better.

## Getting Ready for Chapter 19

**Tick the measurement unit you would use to measure each of the following.**





**1.** The width of the book

- ☐ grams
- ☐ centimetres
- ☐ litres

**2.** The mass of the pumpkin

- ☐ grams
- ☐ metres
- ☐ litres

---

**Solve.**

**3.** 12 × 10 =

**4.** 6.81 × 100 =

**5.** 6 549 ÷ 100 =

**6.** 10.9 ÷ 10 =

---

**Express each as a decimal fraction.**

**7.** $\frac{12}{100}$ =

**8.** $\frac{6}{10}$ =

---

**Find the fractional part of each.**

**9.** $\frac{1}{4}$ of 100

**10.** $\frac{1}{2}$ of 1 000

---

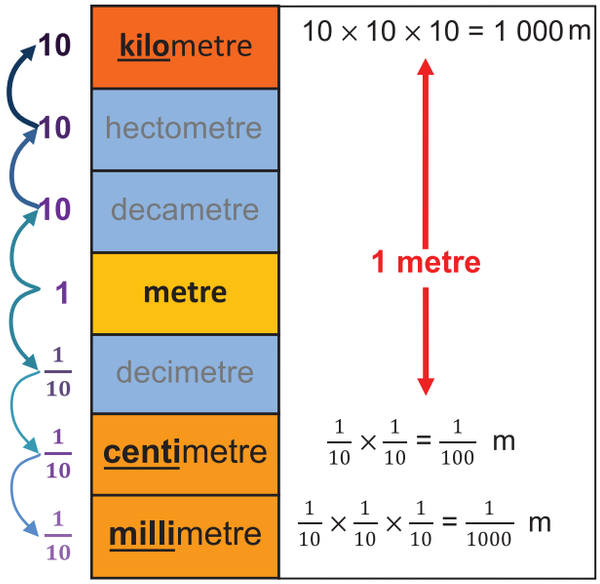
## Metric Units of Length

### Teaching Point 1:

*What is the relationship between metric units of length?*

The basic measurement unit for length in the metric system is the **metre**.

The metric system is based on **multiples of 10**. Every metric unit is **10 times as great** as the next smaller unit.




**kilo** means 1 000.

**centi** means one hundredth or $\frac{1}{100}$ (0.01)

**milli** means one thousandth or $\frac{1}{1000}$ (0.001)

1 000 metres = 1 kilometre (km)

1 metre = 1 metre (m)

$\frac{1}{100}$ or (0.01) metre = 1 centimetre (cm)

$\frac{1}{1000}$ or (0.001) metre = 1 millimetre (mm)

10 millimetres = 1 centimetre

$\frac{1}{10}$ or 0.1 centimetre = 1 millimetre



Chapter 19 Understand the Metric System.indd 240 07/03/18 10:45 AM

### Teaching Point 2:

*How can you relate standard units to their sub parts?*

1 kilometre (km) = 1 000 metres (m)

$\frac{1}{4}$ kilometre (km) = 250 metres (m)

$\frac{1}{2}$ kilometre (km) = 500 metres (m)

$\frac{3}{4}$ kilometre (km) = 750 metres (m)

---

1 metre (m) = 100 centimetres (cm)

$\frac{1}{4}$ metre (m) = 25 centimetres (cm)

$\frac{1}{2}$ metre (m) = 50 centimetres (cm)

$\frac{3}{4}$ metre (m) = 75 centimetres (cm)

## Conversion - Units of Lengths

### Teaching Point 1:

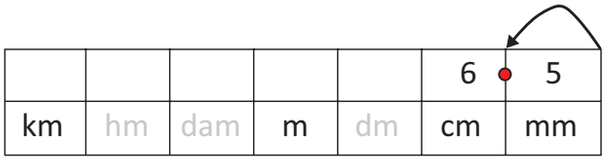
*How can you convert metric units of length?*

65 mm = ____ cm

**You divide to convert smaller units to larger units.**

Convert **millimetres** to **centimetres.**

65 mm ÷ 10 = 6.5 cm ← Move the decimal point 1 place to the left.



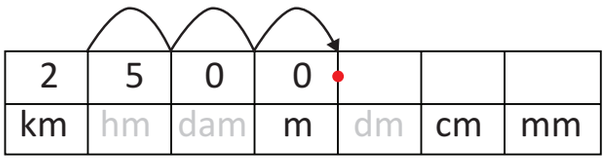

---

2.5 kilometres = ____ metres

**You multiply to convert larger units to smaller units.**

Convert **kilometres** to **metres**.

2.5 × 1 000 = 2 500 m ← Move the decimal point 3 places to the right.




### Activity 1:

**Complete the table to show equivalent measures.**

| | kilometres | metres |
|---|---|---|
| 1. | 4 | 4 000 |
| 2. | 12 | |
| 3. | | 3 000 |
| 4. | | 58 000 |
| 5. | 25 | |
| 6. | | 1 000 000 |
| 7. | 2.3 | |
| 8. | 0.65 | |



Chapter 19 Understand the Metric System.indd 241 07/03/18 10:45 AM

## Activity 2:

**Complete the table to show equivalent measures.**

| | metres | centimetres | millimetres |
|---|---|---|---|
| 1. | 2 | 200 | 2 000 |
| 2. | | 1 900 | |
| 3. | 8.9 | | |
| 4. | 0.67 | | |
| 5. | | 750 | |
| 6. | | 226 | |
| 7. | | | 4 500 |

## Activity 3:

**Solve.**

1. Complete the statement.
   1.75 km = ____ m
2. Express 24.76 kilometres in kilometres and metres.
3. Sharon has a 6 centimetres piece of string. Calculate the length of the string in millimetres.
4. A length of fabric is 475 centimetres. What is the length of the fabric in metres?
5. A 4 500 millimetres length of ribbon is cut into 1-metre pieces.
   a) How many 1-metre pieces can be cut from the ribbon?
   b) What will be the length, in centimetres, of the remaining piece of ribbon?
6. A runner completes a distance of 4.35 km in length. Find the distance that was covered in metres.

## Teaching Point 2:

*How can you use sub units to solve problems?*

Jenna bought 145 centimetres of fabric. Jayley bought $1\frac{1}{2}$ metres of fabric. Who bought more fabric?

Convert metres to centimetres.

$\frac{1}{2}$ metre = 50 cm

1 metre $\rightarrow$ 1 × 100 = 100

$1\frac{1}{2}$ metres = 100 + 50 = 150 cm

150 cm > 145 cm

So, Jayley bought more fabric.

## Activity 4:

**Solve.**

1. Complete the statement.
   $\frac{1}{2}$ centimetre = ____ millimetres
2. A football team runs $\frac{5}{8}$ km around a track. What is the distance in metres?
3. Adam uses a metre ruler to measure and cut $\frac{1}{8}$ metre pieces of ribbon.
   a) What is the length of each piece of ribbon in centimetres?



Chapter 19 Understand the Metric System.indd 242 07/03/18 10:45 AM

b) How many pieces of ribbon will Adam get from a 4 metre roll of ribbon?

4. Which length is closer to 1 metre?

a) $\frac{1}{2}$ km  b) 225 m

c) $\frac{1}{4}$ km  d) $\frac{1}{8}$ km

5. Carl lives $2\frac{3}{4}$ kilometres away from the school. He takes the bus for $1\frac{1}{4}$ kilometres and walks the rest. How many metres does Carl walk?

6. The diagram below shows the distances that Maria covered on her trip to the mall.

| car | walk | maxi taxi |
|---|---|---|
|  |  |  |
| 750 m | $\frac{1}{4}$ km | 1 km |

How many metres did Maria cover altogether?

7. Mai has a piece of fabric that is 8.7 metres long.

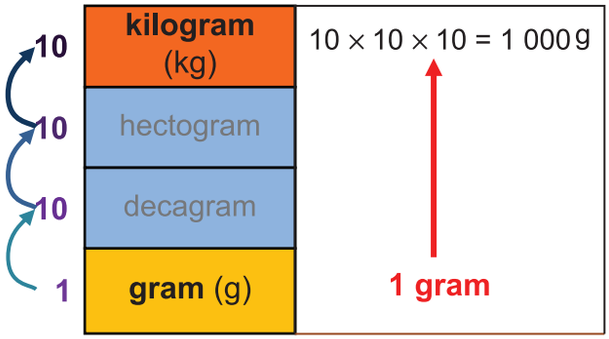
a) How many $\frac{1}{2}$ metre pieces can she cut from the cloth?

b) How much will be left over?

## Metric Units of Mass

### Teaching Point 1:

*What is the relationship between metric units of mass?*




1 000 grams = 1 kilogram (kg)

1 gram (g) = $\frac{1}{1000}$ kilogram

### Teaching Point 2:

*How can you relate standard units with their sub parts?*



1 kilogram (kg) = 1 000 grams (g)

$\frac{1}{4}$ kilogram (kg) = 250 grams (g)

$\frac{1}{2}$ kilogram (kg) = 500 grams (g)

$\frac{3}{4}$ kilogram (kg) = 750 grams (g)



Chapter 19 Understand the Metric System.indd 243 07/03/18 10:45 AM

## Conversion - Units of Mass

### Teaching Point 1:

*How can you convert units of mass?*

1 200 grams = ___ kilograms.

**Divide to convert smaller units to larger units.**

1 200 g ÷ 1 000 = 1.2 kg

---

2.5 kg = ___ grams.

**Multiply to convert larger units to smaller units.**

2.5 kg × 1 000 = 2 500 g

### Activity 1:

**Complete the table to show equivalent measures.**

| | kilograms | grams |
|---|---|---|
| 1. | 2 | 2 000 |
| 2. | 7 | |
| 3. | | 6 000 |
| 4. | | 24 000 |
| 5. | 3.1 | |
| 6. | | 720 |
| 7. | 0.39 | |
| 8. | 1.55 | |
| 9. | 0.63 | |
| 10. | | 1 250 |
| 11. | | 2 060 |
| 12. | | 1 600 |

### Activity 2:

**Solve.**

1. Complete the statement.
   3.8 kg = ____ grams
2. Convert 6 500 grams to kilograms.
3. Complete the statement.
   3 200 grams = ____ kilograms.
4. Express 6.45 kilograms in grams.
5. A crate has 10 000 grams of chicken. How many kilograms of chicken are in the crate?
6. A bag of potatoes has a mass of 7 990 grams. What is the mass of the potatoes in kilograms?



7. Mark's baby brother weighed 1.9 kilograms at birth. What was the baby's weight in grams?

### Teaching Point 2:

*How can you use sub units to solve problems?*

How many $\frac{1}{4}$ kg packs can you fill from a 2 500 gram bag of nuts?

$\frac{1}{4}$ kg = 250 g → 1 pack of nuts

2 500 g ÷ 250 g = 10

So, you can fill 10 packs of nuts.



Chapter 19 Understand the Metric System.indd 244 07/03/18 10:45 AM

## Activity 3:

**Solve.**

1. The mass of a bag of sugar is $1\frac{3}{4}$ kilograms. What is its weight in grams?

2. A packet has $2\frac{1}{2}$ kilograms of flour. Mother uses 500 grams of flour to make two cakes. How many cakes can she make from the packet of flour?

3. A vendor has a fish that weighs 2 kilograms. He sold $\frac{3}{4}$ kilogram of fish and gave his friend $\frac{1}{2}$ kilogram of the fish. How many grams of fish has he remaining?

4. Two pieces of meat are shown below. Which piece of meat has the greater mass?

| chicken | beef |
|---|---|
|  |  |
| $\frac{1}{4}$ kilogram | 275 grams |

5. Leon has a bag of raisins that has a mass of 4.7 kilograms. He wants to make 250 gram packets of raisin for sale.

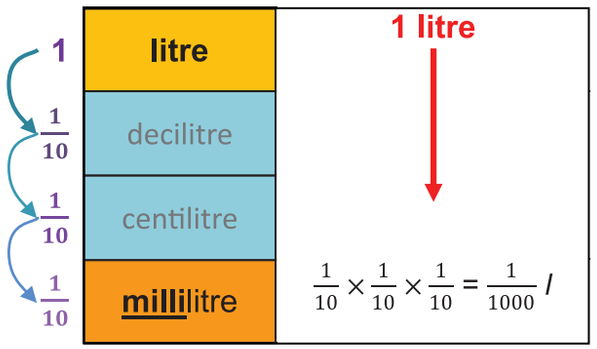
   a) How many packets of raisins can he get from the bag?

   b) How many more grams of raisins does he need to fill another packet?

# Metric Units of Capacity

## Teaching Point 1:

*What is the relationship between metric units of capacity?*




1 000 millilitres (ml) = 1 litre (l)

1 millilitre (ml) = $\frac{1}{1000}$ litre (l)

## Teaching Point 2:

*How can you relate standard units with their sub parts?*




1 litre (l) = 1 000 millilitres (ml)

$\frac{1}{4}$ litre (l) = 250 millilitres (ml)

$\frac{1}{2}$ litre (l) = 500 millilitres (ml)

$\frac{3}{4}$ litre (l) = 750 millilitres (ml)



Chapter 19 Understand the Metric System.indd 245 07/03/18 10:45 AM

## Conversion – Units of Capacity

### Teaching Point 1:

*How can you convert metric units of capacity?*

Express 4.56 litres in millilitres.

**Multiply to convert larger units to smaller units.**

4.56 L × 1 000 = 4 560 ml

---

Convert 19 400 millilitres to litres.

**Divide to convert smaller units to larger units.**

19 400 ml ÷ 1 000 = 19.4 *L*

---

### Activity 1:

**Complete the table to show equivalent measures.**

| litres | millilitres |
|---|---|
| 1. 4 | 4 000 |
| 2. 5 | |
| 3. | 8 000 |
| 4. | 6 700 |
| 5. 3.2 | |
| 6. | 1 900 |
| 7. 4.57 | |
| 8. | 600 |
| 9. | 1 200 |
| 10. 0.45 | |

### Activity 2:

**Solve.**

1. Express 12.57 litres in litres and millilitres.
2. Convert 12 000 millilitres to litres.
3. A glass contains 240 ml of water. Express the amount of water in the glass as litres.



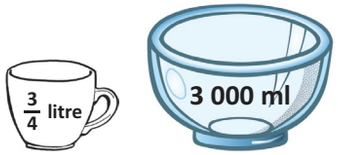
4. A bottle of shampoo contains 750 millilitres. Express the amount of shampoo in litres.
5. A bottle has 0.05 litres of medicine. If one dose is 1 millilitre, how many doses does the bottle have?

---

### Teaching Point 2:

*How can you use sub units to solve problems?*

How many cups will it take to fill the bowl?




3 000 ml = 3 L

$3 \div \frac{3}{4} \rightarrow \frac{3 \div 3}{1} \times \frac{4}{3 \div 3} = 4$

So, it will take 4 cups to fill the bowl.



Chapter 19 Understand the Metric System.indd 246 07/03/18 10:45 AM

## Activity 3:

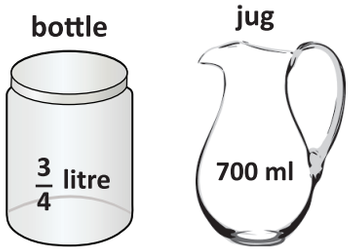
**Solve.**

1. A jug holds $1\frac{3}{4}$ litres of juice. How many 250 ml glasses of juice can be filled from the jug?

2. A carton contains 750 ml of milk. Ravi drank $\frac{1}{4}$ litre of milk with his cereal. How many millilitres of milk is left?

3. 40 children each drank 250 millilitres (ml) of water from a water cooler. How many litres of water did they drink altogether?

4. Two containers are shown below. Which container holds less?




5. A man drinks 8 bottles of water each day. Each bottle contains $\frac{1}{4}$ litre of water. How many litres of water does he drink in one week?

## Chapter Review

**Answer all questions.**

1. 1 000 grams = 1 kilogram Convert 6 300 grams to kilograms.

2. Complete this statement.
   2 400 metres = _____ kilometres.

3. Convert 250 centimetres to metres.

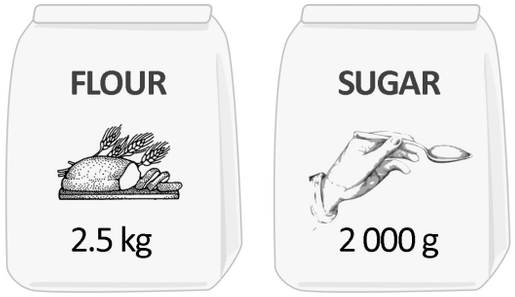
4. Complete the statement below.
   $\frac{1}{8}$ litre = ____ millilitres

5. $2\frac{1}{4}$ kilometres = ____ metres.

6. How many $\frac{1}{4}$ litre glasses of juice can be filled from a jug holding 4 litres?

7. A bag of sugar weighing 5 000 grams is divided into $\frac{1}{2}$ kilogram packets. How many packets were made from the bag of sugar?

8. Two bags are shown below. Which bag has the greater mass?




9. Mark runs $\frac{3}{4}$ km around the savannah to warm up before playing football. What is the distance in metres?

10. A bottle contained 750 ml of water. Mother used $\frac{1}{2}$ litre of the water to make juice. How much water was left in the bottle?



Chapter 19 Understand the Metric System.indd 247 07/03/18 10:45 AM

CHAPTER

20

# Measure Length

**Chapter Outcomes:**

- Demonstrate an understanding of the relationship between standard units and their sub-parts to solve practical problems involving linear measure.
- Demonstrate appropriate techniques when measuring.
- Solve problems involving linear measure.



Measuring, calculating, comparing and estimating lengths are practical activities that are used in everyday life during experiences, such as building, constructing, designing, and gardening. The ability to use and estimate with rulers and measuring tapes are necessary skills that enable us to quantify the world around us. These tools can tell us how tall we are, how long an object is or how far it is from here to there.

## Getting Ready for Chapter 20

**Tick the most appropriate unit for measuring each of the following.**





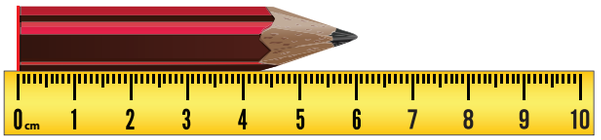
**1.** The length of a pencil

- ☐ centimetre
- ☐ metre
- ☐ kilometre

**2.** The mass of the banana

- ☐ grams
- ☐ kilograms

**3.** What is the length of the pencil below?




**4.**

| m | cm |
|---|---|
| 5 | 65 |
| + 6 | 82 |
| | |

**5.**

| m | cm |
|---|---|
| 6 | 23 |
| − 3 | 41 |
| | |

**Solve.**

**6.** Complete the statement.
2.5 kilometres (km) = ____ metres (m)

**7.** A man runs 7 kilometres every day. How far would he run in a week?

**8.** How many 10 cm pieces of ribbon can be cut from roll of ribbon 5 m long?

## The Millimetre

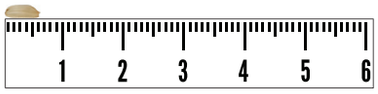
### Teaching Point 1:

*Why do we need millimetres?*

What standard unit can we use to measure a grain of rice?



It is less than 1 cm.




It is actually **6 millimetres** (**mm**) in length.

Each of these strokes represents **1 millimetre**







1 millimetre (mm) is about the thickness of a 10¢ coin.

You need a **smaller unit** than centimetres to measure the length of small objects.

**10 millimetres = 1 centimetre**

**1 millimetre = $\frac{1}{10}$ centimetre**

**1 millimetre = 0.1 centimetre**

### Activity 1:

**Express the following in millimetres.**

| | | |
|---|---|---|
| **1.** 3 cm | **2.** 1 cm | **3.** 7 cm |
| **4.** 11 cm | **5.** 15 cm | **6.** 20 cm |



Chapter 20 Measure Length.indd 249 07/03/18 10:48 AM

| | | |
|---|---|---|
| **7.** $\frac{1}{2}$ cm | **8.** $\frac{2}{10}$ cm | **9.** $\frac{4}{10}$ cm |
| **10.** 0.5 cm | **11.** 0.9 cm | **12.** 0.4 cm |
| **13.** 2.7 cm | **14.** 8.3 cm | **15.** 12.6 cm |
| **16.** 3 cm 9 mm | **17.** 15 cm 8 mm | |
| **18.** 5 cm 7 mm | **19.** 8 cm 6 mm | |

### Activity 2:

**Express the following in centimetres.**

| | | |
|---|---|---|
| **1.** 40 mm | **2.** 70 mm | **3.** 90 mm |
| **4.** 250 mm | **5.** 300 mm | **6.** 560 mm |
| **7.** 130 mm | **8.** 760 mm | **9.** 980 mm |
| **10.** 45 mm | **11.** 26 mm | **12.** 105 mm |
| **13.** 69 mm | **14.** 135 mm | **15.** 16 mm |

**Solve.**

**16.** Renaldo's pencil is 156 millimetres long. What is the length of his pencil in centimetres?

## Estimate, Measure and Record Lengths

### Teaching Point 1:

*How do you estimate, measure and record length?*

What is the length of the pencil?

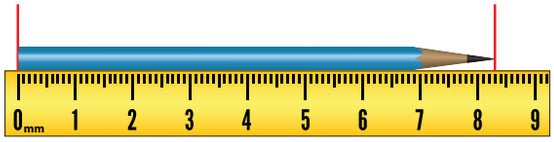


**Step 1: Estimate**

The best unit to measure the pencil would be centimetres. The pencil can be about 6 centimetres in length.

**Step 2: Measure**

Line up the left edge of the object with the **zero mark** on the ruler.




The pencil is **exactly 8 cm 3 mm** long or **83 mm** long.

**Step 3: Measure to the nearest centimetre**

Find the centimetre mark closest to the right edge of the object.

The pencil is more than **8 cm** and less than **9 mm**. It is nearer to **8 cm** than to **9 cm**.

So the pencil is **approximately 8 cm** long.

**Step 4: Record the measurement**

The pencil is **8 cm 3 mm** long

The pencil is **8$\frac{3}{10}$** or **8.3 cm** long

The pencil is **83 mm** long

The pencil is **approximately 8 cm** long.

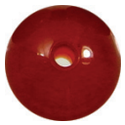
### Activity 1:

**Estimate. Then measure and record the length of the following objects using millimetres.**

| | |
|---|---|
| **1.** thumb tack  | **2.** 10¢ coin   |



Chapter 20 Measure Length.indd 250 07/03/18 10:48 AM

| | |
|---|---|
| **3.** raisin  | **4.** eraser  |
| **5.** pea  | **6.** paper clip  |
| **7.** shirt button  | **8.** seashell  |
| **9.** bead  | **10.** finger nail  |
| **11.** almond  | **12.** sharpener  |
| **13.** pumpkin seed  | **14.** small screw  |

## Activity 2:

**Use your centimetre ruler and draw lines in your book with the following lengths.**

| | | |
|---|---|---|
| **1.** 12 mm | **2.** 23 mm | **3.** 17 mm |
| **4.** 54 mm | **5.** 98 mm | **6.** 42 mm |
| **7.** 50 mm | **8.** 30 mm | **9.** 80 mm |
| **10.** 102 mm | **11.** 110 mm | **12.** 79 mm |

## Activity 3:

**Estimate. Then measure and record the lengths of the following lines to the nearest centimetre.**

**1.** _____

**2.** _____

**3.** _____

**4.** _____

**5.**

**6.**

**7.**

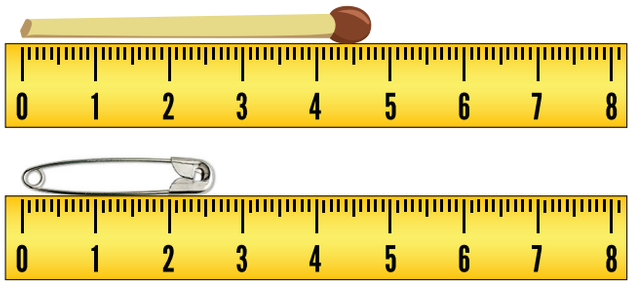
**8.** _____

**9.**

**10.** _____

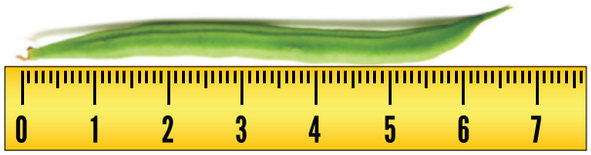
## Activity 4:

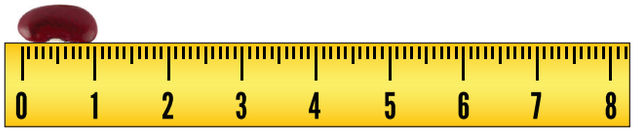
**Use the measurement for the objects below to complete items 1 to 7.**

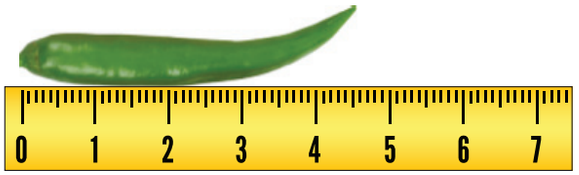





Chapter 20 Measure Length.indd 251 07/03/18 10:48 AM




1. Record the length of each object using millimetres.
2. Write the length of each object using centimetres and millimetres.
3. Write the length of each object using centimetres only.
4. What is the length of each object to the nearest centimetre?
5. Order the objects from shortest to longest.
6. Calculate the total length of all the objects?
7. Which two objects have a total length of approximately 6 centimetres?

## Activity 5:

**Use your centimetre ruler and draw lines in your book with the following lengths.**

| | | |
|---|---|---|
| 1. 3 cm | 2. 5 cm | 3. 8 cm |
| 4. 6.5 cm | 5. 4.9 cm | 6. 12.7 cm |
| 7. 9.3 cm | 8. 8.2 cm | 9. 1.6 cm |
| 10. 11 cm | 11. 10.1 cm | 12. 9.5 cm |
| 13. 7 cm 8 mm | 14. 5 cm 9 mm | |

## Activity 6:

**Use a metre or centimetre ruler to measure the following lengths and record the measurements in your book.**

1. The length of your arm from shoulder to finger
2. The length of your index finger
3. Your height
4. The length of your foot
5. The length of your big toe

## Teaching Point 2:

*How do measure from any mark on the ruler?*

You can line up the left edge of the object at any mark on the ruler. Then count on or subtract to find the length.




The pencil above is lined up 3.

**Step 1: Find the beginning and end mark.**

3 is the beginning mark.

11 cm 3 mm or 11.3 cm is the end mark.

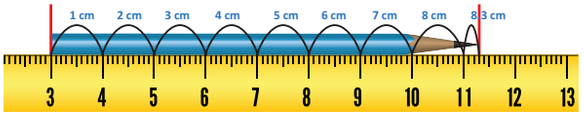
**Step 2: Count on or subtract.**



Chapter 20 Measure Length.indd 252 07/03/18 10:48 AM

### Method 1:

Count on from 3 cm → 3 + 8.3 = 11.3 cm




### Method 2:

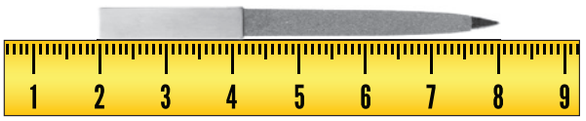
Subtract the beginning mark (3 cm) from the ending mark (11.3 cm).

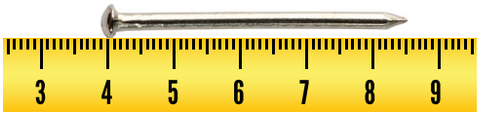
11.3 cm – 3 cm = 8.3 cm

The pencil is 8.3 cm long.

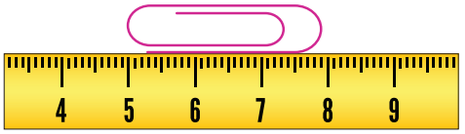
## Activity 7:

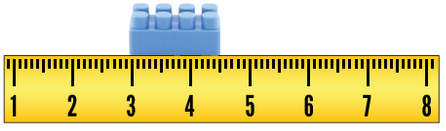
**Write the length of each of the following objects in centimetres.**

1. 


2. 


3. 


4. 


5. 


6. 


7. 


## Teaching Point 3:

*How can you measure objects that are longer than 1 metre?*

1. Line up the edge of the object with the **zero mark** on the metre ruler.
2. Make a mark at 100cm.
3. Move the ruler and place the zero mark at the 100cm mark.
4. Repeat until the length is measured.
5. Record the number of metres, centimetres and millimetres.

## Activity 8:

**Measure the following lengths or distances. Record the lengths using a combination of metres, centimetres and millimetres.**

1. The length of the chalk board
2. The height of the cupboard
3. The length of your classroom
4. The height of a door
5. The width of a window
6. The length of the school gate



Chapter 20 Measure Length.indd 253 07/03/18 10:48 AM

7. The distance from your class to another class

8. The distance from your class to the principal's office

## Use the Appropriate Unit

### Teaching Point 1:

*How can you select the most appropriate unit and tools to measure length?*




1 millimetre (mm) is about the thickness of a 10¢ coin.




1 centimetre (cm) is about the tip of a finger.



1 metre (m) is about the height of a 4 year old child.



1 kilometre (km) is $2\frac{1}{2}$ times the distance around the stadium race track.

### Activity 1:

**What is the most appropriate unit to measure each.**

| | |
|---|---|
| 1. height of a door | 2. length of your arm |
| 3. width of a room | 4. length of a crayon |
| 5. width of a paperclip | 6. distance between two classrooms |
| 7. distance travelled by plane | 8. width of a watermelon seed |
| 9. height of a school | 10. length of a window |
| 11. distance from home to school | 12. distance from the class to the schoolyard |

## Compare Lengths

### Teaching Point 3:

*How can you compare lengths?*

Compare 7.5 km and 7 000 m. Which is longer?

**Step 1: Convert the measurements to similar units.**

7 000 m = 7 km

**Step 2: Then compare.**

7.5 km > 7 km

So, 7.5 km is longer.



Chapter 20 Measure Length.indd 254 07/03/18 10:48 AM

### Activity 1:

**Compare the lengths. Write >, < or = for each.**

1. 6.4 cm ☐ 40 mm
2. 400 cm ☐ 4 m
3. 5 360 m ☐ 5.6 km
4. 1 200 mm ☐ 12 m
5. 5 800 cm ☐ 250 m
6. 8 m ☐ 8 000 mm
7. $\frac{3}{4}$ m ☐ 354 cm
8. $\frac{3}{4}$ km ☐ 750 m
9. 150 m ☐ $\frac{1}{4}$ km
10. $\frac{1}{2}$ cm ☐ 3 mm
11. 50 cm ☐ $\frac{1}{2}$ m
12. 3 km ☐ 5 000 m
13. 38.5 cm ☐ 385 mm
14. 1 m ☐ 900 mm

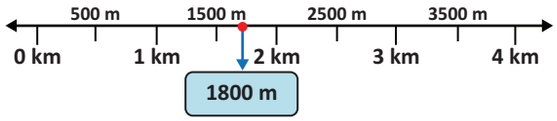
## Approximate Distances and Lengths

### Teaching Point 3:

*How can you approximate lengths and distances?*

Approximate 1 800 metres to the nearest kilometre.

**Method 1: Use a number line.**




**Method 2: Use a rule.**

1 000 m = 1 km

1 800 **rounded to thousands** → 2 000

or

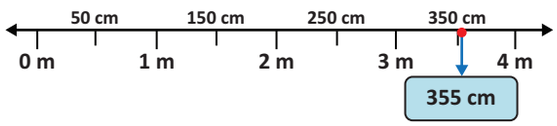
1 800 m = 1.8 km

1.8 **rounded to the nearest whole number** → 2.

So, 1 800 metres is approximately equal to 2 kilometres.

Approximate 355 centimetre to the nearest metre.

**Method 1: Use a number line.**






Chapter 20 Measure Length.indd 255 07/03/18 10:48 AM

**Method 2: Use a rule.**

100 cm = 1 m

355 **rounded to hundreds** → 400

or

355 cm = 3.55 m

3.55 **rounded to the nearest whole number** → 4.

So, 355 centimetres is approximately equal to 4 metres.

### Activity 1:

**Approximate each length or distance to the nearest metre.**

| | | | | | |
|---|---|---|---|---|---|
| **1.** | 367 cm | **2.** | 407 cm | **3.** | 56 cm |
| **4.** | 98 cm | **5.** | 123 cm | **6.** | 530 cm |
| **7.** | 563 cm | **8.** | 987 cm | **9.** | 1 300 cm |
| **10.** | 4.2 m | **11.** | 1.56 m | **12.** | 3.06 m |
| **13.** | 1 600 mm | **14.** | 2 423 mm | | |

### Activity 2:

**Approximate each length or distance to the nearest kilometre.**

| | | | | | |
|---|---|---|---|---|---|
| **1.** | 607 m | **2.** | 1 307 m | **3.** | 2 540 m |
| **4.** | 3 009 m | **5.** | 5 801 m | **6.** | 2 476 m |
| **7.** | 5 198 m | **8.** | 2 671 m | **9.** | 1 900 m |
| **10.** | 2.35 km | **11.** | 1.76 km | **12.** | 3.6 km |
| **13.** | 5.18 km | **14.** | 8.07 km | **15.** | 2.42 km |

## Calculation in Metres

### Teaching Point 1:

*How can you calculate in metres and centimetres?*

| m | cm |
|---|---|
| 1 | |
| 3 | 59 |
| + 6 | 88 |
| 10 | 47 |

59 cm + 88 cm = 147 cm
147 cm ÷ 100 = 1.47 m
1 m 47 cm
3 m + 6 m + 1 m = 10 m

| km | m | cm |
|---|---|---|
| 1 | 1 | |
| 2 | 125 | 63 |
| + 4 | 894 | 57 |
| 7 | 20 | 20 |

63 cm + 57 cm = 120 cm
120 cm ÷ 100 = 1.2 m
1.2 m → 1 m 20 cm
125 m + 894 m + 1 m = 1 020 m
1 020 m ÷ 1 000 = 1.02 km
1.02 km → 1 km 20 m
2 km + 4 km + 1 km = 7 km

| m | cm |
|---|---|
| 5 | 124 |
| ~~6~~ | 24 |
| − 2 | 74 |
| 3 | 50 |

24 cm is less than 74 cm
Regroup 1 m to 100 cm
124 cm − 74 cm = 50 cm
5 m − 2 m = 3 m

| cm | mm |
|---|---|
| 3 | 18 |
| ~~4~~ | 8 |
| − 2 | 9 |
| 1 | 9 |

8 mm is less than 9 mm
Regroup 1 cm to 10 mm
10 mm + 8 mm = 18 mm
18 mm - 9 mm = 9 mm

3 cm − 2 cm = 1 cm

| m | cm |
|---|---|
| 1 | |
| 2 | 19 |
| × | 8 |
| 17 | 52 |

19 cm × 8 = 152 cm
152 cm ÷ 100 = 1.52 m
1 m 52 cm

2 m × 8 = 16 m
16 m + 1 m = 17 m



Chapter 20 Measure Length.indd 256 07/03/18 10:48 AM

| km | m |
|---|---|
| 1 | |
| 5 | 165 |
| × | 12 |
| 61 | 980 |

125 m × 12 = 1 980 m
1 980 m ÷ 1 000 = 1.98 km
1.98 km → 1 km 980 m
5 km × 12 = 60 km
60 km + 1 km = 61 km

| m | cm |
|---|---|
| | **310** |
| 5) 8 | 10 |
| 1 | 62 |

8 m ÷ 5 = 1 remainder 3 m
3 m × 100 = 300 cm
300 cm + 10 cm = 310 cm
310 cm ÷ 5 = 62

| km | m |
|---|---|
| | **3 012** |
| 6) 9 | 12 |
| 1 | 502 |

9 km ÷ 6 = 1 remainder 3 km
3 km × 1 000 = 3 000 m
3 000 m + 12 m = 3 012 m
3 012 m ÷ 6 = 502

## Activity 1:

**Calculate the following.**

**1.** 3 mm + 5 mm =

**2.** 5 km + 8 km =

**3.** 14 m + 25 m =

**4.** 37 cm + 15 cm =

**5.**

| m | cm |
|---|---|
| 5 | 25 |
| + 5 | 35 |

**6.**

| m | cm |
|---|---|
| 10 | 19 |
| + 2 | 5 |

**7.**

| km | m |
|---|---|
| 3 | 873 |
| + 6 | 479 |

**8.**

| cm | mm |
|---|---|
| 27 | 6 |
| + 21 | 7 |

**9.**

| km | m |
|---|---|
| 8 | 601 |
| + 2 | 969 |

**10.**

| cm | mm |
|---|---|
| 2 | 8 |
| + 2 | 9 |

**11.** 7 m 32 cm + 3 m 76 cm =

**12.** 1 km 972 m + 3 km 658 m + 6 m =

**13.** 24.8 cm + 12.5 cm =

**14.** 11.9 m + 15.8 m + 9.4 m =

**15.** 21.1 m + 14.8 m + 32.7 m =

## Activity 2:

**Calculate the following.**

**1.** 9 mm – 4 mm =

**2.** 6 km – 1 km =

**3.** 70 m – 28 m =

**4.** 82 cm – 37 cm =

**5.**

| m | cm |
|---|---|
| 4 | 48 |
| – 2 | 25 |

**6.**

| m | cm |
|---|---|
| 12 | 63 |
| – 10 | 12 |

**7.**

| cm | mm |
|---|---|
| 40 | 1 |
| – 26 | 6 |

**8.**

| km | m |
|---|---|
| 4 | 200 |
| – 1 | 382 |

**9.**

| km | m |
|---|---|
| 11 | 308 |
| – 9 | 561 |

**10.**

| m | cm |
|---|---|
| 2 | 20 |
| – | 39 |

**11.** 19 m 27 cm – 14 m 48 cm =

**12.** 6 km 32 m – 4 km 720 m =

**13.** 7 m 50 cm – 5 m 98 cm =

**14.** 21.1 km – 14.8 km =



Chapter 20 Measure Length.indd 257 07/03/18 10:48 AM

15. 37.3 cm – 23.9 cm =

16. 40.5 m – 24.6 m =

## Activity 3:

**Calculate the following.**

1. 19 m × 2 =

2. 15 cm × 6 =

3.
| m | cm |
|---|---|
| 6 | 8 |
| × | 5 |

4.
| km | m |
|---|---|
| 1 | 450 |
| × | 10 |

5.
| m | cm |
|---|---|
| 4 | 80 |
| × | 9 |

6.
| km | m |
|---|---|
| 3 | 326 |
| × | 8 |

7.
| cm | mm |
|---|---|
| 6 | 9 |
| × | 15 |

8.
| m | cm |
|---|---|
| 2 | 24 |
| × | 12 |

9. 2 m 62 cm × 5 =

10. 5 m 51 cm × 9 =

11. 1 km 5 m × 24 =

12. 6 km 20 m × 7 =

13. 4 m × 3.4 =

14. 5.3 cm × 1.7 =

## Activity 4:

**Calculate the following.**

1. 24 mm ÷ 6 =

2. 15 cm ÷ 3 =

3. 68 m ÷ 4 =

4. 16 km ÷ 8 =

5.
| cm | mm |
|---|---|
| 5) 6 | 5 |

6.
| km | m |
|---|---|
| 8) 12 | 8 |

7.
| m | cm |
|---|---|
| 12) 6 | 60 |

8.
| m | mm |
|---|---|
| 6) 1 | 86 |

9. 4 m 52 cm ÷ 4 =

10. 3 km 60 m ÷ 6 =

11. 29 cm 7 mm ÷ 9 =

12. 21 m 15 cm ÷ 15 =

## Solve Problems in Measurement

1. Kevin cycled 10 kilometres on Monday. He cycled twice as many kilometres on Tuesday. How many kilometres did he cycle in total on both days?

2. Maria walked 4 kilometres on Friday. On Saturday she walked 900 metres. On Sunday she walked 3.6 kilometres. How many kilometres did she walk in total?

3. A week ago Terry-Ann bought the pencil shown below. Now the pencil measures 12.5 centimetres. How many millimetres of the pencil has been used?






Chapter 20 Measure Length.indd 258 07/03/18 10:48 AM

4. A ribbon is 4.36 metres long. Another ribbon is 3.14 metres shorter than it. What is the total length of both ribbons?

5. Lianna lives 3.56 kilometres away from the school. Keon lives 2 500 metres away from the school. Jervon lives $3\frac{1}{2}$ kilometres away from the school. Which child lives nearest to the school?

6. A piece of wood is 1.26 metres long. A carpenter used 0.9 metre of it. Then he cuts the remaining piece into two pieces of equal lengths. What is length of each piece?

7. Trees are planted along a road that is 2 kilometres 50 metres long. Eleven trees are planted at an equal distance apart along the road. What is the distance in metres between each tree?

8. An electrician has a length of pipe 268 centimetres long. He cuts the pipe into 4 equal pieces.

   (a) What is the length of each piece of pipe in metres?

   (b) Round your answer to the nearest tenth of a metre.

9. Every day Michael runs 4 laps of $1\frac{1}{2}$ kilometres each.



   (a) What is the total distance that Michael runs each day?

   (b) If he continues this routine, how many days will it take for him to run a total of 36 kilometres?

10. A string of Christmas lights is 12 metres long. The first light from the plug is 30 centimetres from the plug. If the lights are placed 10 centimetres apart, how many lights are on the string?

11. In a triathlon, an athlete swam 400 metres, cycled 10 kilometres and ran 2.5 kilometres. How many kilometres did the athlete cover altogether?

12. A roll of crepe paper that is 3.3 metres long is cut into smaller pieces. Each piece is 22 centimetres long. How much money will a shopkeeper receive if he sells each piece at $2.50?

13. A seamstress made 12 sheet sets for sale as shown below.



For each sheet set she used 2.5 metres of fabric to make a sheet and 0. 5 metres to make two pillowcases.

   (a) How much fabric did she use to make one sheet set?

   (b) The fabric cost $25.00 per metre. If the seamstress sold each sheet set for $100, how much profit did she make?

## Chapter Review

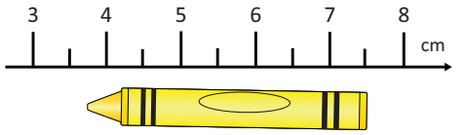
**Answer the questions.**

1. Convert 2.5 centimetres to millimetres.

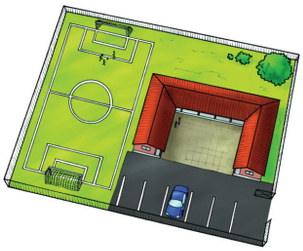
2. What is the length of the crayon to the nearest centimetre?



Chapter 20 Measure Length.indd 259 07/03/18 10:48 AM




**3.** The picture below shows a diagram of a school compound.



Tick the most appropriate metric unit for measuring the distance from the car to the football field.

- ☐ millimetre
- ☐ metre
- ☐ centimetre
- ☐ kilometre

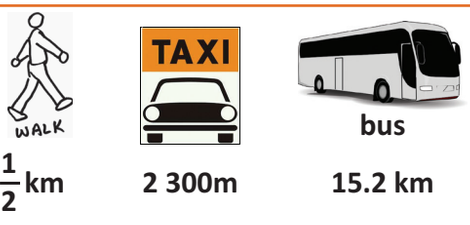
**4.**

| km | m |
|---|---|
| 17 | 462 |
| + 9 | 709 |
| | |

**5.**

| m | cm |
|---|---|
| 15 | 56 |
| – 9 | 79 |
| | |

**6.** On a trip to the city Keon travelled the following distances.



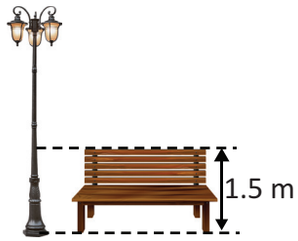

What is the total distance Keon travelled in kilometres?

**7.** Draw a line that is 5.4 cm long. What is the length of the line in millimetres?

**8.** Write the following lengths in ASCENDING order shortest first:

4.25 km  4 050 m  $4\frac{1}{2}$ km

**9.** The diagram below shows a bench next to an lamp post.




The height of the bench is 1.5 m. Estimate the height of the lamp post.

**10.** The distance between Jenny's home and the school is 2 604 metres. What is the distance to the nearest kilometre?

**11.** A roll of ribbon is cut into 30 pieces, each piece $\frac{3}{4}$ metres long. What was the total length of the ribbon on the roll?

**12.** Eight children stand in a line. If they stand 3 metres apart, what is the distance between the first child and the last child?

**13.** Lisa and Leanna participated in the long jump at a track and field event. Lisa's jump was 1 metre. Leanna's jump was 132 centimetres.

**(a)** Who had the longer jump?

**(b)** How much longer?

**14.** Miss Russell needs 42 centimetres of ribbon to make 3 bows. She has a piece of ribbon that is $2\frac{1}{4}$ metres long.



**(a)** How many bows will she be able to make?

**(b)** How much ribbon will she have left after making the bows?



Chapter 20 Measure Length.indd 260 07/03/18 10:48 AM

CHAPTER

21

# Perimeter

**Vocabulary:**

perimeter
breadth
formula

**Chapter Outcomes:**

- Solve problems involving linear measure.
- Develop and use proficiently the formulae to calculate perimeter of squares and rectangles in problem solving.



An artist paints a scenery using beautiful colours. He wants to display his artwork in the best possible way so that others can enjoy it. What is the length of the wooden strip he would need to frame the painting? He finds out by measuring the perimeter of the painting? Perimeter is used for many things in everyday life. Finding the perimeter is important in construction, interior designing and art to name a few.

## Getting Ready for Chapter 21

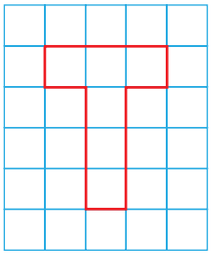
**Choose a word from the list below to fill each space in the sentences.**

| | |
|---|---|
| perimeter | square |
| rectangle | area |

1. A _____ has two pairs of opposite sides that are equal in length.
2. _____ is the distance around a figure.
3. A _____ has four sides that are equal in length.

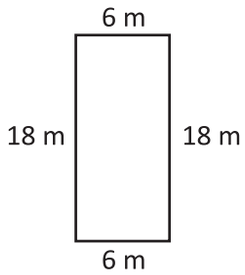
**Find the perimeter of the figure in the grid below. Each unit represents 1 centimetre.**

4.



**Calculate the perimeter of the figure below.**

5.



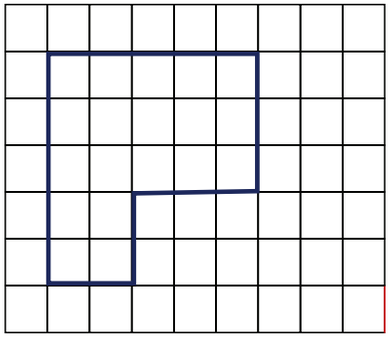

## Model Perimeter

### Teaching Point 1:

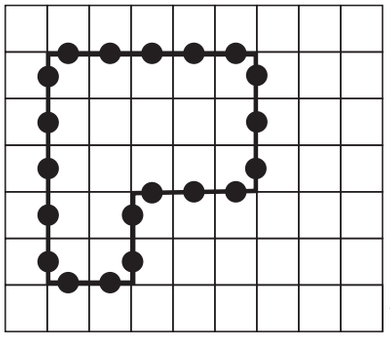
*How can you find the perimeter?*

**Perimeter** is the distance around a shape.

Find the perimeter of the shape.




1. Choose a unit, begin counting and label it. Mark off each unit as you count.




2. Count each unit around the shape to find the perimeter.

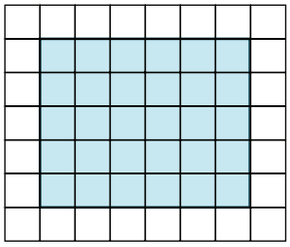
So, the perimeter is 20 units.

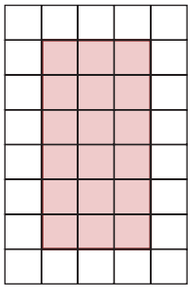


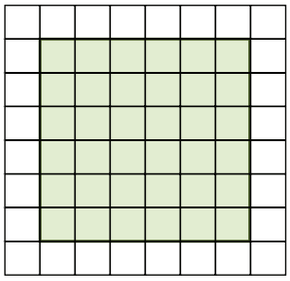
Chapter 21 Perimeter.indd 262 08/03/18 12:41 PM

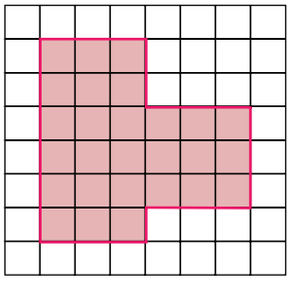
## Activity 1:

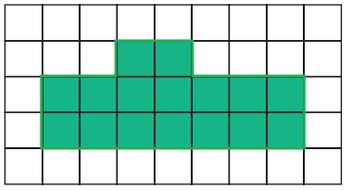
**Find the perimeter of each shape. Each unit is 1 centimetre.**

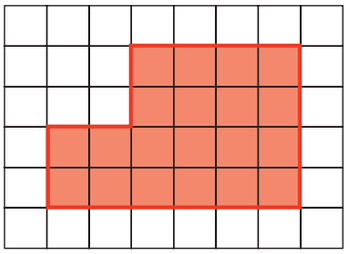
1. 

2. 

3. 

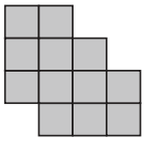
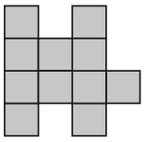
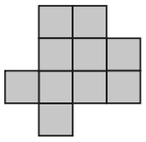
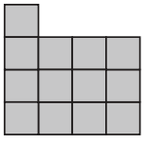
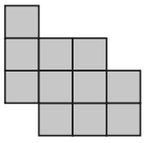
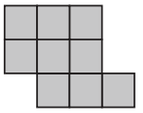
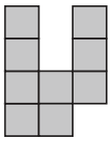
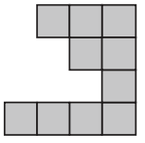
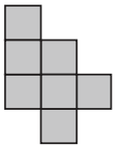
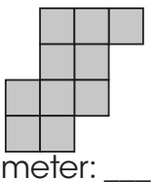
4. 

5. 

6. 

## Activity 2:

**Calculate the perimeter of each shape.**

| | |
|---|---|
| 1.  Perimeter: ___ units | 2.  Perimeter: ___ units |
| 3.  Perimeter: ___ units | 4.  Perimeter: ___ units |
| 5.  Perimeter: ___ units | 6.  Perimeter: ___ units |
| 7.  Perimeter: ___ units | 8.  Perimeter: ___ units |
| 9.  Perimeter: ___ units | 10.  Perimeter: ___ units |



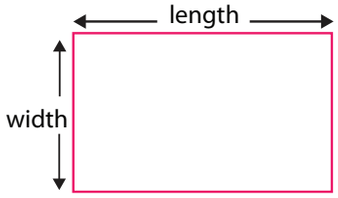
Chapter 21 Perimeter.indd 263 08/03/18 12:41 PM

# Measure and Calculate Perimeter

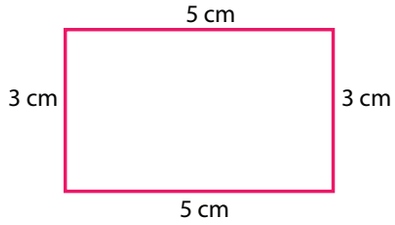
## Teaching Point 1:

*How can you measure the perimeter?*

Find the perimeter of the shape.




1. Use a ruler to measure the length and width of the shape.




2. Add the lengths of all sides.
   5 cm + 3 cm + 5 cm + 3 cm = 16 cm

So, the perimeter of the shape is 16 cm.

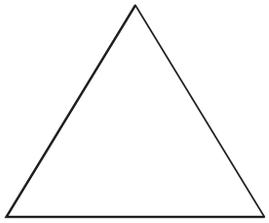
## Activity 1:

**Use a ruler to find the perimeter of each shape.**

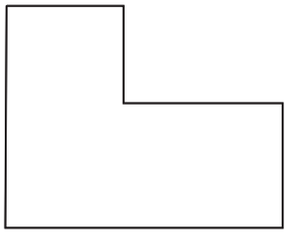
1.

2.

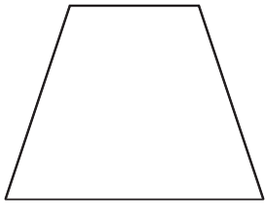
3.



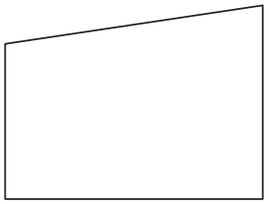
4.



5.



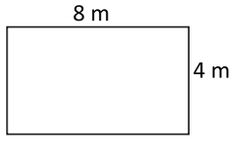
6.



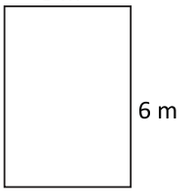
## Activity 2:

**Find the perimeter of each rectangle.**

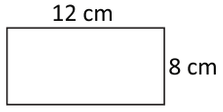
1.



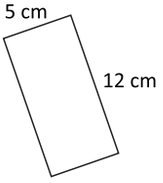

2.




3.




4.

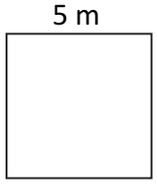




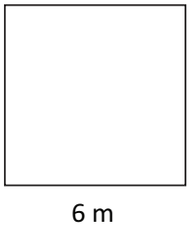

Chapter 21 Perimeter.indd 264 08/03/18 12:41 PM

**Find the perimeter of each square.**

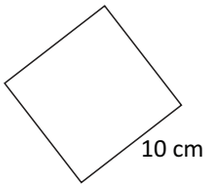
**5.**



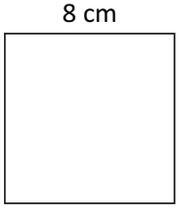

**6.**



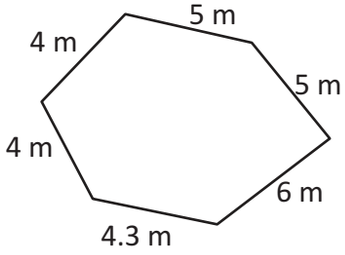

**7.**




**8.**




**9.** Manny wants to put a fence around his garden below. What is the length of fence that he needs?

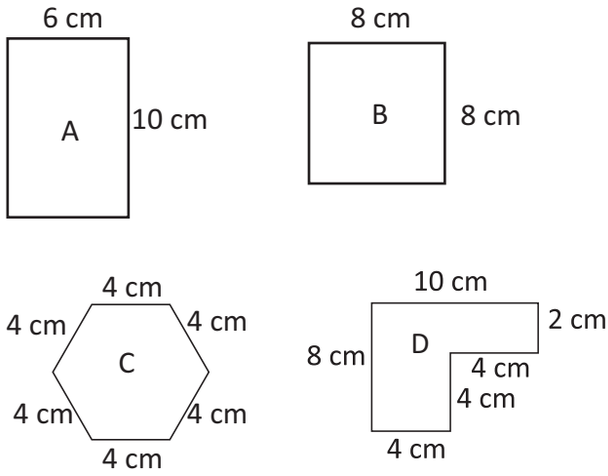



**10.** The width of a rug is 1.5 metres. Its length is twice its width. What is the perimeter of the rug?




**11.** The length of a rectangular playground is 150 metres. Its length is three times its width. Mark jogs around the playground once. How far did he jog?

**12.** Which of the figures below have the same perimeter?

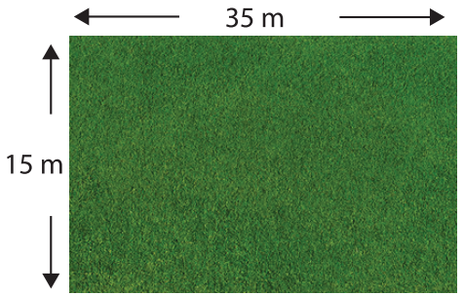



## Use a Formula to Find the Perimeter

### Teaching Point 1:

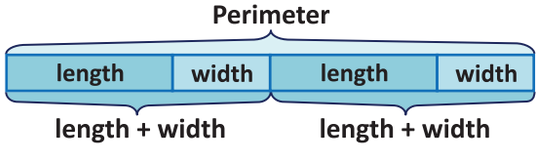
*How can you use a formula to find the perimeter of rectangles?*

What is the perimeter of the field below?




**Formula for Perimeter of a rectangle:**

Perimeter = length + width + length + width






Chapter 21 Perimeter.indd 265 08/03/18 12:41 PM

The length + width is added **two** times to find the perimeter of a rectangle.

So, length + width is equal to $\frac{1}{2}$ of the perimeter.

***Perimeter = (L + W) x 2***

***(L + W) x 2*** = (35 m + 15 m) x 2
= 50 m x 2
= 100 m

So, the perimeter of the field is 100 m.

The **perimeter** (***P***) of a **rectangle** is the sum of the lengths and the widths. It is also two times the length (***l***) plus two times the width (***w***).

## Teaching Point 2:

*How can you use a formula to find the perimeter of squares?*

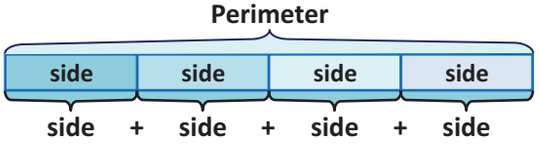
What is the perimeter of the square?

0.66 km



**Formula for Perimeter of a square:**

Perimeter = side + side + side + side




The side is added **four** times to find the perimeter of a square.

So, one side is equal to $\frac{1}{4}$ of the perimeter

**Perimeter = s x 4**

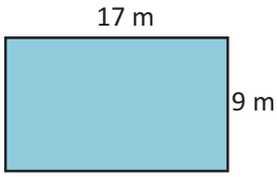
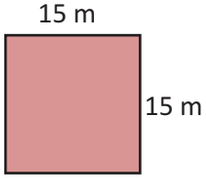
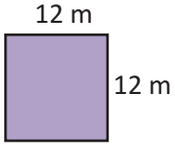
**s x 4** = 0.66 x 4
= 2.64 km

So, the perimeter the square is 2.64 km.

The **perimeter** (***P***) of a **square** is 4 times the measure of any of its sides (***s***).

## Activity 1:

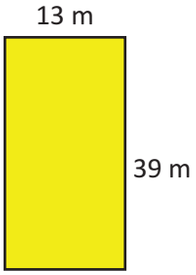
**Use the formula to calculate the perimeter of the squares and rectangles.**

| | | |
|---|---|---|
| 1. |   | Length = 22 m<br>Width = 12 m<br>Perimeter = |
| 2. |   | Length = 17 m<br>Width = 9 m<br>Perimeter = |
| 3. |   | Side = 15 m<br>Perimeter = |
| 4. |   | Side = 12 m<br>Perimeter = |



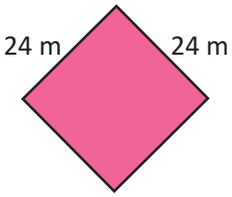
Chapter 21 Perimeter.indd 266 08/03/18 12:41 PM

**5.**



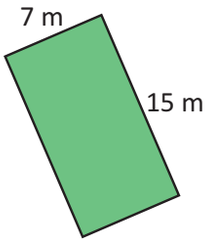

Length = 39 m
Width = 13 m
Perimeter =

**6.**



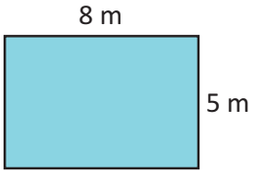

Side = 24 m
Perimeter =

**7.**




Length = 15 m
Width = 7 m
Perimeter =

**8.**




Length = 8 m
Width = 5 m
Perimeter =

## Activity 2:

**Use the formula for perimeter to complete the table.**

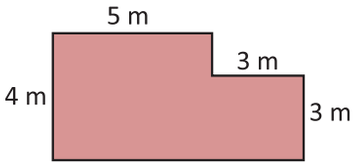
| | Length | Width | Perimeter |
|---|---|---|---|
| **1.** | 6 cm | 6 cm | |
| **2.** | 12 cm | 9 cm | |
| **3.** | 18 cm | 13 cm | |
| **4.** | 25 cm | 15 cm | |
| **5.** | 19 m | 10 m | |
| **6.** | 5 m | 5 m | |
| **7.** | 16 m | 9 m | |
| **8.** | 1.5 m | 0.7 m | |
| **9.** | 3 km | 2 km | |
| **10.** | 0.6 cm | 0.6 km | |

# Apply the Formula with Simple Composite Figures

## Teaching Point 1:

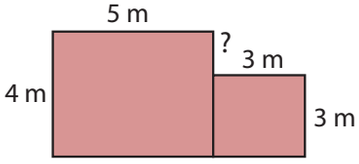
*How can you use the formula to find perimeter of composite figures?*

Find the perimeter of the figure below.




The figure is made up of a rectangle and a square. It is a **composite figure.**

**Step 1:** Separate the figure into a rectangle and a square.




**Step 2:** Find the length of the missing side.

Length of missing side: 4 m – 3 m = 1 m.



Chapter 21 Perimeter.indd 267 08/03/18 12:41 PM

**Step 3:** Find the perimeter of the whole shape.

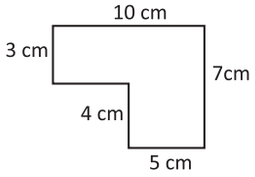
Perimeter: 5 m + 4 m + 5 m + 3 m + 3 m + 3 m + 1 m = 24 m

So the perimeter of the figure is 24 m.

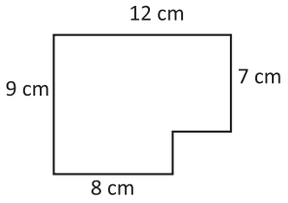
## Activity 1:

**Calculate the perimeter of these simple composite figures.**

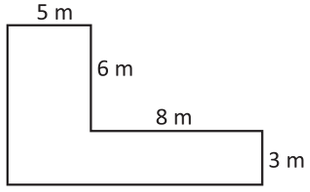
**1.**



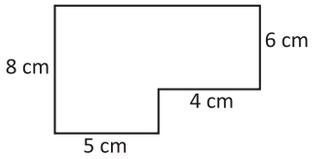

**2.**



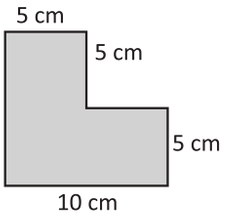

**3.**



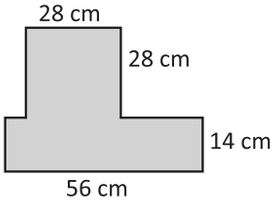

**4.**



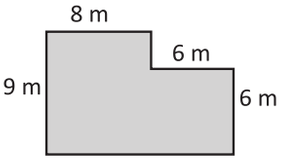

**5.**



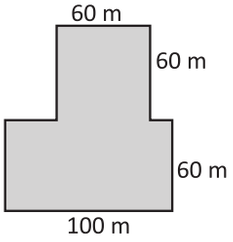

**6.**



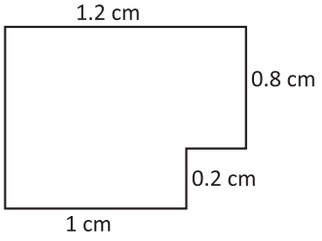

**7.**



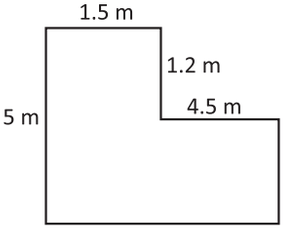

**8.**




**9.**




**10.**





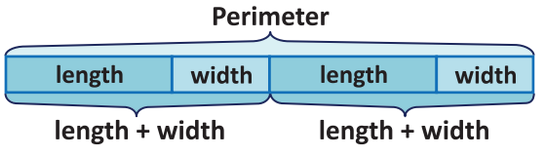

Chapter 21 Perimeter.indd 268 08/03/18 12:41 PM

## Find One Side Given the Perimeter

### Teaching Point 1:

*How can you find one side of a rectangle given the perimeter?*

The perimeter of a rectangle is 24 metres. Its width is 5 metres. Find its length.




length + width = $\frac{1}{2}$ of perimeter

L + W = 24 m ÷ 2
= 12 m

L + 5 m = 12 m
Length = 12 m – 5 m
= 7 m

So the length of the rectangle is 7 metres.

### Activity 1:

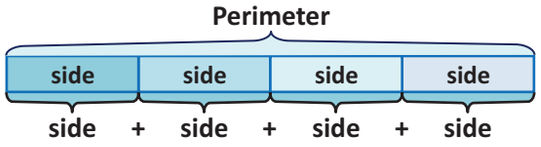
**Complete the table. Find the length of the missing side.**

| Length | Width | Perimeter |
|---|---|---|
| 1. 12 cm | _____ | 32 cm |
| 2. 26 cm | _____ | 64 cm |
| 3. _____ | 8 cm | 38 cm |
| 4. _____ | 9 cm | 36 cm |
| 5. 17 cm | _____ | 48 cm |
| 6. _____ | 3 m | 18 m |
| 7. 20 m | _____ | 60 m |
| 8. 2.5 m | _____ | 6 m |
| 9. _____ | 2 km | 12 km |
| 10. 0.8 km | _____ | 2.4 km |

### Teaching Point 2:

*How can you find one side of a square given the perimeter?*

The perimeter of a square is 52 metres. Find the length of one side.




side = $\frac{1}{4}$ of perimeter

side = 52 m ÷ 4
= 13 m

So the length of one side is 13 metres.



Chapter 21 Perimeter.indd 269 08/03/18 12:41 PM

## Activity 2:

**Complete the table. Find the length of one side of the square.**

| Side | Perimeter |
|---|---|
| 1. _____ | 48 cm |
| 2. _____ | 96 cm |
| 3. _____ | 28 cm |
| 4. _____ | 56 cm |
| 5. _____ | 100 m |
| 6. _____ | 36 m |
| 7. _____ | 72 m |

## Activity 3:

**Solve the problems below.**

1. A fountain in the middle of a park has a square base. The perimeter of the base is 12 metres. Calculate the length of each side.
2. The perimeter of a rectangular car park is 134 metres. Its length is 27 metres. Find the width of the car park.
3. Aaron jogged twice around the rectangular field. The total distance he jogged was 1.6 km. If the length of the field is 300 m, what is the width of the field?

# Draw Rectangles and Squares for Given Perimeters

## Teaching Point 1:

*How can you draw rectangles and squares for given perimeters?*

Draw a rectangle with a perimeter of 12 cm.

In a rectangle the length is the longer side.

**Step 1:** Calculate the length and width of the rectangle.

length + width = 12 cm ÷ 2
= 6 cm

length + width = 6 cm
4 cm + 2 cm = 6 cm ← one choice

**Step 2:** Draw the rectangle.



Draw a square with a perimeter of 8 cm.

**Step 1:** Calculate the length of each side of the square.

side = 8 cm ÷ 4
= 2 cm

**Step 2:** Draw the square.



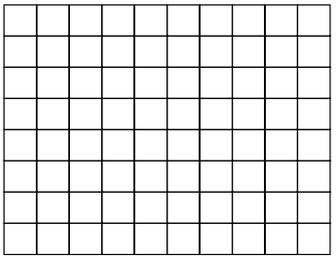


Chapter 21 Perimeter.indd 270 08/03/18 12:41 PM

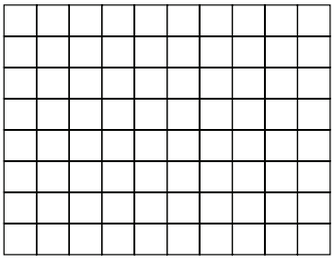
## Activity 3:

**Draw a square or rectangle on each grid to match the perimeter shown.**

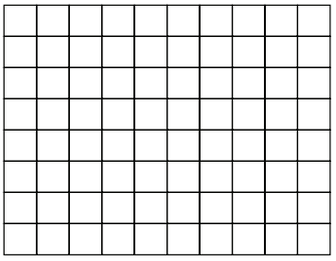
**1.** 16 units



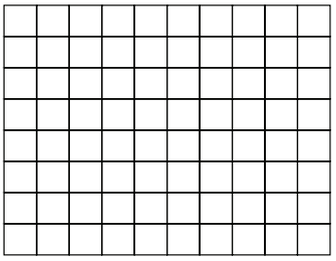
**2.** 18 units



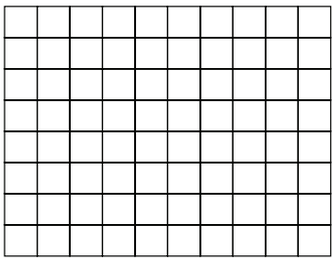
**3.** 12 units



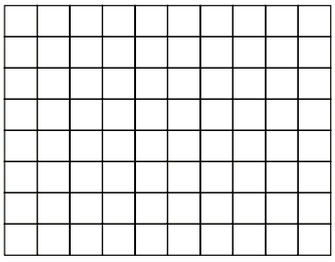
**4.** 10 units



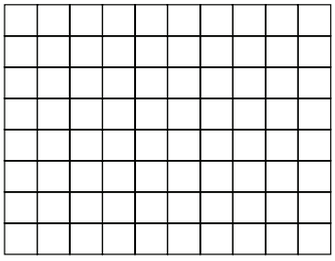
**5.** 24 units



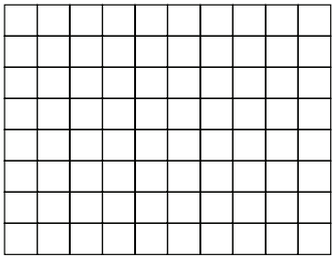
**6.** 32 units



**7.** 20 units



**8.** 28 units





Chapter 21 Perimeter.indd 271 08/03/18 12:41 PM

## Activity 2:

**Draw rectangles that have the following perimeters.**

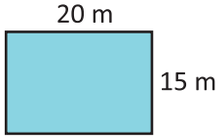
1. 24 cm
2. 24 cm
3. 18 cm
4. 10 cm
5. 16 cm
6. 28 cm
7. 32 cm
8. 12 cm
9. 8 cm
10. 14 cm

**Draw squares that have the following perimeters.**

11. 12 cm
12. 16 cm
13. 24 cm
14. 40 cm
15. 28 cm
16. 4 cm

## Solve Problems in Perimeter

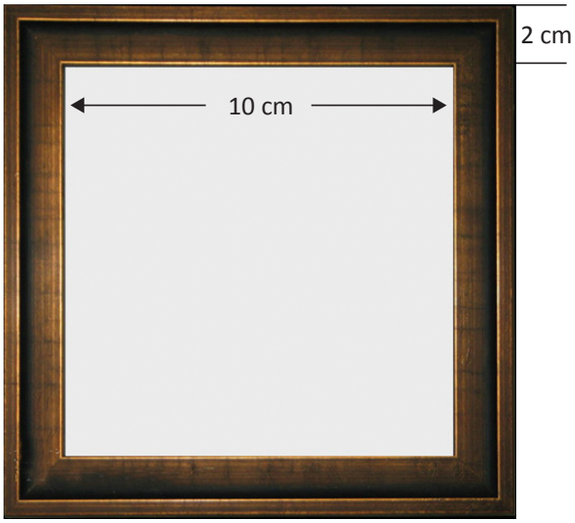
1. Mr. Wong is putting a brick edge around his rectangular swimming pool. What is the perimeter of the pool?




2. Calculate the width of a garden plot that is 24 metres long and which has a perimeter of 88 metres.

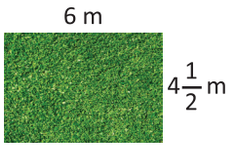
3. The perimeter of a rectangular garden is 60 metres. The width of the fence around the garden is 14 metres. Find its length.

4. Nadia has a square picture frame that holds a 10 cm by 10 cm photograph. The frame has a border that is 2 cm thick all the way around. How much larger is the perimeter of the frame than the perimeter of the photograph?




5. Mother plans to sew a lace border around the edge of a rectangular pillow. The length of the pillow is 58 cm. The width is one half the length. How much lace does Mother need?

6. The perimeter of the garden below is to be fenced.




(a) Calculate the length of the fence needed.

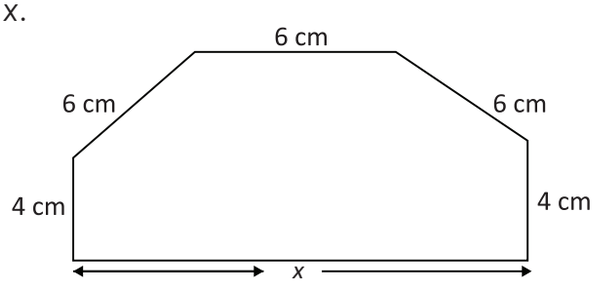
(b) If fencing is sold at $150.00 per metre, calculate the cost of fencing for the whole garden.

7. Jada will make a frame for her picture. The length of the picture is 45 cm. The width is one third of the length. How much wood does Jada need for the frame?

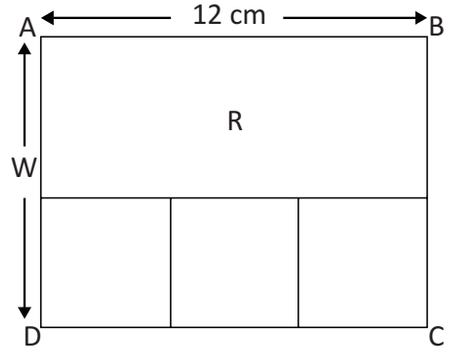


Chapter 21 Perimeter.indd 272 08/03/18 12:41 PM

**8.** The perimeter of the shape below is 41 cm. Find the length of the side marked x.




**9.** Rectangle ABCD below is made with one rectangle, R, and three small identical squares as shown in the diagram below.

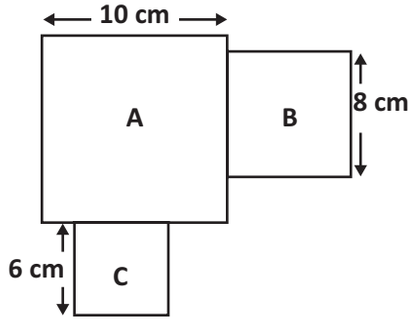



**(c)** Calculate the length of EACH of the sides of the small squares.

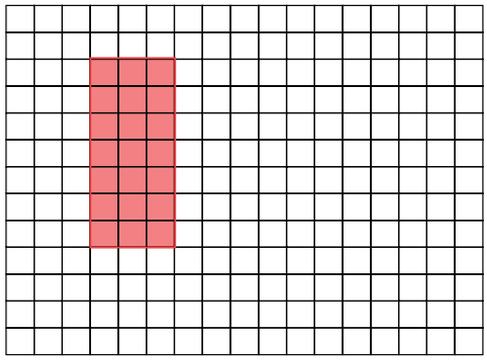
**(d)** If the perimeter of rectangle ABCD is 42 cm, what is the width, W?

**(e)** Calculate the width of rectangle R.

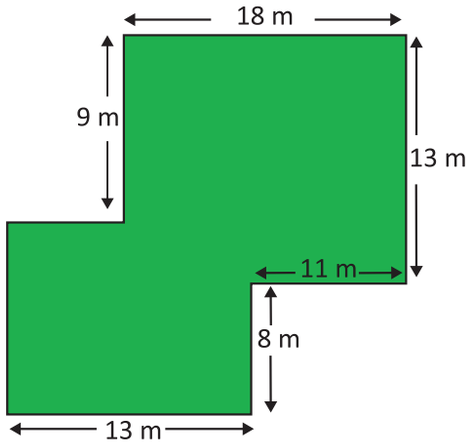
**10.** The figure below is made up of 3 squares, A, B and C. Find the perimeter of the figure.




**11.** On the grid, draw a DIFFERENT rectangle that has the SAME perimeter as the one shown below.



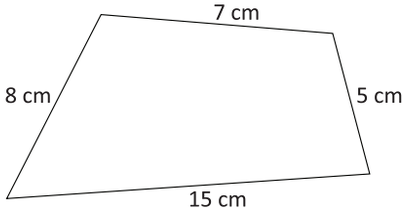
**12.** The figure below shows the courtyard of a school. Find the perimeter of the courtyard.




## Chapter Review

**Answer the questions.**

**1.** Calculate the perimeter of the shape below.

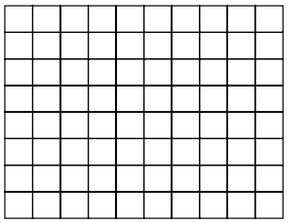





Chapter 21 Perimeter.indd 273 08/03/18 12:41 PM

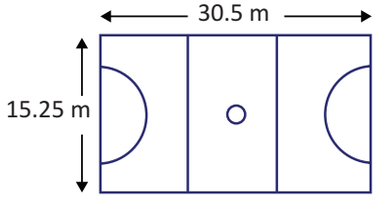
2. The perimeter of a square is 96 cm. What is the length of one side of the square?

3. In the grid below the length of each small square is 1 cm.

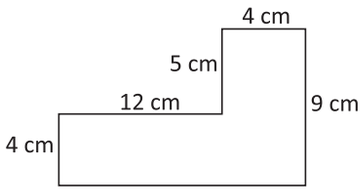


Draw a rectangle on the grid that has a perimeter of 22 cm.

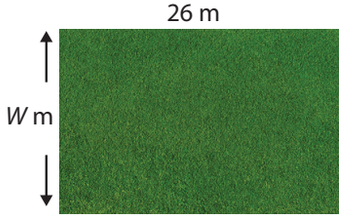
4. What is the perimeter of the netball court below?




5. Calculate the perimeter of the shape shown below.

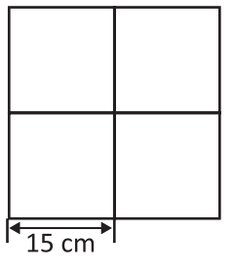



6. The length of a rectangular garden shown below is 26 m and the perimeter is 90 m. Find the width, *W*, of the garden.

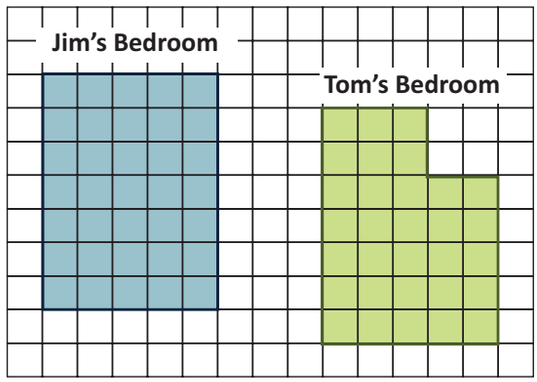



7. Josiah ran 3 times around a square field. He covered a distance of 12 km. What is the length of one side of the field?

8. Four square tiles are joined together to make a square as shown below. The length of each side of each tile is 15 cm. What is the perimeter of the square?

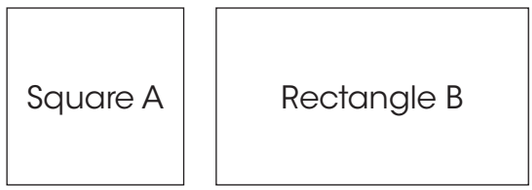



9. The floors of Jim's and Tom's bedrooms are shown in the diagram below.




Which room has the floor with the smaller perimeter?

10. Rectangle B has a perimeter of 96 cm. The perimeter of Square A is $\frac{6}{8}$ of the perimeter of Rectangle B. Find the length of one side of Square A.






Chapter 21 Perimeter.indd 274 08/03/18 12:41 PM

CHAPTER

22

# Measure Mass

**Chapter Outcomes:**

- Demonstrate an understanding of the relationship between standard units and their sub-parts to solve practical problems involving mass.
- Apply algebraic reasoning to calculate unknown values involving mass.
- Solve problems involving mass.



Each year, worldwide, products are bought and sold according to their measurement of mass. This measurement allows buyers and sellers to trade fairly with each other. Every time we purchase food for ourselves or for our pets we want to be sure that the quantity we receive is accurate and that it is of the best value. For example, if we are purchasing dog food, we can only determine the value of the dog food if we are able to compare the amount of money per bag of food. In addition, knowing how much to purchase depends on large part, on the weight of your pet. The pet with the greater mass will eat more food in comparison with a pet that weighs less.

## Getting Ready for Chapter 22

**Fill the blanks with words from the box.**

| | |
|---|---|
| kilogram | grams |
| measuring scale | heavier |

1. A _____ is used to measure the mass of an object.
2. You can use _____ to measure the weight of a banana.

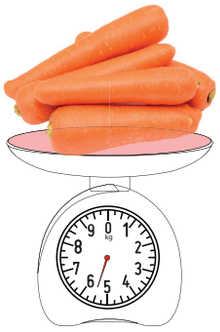
**Choose the most appropriate unit from the box that can be used for measuring the mass of the following objects.**

| | |
|---|---|
| kilogram | grams |
| litres | metres |

3. 

4. 

5. What is the mass of the carrots?



6. Express 3 kg 600 g in grams only.

## Estimate Mass

### Teaching Point 1:

*How do you estimate mass?*

The **gram** is the basic unit for measuring **mass**. **Mass** is the amount of matter in an object.



One small paperclip has the mass of about **1 gram**.

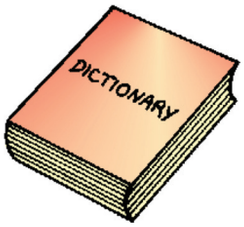


1 000 small paperclips will have the mass of about **1 kilogram**.

You can use benchmarks to estimate mass.

| **1 gram** | **1 kilogram** |
|---|---|
| a small paperclip | a text book |






Estimate the mass of the orange.





Chapter 22 Measure Mass.indd 276 07/03/18 10:55 AM

The mass of the orange is less than the mass of the text book. So grams is the **appropriate unit** to measure the mass.

Then **estimate** the mass by imagining how many paperclips would have the same mass as the orange.

## Activity 1:

**Write gram or kilogram to show which is the better unit to measure the mass of each object listed below.**

| | | | |
|---|---|---|---|
| 1. | whole chicken | 2. | a cucumber |
| 3. | baby | 4. | box of oranges |
| 5. | a key | 6. | a dog |
| 7. | a computer | 8. | a cell phone |

## Activity 2:

**Write the better estimate for each mass.**

| | |
|---|---|
| 1.  **10 g 100 g** | 2.  **1 kg 100 g** |
| 3.  **30 g 300 g** | 4.  **100 g 1 kg** |
| 5.   **200 g 2 kg** | 6.  **5 kg 500 g** |

| | |
|---|---|
| 7.  **2 kg 20 kg** | 8.  **1 kg 10 kg** |
| 9.  **400 g 4 000 g** | 10.   **50 kg 500 kg** |

## Activity 3:

**Copy and complete using the appropriate metric unit: grams (g) or kilograms (kg).**

1. The mass of a mango is 200 _____.
2. The mass of a baby is 4 _____.
3. The mass of a hammer is 1 _____.
4. The mass of a cricket ball is 163 _____.
5. The mass of a book bag is 10 _____.
6. The mass of an envelope 6 _____.

7. Name 5 objects in your home that have a mass of less than 1 kilogram?
8. Vanna is buying 6 bananas that cost $1 per kilogram. Is it reasonable to say that the cost of the bananas will be greater than $6? Explain.
9. The weight of a mouse is best measured in what units?



Chapter 22 Measure Mass.indd 277 07/03/18 10:55 AM

# Measure Mass in Grams and Kilograms

## Teaching Point 1:

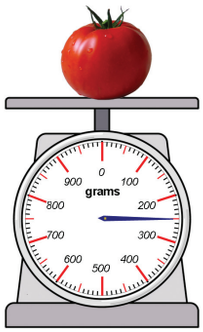
*How do you measure and record mass?*

**Use a Digital Scale**



The scale shows that the peanut weighs **2.1 grams.**

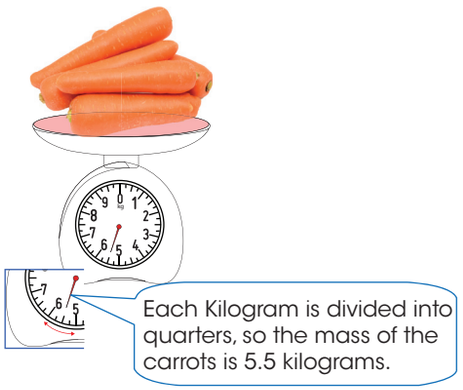
**Use an Analogue Scale**




The scale shows that the tomato weighs **250 grams**.

This scale measures **grams**.

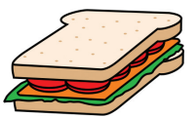
**Use an Analogue Scale**




This scale measures **kilograms**.

## Activity 1:

**Estimate. Then use a digital or an analogue scale to measure and record the mass of the following objects.**

| | |
|---|---|
| **1.** pencil  | **2.** 10¢ coin   |
| **3.** raisin  | **4.** base ten cube  |
| **5.** shoes  | **6.** paper clip  |
| **7.** tomato  | **8.** lunch bag  |
| **9.** red bean  | **10.** banana  |
| **11.** snack   | **12.** sandwich  |



Chapter 22 Measure Mass.indd 278 07/03/18 10:56 AM

## Activity 2:

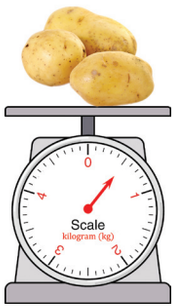
**Write the mass for each of the following.**

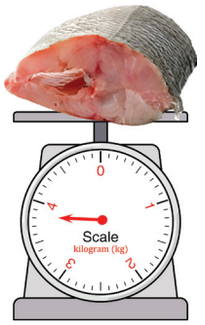
1. 

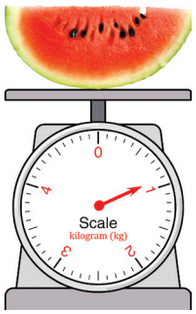
2. 

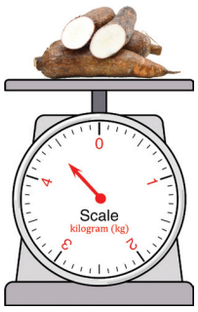
3. 

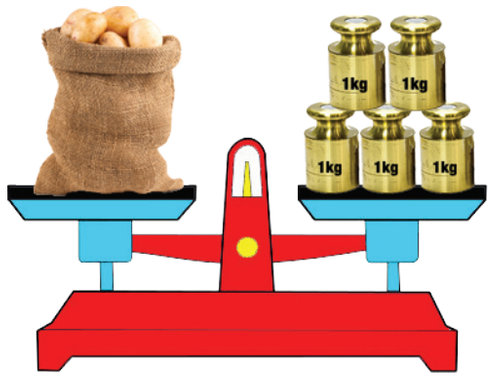
4. 

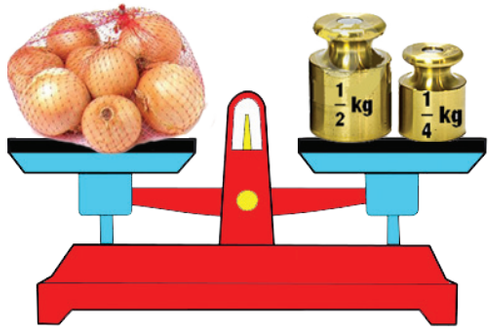
5. 


6. 


7. 


8. 


9. 


10. 


## Activity 3:

**Write the mass of each item to the nearest gram.**

1. 


2. 


3. 


4. 




Chapter 22 Measure Mass.indd 279 07/03/18 10:56 AM

5.




6.




7.




8.

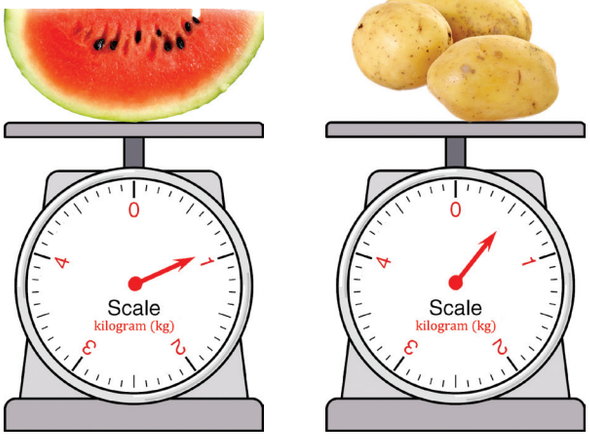



## Compare and Order Mass

### Teaching Point 1:

*How can you compare mass?*

Which item is heavier?.




The scales show that the slice of watermelon is 900 grams and the potato is 600 grams.

So the slice of watermelon is heavier.

### Activity 1:

**Use the scales to compare the mass of the following items. Write < or > to compare.**

1.




cucumber ☐ almonds

2.



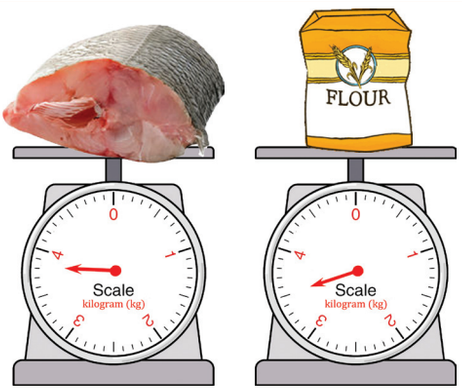

burger patty ☐ cupcake

3.




chicken leg ☐ garlic

4.

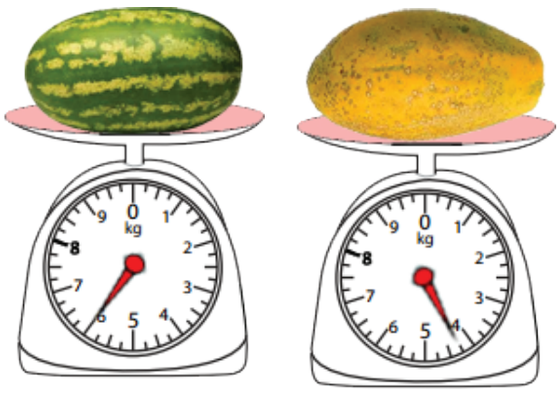



fish ☐ flour



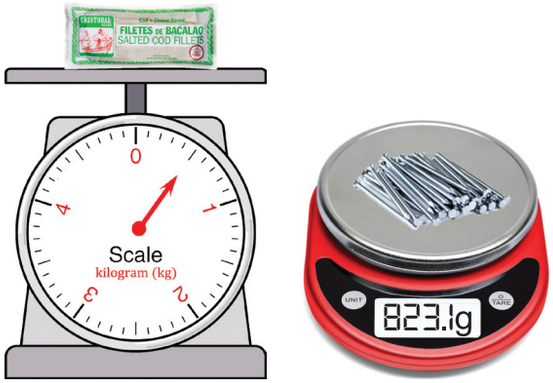
Chapter 22 Measure Mass.indd 280 07/03/18 10:57 AM

5.



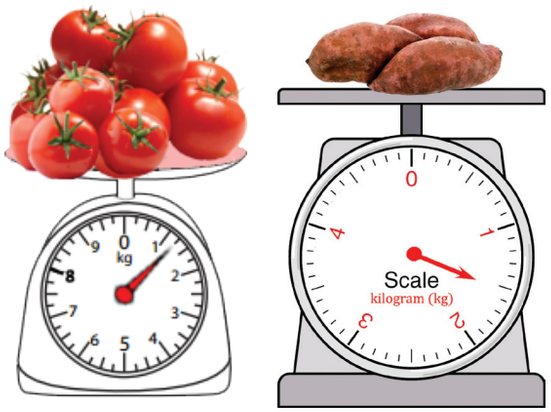
watermelon ☐ paw paw

6.




salted fish ☐ nails

7.




tomatoes ☐ sweet potatoes

## Activity 2:

**Order each item from lightest to heaviest.**

1. banana orange tomato



183 g 262 g 245 g

2. sandwich apple mango



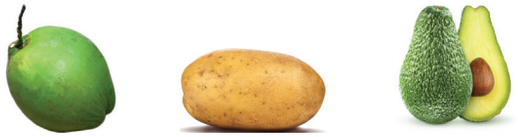
146 g 96 g 198 g

3. sweet potato dasheen eddoes



$\frac{1}{4}$ kg 0.5 kg 240 g

4. coconut potato avocado



1.4 kg 260 g 566 g

5. sugar flour rice




2 kg 1.5 g 3 000 g



Chapter 22 Measure Mass.indd 281 07/03/18 10:57 AM

## Calculation in Grams

### Teaching Point 1:

*How can you calculate in kilograms and grams?*

| kg | g |
|---|---|
| **1** | |
| 5 | 823 |
| + 3 | 697 |
| 9 | 520 |

823 g + 697 g = 1 520 g
**Regroup** 1 520 to kg and g
1 520 kg → 1 kg 520 g
1 kg + 5 kg + 3 kg = 9 kg

| kg | g |
|---|---|
| **3** | **1120** |
| ~~4~~ | 120 |
| – 2 | 351 |
| 1 | 769 |

120 g is less than 351 g
**Regroup** 1 kg to 1 000 g
1 000 g + 120 g = 1 120 g
1 120 g – 351 g = 769 g
3 kg – 2 kg = 1 kg

| kg | g |
|---|---|
| **1** | |
| 1 | 460 |
| × | 4 |
| 5 | 840 |

460 g × 4 = 1 840 g
**Regroup** 1 840 g to kg and g
1 840 g → 1 kg 840 g
1 kg × 4 = 4 kg
4 kg + 1 kg = 5 kg

| kg | g |
|---|---|
| **1** | **2048** |
| 8)2 | 48 |
| | 256 |

2 is less than 8
**Regroup** 2 kg to g
2 kg → 2 000 g
2 000 + 48 g = 2 048 g
2 048 g ÷ 8 = 256 g

### Activity 1:

**Calculate the following.**

1. 40 g + 16 g =
2. 390 g + 498 g =
3. 297 g + 97 g =
4. 5 g + 865 g =

5.

| kg | g |
|---|---|
| 4 | 135 |
| 6 | 369 |
| + | 576 |
| | |

6.

| kg | g |
|---|---|
| 3 | 900 |
| 7 | 88 |
| +9 | 35 |
| | |

7.

| kg | g |
|---|---|
| 4 | 677 |
| + 1 | 806 |
| | |

8.

| kg | g |
|---|---|
| | 571 |
| + 1 | 659 |
| | |

9.

| kg | g |
|---|---|
| 3 | 402 |
| + 1 | 789 |
| | |

10.

| kg | g |
|---|---|
| 10 | 15 |
| + 3 | 990 |
| | |

11.

| kg | g |
|---|---|
| 2 | 520 |
| | 609 |
| + 4 | 273 |
| | |

12.

| kg | g |
|---|---|
| | 5 |
| 6 | 69 |
| + | 941 |
| | |

13. 7 kg 32 g + 4 kg 865 g =
14. 5 kg 470 g + 734 g =
15. 1 kg 58 g + 8 kg 642 g + 705 g =
16. 2.9 kg + 4.5 kg + 0.4 kg =
17. 1.6 kg + 0.76 kg + 0.69 kg =

### Activity 2:

**Calculate the following.**

1. 45 g – 18 g =
2. 100 g – 17 g =
3. 320 g – 248 g =
4. 474 g – 368 g =



Chapter 22 Measure Mass.indd 282 07/03/18 10:57 AM

**5.**

| kg | g |
|---|---|
| 2 | 345 |
| − 1 | 806 |
| | |

**6.**

| kg | g |
|---|---|
| 6 | 98 |
| − 4 | 183 |
| | |

**7.**

| kg | g |
|---|---|
| 3 | 10 |
| − | 57 |
| | |

**8.**

| kg | g |
|---|---|
| 10 | 120 |
| − 5 | 615 |
| | |

**9.**

| kg | g |
|---|---|
| 4 | 67 |
| − 1 | 69 |
| | |

**10.**

| kg | g |
|---|---|
| 12 | 10 |
| − | 26 |
| | |

**11.**

| kg | g |
|---|---|
| 3 | 304 |
| − 1 | 579 |
| | |

**12.**

| kg | g |
|---|---|
| 9 | 7 |
| − 6 | 19 |
| | |

**13.** 4 kg 89 g – 375 g =

**14.** 1 kg – 34 g =

**15.** 6 kg 100 g – 4 kg 673 g =

**16.** 4.5 kg – 3.6 kg =

**17.** 0.9 kg – 456 g =

**18.** 1.07 kg – 0.75 kg =

## Activity 3:

**Calculate the following.**

**1.** 35 g × 2 =

**2.** 650 g × 4 =

**3.**

| kg | g |
|---|---|
| 3 | 17 |
| × | 5 |
| | |

**4.**

| kg | g |
|---|---|
| 4 | 200 |
| × | 9 |
| | |

**5.**

| kg | g |
|---|---|
| 2 | 28 |
| × | 15 |
| | |

**6.**

| kg | g |
|---|---|
| 1 | 146 |
| × | 8 |
| | |

**7.**

| kg | g |
|---|---|
| 3 | 17 |
| × | 5 |
| | |

**8.**

| kg | g |
|---|---|
| 10 | 321 |
| × | 10 |
| | |

**9.**

| kg | g |
|---|---|
| 5 | 49 |
| × | 24 |
| | |

**10.**

| kg | g |
|---|---|
| 2 | 601 |
| × | 13 |
| | |

**11.** 2 kg 62 g × 6 =

**12.** 1 kg 234 g × 9 =

**13.** 12 kg 507 g × 8 =

**14.** 1 kg 77 g × 14 =

**15.** 15 kg × 3.45 =

**16.** 15.3 kg × 1.5 =

## Activity 4:

**Calculate the following.**

**1.** 69 g ÷ 3 =

**2.** 495 g ÷ 15 =

**3.** 408 g ÷ 12 =

**4.** 264 g ÷ 24 =

**5.**

| | kg | g |
|---|---|---|
| 5 | 12 | 15 |

**6.**

| | kg | g |
|---|---|---|
| 7 | 48 | 6 |

**7.**

| | kg | g |
|---|---|---|
| 14 | 30 | 44 |

**8.**

| | kg | g |
|---|---|---|
| 20 | 1 | 600 |



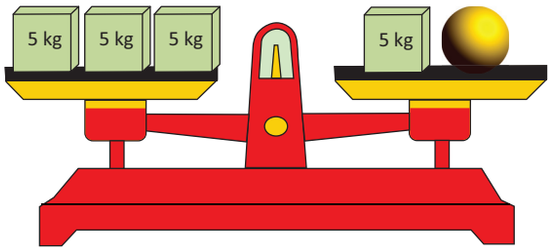
Chapter 22 Measure Mass.indd 283 07/03/18 10:57 AM

## Calculate Unknown Mass on a Balance

### Teaching Point 1:

*How can you determine the mass of the unknown?*

What is the mass of the sphere?




The scale is balanced. So the mass on each side of the scale is equal.

1 cube weighs 5 kg.

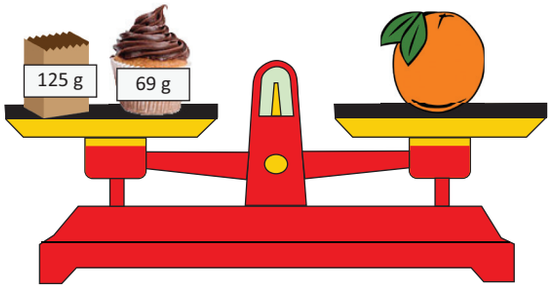
The sphere weighs as much as 2 cubes.

The sphere → 5 kg × 2 = 10 kg

So, the mass of the sphere is 10 kg.

---

What is the mass of the orange?



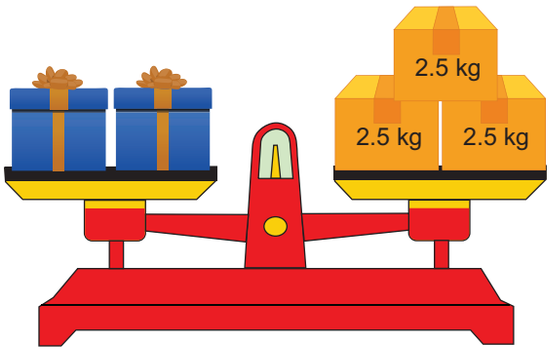

The mass on both sides of the scale is equal.

The orange weighs:
125 g + 69 g = 194 g

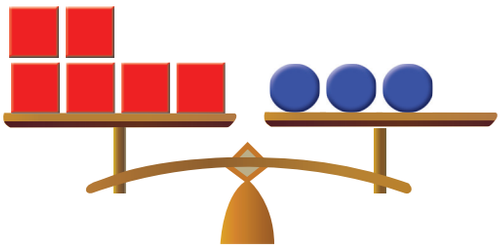
### Activity 1:

**Calculate the unknown weight to balance each scale.**

1. If each gift box has the same mass, what is the mass of one gift box?

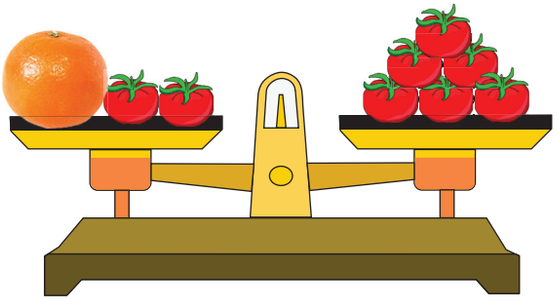



2. On the equal arm balance shown below, one ● is 30 grams.



What is the weight of one ■ ?

3. The scale below is balanced. Each tomato weighs exactly 90 grams.



What is the mass of the grapefruit?



Chapter 22 Measure Mass.indd 284 07/03/18 10:57 AM

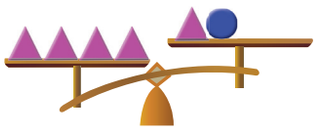
## Solve Problems in Measurement

4. Teanna has a box with 198 g of cereal and Maria has a box with 0.25 kg of cereal. Who has more cereal?

5. A chicken and a turkey together weigh 6 kilograms. The turkey alone weighs 4 kilograms 267 grams. Calculate the weight of the chicken.

6. Mother buys 5 kilograms of fish which costs $23.50 per kilogram. How much did she pay for the fish?

7. If ● = 30 grams and ▲ = 15 grams, how many of the triangles should be removed from the left side for the scale to balance?



8. Six bags of cucumbers each weighing 0.75 kilograms are bought at the grocery.

   (a) What is the total mass of the cucumbers?

   (b) The cucumbers are cut up and shared equally into 10 salad bowls. What is the mass of cucumbers in each bowl?

9. A baker used 9.75 kg of flour to make bread and $3\frac{1}{2}$ kg to make cakes. How much flour is left from a 20 kg bag of flour?

10. The mass of 20 packs of chocolate chip cookies is 960 grams. If there are 4 cookies in a pack, what is the mass of one cookie?

11. The total mass of a bag of mangoes and plums is 1.5 kg. Each plum has a mass of 5 grams and each mango has a mass of 120 grams. The bag contains 60 plums.

    (a) What is the total mass of the plums?

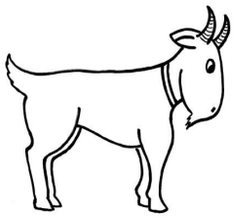
    (b) How many mangoes are in the bag?

12. Mother used 0.5 kg of cheese to make a macaroni pie and 8 cheese sandwiches. She put 12 grams of cheese in each sandwich. How much cheese did she use in the pie?

## Chapter Review

**Answer the questions.**

1. What is the most suitable unit for measuring the mass of a goat.



2.

| kg | g |
|---|---|
| 4 | 25 |
| × | 8 |
| | |

3. Which of the two fruits below has the greater mass?

**coconut**



**2.25 kg**

**breadfruit**



**2 005 g**



Chapter 22 Measure Mass.indd 285 07/03/18 10:57 AM

4. A man bought a pumpkin and a watermelon as shown below.



8.25 kg



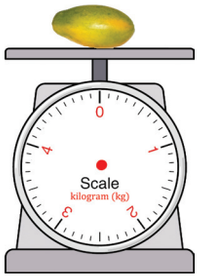
3.5 kg

How much heavier is the watermelon than the pumpkin?

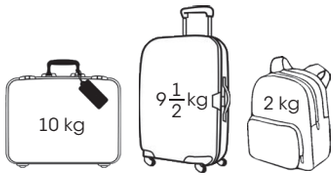
5. Write > of < in the box below.

1.5 kg ☐ 1 345 g

6. Draw the pointer on the scale below to show that the paw paw weighs 2.8 kilogram.

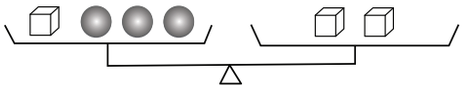



7. Maria went on a vacation with the bags shown below.

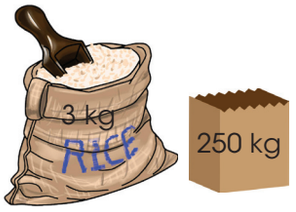



Calculate the total mass of the bags.

8. The diagram below shows a balanced scale with some cubes and some balls.



Each cube weighs 9 grams. What is the mass of one ball?




9. How many bags of rice each weighing 250 g can you get from a bag of rice weighing 3 kilograms?

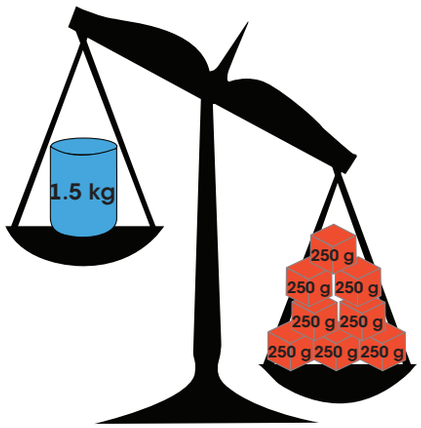
10. Barry has 10 kilograms of peppers. He makes bottles of seasoning with 2 kg 500 g of the pepper and packages 5 kg 890 g to sell at the market.

(a) What is the total mass of peppers that Barry uses altogether?

(b) What mass of peppers remains?

(c) If Barry uses $\frac{1}{4}$ kg of peppers in each bottle of seasoning, how many bottles of seasoning can he make with the remaining peppers?

11. In the diagram below, the cylinder weighs 1.5 kilogram and each cube weighs 250 grams.




How many cubes must be removed from the scale pan to balance the scale?



Chapter 22 Measure Mass.indd 286 07/03/18 10:57 AM

CHAPTER

23

# Measure Capacity

**Chapter Outcomes:**

- Solve problems involving capacity.



You may not even know it, but you use capacity every day! It's all around you - in the glass of juice you pour, the box you put your toys in, even in your bowl of cereal! You decide to pour a glass of juice. You take a glass and the pack of juice. You begin to pour - when something else catches your attention. You keep pouring and pouring until...splash! Juice is all over the counter! What happened? You have exceeded the capacity of the glass.

## Getting Ready for Chapter 23

**Choose the most appropriate unit from the box that can be used for measuring the capacity of the following containers.**

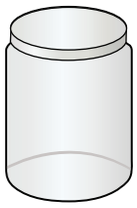
litres millilitres

1. 

2. 

3. Convert 3 litres to millilitres.

4. Arrange the containers from greatest capacity to least capacity.

jar  2.5 litres

glass  250 ml

jug  $2\frac{3}{4}$ litres

5. Approximate the amount of liquid in the bottle to the nearest litre.



**1 450 ml**

## Estimate Capacity

### Teaching Point 1:

*How do you estimate the capacity of containers?*

**Capacity** is the amount a container will hold.

| 1 millilitre | 1 litre |
|---|---|
|  |   |
| $\frac{1}{2}$ litre or 500 ml  | $\frac{1}{4}$ litre or 250 ml  |

The containers above are benchmark items. You can use benchmark items to estimate capacity.

Estimate the capacity of the jug below.



**Step 1: Choose the most appropriate unit.**

A millilitre is a very small amount. The best unit would be the litre.



Chapter 23 Measure Capacity.indd 288 08/03/18 12:10 PM

**Step 2:** **Estimate.**

Imagine how many litre cartons it would take to fill the jug.

**Step 3:** **Measure.**

Fill a litre container and pour it into the jug. Do this until the jug is full and count how many litre containers were used.

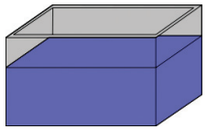
## Activity 1:

**Which is the best unit for measuring the capacity of each container?**

| | |
|---|---|
| **1.** one dose of medicine<br>**millilitres litres** | **2.** water in a swimming pool<br>**millilitres litres** |
| **3.** a small water bottle<br>**millilitres litres** | **4.** glass of water<br>**millilitres litres** |
| **5.** water in a baby's bathtub<br>**millilitres litres** | **6.** a cereal bowl<br>**millilitres litres** |
| **7.** water from the shower<br>**millilitres litres** | **8.** a large pan<br>**millilitres litres** |

## Activity 2:

**Use real objects. Estimate the capacity of each by comparing it with a benchmark item.**

| | |
|---|---|
| **1.**  | **2.**  |
| **3.**  | **4.**  |
| **5.**  | **6.**  |
| **7.**  | **8.**  |
| **9.**  | **10.**  |



Chapter 23 Measure Capacity.indd 289 08/03/18 12:10 PM

## Solve Problems in Capacity

1. How many $\frac{1}{2}$ litre bottles can be filled from a container holding 5 litres?
2. 5.6 litres of lime juice is used to fill up some glasses, each with a capacity of $\frac{1}{4}$ litre. What is the maximum number of glasses that can be filled?
3. A water truck holds 270 litres of water. The water is pumped equally into tanks at 15 homes. How many litres of water did each home receive?
4. Mother fills some glasses with all the milk from a 1 litre carton. The capacity of each glass is 250 ml. How many glasses does she fill?
5. A bucket holds 16 litres of water. The water is used to completely fill some $\frac{1}{2}$ litre bottles.
   a) How many bottles were filled?
   b) 6 bottles of water were used for drinking. How much water is left?
6. A bottle contains 5 litres of oil when full. A cook uses 750 millilitres of the oil to make roti. How much oil was left in the bottle?
7. Mr. Thomas uses 5 litres of pineapple juice and 2 litres of orange juice to make a fruit punch. How many 250 ml servings of punch will Mr. Thomas make?
8. The diagram on the right shows a medicine bottle containing 200 millilitres (ml) of medicine.







**1 dose = 10 ml**

Mark took two doses per day for 5 days. Each dose is 10 ml.

a) If the medicine spoon has a capacity of 5 ml, how many spoonfuls of medicine will he take over the 5 days?

b) How many millilitres of medicine will remain in the bottle?

## Chapter Review

**Answer the questions.**

1. Which unit would you use to measure each container's capacity? Write millilitre or litre.

a)



b)





Chapter 23 Measure Capacity.indd 290 08/03/18 12:10 PM

2. Brian filled the two containers, as shown below, with water. One container held 2 litres and the other container held 250 millilitres.



A B

Which container held 250 millilitres?

3. Two containers are shown below. Which container holds more?




$\frac{1}{4}$ litre 275 ml

4. Arrange the following capacities in ascending order.

0.35 litre, $\frac{1}{4}$ litre, 1 500 millilitre

5. Choose the better estimate for the container below.



5 ml 1 litre

6. How many 250 ml glasses of water will it take to fill a 1 litre jug?

7. A full teapot holds $\frac{3}{4}$ litre of tea. Mother pours the tea to fill teacups that have a capacity of 150 ml.

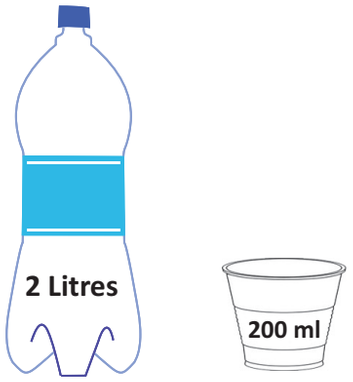


$\frac{3}{4}$ litre 200 ml

a) How many teacups can she fill?

b) How much tea will be left?

8. The bottle in the diagram below holds 2 litres when full. The cup holds 200 ml when full.




Bottle cup

a) Jada pours 4 cups of water into the bottle. What fraction of the capacity of the bottle is filled?

b) How many MORE cups of water is needed to fill the bottle?

9. Shania uses 5 ml of lotion a day. How long will it take her to use a $\frac{3}{4}$ Litre bottle of lotion?



Chapter 23 Measure Capacity.indd 291 08/03/18 12:10 PM

CHAPTER

24

# Area

**Vocabulary:**

formula

**Chapter Outcomes:**

- Demonstrate an understanding of area of regular and irregular plane shapes.
- Develop and use proficiently formula to calculate area in problem solving.



Measuring the area of spaces is a skill that you can use in many careers like architecture, gardening, construction, interior design and engineering. One day when you have your own home you will want to remodel or decorate it. If you can measure area, it will help you to purchase the necessary decorative pieces to beautify your home.

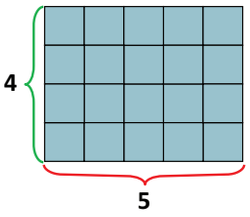
## Getting Ready for Chapter 24

**Complete the related multiplication sentence for the addition sentence below.**

**1.** 5 + 5 + 5 + 5 = 20

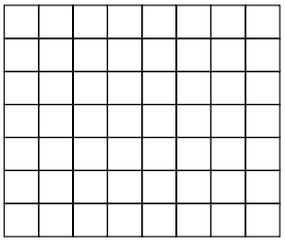
☐ × ☐ = ☐

**Use the area model to multiply.**




**2.** 5 × 4 = ☐

**3.** Shade an array to show 4 × 3 on the grid below.



**4.** Which figure shown below is the best for measuring the area of a rectangle?



## Measure Area

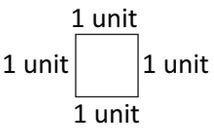
### Teaching Point 1:

*How do you measure area?*

**Area** is the number of square units needed to cover a region.

A **square unit** is a square with a side length of 1 unit. It has an **area** of 1 **square unit**.

Square Unit



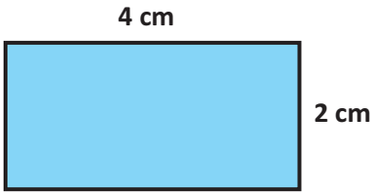

Area



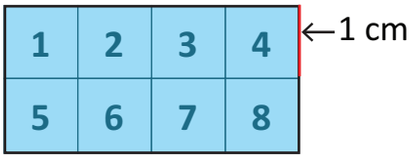
1 square unit

You can count the number of square units inside a figure to find its area in square units.

What is the area of the rectangle below?




You can measure the area of the figure with **1-cm square tiles**. Then **count** the **square units** to find the area of the figure.



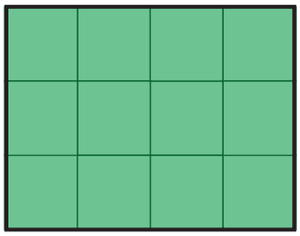

**Area** = 8 square centimetres or 8 $cm^2$

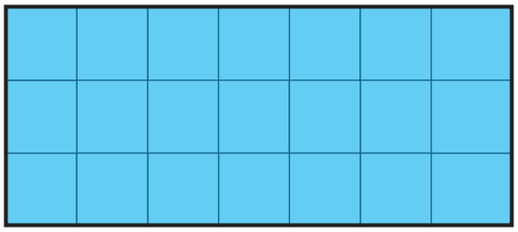


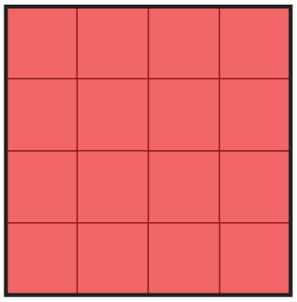
Chapter 24 Area.indd 293 08/03/18 12:34 PM

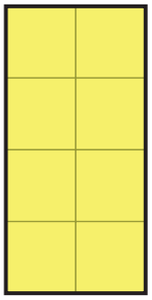
## Activity 1:

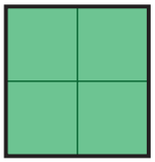
**Calculate the area of the figures below. Each shape is covered by 1 cm square tiles.**

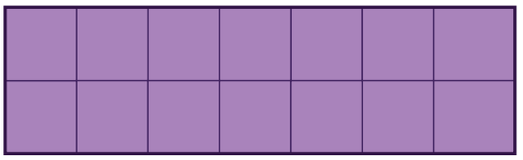
1. 

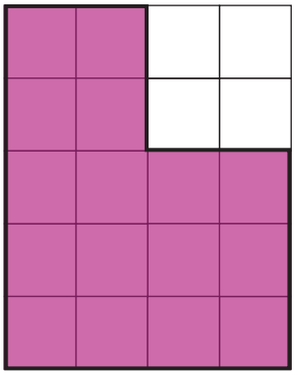
2. 

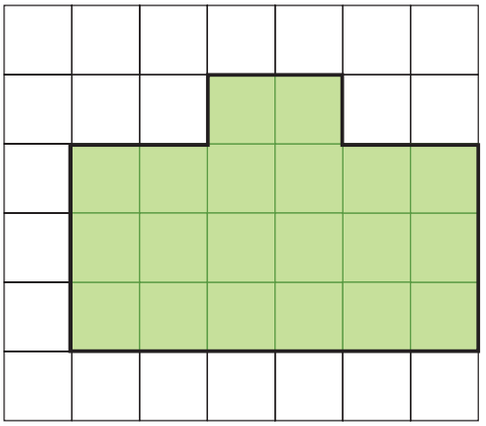
3. 

4. 

5. 

6. 

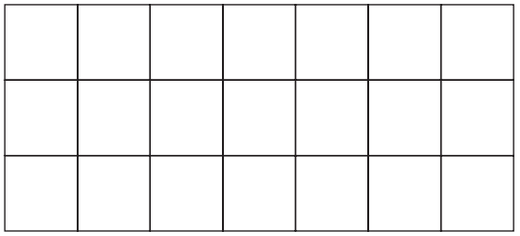
7. 

8. 

## Activity 2:

**Draw and shade figures on each grid to match the given area.**

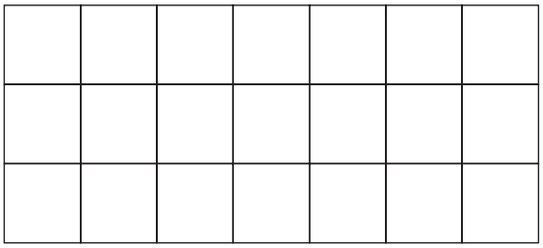
1. Area = 12 $cm^2$



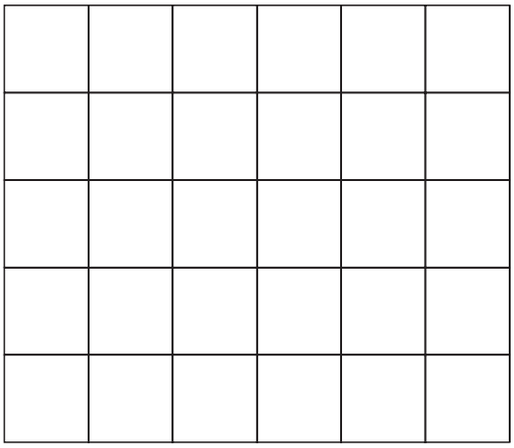


Chapter 24 Area.indd 294 08/03/18 12:34 PM

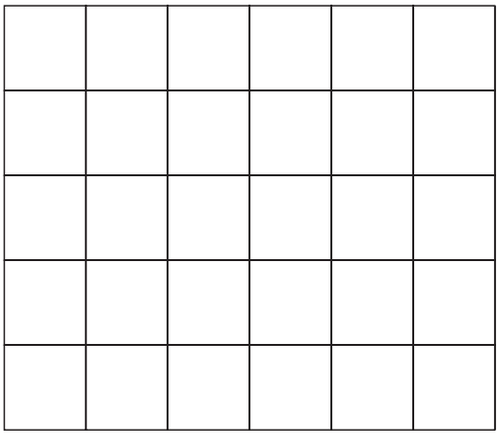
**2.** Area = 9 $cm^2$



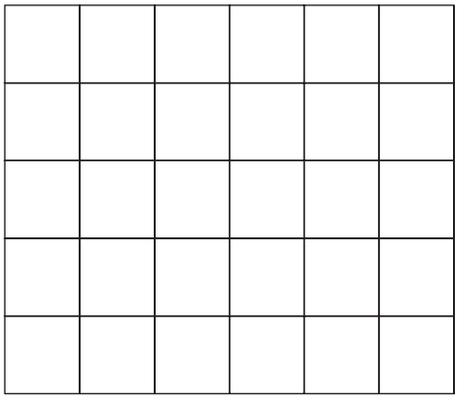
**3.** Area = 18 $cm^2$



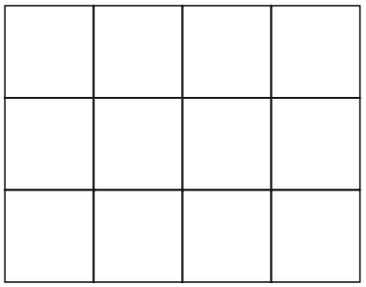
**4.** Area = 24 $cm^2$



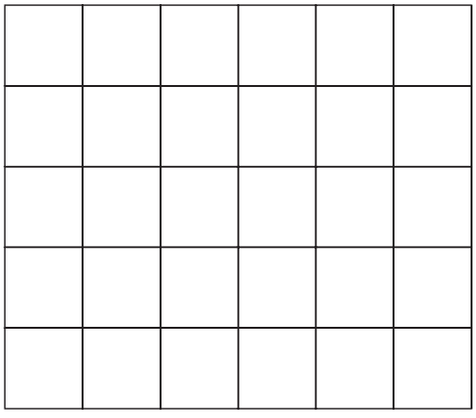
**5.** Area = 21 $cm^2$



**6.** Area = 4 $cm^2$



**7.** Area = 15 $cm^2$



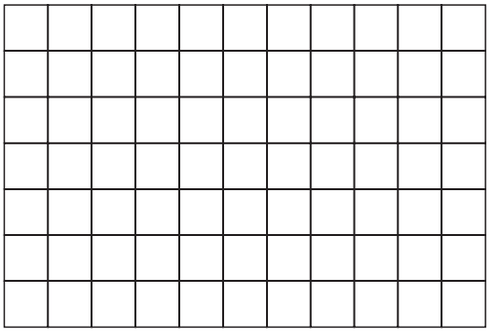


Chapter 24 Area.indd 295 08/03/18 12:34 PM

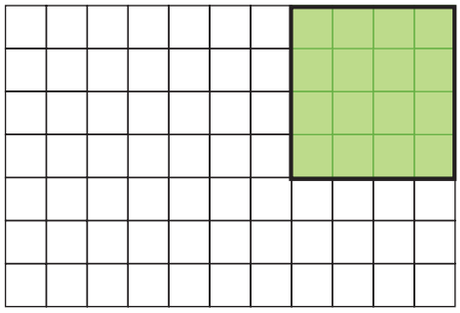
## Activity 3:

**Solve.**

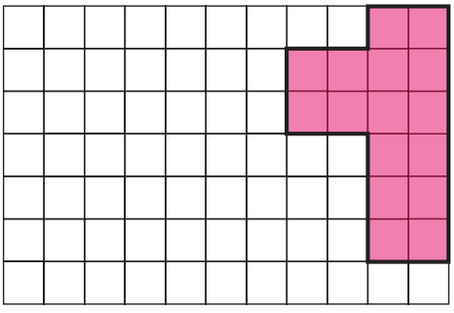
1. Draw a rectangle that has an area of 24 $cm^2$ and a perimeter of 22 cm. Assume the length of each square is 1 cm.



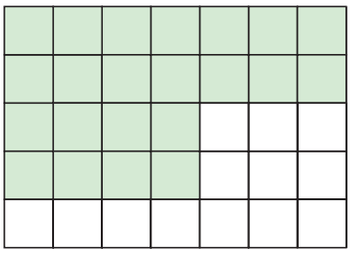
2. Draw a rectangle that has the same area as the square.



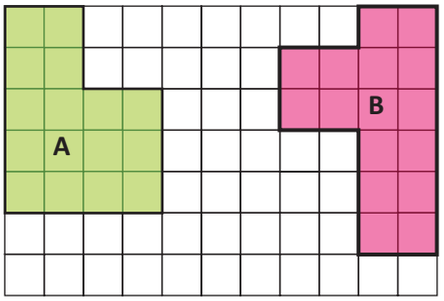
3. Draw a square that has the same area as the figure.



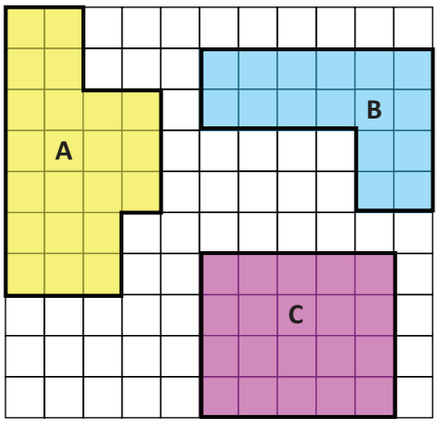
4. Angel is covering a sheet of paper with 1 cm square tiles. The green squares are completed. What area of the paper is still left to be covered?



5. Write <, > or = to compare the area of Shape A to Shape B.




6. Order the figures in the diagram below from greatest to least area.





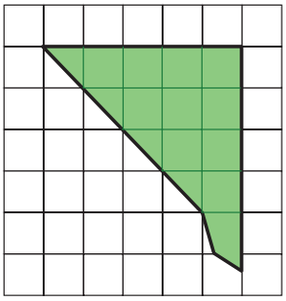

Chapter 24 Area.indd 296 08/03/18 12:34 PM

# Approximate Area of Surfaces

## Teaching Point 1:

*How can you approximate area?*

What is the area of shaded figure?



Use **rounding** to approximate the area of the figure.

1 square unit = 1 square unit

$\frac{1}{2}$ square unit = $\frac{1}{2}$ square unit

more than $\frac{1}{2}$ square unit = 1 square unit

less than $\frac{1}{2}$ square unit = 0 square unit

**Step 1: Count the different types of units.**

**Whole** square units → 10 square units

**More than** $\frac{1}{2}$ square unit → 1 square unit

$\frac{1}{2}$ square units → $\frac{1}{2} \times 4 = 2$ square units

**Step 1: Add the units.**

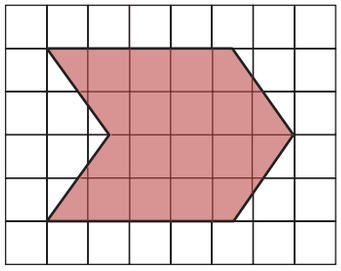
10 + 1 + 2 = 13 square units

So, the area of the shaded figure is 13 square units.

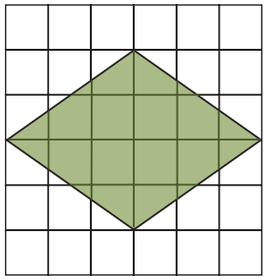
## Activity 1:

**Approximate the area of each shape. Each square in each grid is 1 cm².**

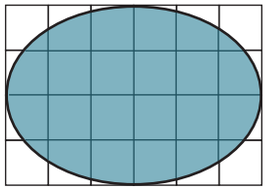
**1.**



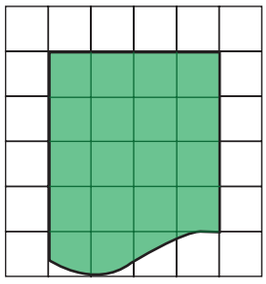
**2.**



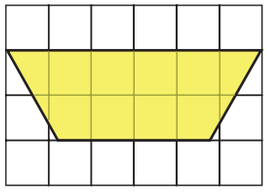
**3.**



**4.**



**5.**





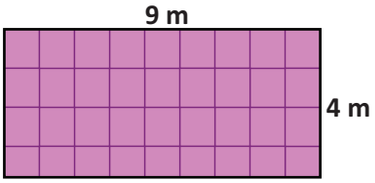
Chapter 24 Area.indd 297 08/03/18 12:34 PM

## Use Area Models to find Area

### Teaching Point 1:

*How do you use multiplication to find area of squares and rectangles?*

What is the area of the rectangular car park below?




There are 4 rows of square units.

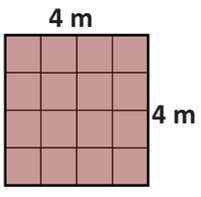
Each row has 9 squares units.

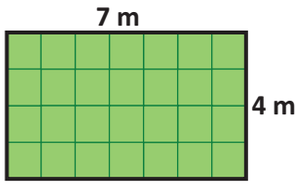
$9 + 9 + 9 + 9 = 36\ m^2$

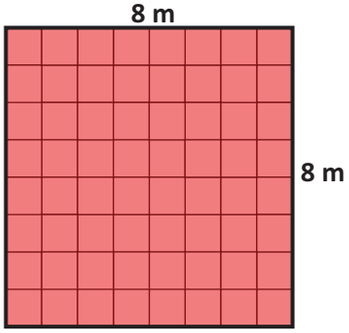
$9 \times 4 = 36\ m^2$

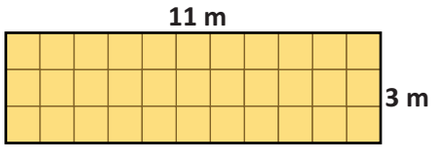
### Activity 1:

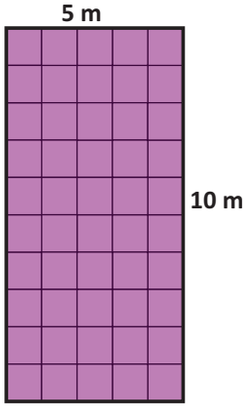
**Use repeated addition or multiplication to find each area.**

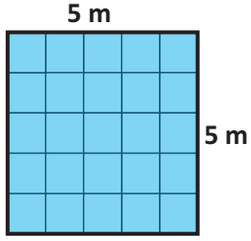
1. 


2. 

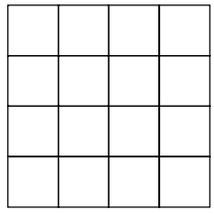

3. 


4. 

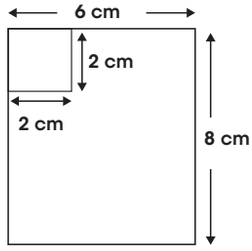

5. 


6. 


7. Leroy draws this diagram of his porch. Each square is 1 square metre. He wants to add 8 square metres to the porch. What will be the area of the new porch?



8. A rectangular piece of paper is 16 centimetres by 8 centimetres. How many squares each with a side length of 4 centimetres can be cut from the piece of paper?




9. Miss Charles wants to cut 2 cm squares from a rectangular sheet of paper measuring 6 cm by 8 cm, to make tickets.

How many tickets can she cut from the paper?



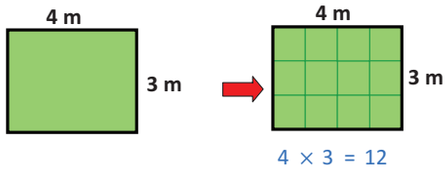
Chapter 24 Area.indd 298 08/03/18 12:34 PM

## Use a Formula to Find Area

### Teaching Point 1:

*How can you find the area using a formula?*

What is the area of the rectangle?




Length = 4 m

Width = 3 m

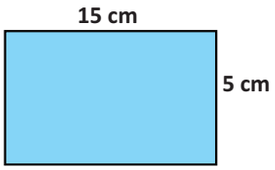
Area of rectangle = Length × Width

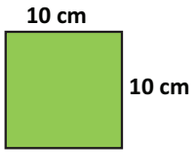
Area = 4 m × 3 m

= 12 $m^2$

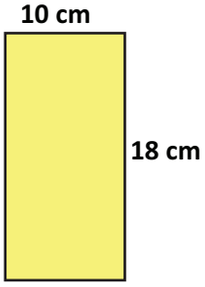
### Activity 1:

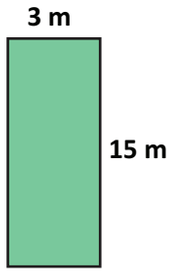
**Find the area of the rectangles and squares.**

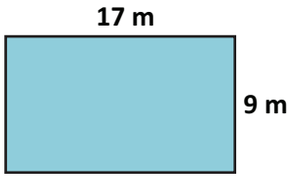
1. 

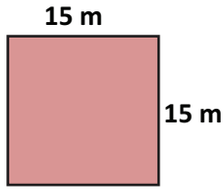

2. 


3. 


4. 


5. 


6. 


7. 


**Solve.**

8. The length of a rectangular porch is 15 metres and the width is 10 metres. Half of the porch is tiled. What is the area of the tiled region.

9. A square has a perimeter of 24 cm. What is the area of the square?

10. A table at the park is 6 metres long and 2 metres wide. What is the area of the rectangular surface of the table?

11. A rectangle has an area of 96 square metres. If the length of the rectangle is 12 metres, what is the width of the rectangle?

12. The area of a square is 64 sq cm. What is the perimeter of the square?

13. Joshua's room has a rectangular floor. He covers the floor with 45 square metres of carpet. If the width of the room is 9 metres, what is the perimeter of the room?



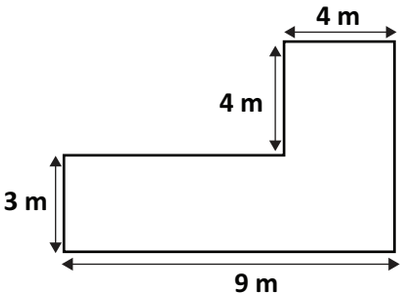
Chapter 24 Area.indd 299 08/03/18 12:34 PM

# Area of Compound Shapes

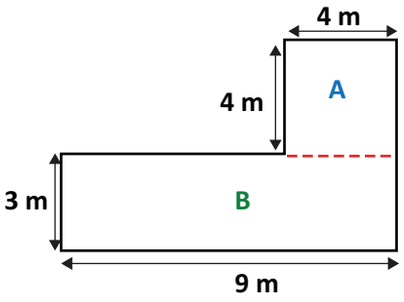
## Teaching Point 1:

*How can you break apart a compound shape to find the area?*

What is the area of the figure?




**Step 1:** **Break apart the figure into rectangles and squares.**




**Step 2:** **Find the area of both shapes.**

Area of A = 4 m × 4 m = 16 $cm^2$

Area of B = 9 m × 3 m = 27 $cm^2$

**Step 3:** **Combine the areas.**

Area of A + Area of B = Area of Figure

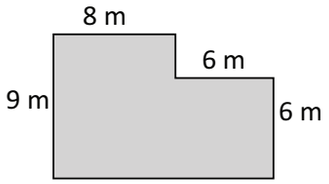
16 $m^2$ + 27 $m^2$ = 43 $m^2$

So, the area of the figure is 43 $m^2$.

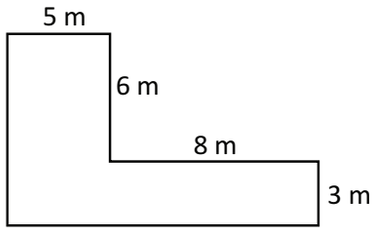
## Activity 1:

**Find the area of the compound shapes.**

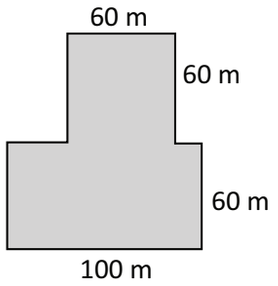
**1.**



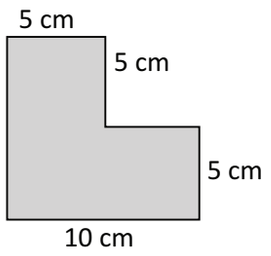

**2.**



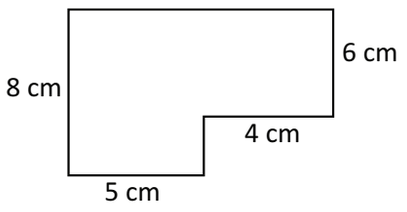

**3.**



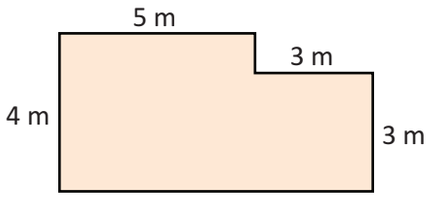

**4.**




**5.**




**6.**






Chapter 24 Area.indd 300 08/03/18 12:34 PM

# Multi-Step Problems Involving Area

## Teaching Point 1:

*How can you use area to solve problems?*

Follow the problem solving steps.

**Read the Problem**

What do I need to find?

What Information am I given?

**Plan you Strategy**

What is my strategy?

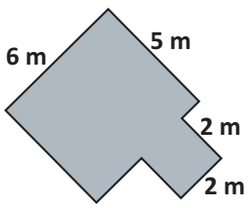
What conversions do I have to do?

**Solve the Problem**

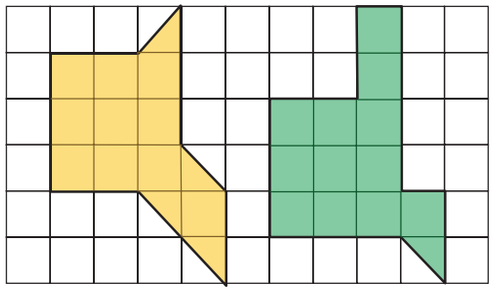
**Remember:**

If a problem has different sizes of measurement units, perform your conversions when solving the problem.

1. Mr. Smith is carpeting a room. The size of the room is shown in the diagram. How many square metres of carpet does Mr. Smith need?



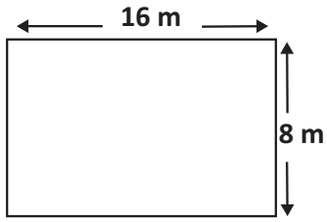

2. Calculate the difference between the areas of the two shapes below.



**1-cm grid**

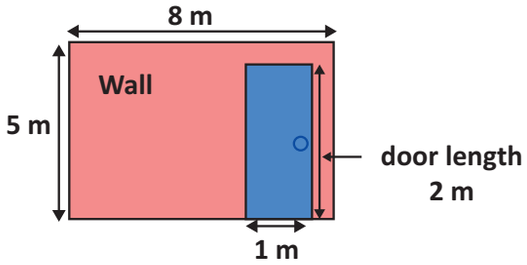
3. A photographer is covering two pictures with glass. Picture 1 is 12 cm by 8 cm and Picture 2 is 10 cm by 10 cm. How many square centimetres of glass does he need altogether?

4. A rectangular garden of length 16 m and width 8 m is divided into rectangular plant beds 3 m by 2 m.




What is the largest number of plant beds that can be made in the garden?

5. Father is painting a wall, as shown in the diagram. He will paint the whole wall except for the doorway. How many square metres of wall will he paint?

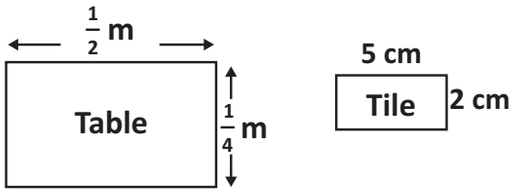





Chapter 24 Area.indd 301 08/03/18 12:34 PM

6. A rectangular field is 80 metres long and 36 metres wide. A tent that is 18 metres long and 16 metres wide covers part of the field. How many square metres of the field are NOT covered by the tent?

7. A carpenter wants to cover a small table with rectangular tiles. The length of the table is $\frac{1}{2}$ metre and the width $\frac{1}{4}$ metre.




(a) How many tiles will he need to cover the table?

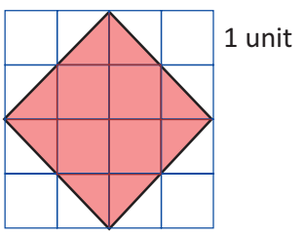
(b) If each tile costs $6.00, how much money will the carpenter spend on tiles?

8. Mr. Charles is building a rectangular fence around a part of his garden. The total length of his fencing is 42 metres. How much fencing should he use along the length and width to fence the largest possible area?

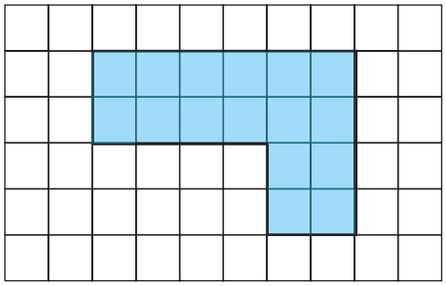
## Chapter Review

**Answer the questions.**

1. What is the approximate area of the shape in the grid below.




2. In the diagram below each small square has an area of 4 $cm^2$.

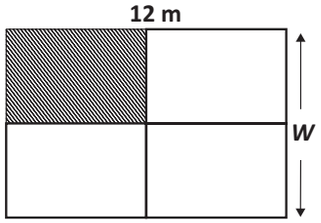


Area ▭ = 4 $cm^2$

Calculate the area of the shaded area.

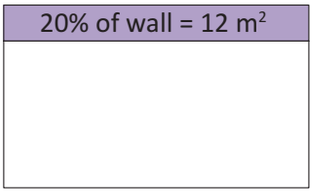
3. The area of a square rug is 144 $cm^2$. What is the length of EACH side of the rug?

4. One quarter of the rectangle is shaded. The area of the shaded part of the rectangle below is 24 $m^2$. The length of the rectangle is 12 metres.




Find the width of the rectangle.

5. The painted area of 20% of the wall shown below is 12 $m^2$.



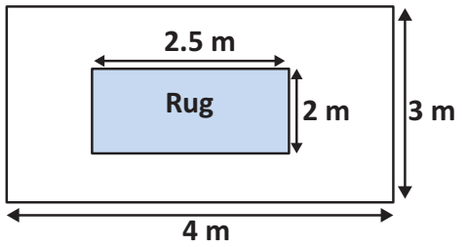

(a) What is the area of the unpainted part of the wall?

(b) If the width of the wall is 5 m, what is the length of the wall?

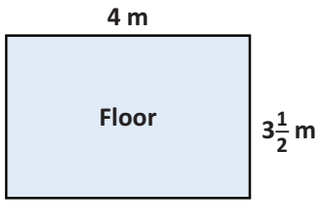


Chapter 24 Area.indd 302 08/03/18 12:34 PM

**6.** A rectangular floor is 4 metres long and 3 metres wide. A rug that is 2.5 metres long and 2 metres wide covers part of the floor as shown below.



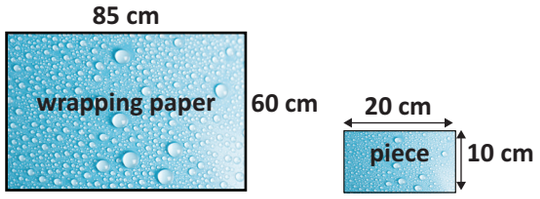

How many square metres of the floor are NOT covered by the rug?




**(a)** Calculate the area of the floor.

**(b)** If carpet is sold at \$30 per $m^2$, what is the cost of the carpet needed to cover the floor completely?

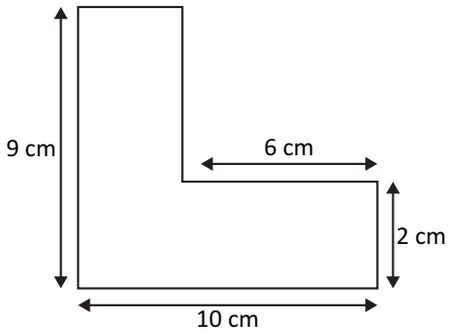
**7.** Miss has a sheet of wrapping paper as shown below. She cuts the paper into rectangular pieces of length 20 cm and width 10 cm to wrap gifts.



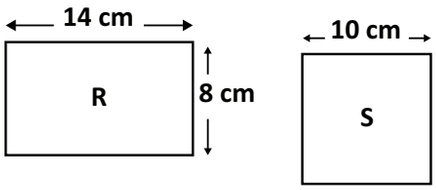

**(a)** What is the greatest number of pieces that can be cut from the sheet of paper?

**(b)** Miss wants to wrap 100 gifts. How many sheets of wrapping paper will she need?

**8.** Find the area of the figure below.

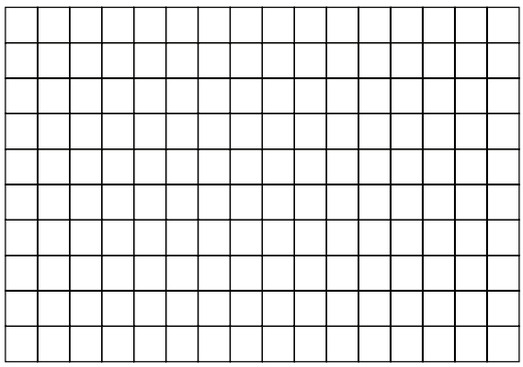



**9.** A rectangle R and a square S are shown below?




Which shape has the greater area? Show how you arrived at your answer.

**10.** Ali drew two rectangles on a grid. Each rectangle had an area of 24 $cm^2$. Rectangle A had a perimeter of 20 cm and Rectangle B had a perimeter of 22 cm.



1-cm grid

Draw Ali's rectangles.

**11.** A rectangular field has a perimeter of 90 metres. Its length is 4 times its width. Find the area of the field.



Chapter 24 Area.indd 303 08/03/18 12:34 PM

CHAPTER

25

# Time

**Vocabulary:**

schedules

**Chapter Outcomes:**

- Accurately read and record time to the minute and solve practical problems involving time.
- Develop an understanding of time schedules.
- Solve problems involving time.

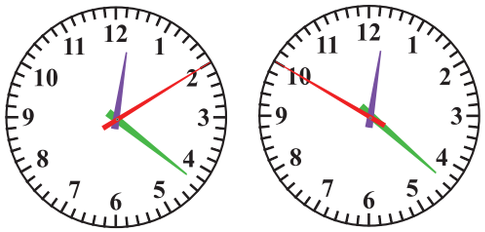



Imagine your daily activities – waking up in the morning, getting ready for school, travelling to different destinations and other events that make up your day. Now imagine all the people in your community, and in your country doing these same things. All these events follow time schedules and could be measured according to time. Time allows everyone to complete activities orderly.

## Getting Ready for Chapter 25

**Write how many seconds have passed.**

**1.**

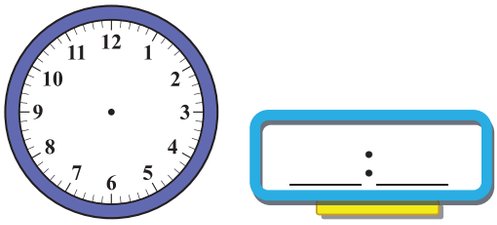


**Write the time shown on the clock in digital notation.**

**2.**



**3.** Jayden arrived home at 5 o'clock in the afternoon. He began his homework at 30 minutes later. Show the time that he began his homework on the clocks.



**4.** How many days are there from the first day of April to the last day of July?

**5.** Write your date of birth using the format: yyyy/mm/dd.

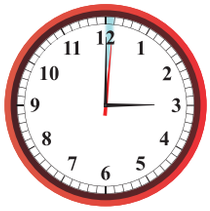
## Units of Time

### Teaching Point 1:

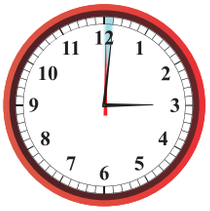
*What are the units of time?*

| Units of Time |
|---|
| 60 seconds = 1 minute |
| 60 minutes = 1 hour |
| 24 hours = 1 day |
| 7 days = 1 week |
| 2 weeks = 1 fortnight |
| 4 weeks = 1 month |
| 365 days = 1 year |
| 52 weeks = 1 year |
| 12 months = 1 year |
| 366 days = 1 leap year |
| 10 years = 1 decade |
| 100 years = 1 century |
| 1 000 years = 1 millennium |

1 **second** elapsed



1 **minute** or 60 seconds elapsed



1 **hour** or 60 minutes elapsed





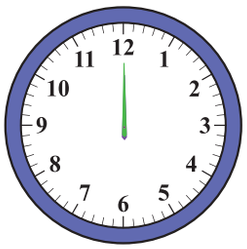
Chapter 25 Time.indd 305 07/03/18 11:06 AM

# Read and Record Time on Digital and Analog Clocks

## Teaching Point 1:

*How can you tell and record time?*

What time is it?






**Analog Clock** **Digital Clock**

When we tell time on the 12-hour clock, we use am for time between 12 midnight and 12 noon, and pm for time between 12 noon and 12 midnight.

So, the time could be 12 am if it is midnight or 12 pm if it is noon.

State the time on the clock and write it in digital notation.



Quarter to 6 or 15 minutes to 6 is written as 5:45

## Activity 1:

**State the time shown on each clock. Write the time in digital notation on the digital clock.**

1. 

2. 

3. 

4. 

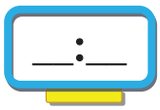
5. 



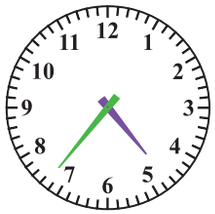
Chapter 25 Time.indd 306 07/03/18 11:06 AM

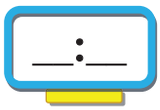
6.



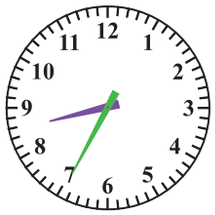



7.






8.





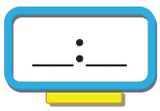

9.






10.






## Activity 2:

**Write each time in digital notation.**

1. nine minutes to nine
2. eighteen minutes to three
3. twenty-six minutes to eleven
4. fifteen minutes to five
5. eleven minutes past eight
6. twenty-five minutes to two
7. quarter to ten
8. half past six
9. seven minutes past one
10. fourteen minutes after five

## Activity 3:

**Draw analog clocks to show the following times.**

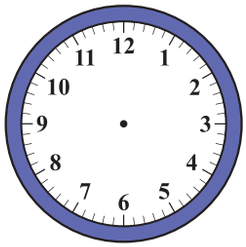
1. five o'clock
2. twenty-three minutes past eleven
3. four thirty
4. seven forty-eight
5. six fifty-five
6. three minutes to ten
7. ten minutes past seven
8. twelve twenty
9. four minutes past five
10. eleven fifty-three



Chapter 25 Time.indd 307 07/03/18 11:06 AM

**Solve.**

**11.** Ravi awoke at quarter past 6. Draw in the hands on the clock below to show the time Ravi awoke.

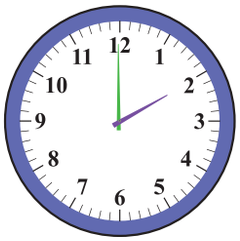


**12.** School was dismissed at 2:48. Show this time on an analog clock.

## The 24 Hour Clock

### Teaching Point 1:

*How can you use the 24-hour clock to tell time?*



On a 12 hour clock each time is shown twice a day, for example, 2:00 am (morning) and 2:00 pm (afternoon).

The military, airlines, bus and trains use 24-hour times in their time schedules.

A 24-hour clock tells time without using am or pm. The clock begins at midnight and reads the same as a 12 hour clock until midday. It uses numbers from 0 to 24 to stand for hours in a day. The hours are counted from midnight to midnight.



**The 24-Hour Clock**

When we write 24-hour clock times we use four digits with or without a colon, for example, the time on the clock can be either 1010 hours (am) or 2210 hours (pm).

10:10 am is 1010 hours. We say "ten ten hours".

2:10 pm is 2210 hours. We say "twenty-two ten hours".

| Times on a 24-Hour Clock | | | |
|---|---|---|---|
| **am** | **24-hour** | **pm** | **24-hour** |
| 1:00 | 0100 hours | 1:00 | 1300 hours |
| 2:00 | 0200 hours | 2:00 | 1400 hours |
| 3:00 | 0300 hours | 3:00 | 1500 hours |
| 4:00 | 0400 hours | 4:00 | 1600 hours |
| 5:00 | 0500 hours | 5:00 | 1700 hours |
| 6:00 | 0600 hours | 6:00 | 1800 hours |
| 7:00 | 0700 hours | 7:00 | 1900 hours |
| 8:00 | 0800 hours | 8:00 | 2000 hours |
| 9:00 | 0900 hours | 9:00 | 2100 hours |
| 10:00 | 1000 hours | 10:00 | 2200 hours |
| 11:00 | 1100 hours | 11:00 | 2300 hours |
| 12:00 **noon** | 1200 hours | 12:00 **midnight** | 2400 hours |



Chapter 25 Time.indd 308 07/03/18 11:06 AM

Write 3:45 pm in 24-hour time.

**Method: Add 12 to pm times.**

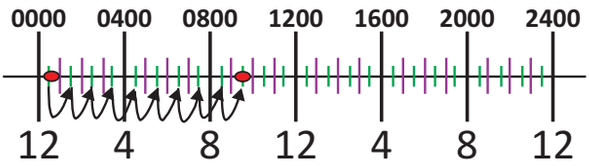
12 + 3:45 = 1545

So, 3:45 pm is 1545 hours in 24-hour time.

---

How long is it from 0030 hours to 0930 hours?

**Method 1: Use a time-line.**




**Count on from 0030 to 0930**

It is 9 hours.

**Method 2: Use subtraction.**

| hours | minutes |
|---|---|
| 09 | 30 |
| –00 | 30 |
| 09 | 00 |

It is 9 hours.

## Activity 1:

**Convert these times to 24-hour times.**

| | |
|---|---|
| **1.** 4:00 am | **2.** 1:00 am |
| **3.** 3:09 pm | **4.** 7:10 pm |
| **5.** 6:15 pm | **6.** 4:00 am |
| **7.** 12:00 am | **8.** 4:00 pm |
| **9.** 10:30 pm | **10.** 12:10 am |
| **11.** 8:25 am | **12.** 5:03 pm |
| **13.** 12:25 am | **14.** 12:00 pm |

## Activity 2:

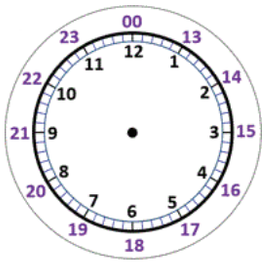
**Convert these times from 24-hour time to am and pm times.**

| | |
|---|---|
| **1.** 0312 hours | **2.** 1007 hours |
| **3.** 1200 hours | **4.** 0920 hours |
| **5.** 1750 hours | **6.** 2359 hours |
| **7.** 0030 hours | **8.** 0100 hours |
| **9.** 1900 hours | **10.** 1201 hours |
| **11.** 0645 hours | **12.** 1845 hours |
| **13.** 0230 hours | **14.** 0050 hours |

## Activity 3:

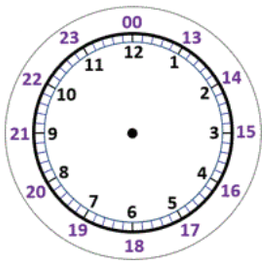
**Draw the hands on the clock faces to match the 24-hour times.**

**1.**



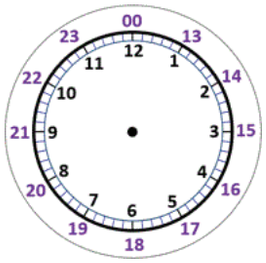

0400 hours

**2.**




0305 hours

**3.**

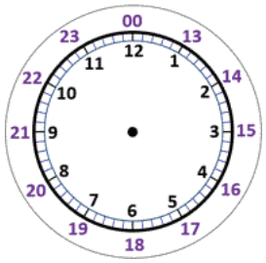



1400 hours



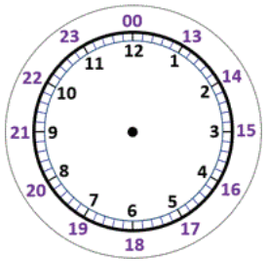
Chapter 25 Time.indd 309 07/03/18 11:06 AM

4.



1250 hours

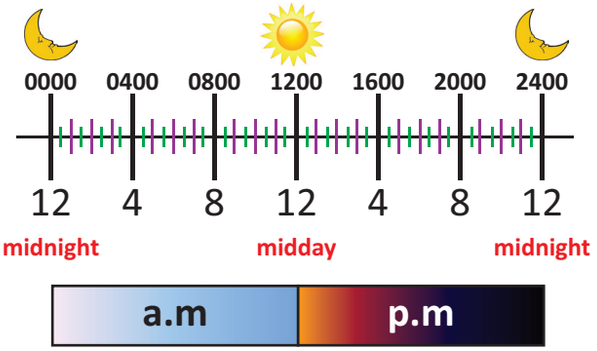
5.



2304 hours

## Activity 4:

**Use the timeline below to help you find how many hours between the times.**




| | | | |
|---|---|---|---|
| 1. | 0400 and 0800 | 2. | 0500 and 1100 |
| 3. | 0630 and 1530 | 4. | 1000 and 2200 |
| 5. | 1615 and 2115 | 6. | 1945 and 2345 |

**Use the Caribbean Airline flight schedule to answer the following questions.**

| Aircraft | Days | Departure Time | Arrival Time |
|---|---|---|---|
| BWA520 | Friday | 0012 | 0450 |
| BWA527 | Friday | 0135 | 0700 |
| BWA551 | Friday | 0010 | 0551 |
| BWA601 | Thursday | 2257 | 0425 |

7. Convert the times in the flight schedule from 24-hour times to 12-hour times.
8. Which aircraft departs during the afternoon?
9. Mr. Mohammed wants to travel before 1:00 am on Friday. Which aircraft should he use?
10. How long does the BWA527 take to get to its destination on Friday?
11. Which flight takes the longest time to arrive at its destination?

**Solve.**

12. The sun sets at 1930 hours and rises again at 0630 hours.
    (a) How many hours of darkness are there?
    (b) How many hours of daylight are there?
13. A bus leaves Sangre Grande at 0945 hours and arrives at Matelot at 1246 hours. How long does the journey last?



Chapter 25 Time.indd 310 07/03/18 11:06 AM

## Convert Units of Time

### Teaching Point 1:

*How can you convert units of time?*

How many minutes in 3 hours?

1 hour → 60 minutes

3 hours → 60 × 3 = 180 minutes

To convert a larger unit to a smaller unit, find out how many of the smaller units equal one of the larger units, and MULTIPLY.

Convert 360 seconds to minutes.

60 seconds → 1 minute

360 seconds → 360 ÷ 60 = 3 minutes

To convert a smaller unit to a larger unit, find out how many of the smaller units equal one of the larger units, and DIVIDE.

### Activity 1:

**Complete the following.**

1. 12 minutes = ____ seconds
2. 120 minutes = ____ hours
3. 42 days = ____ weeks
4. 480 seconds = ____ minutes
5. $2\frac{1}{2}$ hours = ____ minutes
6. 96 hours = ____ days
7. 270 minutes = ____ hours
8. 5.5 hours = ____ minutes
9. 2.5 minutes = ____ seconds
10. 6.25 years = ____ months

### Activity 2:

**Compare the units of time using <, > or =.**

1. 3 years ☐ 36 months
2. 2 days ☐ 23 hours
3. 250 weeks ☐ 5 years
4. 12 minutes ☐ 720 seconds
5. 4 days ☐ 50 hours
6. $8\frac{1}{4}$ minutes ☐ 500 seconds
7. $2\frac{1}{2}$ years ☐ 27 months
8. 3.5 years ☐ 41 months
9. 45 days ☐ 6 weeks
10. $5\frac{3}{7}$ weeks ☐ 38 days

### Activity 3:

**Solve.**

1. David spent 5 weeks in the country. Carla spent 42 days. Who spent a longer time in the country?
2. Track and field practice lasts 3 hours. The coach wants to spend an equal number of minutes on each of 3



Chapter 25 Time.indd 311 07/03/18 11:06 AM

different races. How many minutes will the team spend on each race?

3. Keisha's brother just turned 3 years old. What is her brother's age in months?

4. Mr. James drove 3 hours. Mrs. Ali drove 195 minutes. Miss Peters drove 25 minutes longer than Mrs. Ali. How much longer did Miss Peters drive than Mr. James?

5. Aviya's little brother is 7 weeks old. She is exactly 2 years and 10 days older than he is. How old is Aviya in days? Assume that a year is 365 days.

6. Nalini spent $\frac{3}{4}$ hour studying, 40 minutes eating lunch and $\frac{2}{3}$ hour playing with her friends.

   (a) At which activity did Nalini spend the most amount of time?

   (b) How much time did she spend on all three activities?

## Computation of Units of Time

### Teaching Point 1:

*How can you calculate units of time?*

#### Addition

| hours | minutes | seconds |
|---|---|---|
| 1 | 45 | 37 |
| + 2 | 29 | 36 |
| 4 | 15 | 13 |

**Regroup** 73 sec
73 sec ÷ 60 = 1 min
13 sec

**Regroup** 75 min
75 min ÷ 60 = 1 hr
15 min

#### Subtraction

| hours | minutes | seconds |
|---|---|---|
| | 44 | 60 + 24 = 84 |
| 3 | ~~45~~ | ~~24~~ |
| − 1 | 30 | 36 |
| 2 | 14 | 48 |

24 sec < 36 sec

**Regroup** 1 min
60 sec + 24 sec = 84 sec

#### Multiplication

| hours | minutes | seconds |
|---|---|---|
| 1 | 12 | 15 |
| × | | 6 |
| 7 | 13 | 30 |

**Regroup** 90 sec
90 sec ÷ 60 = 1 min 30 sec

**Regroup** 73 min
73 min ÷ 60 = 1 hr 13 min

#### Division

| hours | minutes | seconds |
|---|---|---|
| | 60 + 6 = 66 | 120 + 20 = 140 |
| 4 ) 5 | ~~6~~ | ~~20~~ |
| 1 | 16 | 35 |

5 ÷ 4 = 1 remainder 1

**Regroup** 1 hr
60 min
60 + 6 = 66 min
66 ÷ 4 = 16 remainder 2

**Regroup** 2 min
120 + 20 = 140 sec



Chapter 25 Time.indd 312 07/03/18 11:06 AM

## Activity 1:

**Calculate the following.**

**1.**

| | min | sec |
|---|---|---|
| | 5 | 50 |
| + | 9 | 40 |

**2.**

| | hr | min |
|---|---|---|
| | 7 | 25 |
| + | 3 | 45 |

**3.**

| | days | hours |
|---|---|---|
| | 4 | 18 |
| + | 3 | 16 |

**4.**

| | weeks | days |
|---|---|---|
| | 2 | 5 |
| + | 6 | 4 |

**5.**

| | hr | min | sec |
|---|---|---|---|
| | 7 | 20 | 55 |
| + | 5 | 49 | 15 |

**6.**

| | hr | min |
|---|---|---|
| | 7 | 30 |
| − | 2 | 45 |

**7.**

| | days | hours |
|---|---|---|
| | 10 | 10 |
| + | 3 | 15 |

**8.**

| | hr | min | sec |
|---|---|---|---|
| | 8 | 20 | 42 |
| − | 4 | 30 | 50 |

**9.**

| | weeks | days |
|---|---|---|
| | 12 | 4 |
| − | 8 | 6 |

**10.**

| | wk | dy | hr | min |
|---|---|---|---|---|
| | 9 | 6 | 20 | 10 |
| − | 2 | 6 | 23 | 25 |

**11.**

| | hr | min |
|---|---|---|
| | 4 | 15 |
| × | | 6 |

**12.**

| | min | sec |
|---|---|---|
| | 8 | 22 |
| × | | 4 |

**13.**

| | hr | min | sec |
|---|---|---|---|
| | 1 | 20 | 30 |
| × | | | 3 |

**14.**

| | weeks | days |
|---|---|---|
| | 4 | 2 |
| × | | 5 |

**15.**

| | wk | dy | hr |
|---|---|---|---|
| | 2 | 3 | 12 |
| × | | | 6 |

**16.** $4\overline{)9\ 8}$ (hr min)

**17.** $6\overline{)33\ 12}$ (min sec)

**18.** $5\overline{)4\ 2}$ (wk dy)

**19.** $7\overline{)8\ 6\ 2}$ (hr min sec)

**20.** $8\overline{)5\ 22\ 16}$ (hr min sec)

## Activity 2:

**Solve.**

1. Mikhail took the T&T Express to go to Tobago. He waited 45 minutes before boarding the boat. Then he waited 1 hour and 30 minutes for the boat to leave the dock. How long did he wait in all?
2. Naveen plays for 2 hours and 23 minutes. Samar plays for 3 hours and 6 minutes. How much longer did Samar play than Naveen?
3. Mr. Mohan is building a wall. He takes 5 minutes to lay one brick. How many bricks would he lay in 3 hours and 25 minutes?
4. Allan walks 5 laps around the stadium without stopping. Each lap takes 25 minutes 45 seconds. How much time does he take?
5. Four children altogether took 10 hours and 24 minutes to complete a task. If they each took the same amount of time, how much time did each child take?



Chapter 25 Time.indd 313 07/03/18 11:06 AM

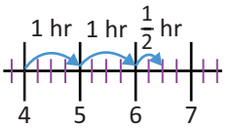
# Elapsed Time

## Teaching Point 1:

*How can you find elapsed time?*

Mother began to cook dinner at 4:00 pm. She finished cooking at 6:30 pm. How much time did she take to make dinner?

**Method 1: Use a timeline.**




She took $2\frac{1}{2}$ hours to make dinner.

**Method 2: Use a clock.**





From 4:00 pm to 6:00 pm → 2 hours
From 6:00 pm to 6:30 pm → 30 minutes

She took $2\frac{1}{2}$ hours to make dinner.

**Method 3: Use subtraction.**

| hours | minutes |
|---|---|
| 6 | 30 |
| − 4 | 00 |
| 2 | 30 |

She took $2\frac{1}{2}$ hours to make dinner.

**Elapsed time** is the amount of time that passes between the beginning and end of an event.

## Activity 1:

**Find out how many minutes have passed.**

1. 12:15 pm to 1:10 pm
2. 11:25 am to 1:45 pm
3. 1400 hours to 1520 hours
4. 1145 hours to 1210 hours

**Find out how many hours and minutes have passed.**

5. 11:30 am to 4:25 pm
6. 3:45 pm to 12 midnight
7. 11:45 am to 2:00 pm (next day)
8. 0920 hours to 1300 hours
9. 1150 hours to 0400 hours (next day)

**Tell what time it will be.**

10. 2 hours after 7:25 am
11. 35 minutes after 0945 hours
12. 3 hours and 25 minutes after 12:50 pm
13. 1 hour and 45 minutes after 2250 hours.

## Activity 2:

**Solve.**

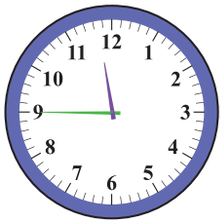
1. Sarah took 45 minutes to travel from home to her school. If she arrived at



Chapter 25 Time.indd 314 07/03/18 11:06 AM

her school at 7.30 a.m., at what time did she leave home?

2. Jaden begins watching a movie at the time shown on the clock below.



The movie ends 1 hour and 40 minutes later. What time did the movie end?

3. Aleena is 9 years 8 months today. What would be Aleena's age in 11 months time?

4. The clock shown below is 20 minutes slow.



To which number should the longer hand point to show the correct time?

5. Kenisha travelled from Toco to Port-of-Spain. The journey took 186 minutes. How many HOURS did her journey take?

6. Hanifah began cleaning her room at 2:17 p.m. She took a 10-minute break after cleaning for one hour. She continued to clean for half an hour after the break. At what time did she finish cleaning her room?

## Interpret Time Schedules

### Teaching Point 1:

*How can you interpret time schedules?*

When reading time schedules, make sure you know what type of information is in each column or row.

| Deluxe Coach Service | | | |
|---|---|---|---|
| **Bus Number** | **Depart SDO** | **Arrive POS** | **Route** |
| D1 | 5:00 AM | 6:20 AM | D21V |
| D2 | 5:15 AM | 6:35 AM | D21V |
| D12 | 12:00 PM | 1:20 PM | D21V |
| D2 | 1:00 PM | 2:20 PM | D21V |

(a) What time does the first bus leave SDO in the afternoon?

(b) How long does it take to get to its destination?

**Read the column heading.**

1. Read departure column for SDO.
2. Look for the earliest departure time for the **afternoon** (PM) → 12:00 pm.

So, the first bus leaves SDO at 12:00 pm in the afternoon.

**Read the information in the rows.**

From 12:00 pm to 1:20 pm → 1 hr 20 min

So, the time taken is 1 hr 20 min.



Chapter 25 Time.indd 315 07/03/18 11:06 AM

## Activity 1:

**Questions 1 to 3 are based on the Interisland Ferry time schedule below.**

| Schedule for Inter-Island Ferry Service between Port of Spain and Tobago | | | | | |
|---|---|---|---|---|---|
| **Date** | **Vessel** | **Depart From** | **Depart Time** | **Arrive At** | **Arrival Time** |
| 11 Jun 2017 | TTEXPR | TBG | 9:30 AM | POS | 1:30 PM |
| 11 Jun 2017 | WATAX | TBG | 4:00 PM | POS | 7:00 PM |
| 11 Jun 2017 | TTEXPR | POS | 3:00 PM | POS | 7:00 PM |
| 12 Jun 2017 | WATAX | POS | 6:00 AM | TBG | 9:00 AM |

1. How long does the trip take on the TTEXPR from Tobago to Port of Spain on the 11th June in the morning period?

2. Which vessel travels faster between the two islands? How much faster is that vessel?

3. Jamie boards the TTEXPR at the scheduled time on 11th June to go to Port of Spain. If the boat was delayed 2 hours before leaving Tobago, at what time would Jamie get to Port of Spain?

4. Below is Grace's incomplete timetable. Complete it using the information that follows.

| TIME | ACTIVITIES |
|---|---|
| 8:00 AM to 9:45 AM | Do Chores |
| | Study |
| | Lunch |
| 1:00 PM to 2:00 PM | Watch Television |
| | Football Practice |
| 7:00 PM | Dinner |

(a) Grace takes $2\frac{1}{2}$ hours to study. She begins to study 10 minutes after she finishes her chores.

(b) She takes 5 minutes to pack away her books before eating lunch. She takes 30 minutes to eat her lunch.

(c) Football practice begins at 2:15 pm and lasts for 3 hours and 25 minutes.

**Use the four months of the 2017 calendar below to help you answer the following questions.**

**January**

| Su | M | Tu | W | Th | F | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

**February**

| Su | M | Tu | W | Th | F | Sa |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | | | | |

**May**

| Su | M | Tu | W | Th | F | Sa |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

**June**

| Su | M | Tu | W | Th | F | Sa |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | |

5. On every 5th Monday in a month, the students of Miss Bradshaw's class has a free period. How many free periods will the class receive in the four months shown?

6. Keisha was supposed to return a book to the library on the 24th February. The charge on overdue books is $0.25 per day. She returned the book 10 days later.



Chapter 25 Time.indd 316 07/03/18 11:06 AM

(a) On what day and date did she return the book?

(b) How much money did she pay in overdue fees?

7. The month of March ends on Friday. What is the date of the last Saturday in the month of April?

## Chapter Review

**Answer the questions.**

1. $5\frac{3}{4}$ hours = ☐ minutes. What is the missing value in the box?

2. Write the time shown on the clock in digital notation.




3. Write 0019 in 12-hour time.

4. It takes Ricardo 20 minutes to walk 1 kilometre. How many kilometres can he walk in 2 hours?

5. Avinash is 3 years younger than Dimitri. Two years ago, Dimitri was 10 years old. How old is Avinash now?

6. The National Games started at 9.45 a.m. and ended at 3.30 p.m. How long was the event?

7. Alex took 2 hours 15 minutes to complete his homework. If he started doing his homework at 4.30 p.m., at what time did he complete his homework?

8. Four friends took turns playing games on a computer. They played from 2:00 pm to 4:30 pm. If each of them had the same amount of playing time, how much time did each friend have?

9. Every leap year has 366 days. Here are some leap years: 2000, 2004, 2008. What will be the next leap year after 2017?

10. Mark was born on the 1 January 2006. What will be his age in years and months on 1 September 2017?

11. The opening hours for a shop is shown in the notice below.

**Opening Hours**

9:00 am to 12:30 pm

1:45 pm to 6:30 pm

What is the total time in hours and minutes that the shop opens each day?

12. Use the information in the TV program guide shown below to answer the question.

| Time | Program |
|---|---|
| 6:00 am | Morning Chat |
| 8:00 am | Learning Street |
| 9:00 am | News |
| 9:15 am | Government Program |
| 10:30 | Advertisement |

(a) If the programs are continuous with no breaks in between, what program airs at 10:00 am?

(b) How much longer is the Government Program than Learning Street?



Chapter 25 Time.indd 317 07/03/18 11:06 AM

CHAPTER

26

# Lines, Angles and Triangles

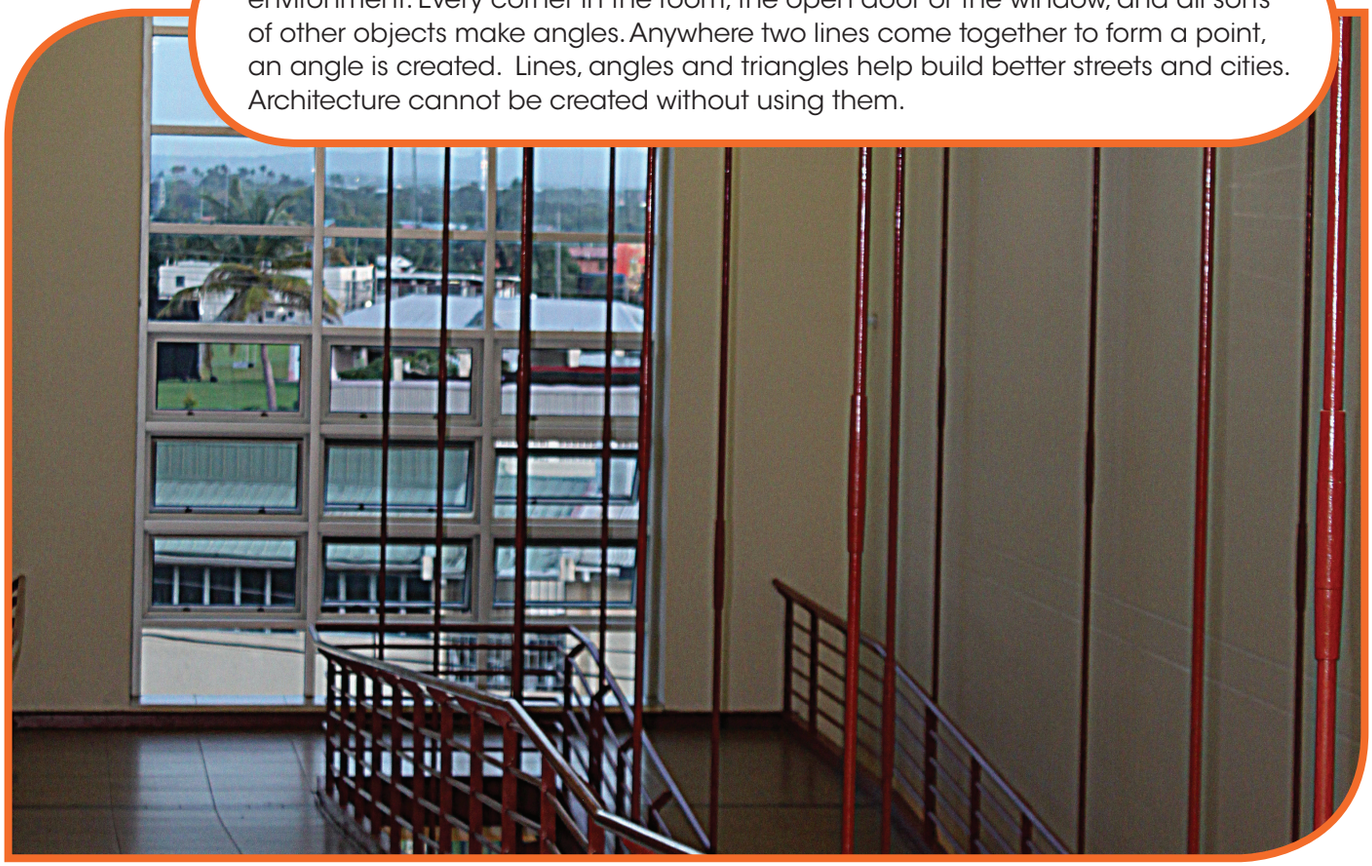
**Vocabulary:**

point
line
endpoint
line segment
parallel line
perpendicular line
intersecting lines
angle
whole turn
rotation
quarter turn
half turn
three quarter turn
clockwise
right angle
isosceles triangle
equilateral triangle
scalene triangle

**Chapter Outcomes:**

- Demonstrate an understanding of the properties of solids and plane shapes.
- Demonstrate an understanding of angles.
- Demonstrate an understanding of the different types of triangles based on properties of sides and angles.

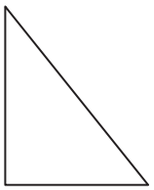
Take note of the curves, angles, lines and other aspects which create your environment. Every corner in the room, the open door or the window, and all sorts of other objects make angles. Anywhere two lines come together to form a point, an angle is created. Lines, angles and triangles help build better streets and cities. Architecture cannot be created without using them.



## Getting Ready for Chapter 26

**Write the number of sides and vertices.**

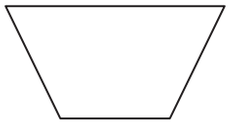
**1.**



___ sides

___ vertices

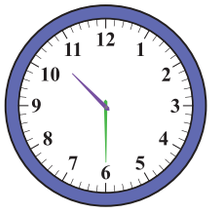
**2.**



___ sides

___ vertices

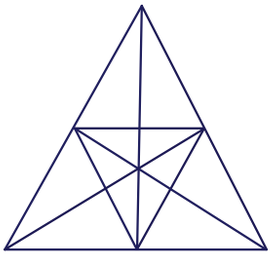
**3.** Tell the time on the clock.




**4.** Which are parts of lines and which are not?



**5.** How many triangles can you count?



## Lines

### Teaching Point 1:

*What is important to know about lines?*

| | |
|---|---|
| ● **point** | A **point** is the exact position that is represented by a dot. |
| ⟷ **line** | A **line** is a straight set of points that extends in opposite directions without ending. |
| end point — **line segment** | A **line segment** is a part of a line with two endpoints. |

### Activity 1:

**Write a name for each.**

**1.**



**2.**



**3.**



**Draw and label a picture of each.**

**4.** line

**5.** point

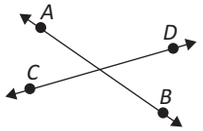
**6.** line segment



Chapter 26 Lines, Angles and Triangles.indd 319 07/03/18 11:07 AM

## Teaching Point 2:

*How can you identify and draw parallel lines and perpendicular lines?*




intersecting lines

**Intersecting lines** are lines that meet and cross each other.

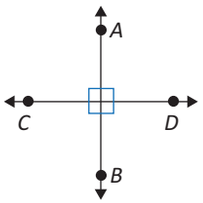
line ***AB*** intersects line ***CD***.




parallel lines

**Parallel lines** are always the same distance apart. They **do not** meet and cross each other.

line ***AB*** is parallel to line ***CD***.




perpendicular lines

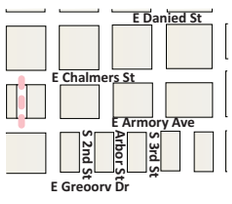
**Perpendicular lines** meet or cross each other to form **square corners.**

line ***AB*** is perpendicular to line ***CD***.

## Activity 2:

**Identify the perpendicular lines and parallel lines in the objects below.**

1. 

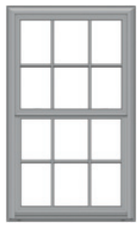
2. 

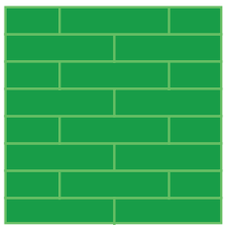

3. 

4. 

5. 

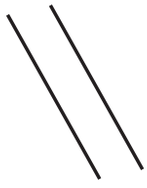
6. 

7. 

8. 

## Activity 3:

**Tick the pairs of lines that appear to be parallel.**

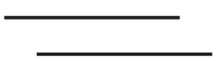
1. 

2. 

3. 

4. 

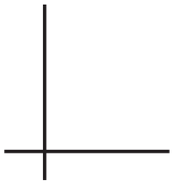
5. 

6. 



Chapter 26 Lines, Angles and Triangles.indd 320 07/03/18 11:07 AM

**Tick the pairs of lines appear to be perpendicular.**

| | |
|---|---|
| 7.  | 8.  |
| 9.  | 10.  |
| 11.  | 12.  |

## Activity 4:

**Copy each line. Draw a line that is perpendicular to each given line.**

1. 

2. 

3. 

**Copy each line. Draw a line that is parallel to each given line.**

4. 

5. 

6. 

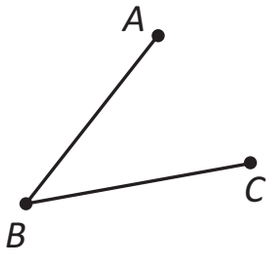
# Angles

## Teaching Point 1:

*How can you identify angles?*

An **angle** is formed when two line segments share the same endpoint.

The shared endpoint is called the **vertex**.




angle

You can name an angle by its vertex.

You can also name an angle using the three endpoints with the vertex point in the middle.

angle ***B*** or angle ***ABC***

In a plane shape two sides meet at a corner to form an angle.

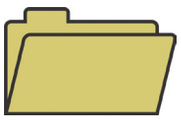
## Activity 1:

**Find angles in the objects below.**

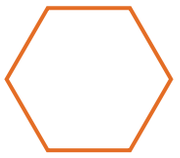
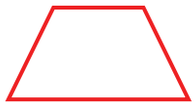
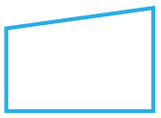
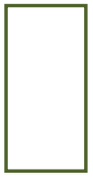
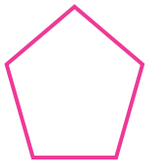
| | |
|---|---|
| 1.  | 2.  |



Chapter 26 Lines, Angles and Triangles.indd 321 07/03/18 11:07 AM

| | |
|---|---|
| 3.   | 4.  |
| 5.  | 6.  |
| 7.  | 8.  |

**Copy each shape. Find the number of angles in each shape.**

| | |
|---|---|
| 9.  | 10.  |
| 11.  | 12.  |
| 13.  | 14.  |
| 15.  | 16.  |

## Teaching Point 2:

*How can you identify angles?*

An angle measures the **amount of turn**.

Two interlocking blue and red circles measure the amount of turn. As the red circle rotates **clockwise**, it moves from no turn through a whole turn.



**no turn**



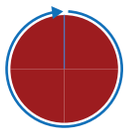
$\frac{1}{4}$ **turn** clockwise



$\frac{1}{2}$ **turn** clockwise



$\frac{3}{4}$ **turn** clockwise



**1 whole turn** clockwise

**Clockwise** is the same direction as the hands of a clock.

**Anti-clockwise** is the direction opposite from the way the hands move on a clock.

## Activity 2:

**Use real objects. Describe the amount of turn each object can make.**

| | |
|---|---|
| 1.  | 2.  |



Chapter 26 Lines, Angles and Triangles.indd 322 07/03/18 11:08 AM

3. 

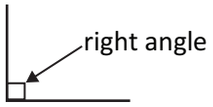
4. 

## Teaching Point 3:

*How can you identify right angles?*

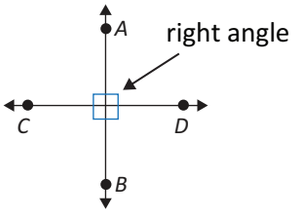


$\frac{1}{4}$ **turn** is also called a **right angle**




A square is drawn in the corner of the angle to show that it is a right angle.

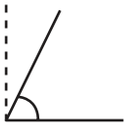
Right angles are formed when two perpendicular lines meet or cross each other.



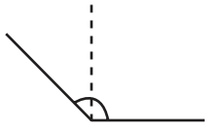

A right angle forms a square corner.



A **right angle**



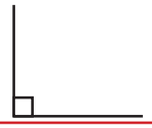
**Less than** a right angle



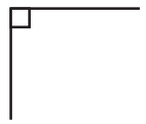
**Greater than** a right angle

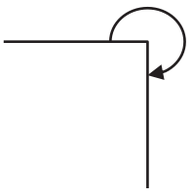
## Activity 3:

**Draw each angle. Use $\frac{1}{4}$ turn, $\frac{1}{2}$ turn or $\frac{3}{4}$ turn to label each angle.**

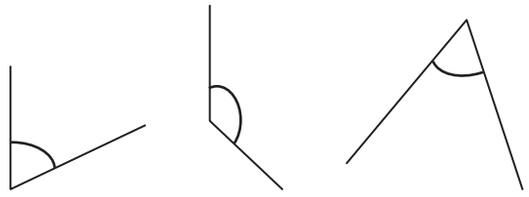
1. 

2. 

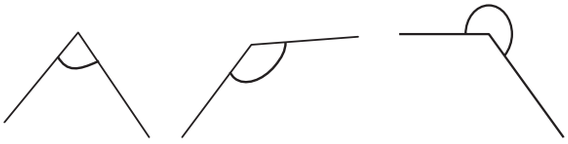
3. 

4. 

5. Which of these angles are less than a right angle?



6. Which of these angles are more than a half turn.

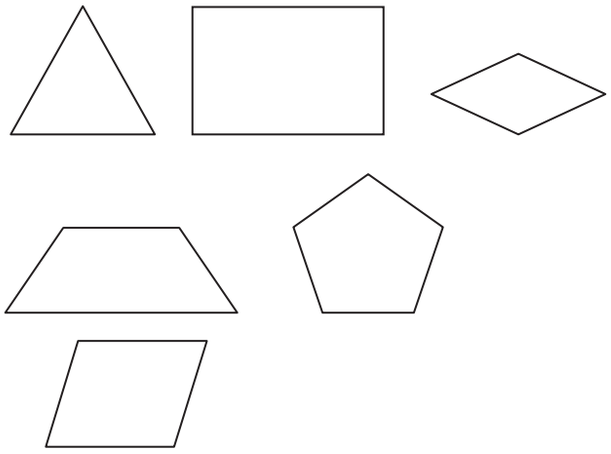


## Activity 4:

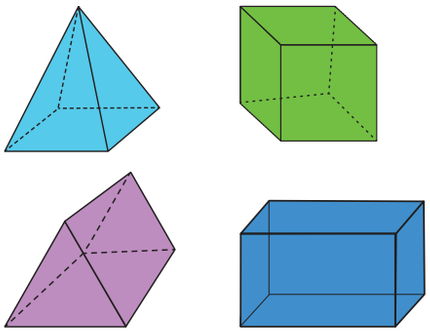
1. Describe the angles in each plane shape as right angles, greater than right angles or smaller than right angles.



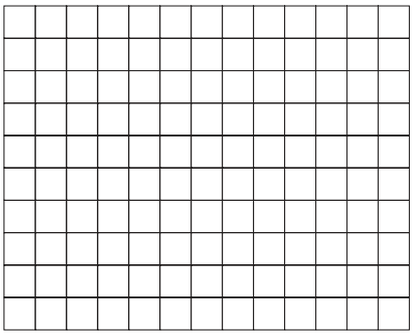
Chapter 26 Lines, Angles and Triangles.indd 323 07/03/18 11:08 AM



2. Describe the angles on the faces of each solid as right angles, greater than right angles or smaller than right angles.



**Use a grid like the one below to complete numbers 3 to 5.**

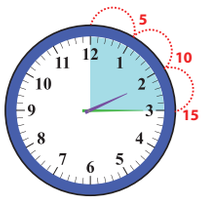


3. Draw a plane shape that has four right angles on the grid below.
4. Draw a plane shape that has one of its angle greater than a right angle.
5. Draw a plane shape that has an three angles that are smaller than a right angle.

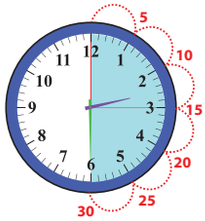
## Teaching Point 4:

*How can we use clocks to show angles?*

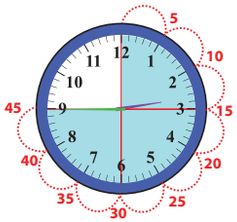
A clock can represent angles.



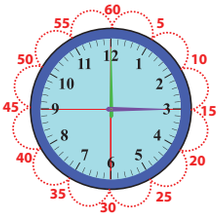
15 minutes = $\frac{1}{4}$ turn



30 minutes = $\frac{1}{2}$ turn



45 minutes = $\frac{3}{4}$ turn



60 minutes = 1 turn

Each 5 minutes represents $\frac{1}{12}$ turn.

## Activity 5:

**Solve.**

1. Susan watched a game from 1 p.m. to 1:30 p.m. Describe the turn the minute hand made.



Chapter 26 Lines, Angles and Triangles.indd 324 07/03/18 11:08 AM

2. Carrie does her homework from 4 p.m. to 4:45 p.m. What is the amount of turn the minute hand made?

3. On a clock face what angle is formed by the two hands of the clock when it is 6 o'clock?

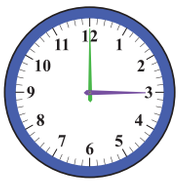
4. Jenny's snack time is 15 minutes each day. Which fraction describes the turn of the minute hand on the clock face after Jenny has her snack?

5. Samara began reading at 7:45 p.m. and finished reading when the minute hand had made a half turn.



At what time did Samara finish reading?

6. In the diagram below, the shorter hand is pointing to the number 3.



The shorter hand makes a quarter turn. To which number is it now pointing?

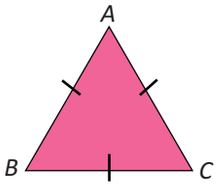
7. The long hand on the clock makes a complete turn. What time is it now?



## Classify Triangles

### Teaching Point 1:

*How can you classify triangles by the length of their sides?*

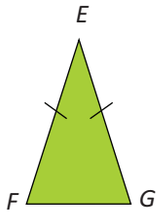



**equilateral triangle**

In triangle ***ABC***, all the sides are of **equal lengths**.

Sides AB = BC = AC

***ABC*** is an **equilateral triangle**.

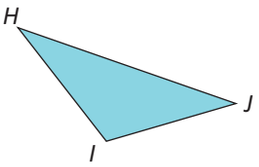



**isosceles triangle**

In triangle ***EFG***, two sides are of **equal lengths.**

Sides EF = EG

***EFG*** is an **isosceles triangle**.




**scalene triangle**

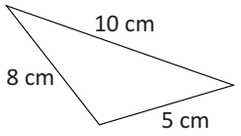
In triangle ***HIJ***, all the sides have **different lengths**.

***HIJ*** is a **scalene triangle**.

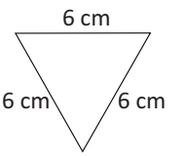
### Activity 1:

**Classify each triangle. Write isosceles, equilateral or scalene.**

**1.**



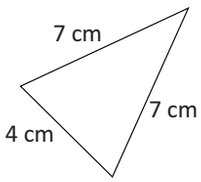

**2.**



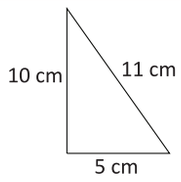



Chapter 26 Lines, Angles and Triangles.indd 325 07/03/18 11:08 AM

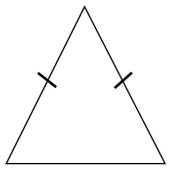
**3.**



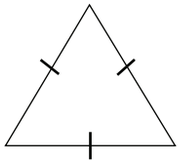

**4.**




**5.**

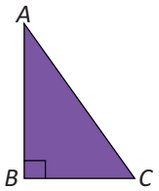


**6.**



## Teaching Point 1:

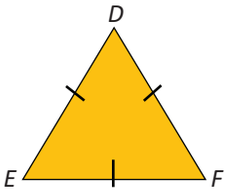
*How can you classify triangles by the size of their angles?*




**right-angled triangle**

In triangle ***ABC***, angle ***B*** is a right angle.

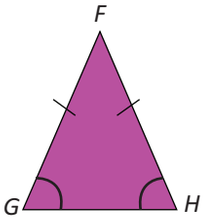
Δ***ABC*** is a **right-angled triangle**.




**equilateral triangle**

**Equilateral triangle *DEF***, has **3 equal sides** and **3 equal angles**.

Each of its angles are smaller than a right angle.



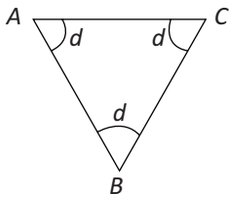

**isosceles triangle**

**Isosceles triangle *FGH***, has **2 equal sides** and **2 equal angles**.

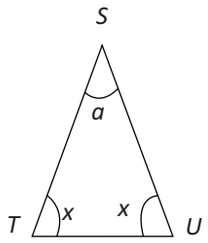
## Activity 2:

**Classify each triangle. Write isosceles, equilateral or right-angled.**

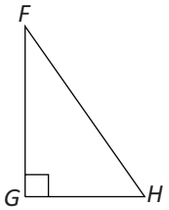
**1.** Triangle *ABC* has ONLY equal angles.




**2.** Triangle *STU* has 2 equal angles.




**3.** Triangle *FGH*.




**4.** Draw an example of an isosceles triangle.

**5.** Draw an example of a right-angled scalene triangle.

**6.** Draw an example of an equilateral triangle.



Chapter 26 Lines, Angles and Triangles.indd 326 07/03/18 11:08 AM

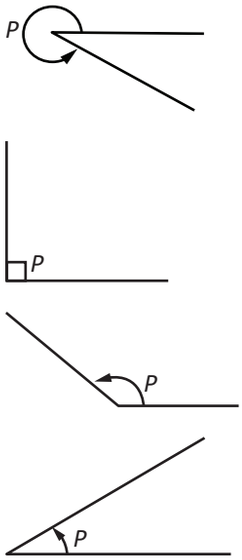
## Chapter Review

**Answer the questions.**

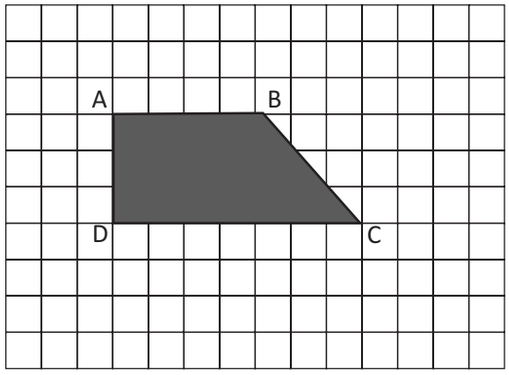
1. Draw a scalene triangle.

2. What angle is formed when two perpendicular lines meet?

3. Which of the following angles marked *p* is greater than a right angle?



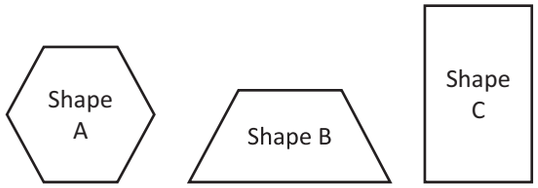

4. The following diagram shows a plane shaded shape ABCD.




On the diagram ABCD, tick (✓) the two sides which are parallel to each other.

5. An equilateral triangle has a perimeter of 90 cm. How long is each side?

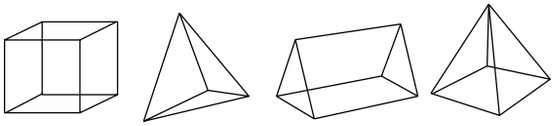
6. Use the plane shapes below to complete each statement.




(a) All of Shape _____ angles are right angles.

(b) Each of Shape _____ interior angles are greater than right angles.

7. Four solids are shown below.

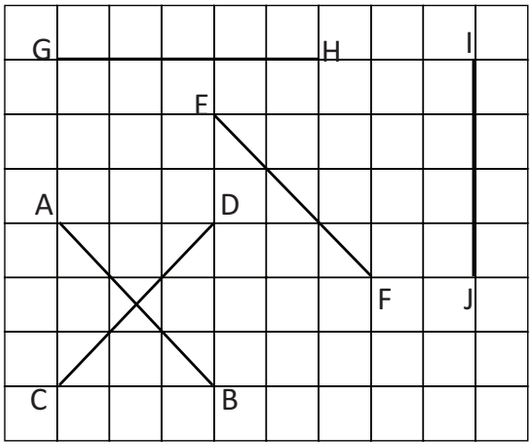


(a) Which solid has NO right angles on any of its faces.

(b) Which solid has ONLY right angles on each of its faces?

(c) How many right angles are on the faces of the triangular prism?

8. The diagram below shows five lines, AB, CD, EF, GH and IJ.

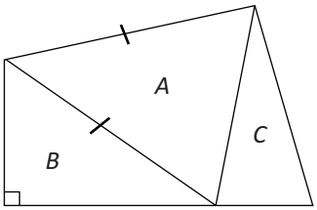



Which of the lines is PARALLEL to AB?



Chapter 26 Lines, Angles and Triangles.indd 327 07/03/18 11:08 AM

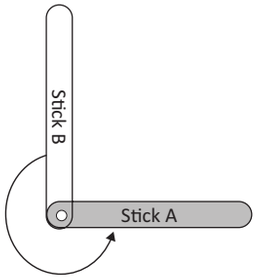
**9.** The figure below is made up of three triangles. Triangle A has two equal sides. Complete the statements.




Triangle _____ has two equal angles.

Triangle _____ is a right-angled triangle.

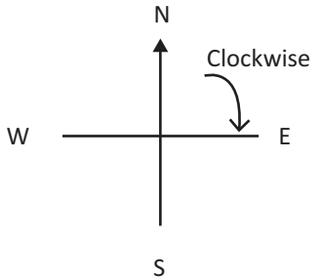
**10.** Adesh rotated two palette sticks as shown below.




**(a)** In what direction did he rotate Stick A?

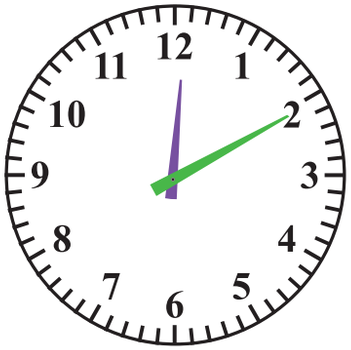
**(b)** Describe the amount of turn that Stick A made.

**11.** Vitali is facing West and makes THREE $\frac{1}{4}$ turns in a clockwise direction.



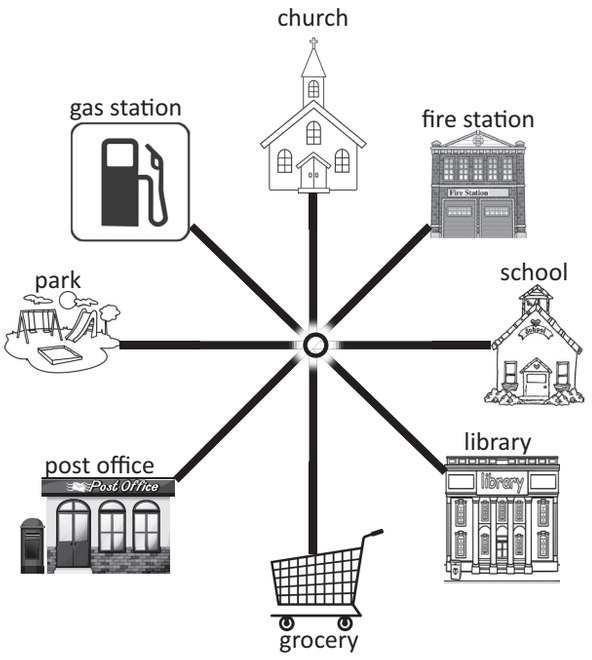

In which direction will Vitali now be facing?

**12.** The minute hand on the clock below is on 2.




It moves to 8. What is the amount of turn the minute hand made?

**13.** In the diagram Andell is standing at point O facing the post office. Which place will he be facing if he makes a $\frac{1}{4}$ of a complete turn anti-clockwise?






Chapter 26 Lines, Angles and Triangles.indd 328 07/03/18 11:08 AM

CHAPTER

27

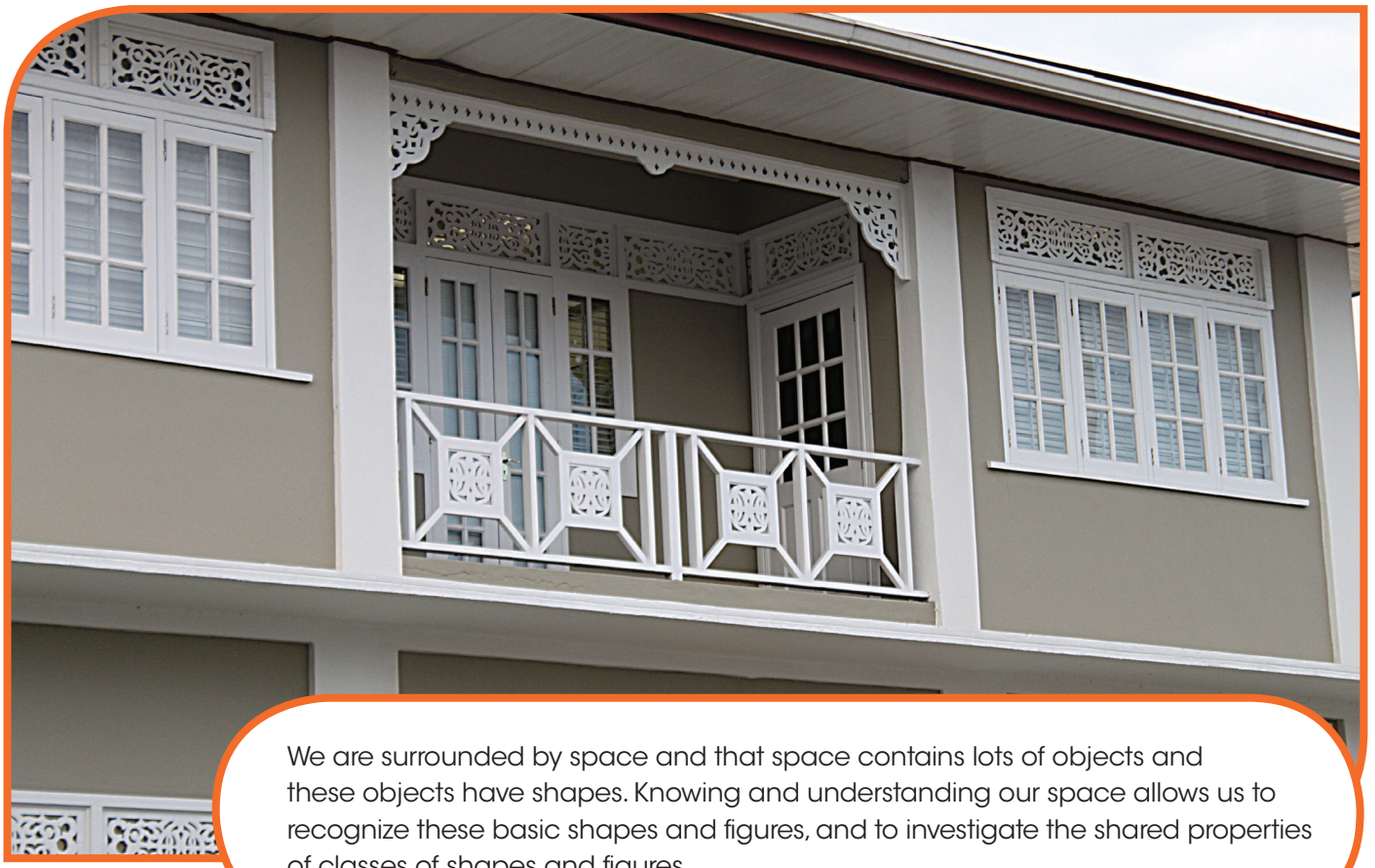
# Plane Shapes

**Vocabulary:**

polygon
base
height
trapezium
parallelogram
rhombus
properties
attributes
quadrilateral

**Chapter Outcomes:**

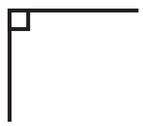
- Demonstrate an understanding of the properties of plane shapes.
- Classify and determine the properties of quadrilaterals.
- Construct and draw plane shapes given a description of their properties and using appropriate resources including computer software.
- Solve problems involving plane shapes.

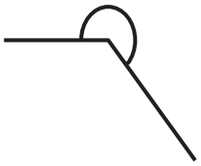


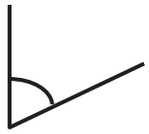
We are surrounded by space and that space contains lots of objects and these objects have shapes. Knowing and understanding our space allows us to recognize these basic shapes and figures, and to investigate the shared properties of classes of shapes and figures.

## Getting Ready for Chapter 27

**Classify the angles. Write right angle, greater than right angle, or smaller than right angle.**

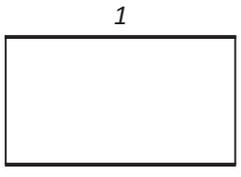
1. 

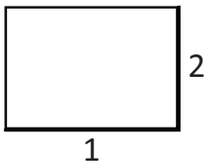
2. 

3. 

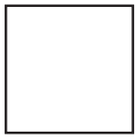
4. 

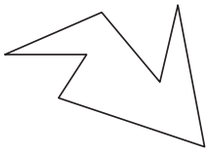
**Write parallel, or perpendicular to describe the numbered sides of each shape.**

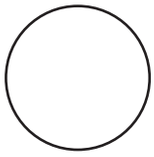
5. 

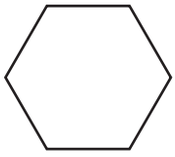

6. 


**How many sides and vertices does each figure have?**

7. 

8. 

9. 

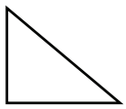
10. 

## Identify and classify Plane Shapes

### Teaching Point 1:

*How do you classify plane shapes?*

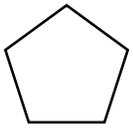
#### Polygons



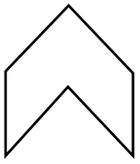
A **triangle** has 3 sides and 3 vertices.



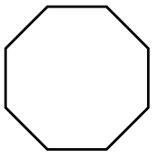
A **quardrilateral** has 4 sides and 4 vertices.



A **pentagon** has 5 sides and 5 vertices.

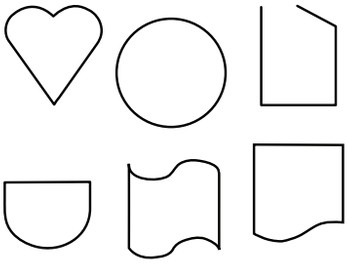


A **hexagon** has 6 sides and 6 vertices.



A **octagon** has 8 sides and 8 vertices.

#### Not Polygons



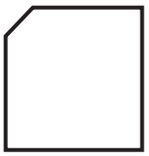
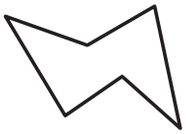
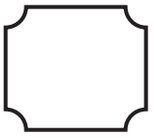
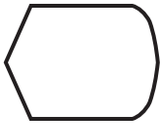
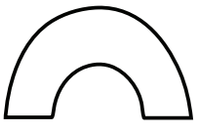
A **polygon** is a closed plane shape that is formed by three or more line segments called sides.



Chapter 27 Plane Shapes.indd 330 04/04/18 5:02 PM

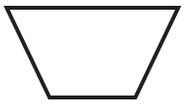
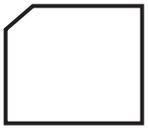
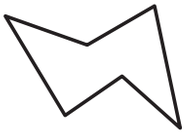
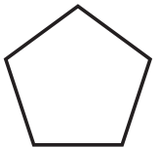
## Activity 1:

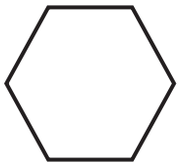
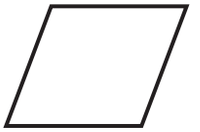
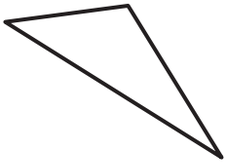
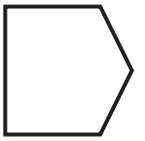
**Write polygon or not polygon to classify each plane shape.**

| | |
|---|---|
| 1.  | 2.  |
| 3.  | 4.  |
| 5.  | 6.  |
| 7.  | 8.  |
| 9.  | 10.  |

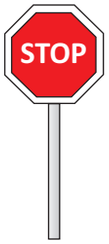
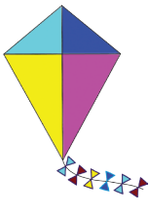
## Activity 2:

**Classify the polygons. Write triangle, quadrilateral, pentagon, hexagon or octagon.**

| | |
|---|---|
| 1.  | 2.  |
| 3.  | 4.  |

| | |
|---|---|
| 5.  | 6.  |
| 7.  | 8.  |
| 9.  | 10.  |

**Identify two polygons on each object below.**

| | |
|---|---|
| 11.   | 12.  |
| 13.  | 14.  |

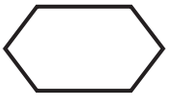
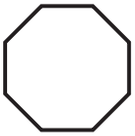
## Activity 3:

**Complete the table below.**

| Polygons | Sides | Angles | Vertices |
|---|---|---|---|
|  triangle | 3 | 3 | 3 |



Chapter 27 Plane Shapes.indd 331 04/04/18 5:02 PM

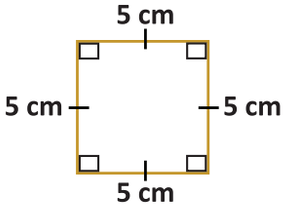
| Polygons | Sides | Angles | Vertices |
|---|---|---|---|
|  quadrilateral | | | |
|  pentagon | | | |
|  hexagon | | | |
|  octagon | | | |

## Teaching Point 2:

*How do you identify and classify polygons?*

### Regular Polygons

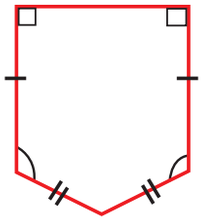
In a regular polygon, all sides are equal and all angles are equal.




A square is a regular polygon.

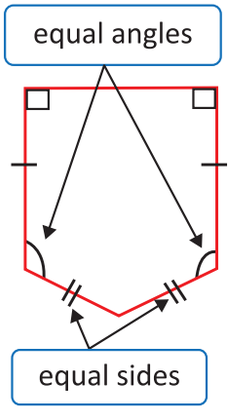
### Irregular Polygons

In an irregular polygon, not all sides are equal and not all angles are equal.



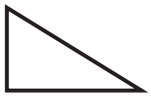
You can draw small lines on the sides of a shape to show whether the sides are equal or not.

You can draw curved lines or use letters to show whether angles are equal or not.



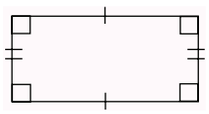
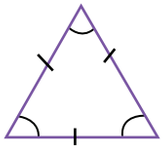
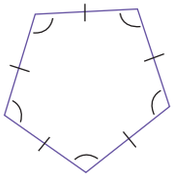
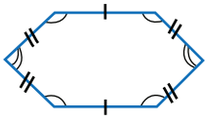
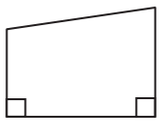
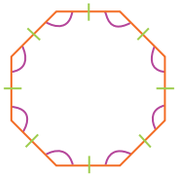

## Activity 4:

**Complete the table. Use the markings on the polygons to help you.**

| Polygon | Name | Regular or Irregular |
|---|---|---|
|  | triangle | irregular |



Chapter 27 Plane Shapes.indd 332 04/04/18 5:02 PM

| Polygon | Name | Regular or Irregular |
|---|---|---|
|  | | |
|  | | |
|  | | |
|  | | |
|  | | |
|  | | |

**Draw a regular and an irregular polygon for each of the following.**

1. quadrilateral
2. triangle
3. pentagon
4. hexagon

## Classify Quadrilaterals

### Teaching Point 1:

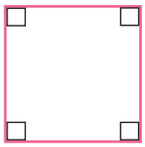
*How do you identify and classify quadrilaterals?*

**Rectangle**



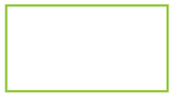
- Opposite sides equal
- All angles right angles
- Opposite sides parallel

**Square**



- All sides equal
- All angles right angles
- Opposite sides parallel

**Parallelogram**



- Opposite sides equal
- Opposite sides parallel

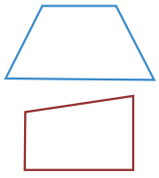


**Rhombus**



- All sides equal
- Opposite sides parallel

**Trapezium**



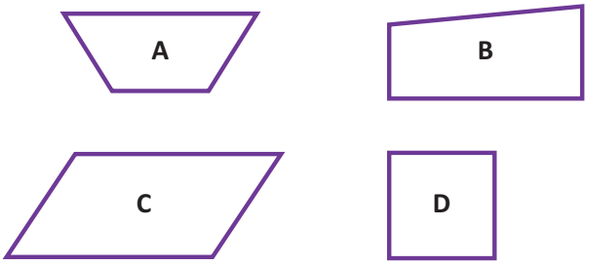
- Exactly one pair of opposite sides parallel



Chapter 27 Plane Shapes.indd 333 04/04/18 5:02 PM

## Activity 1:

**Determine if the sides and angles of each figure are equal. Determine if any side is parallel. Complete the table.**




| Attributes | Figure(s) |
|---|---|
| 1. Opposite sides are equal. | |
| 2. Opposite sides are parallel. | |
| 3. All angles are right angles. | |

4. What are some additional attributes that D has that C does not have?

5. Classify each quadrilateral above.

6. Which quadrilateral named below has all the attributes of a parallelogram?

   rectangle rhombus square trapezium

7. Which quadrilateral named below has all the attributes of a rhombus?

   rectangle parallelogram square trapezium

## Activity 2:

**Describe the attributes of each quadrilateral below. Then classify the quadrilateral based on its attributes.**

1. 

   The opposite sides of the quadrilateral are _____ and _____.

   There are _____ right angles.

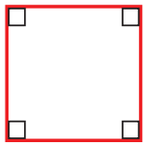
   So the quadrilateral is a _____

2. 

   The opposite sides of the quadrilateral are _____ and _____.

   There are _____ right angles.

   So the quadrilateral is a _____

3. 

   The opposite sides of the quadrilateral are _____.

   All sides are _____.

   There are _____ right angles.

   So the quadrilateral is a _____.

4. 

   Exactly one pair of opposite sides of the quadrilateral is _____.

   There are _____ right angles.

   So the quadrilateral is a _____.



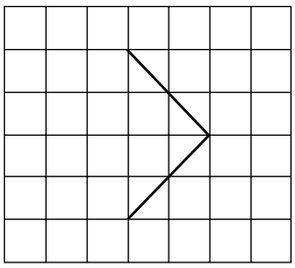
Chapter 27 Plane Shapes.indd 334 04/04/18 5:02 PM

## Sketch Quadrilaterals

### Teaching Point 1:

*How do you sketch and label quadrilaterals from given descriptions?*

The diagram below shows two sides of a figure. Complete the sketch to show a parallelogram.

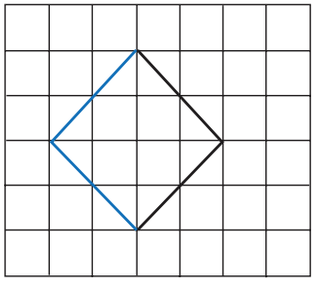


**Think:** A parallelogram has opposite sides equal and opposite sides parallel.

**Step 1:** **Determine the length of the sides.**

Both sides are the same length of 2 units.

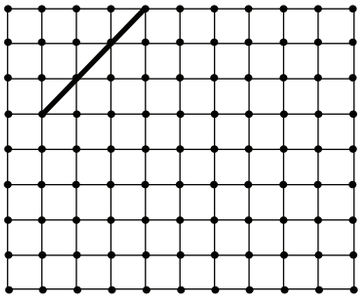
**Step 2:** **Draw opposite sides parallel to each other according to the length.**



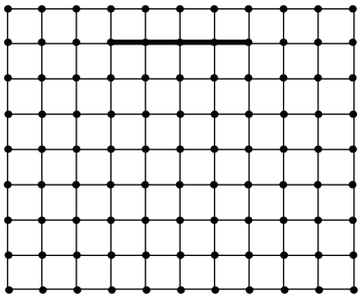
### Activity 1:

**Join the dots to complete each quadrilateral.**

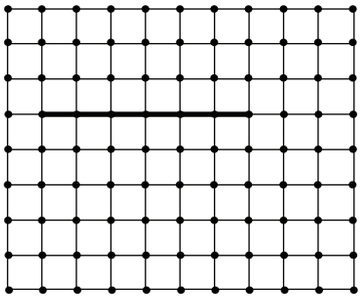
1. rectangle



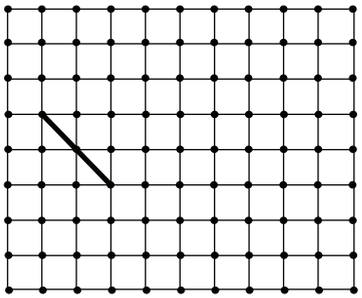
2. square



3. parallelogram



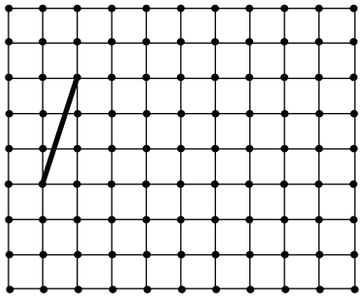
4. rhombus



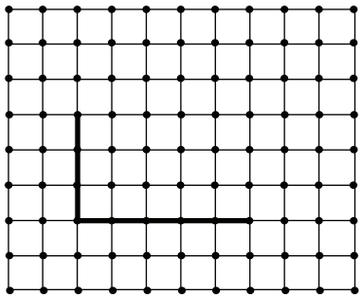


Chapter 27 Plane Shapes.indd 335 04/04/18 5:02 PM

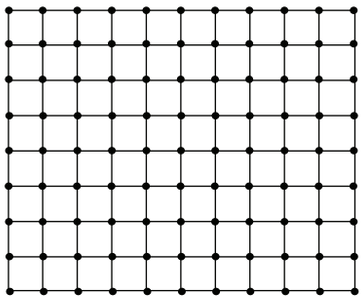
**5.** trapezium



**6.** Join the dots to form a quadrilateral that has ONLY one pair of parallel sides.



**7.** Megan draws a quadrilateral with two right angles. Draw Megan's shape.



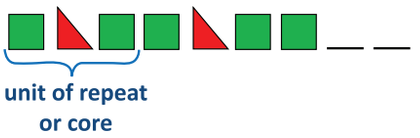
## Patterns with Plane Shapes

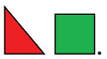
### Teaching Point 1:

*How are patterns used in Geometry?*

A geometric pattern uses shapes in a repeating sequence to follow a set of rules.

Draw the missing shapes in the pattern.




So the missing shapes are  .

---

 _____ _____

**(a)** Draw the next two shapes in the pattern.

**(b)** How many triangles would be in the tenth shape?

You can use a table to help find the pattern.




| Shape | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| No. of △ | 1 | 2 | 3 | | | | |

So, the missing shapes are 

and  .

So, the tenth shape would have 10 triangles.



Chapter 27 Plane Shapes.indd 336 04/04/18 5:03 PM

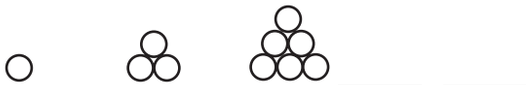
## Activity 1:

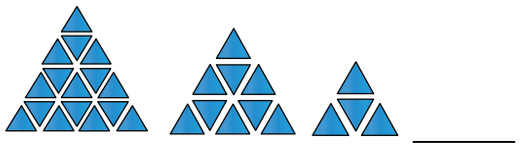
**Copy and extend each pattern.**

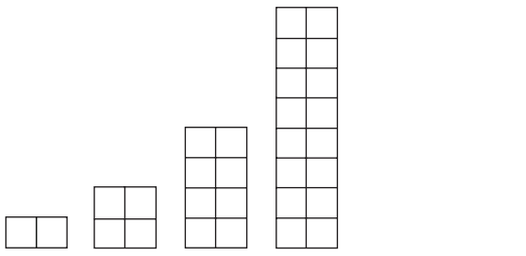
1. 

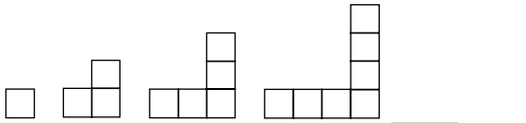
2. 

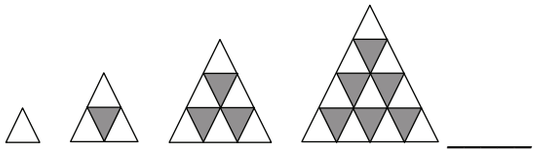
3. 

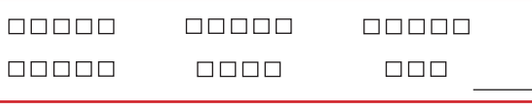
4. 

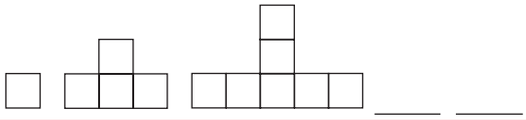
5. 

6. 

7. 

8. 

9. 

10. 

11. 

## Activity 2:

**Solve the pattern problems below.**

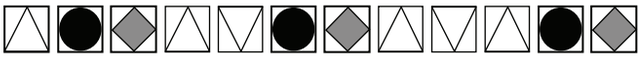
1. Rihanna is drawing a border around a poster. She wants to copy the design below.



   (a) What shape should Rihanna draw next to continue the design pattern?

   (b) What will be the 16th shape in Rihanna's design?

2. Draw the 15th shape for the pattern that is shown below.



3. What is the error in the pattern below?



4. Tamara is drawing a pattern using two kinds of shapes. She begins the pattern with a square then follows it with circles.

   (a) If after every 4 circles there is a square, what will be the 18th shape?

   (b) How many circles would she have drawn by the 20th shape?

5. Use the following shapes to create a repeating pattern.



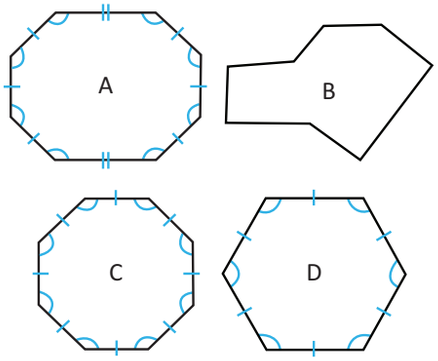


Chapter 27 Plane Shapes.indd 337 04/04/18 5:03 PM

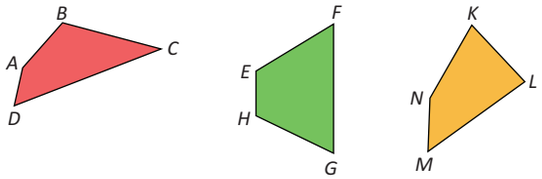
## Chapter Review

**Answer the questions.**

**1.** Which of the following is a regular hexagon?

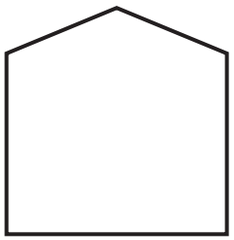



**2.** Which figure is a trapezium?

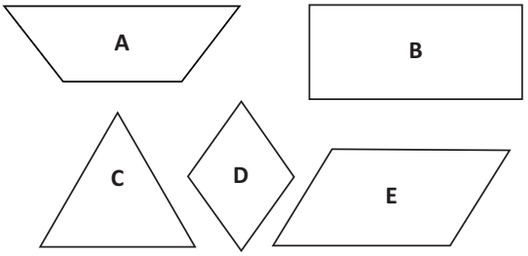



**3.** How can you classify the sides and angles of a square?

**4.** Name the shape below.



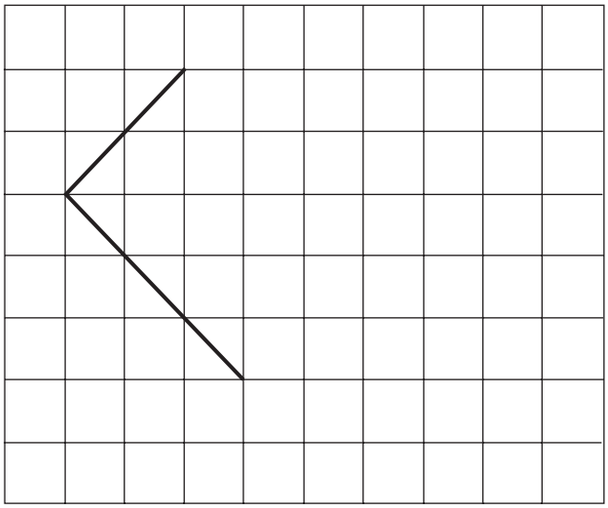
**5.** Five plane shapes, A, B, C, D, and E, are shown below.




**(a)** Which of the shapes has ONLY ONE pair of parallel lines?

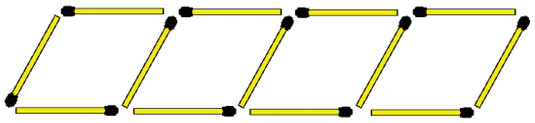
**(b)** Name the shape.

**6.** The following diagram shows two sides of an incomplete shape.

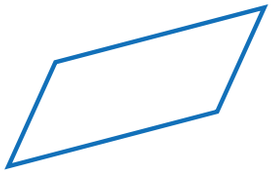


Complete the shape shown in the diagram by drawing the other sides to form a quadrilateral with opposite sides equal and parallel.

**7.** If the pattern shown below is continued until there are 12 rhombuses, how many matchsticks will be in the pattern?



**8.** Describe the attributes of the polygon shown below. Then classify the polygon.





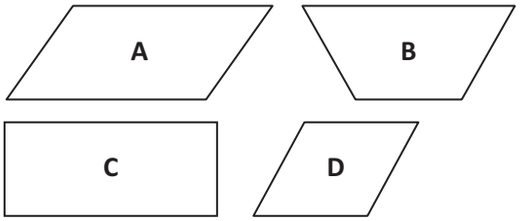
Chapter 27 Plane Shapes.indd 338 04/04/18 5:03 PM

**9.** A bathroom has a tiled border with a repeating pattern as shown below.



Shade the tiles to complete the pattern.

**10.** Four quadrilaterals are shown below.

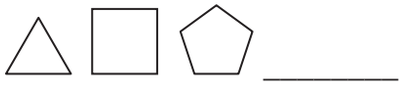



**(a)** Which has 4 right angles?

**(b)** Which shape has exactly one pair of opposite parallel sides?

**(c)** Which has opposite sides that are parallel and equal?

**11.** Leanna drawing a pattern with shapes.



**(a)** If the pattern continues what shape will she draw next?

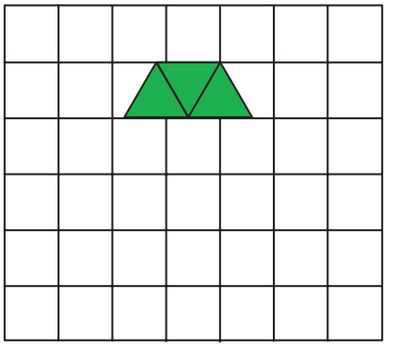
**(b)** What will be the name of that shape?

**12.** Teanna uses pattern blocks to make the shape below.



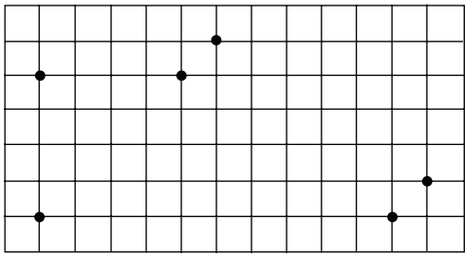
**(a)** What is the name of the shape that she made?

**(b)** She joins 3 other similar triangles to form a regular six-sided polygon. Complete the shape below.



**(c)** What is the name of the new shape?

**13.** Choose four endpoints and connect them to form a trapezium.





Chapter 27 Plane Shapes.indd 339 04/04/18 5:03 PM

CHAPTER

28

# Symmetry

**Vocabulary:**

line symmetry

symmetrical

mirror symmetry

reflecting

**Chapter Outcomes:**

- Demonstrate an understanding of the concept of line symmetry.
- Solve problems involving line symmetry.



Symmetry is found everywhere in nature and is also one of the most common themes in art, architecture, and design. Most, if not all architectural traditions include symmetry. Symmetry is something that Islamic mosques, Chinese pagodas, Hindu temples, cathedrals and many other buildings have in common.

## Getting Ready for Chapter 28

**How many sides, vertices and angles does each shape have?**

1. 

2. 

---

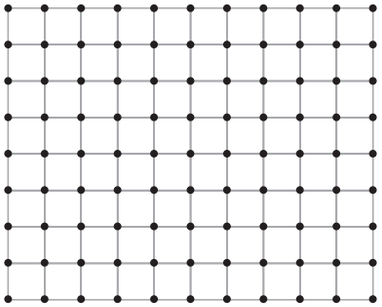
**What plane shape will be formed when you combine each set of shapes.**

3. 

4. 

---

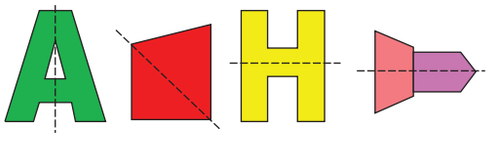
5. Draw a triangle on the grid paper.



---

6. How many of  will it take to make up  ?

7. Identify the symmetric figures.

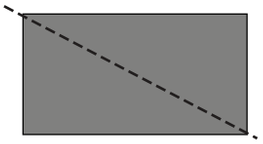


## Line Symmetry

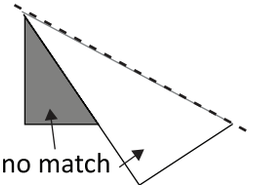
### Teaching Point 1:

*How can you check if a figure has line symmetry?*

Is the line a line of symmetry?



Fold the shape along the dashed line.




The parts on each side do not match.

So, the line **is not** a line of symmetry.

---



After folding along the line, both parts fit exactly on top of each other.

So the line is a line of symmetry.

A figure has **line symmetry** if it can be folded about a line so that its two parts **can fit exactly on top of each other**.

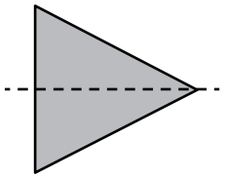
The fold line is called a **line of symmetry**.

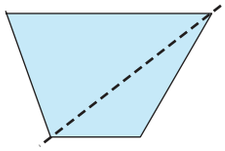


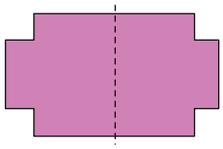
Chapter 28 Symmetry.indd 341 23/03/18 5:03 PM

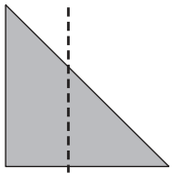
## Activity 1:

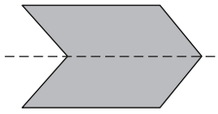
**Tell if the line appears to be a line of symmetry. Write yes or no.**

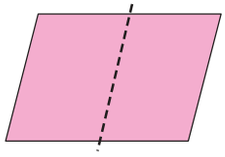
1. 

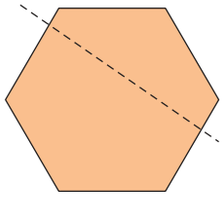
2. 

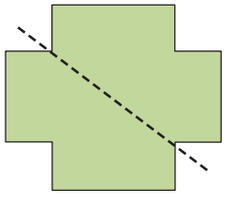
3. 

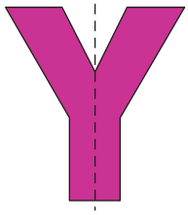
4. 

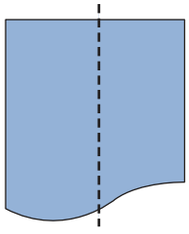
5. 

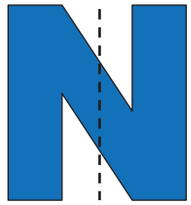
6. 

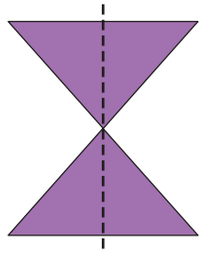
7. 

8. 

9. 

10. 

11. 

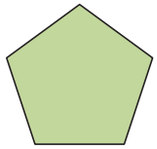
12. 

## Draw Lines of Symmetry

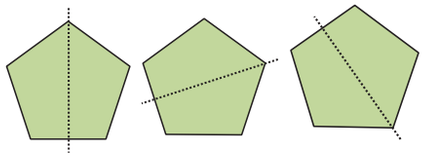
### Teaching Point 1:

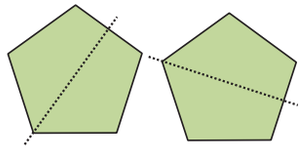
*How do you find lines of symmetry?*

How many lines of symmetry does a regular pentagon have?

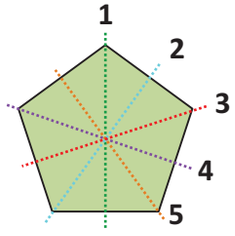


Fold the pentagon in different ways to test for line symmetry. Draw along the fold lines that are the lines of symmetry.





A regular pentagon with 5 equal sides and 5 equal angles has 5 lines of symmetry.

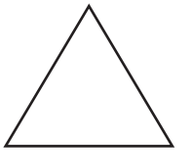
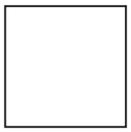
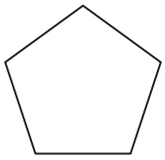
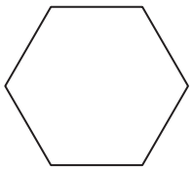
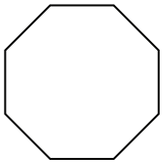





Chapter 28 Symmetry.indd 342 23/03/18 5:03 PM

## Activity 1:

**Complete the table. Find the number of lines of symmetry for the regular polygons.**

| Regular Polygon | Number of Sides | Number of Lines of Symmetry |
|---|---|---|
| 1.  | | |
| 2.  | | |
| 3.  | 5 | 5 |
| 4.  | | |
| 5.  | | |

6. In a regular polygon, all sides are of equal length and all angles are equal. What do you notice about the number of lines of symmetry in regular polygons?

7. How many lines of symmetry does a scalene triangle have?

8. How many lines of symmetry does an isosceles triangle have?

## Activity 2:

**Each figure below has line symmetry. Draw and number the lines of symmetry in each figures.**

1. 

2. 

3. 

4. 

5. 

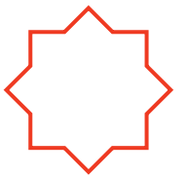
6. 

7. 

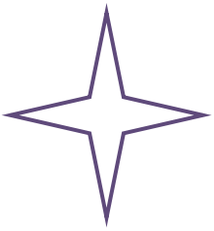
8. 

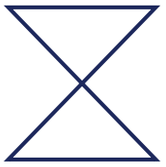


Chapter 28 Symmetry.indd 343 23/03/18 5:03 PM

9. 

10. 

11. 

12. 

## Activity 3:

**Some of these letters have line symmetry. Complete the table below to show the number of lines of symmetry.**

| Letter | Number of Lines of Symmetry |
|---|---|
| 1. A | |
| 2. H | |
| 3. S | |
| 4. B | |
| 5. I | |
| 6. T | |
| 7. C | |
| 8. J | |
| 9. U | |
| 10. D | |
| 11. K | |
| 12. V | |



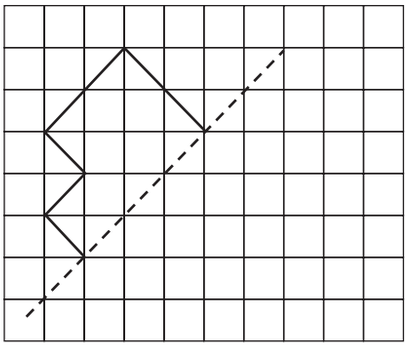
Chapter 28 Symmetry.indd 344 23/03/18 5:03 PM

## Complete Symmetrical Shapes

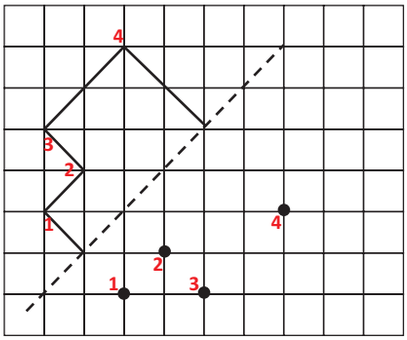
### Teaching Point 2:

*How do you complete symmetrical shapes?*

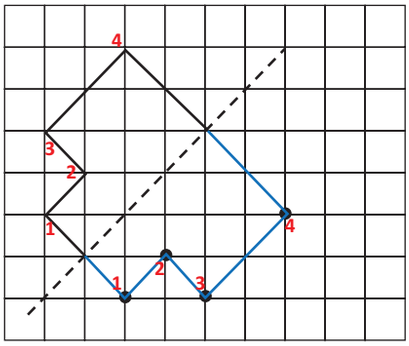
Draw the other half of the symmetrical shape.



**Step 1:** Count and mark off the corners of the grid lines to match half of the shape exactly.

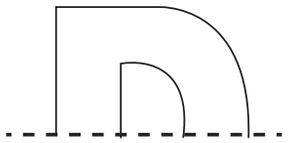


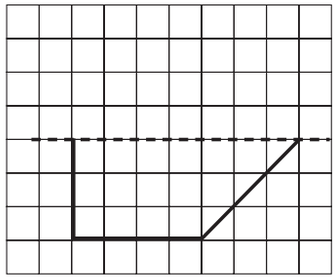

**Step 2:** Join the dots to complete.

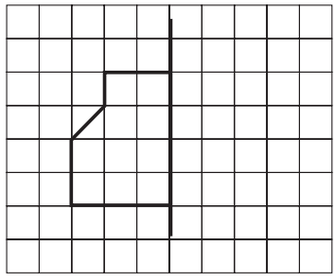


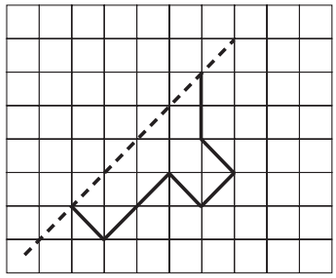

### Activity 1:

**Complete each shape below using the dotted line as the line of symmetry.**

1. 

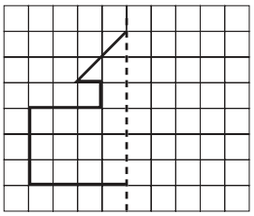
2. 

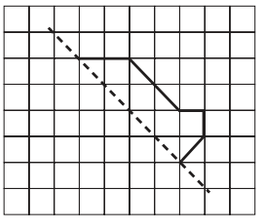
3. 

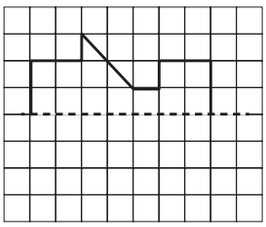
4. 



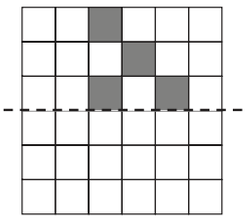
Chapter 28 Symmetry.indd 345 23/03/18 5:03 PM

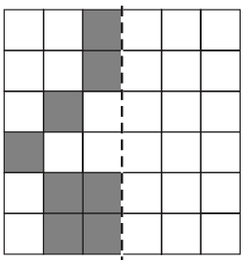
5. 

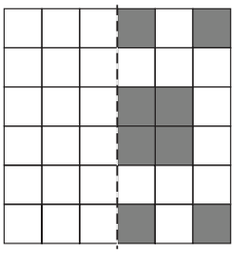
6. 

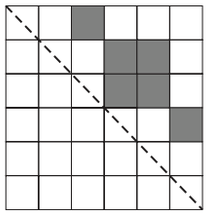
7. 

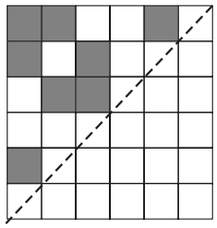
**Shade the squares to make each pattern symmetrical about the dotted line.**

8. 

9. 

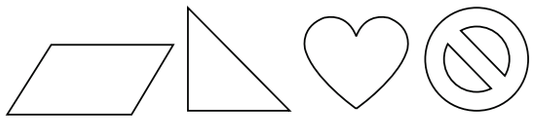
10. 

11. 

12. 

## Solve Problems Involving Symmetry

1. Which of the following figures does not have a line of symmetry?



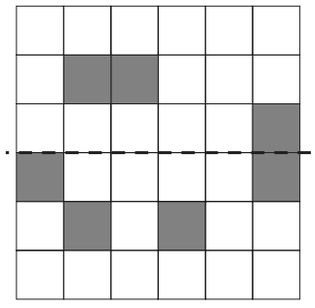
A B C D

2. Write the letter(s) for the figure(s) below that are symmetrical?



A B C D

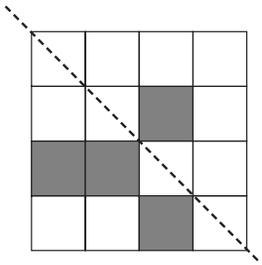
3. The figure below is made up of identical squares. Shade three squares to make the resulting figure symmetrical.





Chapter 28 Symmetry.indd 346 23/03/18 5:03 PM

4. Shade two more squares to make the dotted line the line of symmetry.



## Chapter Review

**Answer the questions.**

1. Which of the following figures does not have line symmetry?

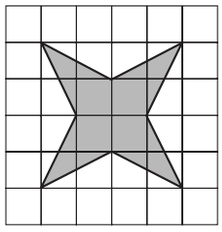


A B C D

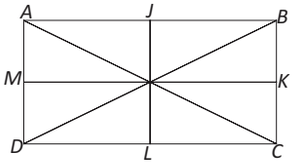
2. How many lines of symmetry does a square have?

3. Draw a quadrilateral that does not have a line of symmetry.

4. How many lines of symmetry are there in the following shaded shape?

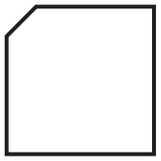


5. The diagram below is a rectangle. The points J, K, L and M are midpoints of its sides.

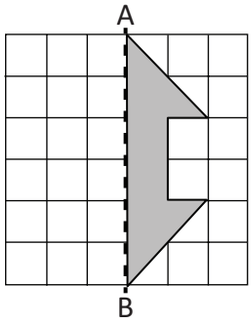



Name the two lines of symmetry of the rectangle.

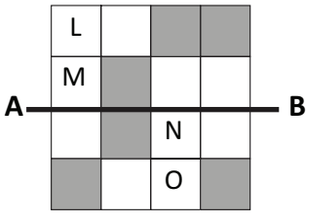
6. Draw a line of symmetry in the figure below.



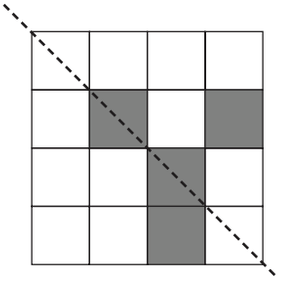
7. Complete the shape below so that AB is a line of symmetry.




8. In the figure below, which two squares (L, M, N or O) must be shaded so that AB becomes the line of symmetry?




9. Shade two more squares so that the figure has the dotted line as a line of symmetry.





Chapter 28 Symmetry.indd 347 23/03/18 5:03 PM

CHAPTER

29

# Solids

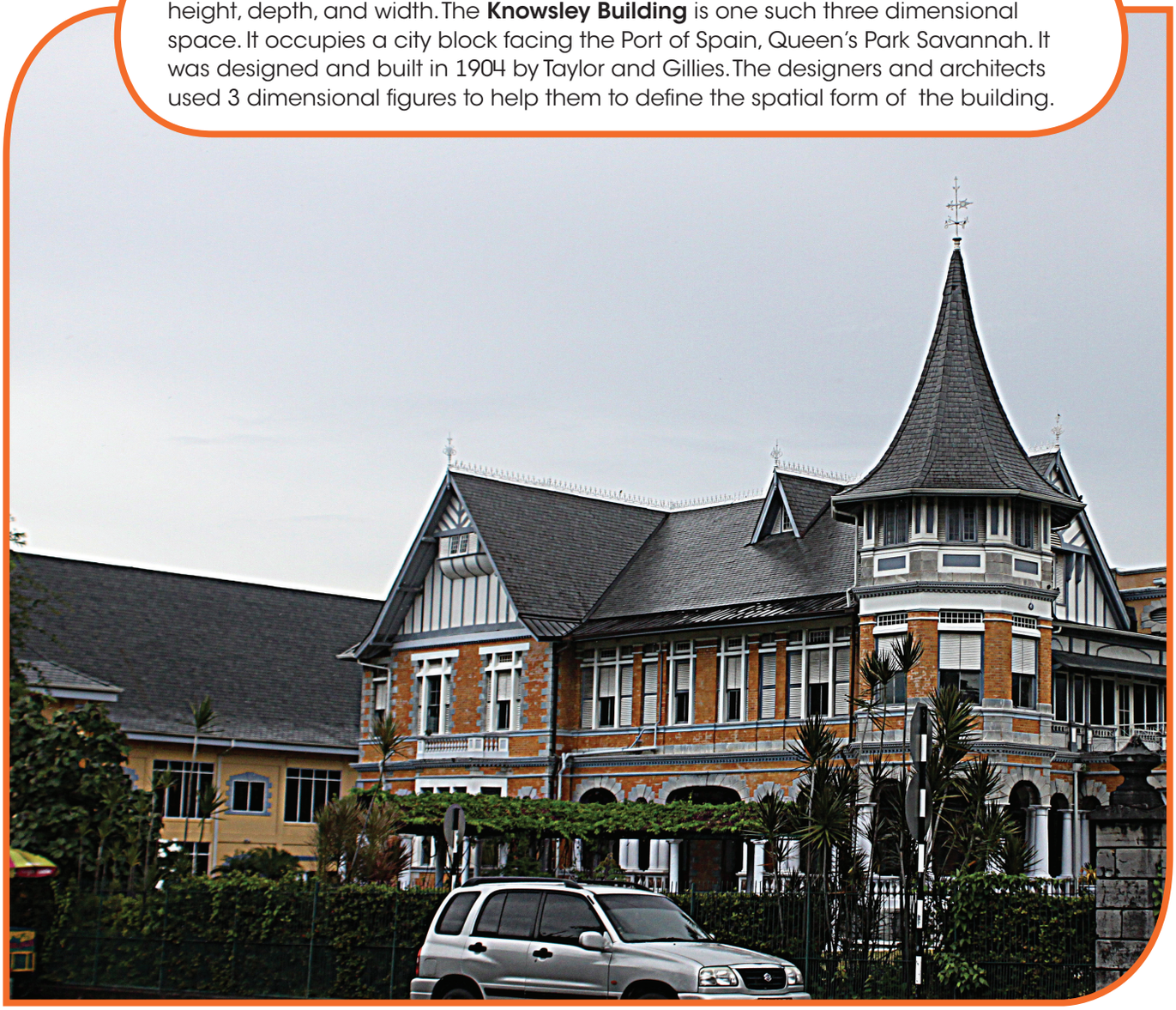
**Vocabulary:**

cross-section

**Chapter Outcomes:**

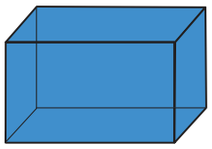
- Describe solids in terms of their properties.
- Solve problems involving solids and plane shapes.

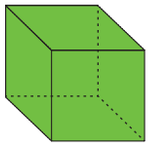
We live in three dimensional space. Our homes, school, place of business, all have height, depth, and width. The **Knowsley Building** is one such three dimensional space. It occupies a city block facing the Port of Spain, Queen's Park Savannah. It was designed and built in 1904 by Taylor and Gillies. The designers and architects used 3 dimensional figures to help them to define the spatial form of the building.



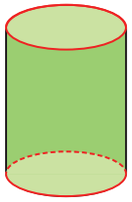
## Getting Ready for Chapter 29

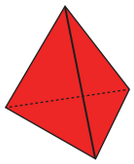
**Identify each figure.**

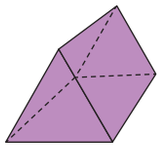
1. 

2. 

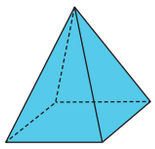
3. 

4. 

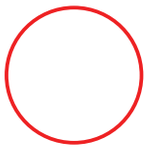
5. 

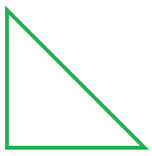
6. 

7. 

8. 

**Identify the shapes below.**

9. 

10. 

11. 

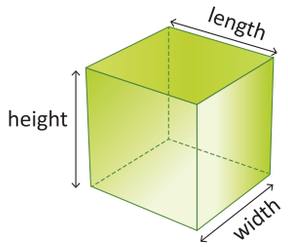
12. 

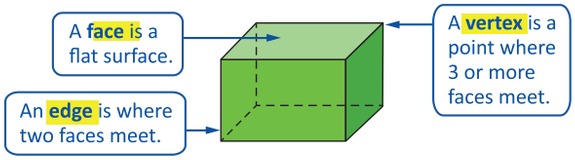
## Properties of Solids

### Teaching Point 1:

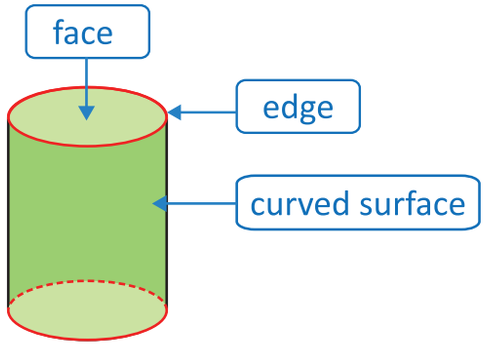
*How do you describe the properties of solids?*

A solid is a three-dimensional figure. **A three-dimensional** figure has length, width and height.




Some solids can have curved surfaces.



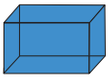


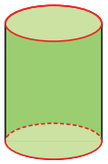
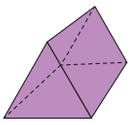
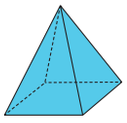



Chapter 29 Solids.indd 349 10/08/17 4:54 PM

## Activity 1:

**Copy and complete the tables.**

| Solid |  |  |  |
|---|---|---|---|
| Name | | | |
| Number of Faces | | | |
| Number of Vertices | | | |

| Solid |  |  |  |
|---|---|---|---|
| Name | | | |
| Number of Faces | | | |
| Number of Vertices | | | |

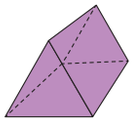
**Solve the problems.**

1. Chocolates are sold in triangular-based pyramid shaped boxes. How many triangles are needed to make 4 boxes?
2. Jaden used rectangles to make 6 cuboid boxes. How many rectangles did she use?
3. Name a solid that has no vertices.
4. Name a solid that have ONLY triangular faces.

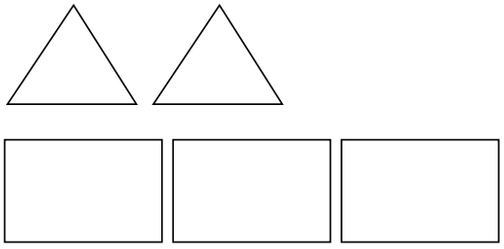
## Teaching Point 2:

*How do you describe the properties of solids?*

Describe the faces, edges and vertices of the solid.



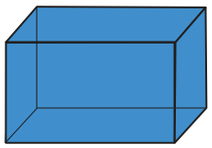
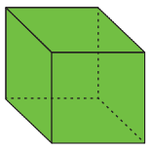
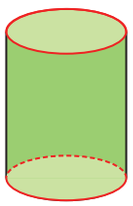
Count the edges and vertices. Trace each face of the solid.



A triangular prism has 3 rectangular faces and 2 triangular faces, 9 edges and 6 vertices.

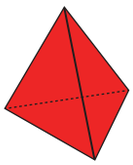
## Activity 2:

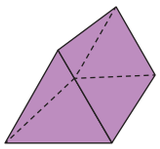
**Trace the faces of each solid. Describe the faces, edges and vertices of each solid. Then identify it.**

1. 
2. 
3. 
4. 

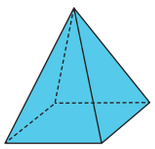


Chapter 29 Solids.indd 350 10/08/17 4:54 PM

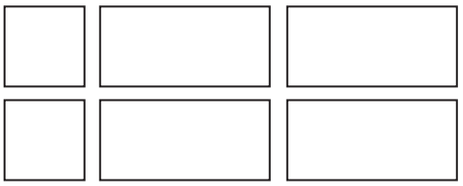
5. 

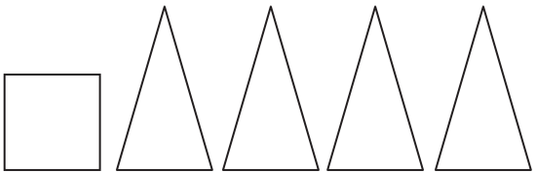
6. 

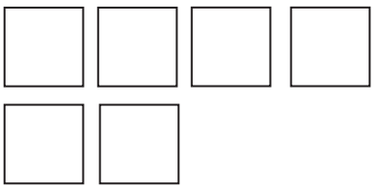
7. 

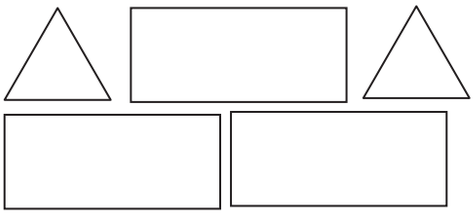
8. 

**Name the solid that matches each set of faces.**

9. 

10. 

11. 

12. 

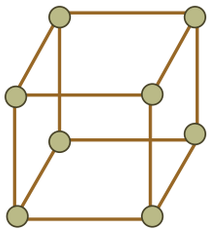
13. 

## Model Solids

### Teaching Point 1:

*How do you model solids?*

Use toothpicks and plasticine to model solids.



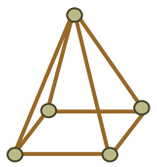
Model of a cube:

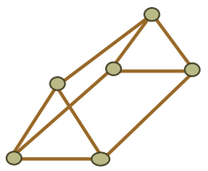
1. Get 12 toothpicks of the same length
2. Get 8 plasticine balls
3. Use plasticine to make 2 squares.
4. Use four toothpicks to join the two squares.

Use the properties of the solid, to help you create a frame of a solid.

### Activity 4:

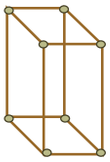
**Which solid is shown by each frame.**

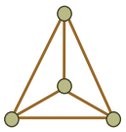
1. 

2. 



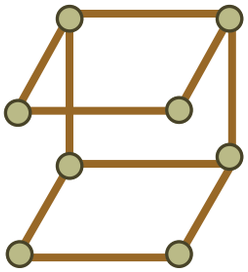
Chapter 29 Solids.indd 351 10/08/17 4:54 PM

3. 

4. 

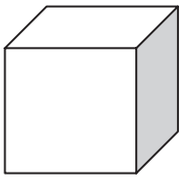
5. Carla made a solid using 12 toothpicks of the same length and 8 pieces of plasticine. Which solid did she make?

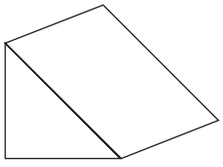
6. Alex was making the frame of a cube and didn't have enough toothpicks to finish it. His unfinished model is shown below.

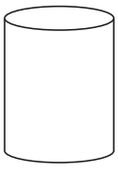


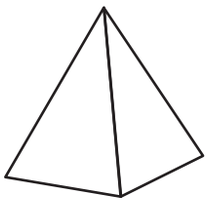
How many toothpicks does he need to finish the frame.

**Draw dotted lines to show missing edges, faces and vertices.**

7. 

8. 

9. 

10. 

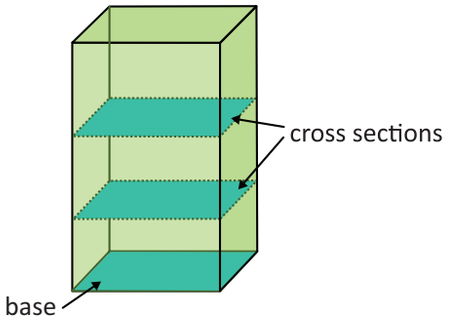
## Cross Section of Solid Figures

### Teaching Point 1:

*How do you describe the cross-section of solids?*

Each slice through a solid figure is called a **cross section.**

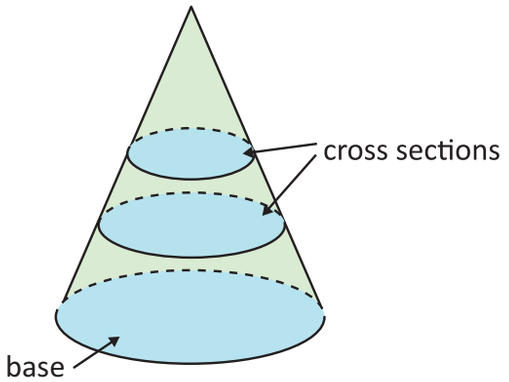
**Cross section of a cuboid**




Any cross section that is parallel to the bases of the cuboid has the same shape and size of the base of the cuboid.

The cuboid has **uniform cross sections.**

**Cross section of a cone**



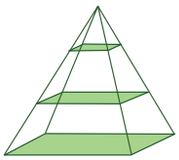

Each cross section is a different size to its base. The cone does not have uniform cross sections.

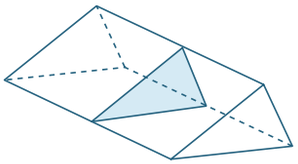


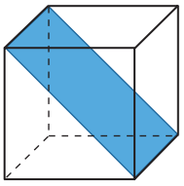
Chapter 29 Solids.indd 352 10/08/17 4:54 PM

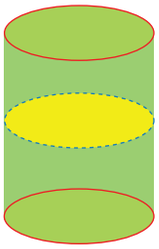
## Activity 1:

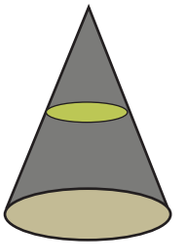
**Describe each cross section. Write uniform cross section or cross section not uniform.**

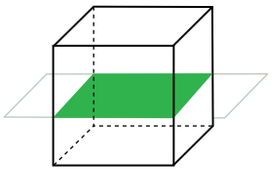
1. 

2. 

3. 

4. 

5. 

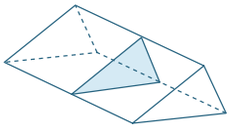
6. 

## Teaching Point 2:

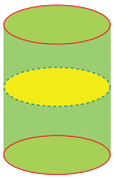
*How do you describe the cross-section of solids?*

A **prism** has uniform cross sections when it is sliced parallel to its base.

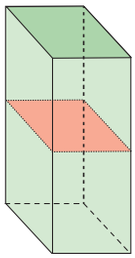
**Prisms**



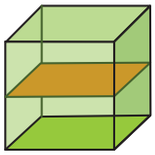
triangular prism



cylinder



cuboid

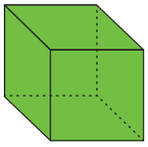


cube

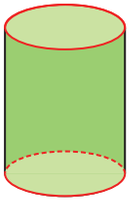
## Activity 2:

**Name each solid figure that has uniform cross sections?**

1. 

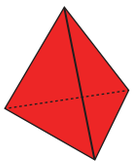
2. 

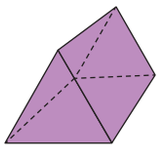
3. 

4. 



Chapter 29 Solids.indd 353 10/08/17 4:54 PM

5. 

6. 

## Drawing Solids

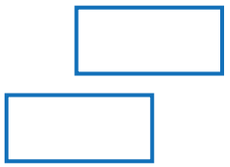
### Teaching Point 1:

*How do you draw solid figures?*

Draw a cuboid.

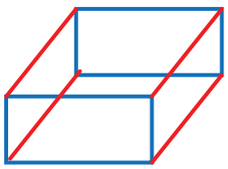
**Step 1**

Draw identical rectangular bases.



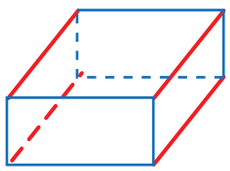
**Step 2**

Connect corresponding vertices.



**Step 3**

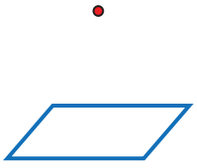
Change any hidden lines to dashed lines.



Draw a pyramid.

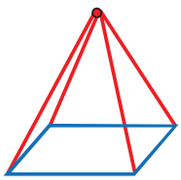
**Step 1**

Draw a square base and a point.



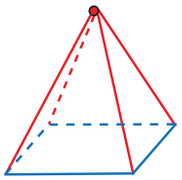
**Step 2**

Connect the vertices of the square to the point.



**Step 3**

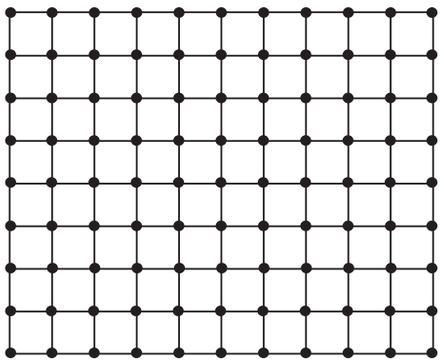
Change any hidden lines to dashed lines.



### Activity 1:

**Solve.**

1. Draw two different solids with 5 faces on the grid below.



2. Draw the following solids.

   (a) cube

   (b) cuboid

   (c) cone

   (d) triangular based pyramid

   (e) triangular based prism

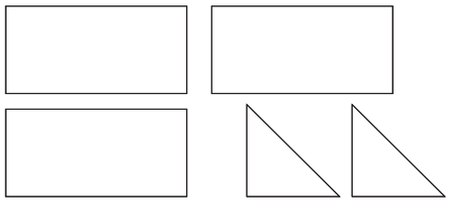


Chapter 29 Solids.indd 354 10/08/17 4:54 PM

## Chapter Review

**Answer the questions.**

**1.** Five plane shapes are shown below.



**(a)** Which solid has these faces?

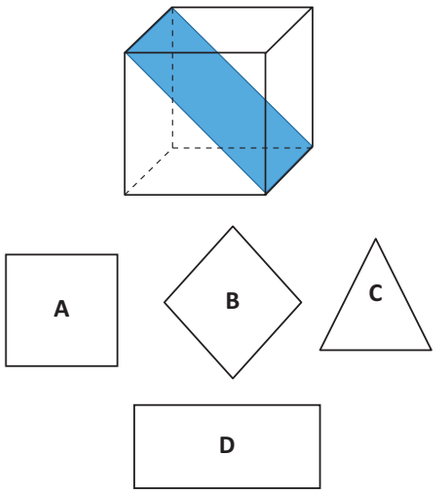
**(b)** How many edges and vertices does this solid have?

**2.** What is the name of the solid that the can of soda best represents?

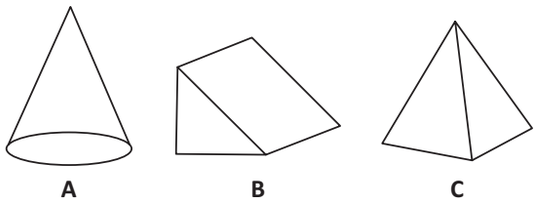



**3.** A solid has 4 triangular faces, 6 edges and 4 vertices. What is the name of the solid?

**4.** Which plane shape matches the shape of the cross section of the cube below?




**5.** Three solids are shown below.

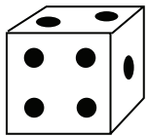



**(a)** Which solid has a uniform cross section?

**(b)** Which solid has two faces?

**(c)** Which solid is a pyramid?

**6.** The diagram below shows a die which is used in board games.



**(a)** What solid does the die represent?

**(b)** How many faces does it have?

**(c)** This solid has a uniform cross section. Draw it.

**7.** A hat box is shown below.



**(a)** Name the solid figure that the hat box represents.

**(b)** Write the number of faces, edges and vertices.

**8.** Joshua is making a frame of a solid. He uses nine pieces of sticks for the edges and six pieces of plasticine for the vertices.

**(a)** What is the name of the solid that Joshua is making?

**(b)** Draw the solid.



Chapter 29 Solids.indd 355 10/08/17 4:54 PM

CHAPTER

30

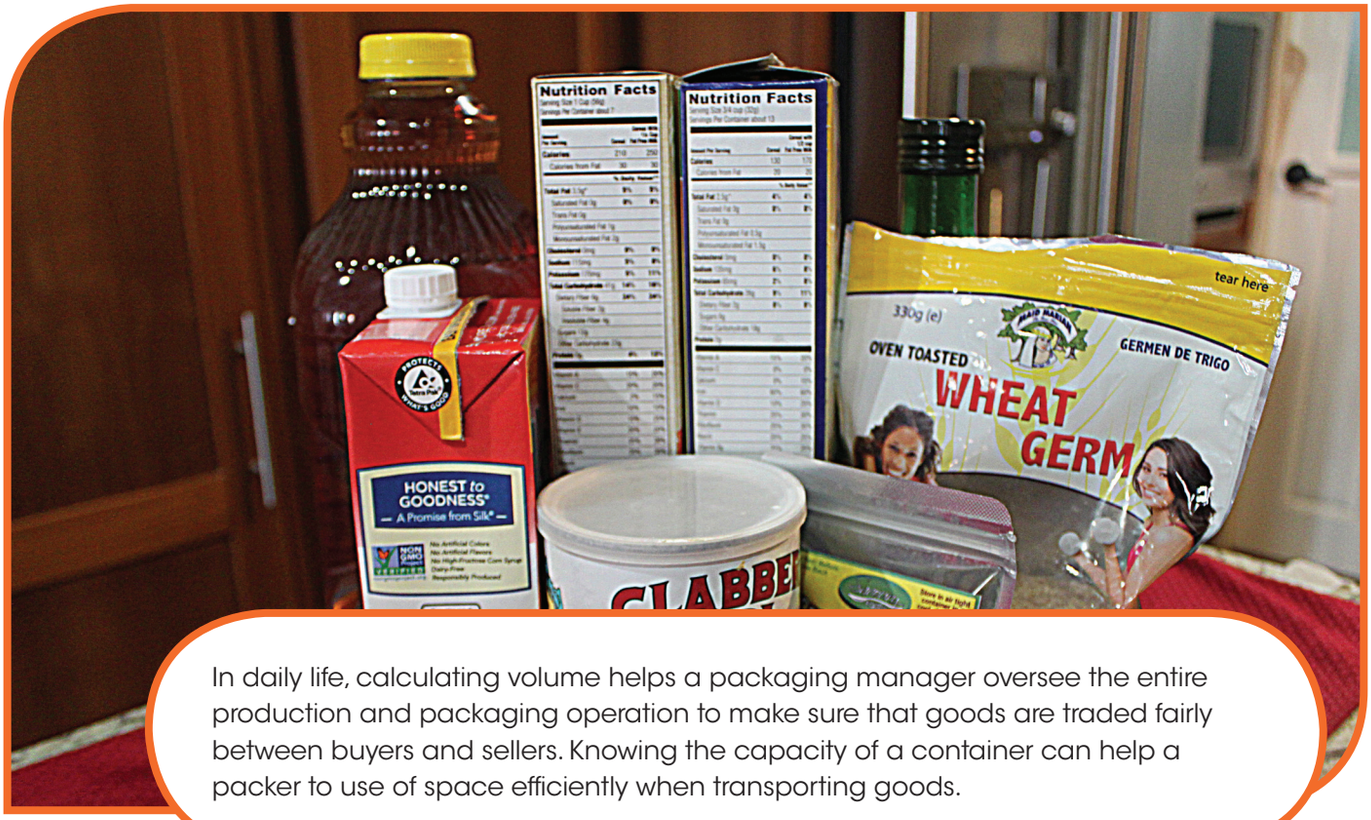
# Measure Volume

**Vocabulary:**

volume
cube unit
cubic unit
layer
cubic centimetre ($cm^3$)
cubic metre ($m^3$)

**Chapter Outcomes:**

- Demonstrate an understanding of the concept of volume.
- Understand that volume can be quantified.
- Understand that capacity and volume are related.
- Understand conservation of volume.
- Develop and use proficiently the formula to calculate volume of cubes and cuboids in problem solving.
- Solve problems involving capacity and volume.



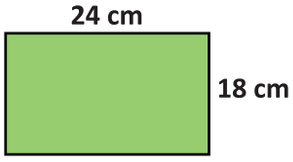

In daily life, calculating volume helps a packaging manager oversee the entire production and packaging operation to make sure that goods are traded fairly between buyers and sellers. Knowing the capacity of a container can help a packer to use of space efficiently when transporting goods.

## Getting Ready for Chapter 30

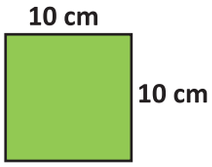
1. 2 litres = ____ millilitres

2. Find the area of the shapes below.

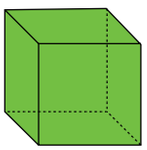
(a)




(b)




3. Name the solids below.

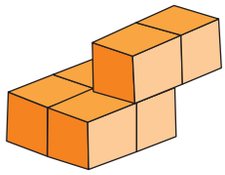




4. Complete the table.

| Solid | Number of Faces | Number of Edges | Number of Vertices |
|---|---|---|---|
| Cube | | | |
| Cuboid | | | |

5. Vanessa built the following shape with cubes. How many cubes are in the shape?



## Describe Volume

### Teaching Point 1:

*How can you describe volume?*

Which object takes up the most space on the shelf?




The toy box takes up the most space.

The **volume** of an object is the **measure** of the amount of space the object occupies

### Activity 1:

**Compare the objects. Identify the object with the greater volume.**

1.


gift box


shoe box



Chapter 30 Measure Volume.indd 357 07/03/18 11:14 AM

2.



plastic container



lunch kit

3.



watermelon



pawpaw

4.



paint can



bucket

5.




box of toothpaste



carton of milk

6.



garbage bin

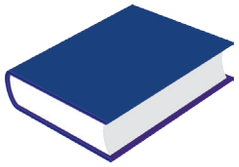


box

7.



cube



book

## Explore Volume of Cubes and Cuboids

### Teaching Point 1:

*How can you measure volume?*

Which is the best unit to measure volume?





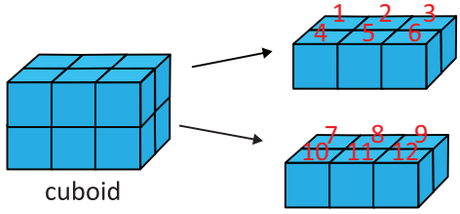




The cubes packs and stacks close together easily without overlaps and leaves no space.

The **cube** is the best unit to measure volume.

Find the volume of the cuboid.




The cuboid is made up of 12 unit cubes. It's volume is 12 cubic units.

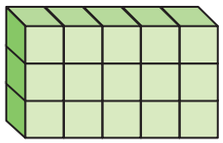
**Volume** is **measured** in **cubic units**. Each unit cube has a volume of **1 cubic unit.**

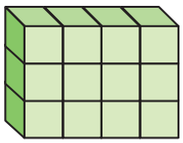


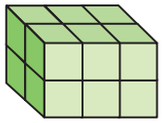
Chapter 30 Measure Volume.indd 358 07/03/18 11:14 AM

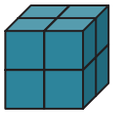
## Activity 1:

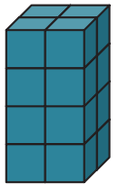
**Each solid is made up of unit cubes. Find the volume of each solid.**

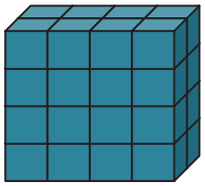
1. 

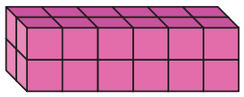
2. 

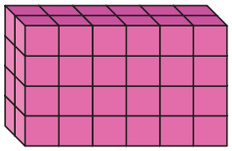
3. 

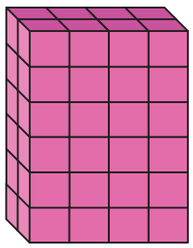
4. 

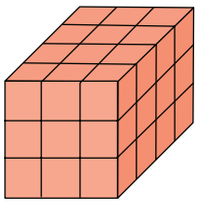
5. 

6. 

7. 

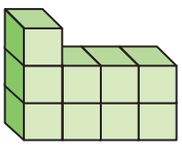
8. 

9. 

10. 

**Solve.**

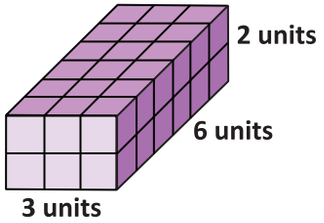
11. How many more cubes can Luke use to make the figure below a cuboid?



## Teaching Point 2:

*How can you use multiplication to find volume of cubes and cuboids?*

Calculate the volume of the cuboid.




Length of rectangular face = 6 unit cubes

Width of rectangular face = 3 unit cubes

Height of cuboid = 2 units

**Method: Use multiplication**

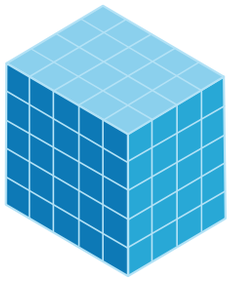
**Number of unit cubes in Layer 1**:
6 unit cubes × 3 unit cubes = 18 unit cubes

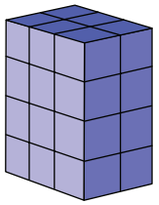
**Number of unit cubes in 2 layers:**
18 unit cubes × 2 unit cubes = 36 unit cubes

**Volume of the cuboid** = 36 cubic units.

## Activity 2:

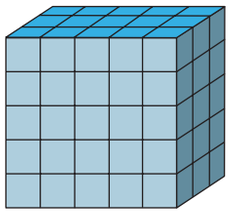
**Use multiplication to find the volume of the cubes and cuboids.**

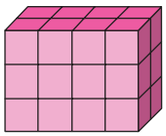
1. 

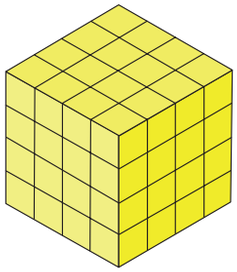
2. 

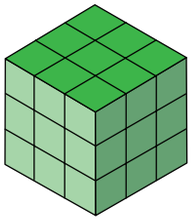


Chapter 30 Measure Volume.indd 359 07/03/18 11:14 AM

3. 

4. 

5. 

6. 

7. Jonathan covered the bottom of a box with 3 rows of 5 unit cubes. Then he stacked 4 more identical layers to fill the box.

   (a) How many unit cubes did he have in each layer?

   (b) How many unit cubes filled the box?

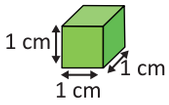
8. Luke covers a rectangle with 5 rows of 4 unit cubes. Then he stacks identical layers to make a cuboid. How many cubes does Lucas use to make the 4 layers?

9. Jaydn wants to make a cuboid with a length of 5 cubes, a width of 4 cubes, and a height of 3 cubes. He has 50 cubes. How many more cubes does Jaydyn need?

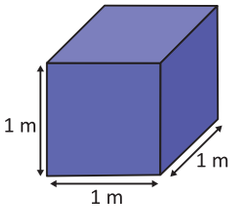
## Use Standard Units to Measure Volume

### Teaching Point 1:

*How can you use standard units to measure volume?*



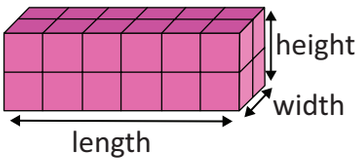

Each side of cube is 1 centimetre. Volume of the cube = 1 $cm^3$




Each side of the cube is 1 metre. Volume of the cube = 1 $m^3$

---

The solid is made up of 1 cm cubes. What is the volume of the solid?




Length = 6 cm

Width = 2 cm

Height = 2 cm

**Multiply to find the area of the base**:
6 cm × 2 cm = 12 $cm^2$

**Add the number of cubes in each layer to find the volume:**

12 cubes + 12 cubes = 24 cubes

**Or, multiply the base and height to find the volume.**

Volume of solid → 12 $cm^2$ × 2 cm = 24 $cm^3$

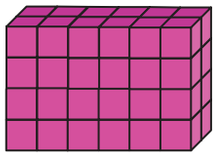
So, the volume of the solid is 24 $cm^3$.

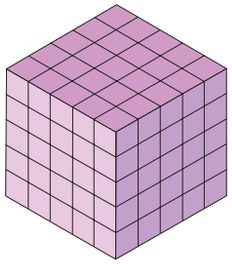


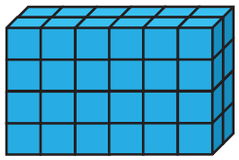
Chapter 30 Measure Volume.indd 360 07/03/18 11:14 AM

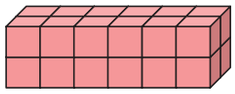
## Activity 1:

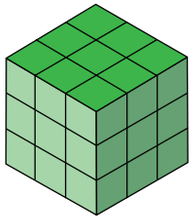
**Each solid is made up of 1 cm cubes. Calculate the volume of each solid.**

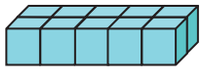
1. 

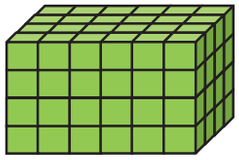
2. 

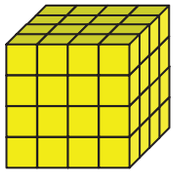
3. 

4. 

5. 

6. 

7. 

8. 

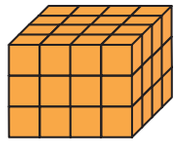
**Solve.**

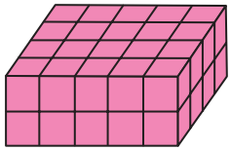
9. 1-cm cubes are stacked to fill a box. The length of the box is 12 cm, the width is 8 cm and the height is 6 cm. What is the volume of the box?

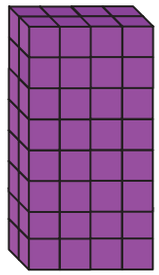
10. Arun has forty 1-cm cubes. He builds a cuboid with 6 cubes in the bottom layer. He wants to have the fewest cubes left over. How many layers can Arun make?

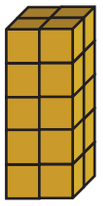
## Activity 2:

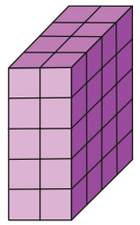
**Each solid is made up of 1-metre cubes. Calculate the volume of each solid.**

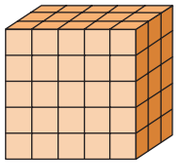
1. 

2. 

3. 

4. 

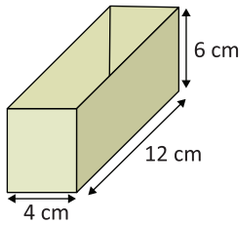
5. 

6. 

7. How many 1 metre cubes are needed to fill this container?




8. The diagram below shows an open box. What is the maximum number of 2-cm cubes that can be placed in the box.





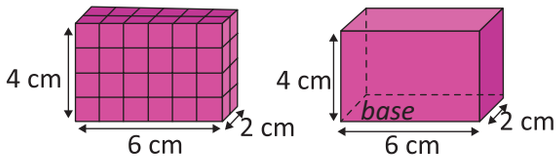

Chapter 30 Measure Volume.indd 361 07/03/18 11:14 AM

## Apply Volume Formulas

### Teaching Point 1:

*How can you use a formula to find the volume of a cube or cuboid?*

Both cuboids show the same dimensions and the same volume.




The length is 6 centimetres.

The width is 2 centimetres.

The height is 4 centimetres.

**Method 1:**

In **1 layer** there are 6 × 2 = 12 1- cm cubes.

In **4 layers** there are 12 × 4 = 48 1- cm cubes.

**Volume of cuboid:** 6 × 2 × 4 = 48 $cm^3$

**Volume = length × width × height**

***V = l × w × h***

**Method 2:**

length × width = area of base (B)

6 × 2 = 12 $cm^2$

Volume = Base × height

= 12 × 4

= 48 $cm^3$

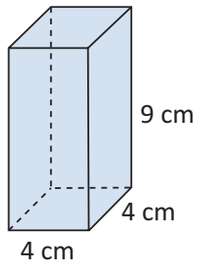
**Volume = area of Base × height**

**V = B × h**

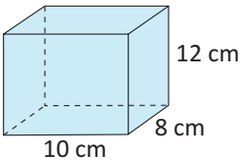
### Activity 1:

**Find the volume.**

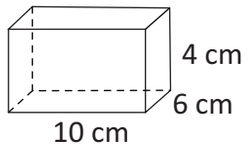
**1.**



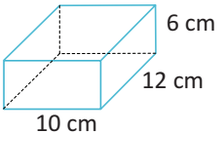

**2.**



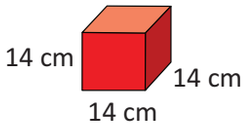

**3.**



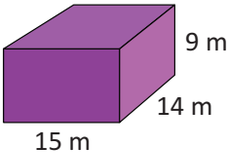

**4.**



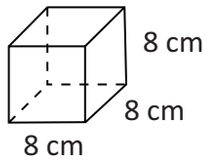

**5.**



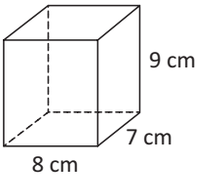

**6.**




**7.**




**8.**




**9.** A box has a length of 8 cm, a width of 4 cm and a height of 2 cm.

**(a)** Calculate the volume of the box.

**(b)** If the box is used for packaging 1-cm cubes, how many boxes are needed to pack 2 452 cubes?

**10.** How many cubic centimetres of flour will a container of 30 cm by 6 cm by 4 cm hold?

**11.** A man is digging a hole for a swimming pool. The hole will be 9 metres long, 5 metres wide and 2 metres deep. How many cubic metres of dirt will the man have to remove?

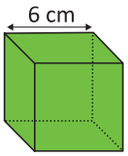


Chapter 30 Measure Volume.indd 362 07/03/18 11:14 AM

**12.** A cereal box has the dimensions shown. What is the volume of the cereal box?



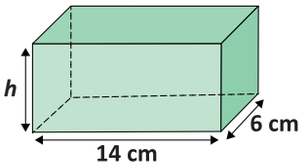

**13.** Find the volume of the cube below.




## Teaching Point 2:

*How can you use a formula to find a missing dimension?*

The volume of the cuboid shown below is 336 $cm^3$. The length of the cuboid is 14 cm and the width is 6 cm and the height is *h* cm.




Calculate the value of *h*.

To find the height first find the area of the base.

Base = length × width ← Calculate area of base.

= 14 cm × 6 cm

= 84 $cm^2$

Volume = B × *h* ← Write formula.

336 = 84 × *h* ← Substitute.

336 ÷ 84 = *h* ← Divide.

4 = *h*

So, the length of h is 4 cm.

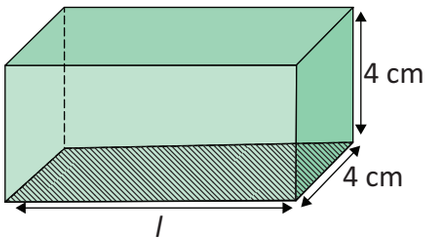
## Activity 1:

**Solve the problems by completing the table.**

| | Length | Width | Height | Volume |
|---|---|---|---|---|
| 1. | 12 cm | ___ cm | 4 cm | 384 $cm^3$ |
| 2. | 6 cm | 5 cm | ___ cm | 120 $cm^3$ |
| 3. | ___ cm | 9 cm | 6 cm | 540 $cm^3$ |
| 4. | 8 cm | 8 cm | ___ cm | 384 $cm^3$ |
| 5. | 4 cm | ___ cm | 11 cm | 176 $cm^3$ |

**6.** Kayla is making a box for wooden cubes. Each wooden cube has a volume of 1 cubic centimetre. Kayla wants to have 12 cubes in each layer. If she wants to fit 60 cubes in each box, what should be the height of the box?

**7.** The volume of the box shown below is 96 $cm^3$.




Calculate the length, *l*, of the box.

**8.** A rectangular container has a volume of 250 $cm^3$. The area of its square base is 25 $cm^2$. What is the height of the container?

**9.** Find the length of a rectangular box which has a volume of 2 400 $cm^3$, width of 10 cm and a height of 8 cm.



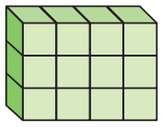
Chapter 30 Measure Volume.indd 363 07/03/18 11:14 AM

## Compare and Order Volume

### Teaching Point 1:

*How can you compare and order volume of solids?*

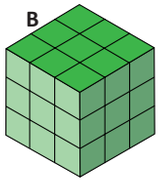
A



12 cubes

**Volume** = 12 cubic units

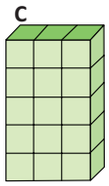
B



27 cubes

**Volume** = 27 cubic units

C



15 cubes

**Volume** = 15 cubic units

Cuboid A has the **least** volume.
Cube B has the **greatest** volume.

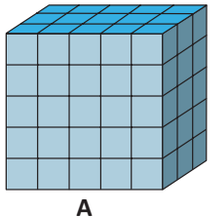
The volume of the solids in order from least to greatest is:

Solid A, Solid C, Solid B

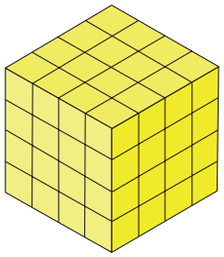
### Activity 1:

**Find the volume of each solid. Then compare their volumes. Use >, < or =.**

1.

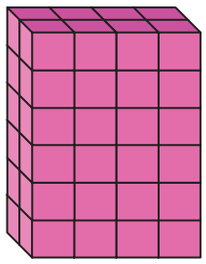


A

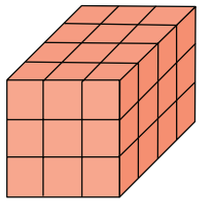


B

2.

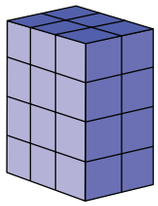


A

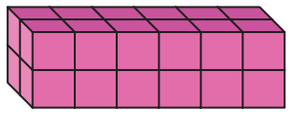


B

3.

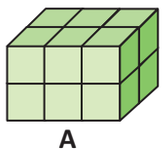


A

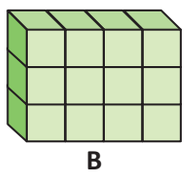


B

4.



A

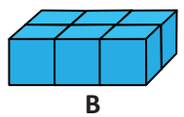


B

5.



A



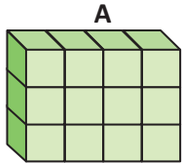
B

### Activity 2:

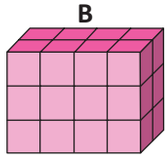
**Order the volume of the solids from least to greatest.**

1.

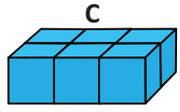
A



B



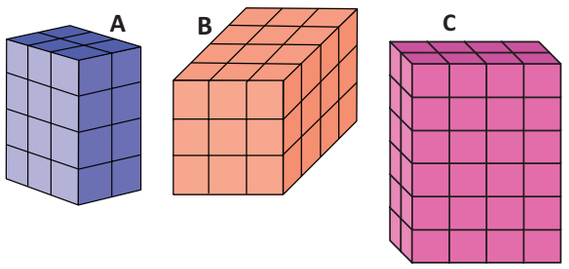
C



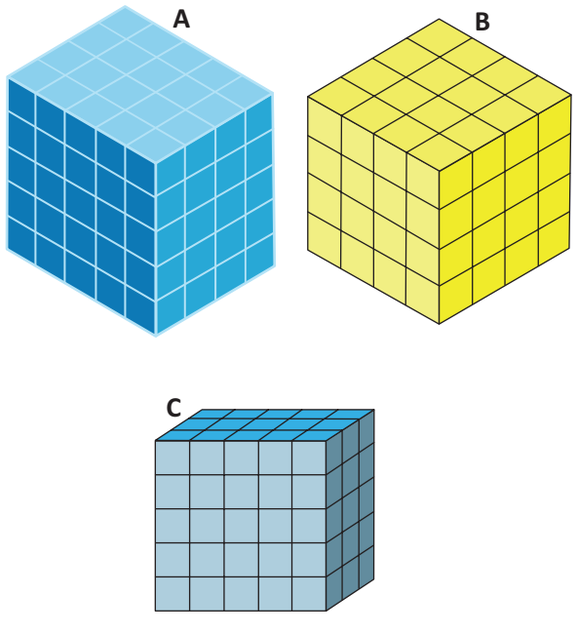


Chapter 30 Measure Volume.indd 364 07/03/18 11:15 AM

**2.**



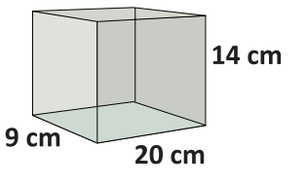

**3.**



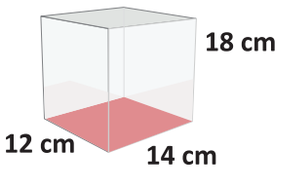

**4.** The volume of a box is 140 $cm^3$. How does that volume compare to the volume of a cube that measures 5 centimetres on each side?

**5.** Two aquariums are shown below.

**Aquarium 1**




**Aquarium 2**

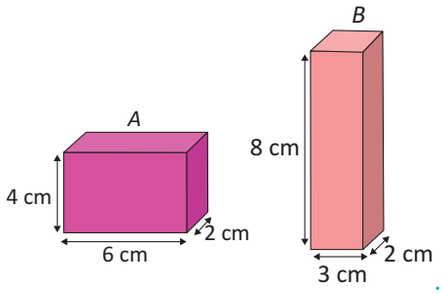



What is the difference between the volumes of the two aquariums?

## Teaching Point 2:

*How can you compare different solids with the same volume?*

Both solids are different but they have the same volume.




**Solid A**

The length is 6 centimetres.
The width is 2 centimetres.
The height is 4 centimetres.

**Volume of Solid A:** $6 \times 2 \times 4 = 48\ cm^3$

**Solid B**

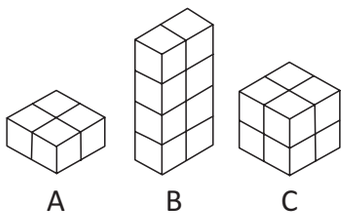
The length is 3 centimetres.
The width is 2 centimetres.
The height is 8 centimetres.

**Volume of Solid A:** $3 \times 2 \times 8 = 48\ cm^3$

## Activity 3:

**Calculate the volume of the solids. Which of them has the same volume?**

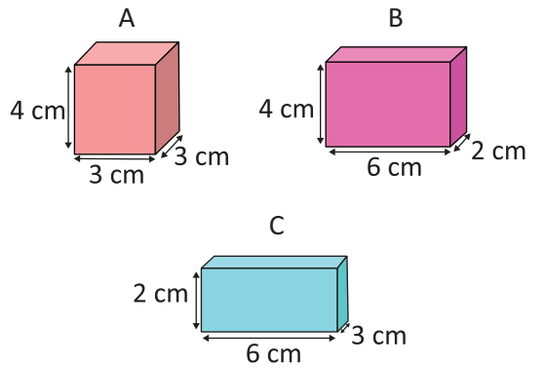
**1.**



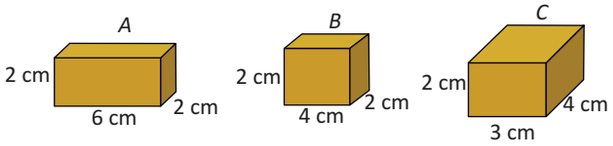



Chapter 30 Measure Volume.indd 365 07/03/18 11:15 AM

**2.**




**3.** A gardener is making rectangular seed boxes. He wants the seed box to hold exactly 24 cubic centimetres of soil. Which of the following boxes can he use?




**4.** Aviya is building a cuboid using one-centimetre cubes. The cuboid needs to be 4 centimetres tall. How many different cuboids can Aviya make using only 16 one-centimetre cubes?

**5.** Matthew has 32 unit cubes. How many cuboids with different-size bases can he make if he uses all the unit cubes in each cuboid?

**6.** Lisa is making storage box that is 10 cm long, 12 cm wide, and 10 cm tall. She wants to build a second box that is 10 cm long and 20 cm tall. If the volume of both boxes is the same, how wide is the second box?

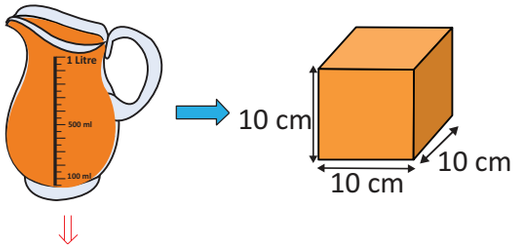
**7.** Mia makes a box that measures 10 cm by 6 cm by 4 cm. She wants to make another box with the same volume but with a different size. What can be the dimensions of the other box?

## Relationship between Capacity and Volume

### Teaching Point 1:

*How can you relate capacity to volume?*

**1 litre** of orange juice will completely fill a rectangular container 10 centimetres long, 10 centimetres wide and 10 centimetres in height.




**1 litre = 1 000 ml**

Volume of liquid in the rectangular container:

$10 \text{ cm} \times 10 \text{ cm} \times 10 \text{ cm} = 1\,000 \text{ cm}^3$
So, $1\,000 \text{ ml} = 1\,000 \text{ cm}^3$
$1 \text{ ml} = 1 \text{ cm}^3$

The **capacity** of a container is the amount the container can hold.

### Activity 1:

**Write the following in cubic centimetres.**

**1.** 600 ml = ___ $\text{cm}^3$ **2.** 340 ml = __ $\text{cm}^3$

**3.** 2 L = ___ $\text{cm}^3$ **4.** 1 L 2ml = ___ $\text{cm}^3$

**5.** 14 ml = ___ $\text{cm}^3$ **6.** 455 ml = ___ $\text{cm}^3$



Chapter 30 Measure Volume.indd 366 07/03/18 11:15 AM

7. 1 L 300 ml = ___ $cm^3$

8. 3 L 34 ml = ___ $cm^3$

**Write the following in millilitres and litres.**

9. 234 $cm^3$ = ___

10. 1 260 $cm^3$ = ___

11. 7 $cm^3$ = ___

12. 27 $cm^3$ = ___

13. 3 000 $cm^3$ = ___

14. 1 004 $cm^3$ = ___

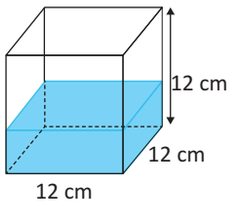
15. 1 490 $cm^3$ = ___

16. 2 500 $cm^3$ = ___

## Teaching Point 2:

*How can you relate capacity to volume?*

Each edge of an aquarium is 12 cm long. The aquarium has 500 ml of water. How much more water is needed to fill the aquarium?




**Capacity:** 12 × 12 × 12 = 1 728 $cm^3$
1 728 $cm^3$ = 1 728 ml or 1 L 728 ml

Volume of water in aquarium = 500 ml

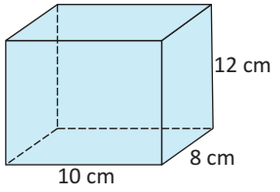
Volume of water needed:
1 728 ml – 500 ml = 1 L 228 ml

So, 1 L 228 ml is needed to fill the aquarium completely.

## Activity 2:

**Solve.**

1. A rectangular container is filled with water. What is the capacity of the container? ( 1 000 ml = 1 000 $cm^3$)

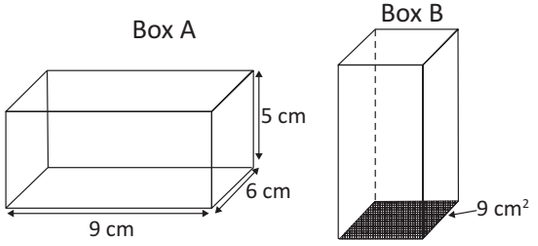



2. A rectangular container when it is $\frac{1}{2}$ full holds 4 litres of water.

   (a) If 1 litre = 1 000 $cm^3$, how many litres of water will the container hold when full?

   (b) What is the height of the container if it is 40 cm long and 20 cm wide?

3. The volume of Box A is the same as the volume of Box B. What is the height of Box B if it has a square base with an area of 9 $cm^2$?




4. A container which measures 24 cm by 8 cm by 10 cm is 75% filled with water.

   (a) How many litres of water are in the container?

   (b) Half of the water is poured from the container to fill a second container. If the base of this second container is 12 cm by 6 cm, what is its height?

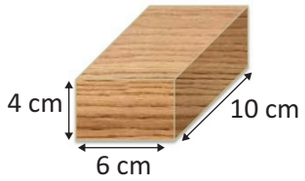


Chapter 30 Measure Volume.indd 367 07/03/18 11:15 AM

## Solve Problems in Volume

1. The volume of a cube is 64 $cm^3$. What is the length of each side of the cube?

2. Mickell has a rectangular block of wood measuring 10 cm by 6 cm by 4 cm.



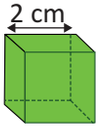

What is the most number of 2-cm cubes that can be cut from it?

3. A shipping clerk packs a cube-shaped box with side lengths of 1 metre into a container. The container's length is 12 metres, the width is 5 metres and the height is 9 metres.



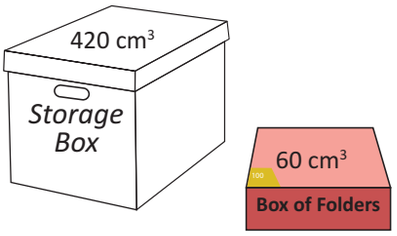

What is the volume of the space left in the container for packing?

4. 36 cubes of 2-cm sides are used to build a cuboid. The perimeter of the rectangular base of the cuboid is 32 cm.




(a) How many cubes are at the base of the cuboid?

(b) What is the height of the cuboid?




5. How many boxes of folders will fill the storage box?

6. A rectangular tank with a square base is $\frac{1}{4}$ full of water. The side length of the square base is 10 cm. When another 2 000 $cm^3$ of water is poured into the tank, it becomes $\frac{1}{2}$ full.

(a) What is the capacity of the tank?

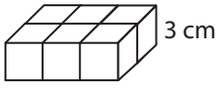
(b) What is the height of the tank?

7. A rectangular container is 40 centimetres long, 20 centimetres wide and 30 centimetres tall. How many litres of water is needed to fill the container?

## Chapter Review

**Answer the questions.**

1. Jake made a cuboid as shown in the diagram using identical cubes of sides 3 cm.




What is the volume of the cuboid?

2. Leanna is using wooden cube blocks to build cuboids. If she has exactly 16 wooden cube blocks find the length, height and width to two possible cuboids she can build.



Chapter 30 Measure Volume.indd 368 07/03/18 11:15 AM

3. Arianna used unit cubes to build a solid with a length of 4 cubes, a width of 4 cubes, and height of 4 cubes. Alex built a different-sized cuboid using the same number of cubes.

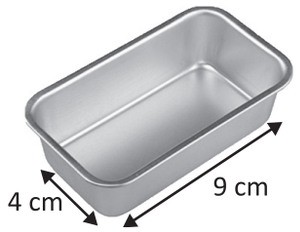
   (a) How many cubes did Arianna use?

   (b) How many cubes did Alex use for the length, width and height of his cuboid?

4. A box is filled with toy blocks. Twenty-five blocks fit in the bottom of the box and there are 3 identical layers of blocks. What is the volume of the box?

5. Jada used unit cubes to build a cuboid with a length of 5 cubes, a width of 2 cubes, and height of 4 cubes. Jim built a cuboid with a length of 4 cubes, a width of 3 cubes and a height of 5 cubes. Who used more cubes?

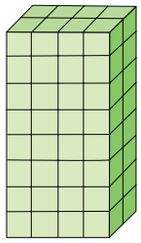
6. A baker uses a rectangular baking pan with a base measuring 36 $cm^2$.




   Cake batter is poured into the pan so that it is 4 cm deep. The finished cake will be 2 times as tall as the batter. What is will be volume of the cake?

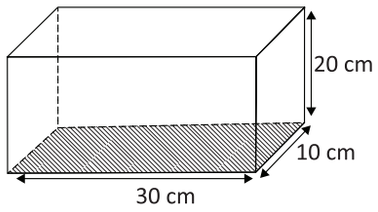
7. A rectangular block of wood that measures 16 cm by 8 cm by 4 cm is cut to form 2 cm cubic blocks. The blocks are packed into a 12 cm by 6 cm by 4 cm box. How many blocks could not be packed into the box.

8. Alisha needs 160 cubes to make a model building. The figure below shows the number of cubes in a box.



   How many boxes of cubes does Alisha need to buy so she has enough cubes for her model?

9. A rectangular glass container measures 30 cm by 10 cm by 20 cm.

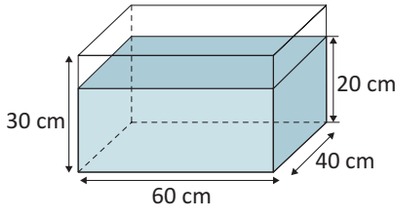



   (a) Calculate in $cm^3$ the volume of the container.

   (b) How many litres of water are needed to fill the container?

   (c) What is the height of the water in the container when 3 000 ml of water is poured into it?

10. A water tank, as shown below, measures 60 cm by 40 cm by 30 cm. The height of the water in the tank is 20 cm. How many litres of water are needed to completely fill the tank?






Chapter 30 Measure Volume.indd 369 07/03/18 11:15 AM

CHAPTER

31

# Statistics

**Vocabulary:**

mode
mean
average

**Chapter Outcomes:**

- Design survey(s) to solve problem(s) that involves the use of statistical data.
- Gather, classify, organize and display data using tables, tally charts and graphs (pictographs, block graphs and bar graphs) and interpret results.
- Describe methods and analyse results and make decisions.
- Communicate findings and decisions made using vocabulary associated with statistics.
- Demonstrate an understanding of mode and mean.



You wake every morning and brush your teeth. The toothbrush, toothpaste and water you use were studied by scientists using statistical methods. These scientists made sure that the tools you use to clean your teeth are safe and that they can do the job effectively. So you see, statistics are central to everyday life. It affects not only the brushing of your teeth, but every product or service you make use of and every activity you choose to do.

## Getting Ready for Chapter 31

**Make a tally chart with the situation shown below.**

1. Rachel did a survey to find out her classmates favourite fruits.

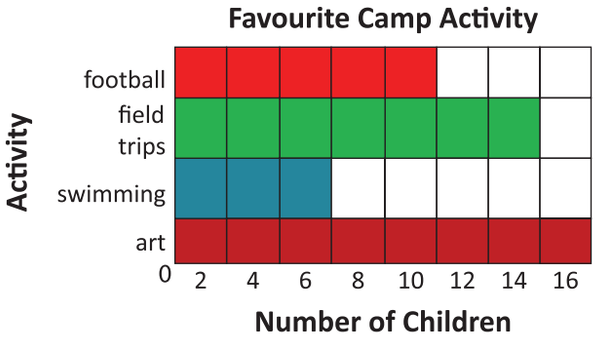
| Favourite Fruit | | | |
|---|---|---|---|
| apple | banana | mango | orange |
| banana | mango | apple | mango |
| mango | orange | banana | mango |
| banana | mango | banana | apple |

**Order the numbers from least to greatest.**

2. 15, 12, 36, 20, 11.

3. 56, 34, 87, 72, 28.

4. Use the block graph to answer the questions.




5. How many more children like football than swimming?

6. Which activity did most of the children prefer?

## Formulate Questions

### Teaching Point 1:

*How do you formulate a question that can be addressed with data?*

If you need to find out about anything you must collect data. You collect the data by asking questions.

**Situation:** Students of a primary school are only allowed to eat fruit for recess time.



What questions can the cafeteria ask to find out which fruit they should sell?

**Some possible questions?**

Which fruit do you prefer: apples, oranges, bananas or mangoes?

Which of these fruits would you buy to eat at recess time: banana, mango, pineapple or plums?

Do you prefer your fruit whole or in a chow?

### Activity 1:

**What questions can you ask to collect data to solve the following problems?**

1. The school wants to put in different play areas in the school yard for students.

2. The students of your school are complaining about the lunches for sale in the school's cafeteria.



Chapter 31 Statistics.indd 371 16/04/18 11:37 AM

3. Your school is changing the colour of your games uniform.

4. Your class has raised funds to buy books for a class library and wants to know what kind of books they should buy.

5. It is the end of term and your class is having a party and wants to know what kind of food to prepare.

6. You are having a sleepover at your home and want to provide activities that your friends would like.

7. Your school wants to purchase equipment for sports but only has enough money to spend on one sporting activity.

8. Your class wants to go on a field trip at the end of the term and wants all of the children to attend.

9. Your school is having a concert and wants each class to participate in one of the events.

## Collect and Record Data

### Teaching Point 1:

*How do you collect data and record the results?*

A **survey** collects **data** or information that answers a question.

You can use a **tally chart** or a **frequency table** to record the data. **Frequency** is the number of times an event occurs.

A **frequency table** is a table that uses numbers to record data about how often something happens.

The students of Miss Peters class collected data on the yield from four ochro plants. The results are recorded in the tally chart and frequency table below.

**Ochro Plant Yield**

| Plants | Tally | Frequency |
|---|---|---|
| Plant 1 | 𝍸 𝍸 𝍸 \| | 16 |
| Plant 2 | 𝍸 𝍸 \|\| | 12 |
| Plant 3 | 𝍸 𝍸 𝍸 \|\| | 17 |
| Plant 4 | 𝍸 𝍸 \| | 11 |

Each tally mark represents one ochro.

Numbers are used to record the yield for each plant.

Plant 3 yielded the most ochroes.
Plant 4 yielded the least ochroes.
The four plants yielded 56 ochroes in total.

### Activity 1:

**Copy and complete the tally charts.**

1. A teacher in Standard 4 wanted to find out how many students bought snacks during the week.

| Days | Tally | Frequency |
|---|---|---|
| Monday | 𝍸 𝍸 \|\| | |
| Tuesday | 𝍸 𝍸 𝍸 \|\|\|\| | |
| Wednesday | 𝍸 𝍸 \| | |
| Thursday | 𝍸 \|\| | |
| Friday | 𝍸 𝍸 𝍸 \|\| | |



Chapter 31 Statistics.indd 372 16/04/18 11:37 AM

2. A Standard 5 class wanted to find out how many children liked Comic Book Movies.

| Movies | Tally | Frequency |
|---|---|---|
| X-men | | 25 |
| Batman | | 17 |
| Iron Man | | 13 |
| Superman | | 2 |

**Make tally charts using the data collected.**

3. A class recorded the type of drinks students bought at the cafeteria one morning.

| Drinks Bought at the Cafeteria | | | |
|---|---|---|---|
| water | water | juice | juice |
| soda | water | juice | soda |
| water | water | juice | juice |
| juice | juice | soda | juice |
| water | juice | soda | juice |

4. A student recorded the type of sport her classmates prefer.

| Favourite Sport | | | |
|---|---|---|---|
| cricket | football | netball | cricket |
| cricket | cricket | football | netball |
| football | cricket | cricket | cricket |
| football | cricket | netball | cricket |
| football | football | cricket | cricket |

5. Your class has been studying animals and wants to go on a field trip. You want to find out which of the places listed below that the class would like to visit.

   - Zoo
   - Wildfowl Trust
   - Caroni Bird Sanctuary

   (a) Formulate an appropriate question to collect the data.

   (b) Survey 15 of your classmates.

   (c) Record the data in a tally chart and frequency table.

6. You want to find out which activities your friends prefer to do in their spare time.

   (a) Formulate an appropriate question to collect the data.

   (b) Survey at least 10 of your friends.

   (c) Record the data in a tally chart and frequency table.



Chapter 31 Statistics.indd 373 16/04/18 11:37 AM

# Represent Data Using Graphs

## Teaching Point 1:

*How can you represent data using graphs?*

The chart below shows the number of bottles of water sold in the cafeteria in one week.

**Bottles of Water Sold During a Week**

| Days | Tally | Frequency |
|---|---|---|
| Monday | 𝍸 𝍸 𝍸 𝍸 | 20 |
| Tuesday | 𝍸 𝍸 𝍸 \| | 16 |
| Wednesday | 𝍸 \|\|\| | 8 |
| Thursday | 𝍸 𝍸 \|\| | 12 |
| Friday | 𝍸 \| | 6 |

Represent the data in the chart above in a pictograph.

Title

| Bottles of water Sold Daily | |
|---|---|
| Monday | |
| Tuesday | |
| Wednesday | |
| Thursday | |
| Friday | |

= 2 bottles ← Key

A **pictograph** uses the same symbol to represent one or more than one vote.

## Activity 1:

**Represent the data in each tally chart or frequency table using a pictograph.**

1.

| Favourite Beach Activity | | |
|---|---|---|
| **Activity** | **Tally** | **Number** |
| swimming | 𝍸 𝍸 𝍸 \| | 16 |
| making sand castles | 𝍸 \|\|\| | 8 |
| collecting shells | \|\|\|\| | 4 |
| sailing | 𝍸 𝍸 \|\| | 12 |
| | **Total** | **40** |

2.

| Favourite Sport | |
|---|---|
| **Sport** | **Frequency** |
| Football | 12 |
| Cricket | 18 |
| Netball | 6 |
| Track and Field | 8 |

3.

| Favorite School Subject | |
|---|---|
| **Subject** | **Tally** |
| Math | 𝍸 𝍸 \| |
| Science | 𝍸 |
| Language Arts | 𝍸 \|\| |
| Reading | 𝍸 \|\|\|\| |
| Social Studies | 𝍸 𝍸 \|\| |



Chapter 31 Statistics.indd 374 16/04/18 11:37 AM

## Teaching Point 2:

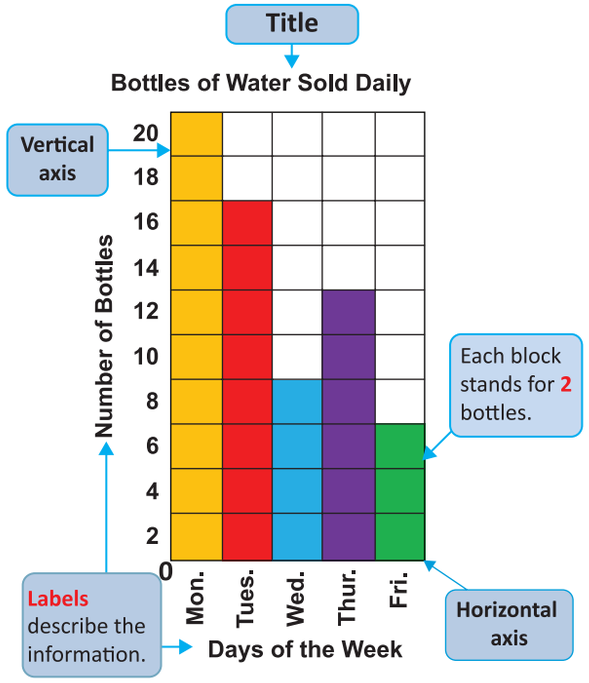
*How can you represent data using graphs?*

The chart below shows the number of bottles of water sold in the cafeteria in one week.

**Bottles of Water Sold During a Week**

| Days | Tally | Frequency |
|---|---|---|
| Monday | 𝍸 𝍸 𝍸 𝍸 | 20 |
| Tuesday | 𝍸 𝍸 𝍸 \| | 16 |
| Wednesday | 𝍸 \|\|\| | 8 |
| Thursday | 𝍸 𝍸 \|\| | 12 |
| Friday | 𝍸 \| | 6 |

Represent the data in the chart above in a block graph.




The **scale factor** is **1 block: 2 bottles**

A **block graph** uses **blocks** to represent different amounts.

## Activity 2:

**Represent the data in each table using a block graph.**

**Write a title. Choose a scale. Draw and label the blocks and axes.**

1.

| Recycling Day Collections | |
|---|---|
| **Items** | **Number** |
| Glass bottles | 20 |
| Plastic bottles | 32 |
| Aluminum cans | 16 |
| Newspapers | 36 |
| Magazines | 24 |

2.

| Favourite Sport | |
|---|---|
| **Sport** | **Frequency** |
| Football | 12 |
| Cricket | 18 |
| Netball | 6 |
| Track and Field | 8 |

3.

| Field Trip choices | |
|---|---|
| **Place** | **Number** |
| IMAX Cinema | 15 |
| Science Centre | 20 |
| Zoo | 10 |
| Caroni Swamp | 25 |



Chapter 31 Statistics.indd 375 16/04/18 11:37 AM

## Teaching Point 3:

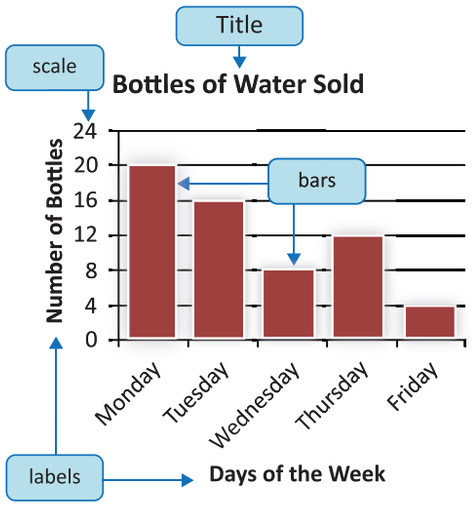
*How can you represent data using graphs?*

The chart below shows the number of bottles of water sold in the cafeteria in one week.

**Bottles of Water Sold During a Week**

| Days | Tally | Frequency |
|---|---|---|
| Monday | 𝍸 𝍸 𝍸 𝍸 | 20 |
| Tuesday | 𝍸 𝍸 𝍸 \| | 16 |
| Wednesday | 𝍸 \|\|\| | 8 |
| Thursday | 𝍸 𝍸 \|\| | 12 |
| Friday | 𝍸 \| | 6 |

Represent the data using a bar graph.




The scale is 0 to 24 by fours.

A **bar graph** uses bars to show data. A scale of equally spaced numbers helps you read the number each bar shows.

## Activity 3:

**Represent the data in each chart, table or graph using a bar graph.**

**Write a title. Choose a scale. Draw and label the bars and axes.**

1.

| Field Trip choices | |
|---|---|
| **Place** | **Number** |
| IMAX Cinema | 15 |
| Science Centre | 20 |
| Zoo | 10 |
| Caronl Swamp | 25 |

2.

| Recycling Day Collections | |
|---|---|
| **Items** | **Number** |
| Glass bottles | 20 |
| Plastic bottles | 32 |
| Aluminum cans | 16 |
| Newspapers | 36 |
| Magazines | 24 |

3.

| Favourite Beach Activity | | |
|---|---|---|
| **Activity** | **Tally** | **Number** |
| swimming | 𝍸 𝍸 𝍸 \| | 16 |
| making sand castles | 𝍸 \|\|\| | 8 |
| collecting sheels | \|\|\|\| | 4 |
| sailing | 𝍸 𝍸 \|\| | 12 |
| | **Total** | **40** |



Chapter 31 Statistics.indd 376 16/04/18 11:37 AM

**4.**

| Text Messages Sent in one Day | |
|---|---|
| Lian |  |
| Brain |  |
| Mark |  |
| Aleem |  |

 = 5 text messages

**5.**

| Favourite Camp Activity | |
|---|---|
| Football |  |
| Hiking |  |
| Painting |  |
| Field Trips |  |

 = 4 children

## Mode

### Teaching Point 1:

*How do you find and use the mode?*

The **mode** is the number or numbers that occur most often in the data.

Find the mode.

26, 23, 27, 26, 22, 25, 26, 23

**Step 1: Find the number or numbers that occur most often.**

22, 23, 23, 25, 26, 26, 26, 27

So, the mode is 26.

You can find the mode from a frequency table.

**Tally Chart**

| Plants | Tally | Frequency |
|---|---|---|
| Plant 1 | 𝍸 𝍸 𝍸 \| | 16 |
| Plant 2 | 𝍸 𝍸 \|\| | 12 |
| Plant 3 | 𝍸 𝍸 𝍸 \|\| | 17 |
| Plant 4 | 𝍸 𝍸 \| | 11 |

Plant 3 has the **most frequent** number of ochroes. So, it is the mode.

### Activity 1:

**Find the mode for each set of data.**

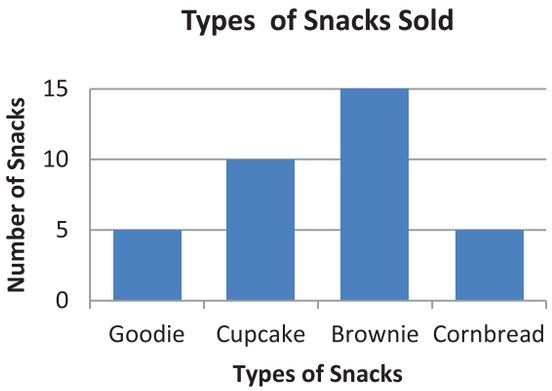
1. 2, 4, 4, 8, 10, 2, 2, 12
2. 41, 51, 51, 39, 49, 51, 56
3. 34, 56, 43, 43, 52, 34, 43, 51, 54
4. 11, 27, 24, 12, 15, 20, 12, 12, 12
5. 32, 42, 32, 45, 32, 56, 42, 32
6. 8, 9, 8, 9, 10, 9, 7, 10, 9, 8, 11
7. 49, 19, 44, 44, 48, 50, 44, 22
8. 30, 42, 49, 42, 28, 27
9. 18, 22, 22, 19, 18, 17, 19, 18
10. 0.5, 0.3, 0.4, 0.6, 0.3, 0.1, 0.1, 0.3



Chapter 31 Statistics.indd 377 16/04/18 11:37 AM

## Activity 2:

The bar graph shows the amount of snacks sold by Miss Shopkeeper, on Wednesday.




**1.** Which snack represents the mode?

The tally chart below shows the win scores of students who have participated in a chess tournament.

| School | Tally |
|---|---|
| St Joseph Sec | 𝍸 |
| Hilltop Sec | 𝍸 I |
| North Sec | 𝍸 III |
| Eastern Sec | II |
| Tobago Sec | III |

**2.** Which school had the modal win scores?

During recycling day, students collected the following number of items shown in the pictograph.

| Recycling Day Collections | |
|---|---|
| Glass Bottles | |
| Plastic Bottles | |
| Cans | |
| Snack wrappers | |
| Newspapers | |
| Magazines | |

= 10 items

**3.** What is the modal item collected?

The ages of students on the football team are shown in the frequency table below.

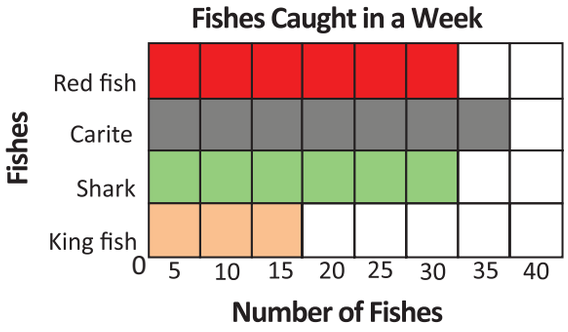
| Ages | Frequency |
|---|---|
| 9 years | 2 |
| 10 years | 7 |
| 11 years | 6 |
| 12 years | 5 |
| 13 years | 1 |

**4.** What is the modal age of children?



Chapter 31 Statistics.indd 378 16/04/18 11:37 AM

**5.** The number of fishes caught in a week is organized in the block graph below.




Which fish represents the modal number of fishes caught?

---

**6.** A batsman scored the following runs in different games during a cricket tournament.

55, 0, 65, 102, 55, 24, 55, 98

What is the modal number of runs?

**7.** The numbers below represent the goals scored by a football team in 6 different matches.

| 3, 3, 6, 5, 4, 3 |
|---|

What is the mode of the scores above?

**8.** The table below shows the number of words 10 children spelt correctly in a Spelling test.

| 11, 10, 15, 15, 11, 15, 9, 10, 15, 13 |
|---|

Write the number representing the mode.

**9.** Mark's test scores are: 92, 88, 79, 97, 92, 88, 85, 92. Find the mode.

**10.** The table shows the sizes of shoes in a Standard 5 class.

**Sizes of Shoes in the Class**

| Sizes | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|
| Number of Pairs | 2 | 4 | 9 | 3 | 4 |

Find the mode.

**11.** Eight children had money to spend at the bazaar. Their money amounts are shown below.

$10, $5, $15, $20, $20, $10, $ ☐, $12

If there is ONLY ONE mode, what is a possible value for $ ☐?

---

## Mean

### Teaching Point 1:

*How do you find the average value of a set of data?*

A **mean** is type of average. The mean of a set of data is the **sum** of the data **divided** by the number of pieces of data.

A single number can be helpful to describe a whole set of data. That single number is called the mean or average.

Find the mean.

4, 5, 7, 4, 6, 8

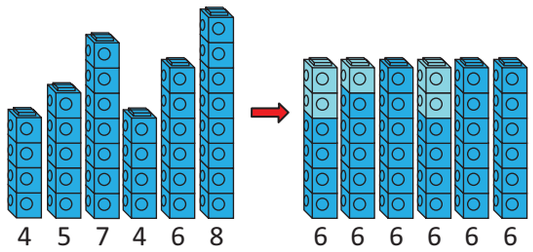


Chapter 31 Statistics.indd 379 16/04/18 11:37 AM

**Method 1: Use a model**

Use 6 stacks of cubes to represent each piece of data in the data set.

Move around the cubes until each stack has the same number of cubes.




After all the cubes have been equally distributed. We can see that the **average** number is 6.

**Method 2:** $\dfrac{\textit{Sum of the data}}{\textit{Number of pieces of data}}$

**Mean** $\rightarrow \dfrac{4+5+7+4+6+8}{6} = \dfrac{36}{6} = 6$

So, the mean or average is 6.

## Activity 1:

**Find the mean for each set of data.**

1. 7, 9, 11, 8, 10, 13, 12
2. 18, 17, 15, 19, 16, 23
3. 49, 52, 62, 54, 61, 70, 55, 53
4. 7.2, 6.5, 7.0, 6.1, 8.2
5. 21.5 cm, 23.7 cm, 20.9 cm, 24.1 cm, 25.6 cm, 22.2 cm

**Solve.**

6. Jameela earned \$15, \$12, \$22, \$18 and \$13 babysitting. What is the mean of the amounts that she earned?
7. The number of goals scored by Ezekiel during the football tournament were 4, 2, 1, 3, 2, 2, 1 and 1. Find the mean number of goals that he scored.
8. The mean age of a group of four friends is 11. Sharon, age 6, joins the group. What is the mean age of the group now?
9. The mean of a set of numbers is 16. The sum of the numbers is 240. How many numbers are there?
10. In a race the mean time for four runners is 15.5 seconds and the mean time for another six runners is 13 seconds. Calculate the mean time for all ten runners.
11. The table shows the runs scored by a batsman in a cricket tournament.

| Matches | Runs |
|---|---|
| Match 1 | 120 |
| Match 2 | 109 |
| Match 3 | 48 |
| Match 4 | 53 |
| Match 5 | 70 |

What is the batsman's mean for the games?



Chapter 31 Statistics.indd 380 16/04/18 11:37 AM

12. The chart below shows the places some students prefer to visit.

| Places to Visit | | |
|---|---|---|
| **Places** | **Tally** | **Frequency** |
| Buccoo Reef | 𝍸 𝍸 \| | 11 |
| Caroni Swamp | 𝍸 \|\| | 7 |
| Pitch Lake | \|\| | 2 |
| Arena Dam | \|\|\|\| | 4 |

Find the mean of the data.

## Teaching Point 2:

*How do you use the mean to solve problems?*

Tricia's mean score from the six Mathematics tests was 82. Five of her scores were 86, 90, 97, 72 and 94. What was her sixth score?

**Sum of the data = mean x number of pieces of data**

**Mean** → 82

**Number of pieces of data** → 6

Total of 6 scores = 82 x 6
Total of 6 scores = 492

Total of 5 scores = 86 + 90 + 97 + 72 + 94

= 439

$6^{th}$ score → 492 – 439 = 53

So, her sixth score was 53.

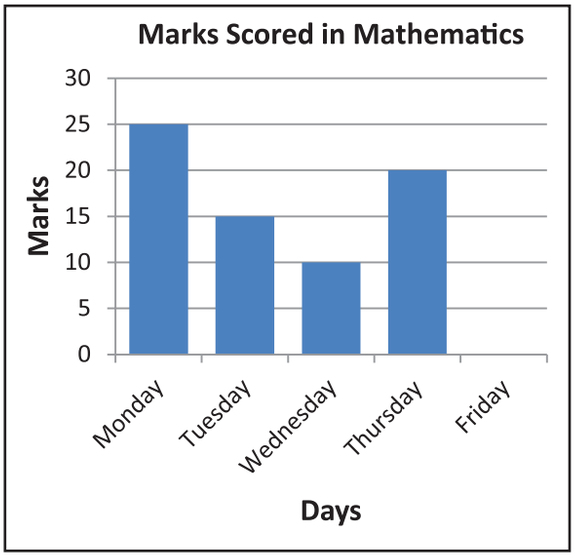
## Activity 2:

**Solve.**

1. The mean of five numbers is 6. Four of the numbers are 4, 8, 7 and 5. What is the fifth number?

2. Xian scored a mean number of 6 000 points in five video games. How many points must he score in his sixth video game so that his mean score becomes 6 600?

3. The incomplete graph below shows the marks that John scored in Mathematics each day during a particular week.




If John had a mean score of 18 for the five days, what was his score for Friday?



Chapter 31 Statistics.indd 381 16/04/18 11:37 AM

4. Five students competed in a walking race. The table below shows the times recorded for 4 students.

| Students | Time (minutes) |
|---|---|
| Sayeed | 12.5 |
| Joshua | 10.9 |
| Alex | 12.4 |
| David | 12.2 |
| Nadeem | |

(a) Calculate the average walking time for the four students.

(b) If the average walking time for all five students was 11 minutes, what was Nadeem's time?

## Interpret Data in Charts, Tables and Graphs

1. The table below shows the heights of five children.

| Children | Jan | Ben | Tom | Ali | Lee |
|---|---|---|---|---|---|
| Heights in centimetres | 56 | 64 | 82 | 72 | 66 |

(a) Who is the tallest child?

(b) Calculate the difference in height between the tallest child and the shortest child.

(c) What is the mean height of the children?

2. The table below shows the number of story books the students of a class read during the vacation.

| Number of story books | 0 | 1 | 2 | 4 | 6 |
|---|---|---|---|---|---|
| Number of students | 6 | 2 | 4 | 5 | 1 |

(a) How many students did not read any books?

(b) How many students read at least two books?

(c) Calculate the mean number of books that were read by students.

3. The table below shows the number of fruit trees in an orchard.

| Type of Tree | Number of Trees |
|---|---|
| Orange | 26 |
| Grapefruit | 30 |
| Mango | 24 |
| Paw paw | |

(a) How many more grapefruit trees there are than mango trees?

(b) 20% of the total number of trees is paw paw trees. Write the number of paw paw trees.

(c) Which tree represents the mode?



Chapter 31 Statistics.indd 382 16/04/18 11:37 AM

**4.** The following pictograph shows the number of gold medals won by each house after a sports meeting.

| Gold Medals won by Houses | |
|---|---|
| Jupiter |  |
| Saturn |  |
| Venus |  |
| Mars |  |
| Uranus |  |

 = 2 medals

**(a)** How many gold medals did the houses win in total?

**(b)** Which house represents the mode?

**(c)** How many gold medals were won by House Jupiter?

**(d)** How many houses won at least 4 medals?

---

**5.** The tally chart below shows the drinks students prefer.

| Favourite Drinks | | |
|---|---|---|
| **Drinks** | **Tally** | **Frequency** |
| water | 𝍸 | 3 |
| juice | 𝍸 𝍸 \|\| | 12 |
| milk | | |
| soda | 𝍸 𝍸 | 10 |

**(a)** Thirty-two students were surveyed. Complete the tally chart to show the tally and frequency.

---

**6.** The tally chart below shows fruits eaten by students at recess time on one day.

| Fruits Eaten by Students at Recess | | |
|---|---|---|
| **Fruits** | **Tally** | **Frequency** |
| mango | 𝍸 𝍸 \|\|\| | 13 |
| apple | 𝍸 \|\| | |
| pineapple | 𝍸 | 5 |
| banana | 𝍸 𝍸 | 10 |

**(a)** Complete the tally chart.

**(b)** How many more children ate mangoes than pineapple?

**(c)** What fruit represents the mode?

---

**7.** Some students were asked about their favourite kind of television show. Their responses are shown in the pictograph that follows.



Chapter 31 Statistics.indd 383 16/04/18 11:37 AM

| Favourite TV Show | |
|---|---|
| Cartoon | ☺☺☺☺☺ |
| Nature | ☺☺ |
| Sports | ☺☺☺☺ |
| Movies | ☺☺☺ |

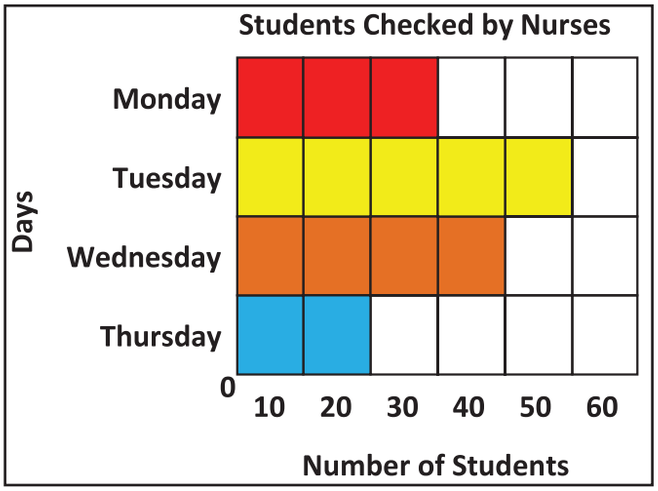
☺ = 2 students

**(a)** Which type of show did the most students choose?

**(b)** How many students took part in the survey?

**(c)** How many pictures will you draw if 8 students chose game shows?

**8.** The block graph below shows the number of Standard 4 and 5 students who were checked by nurses from Monday to Thursday.



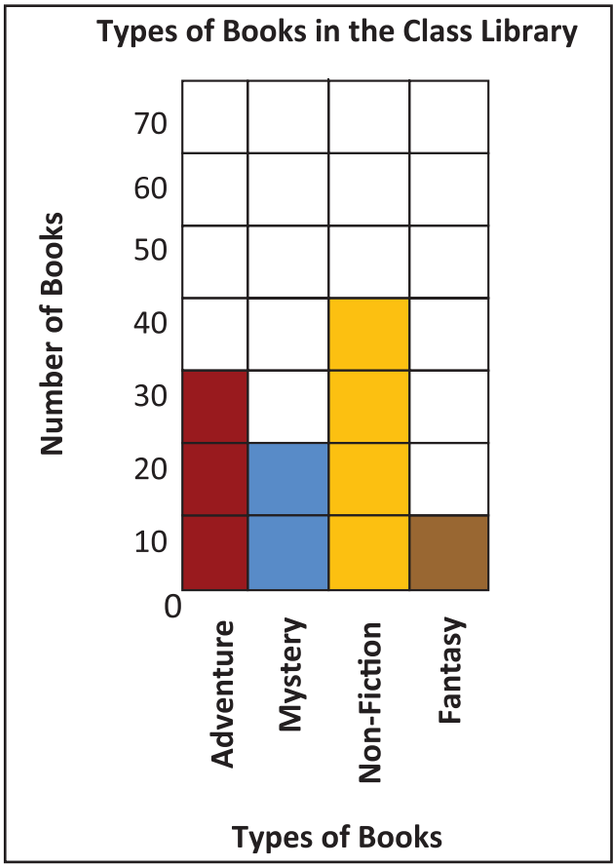

**(a)** How many students were checked on Thursday?

**(b)** How many students were checked altogether.

**(c)** If there are 168 students in both classes, how many students were not checked by the nurses?

**(d)** Calculate the average number of students that were checked each day.

**9.** The block graph below shows the number of books of each type in a class library.




**(a)** What is the total number of books in the library?

**(b)** Which type of book represents the mode?

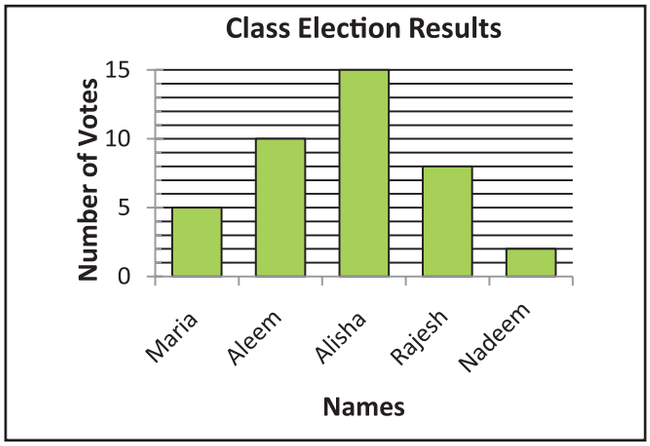


Chapter 31 Statistics.indd 384 16/04/18 11:37 AM

(c) What percentage of books in the library is of the Mystery type?

(d) There are 25 students in the class. If each student borrows two books to read over the holidays, how many books will remain in the library?

**10.** The bar graph below shows the election results for a prefect in a Standard 4 class.

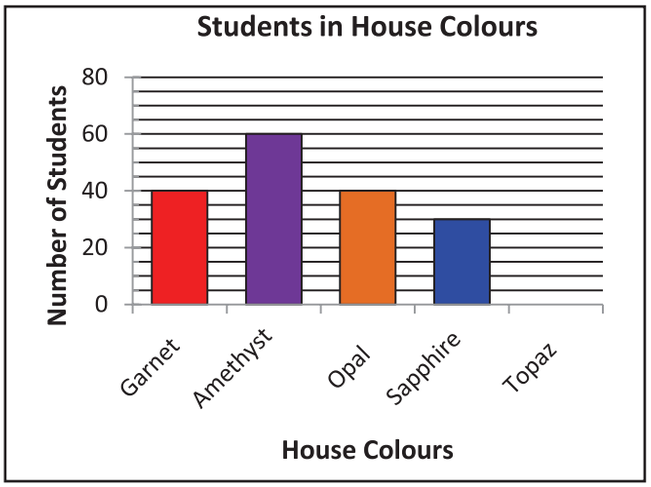



(a) How many more votes did Alisha get than Nadeem?

(b) What fraction of the votes did Aleem get?

(c) How many students did not vote for Alisha?

**11.** The chart below shows the number of students who were dressed in their house colours for a Sports Day.



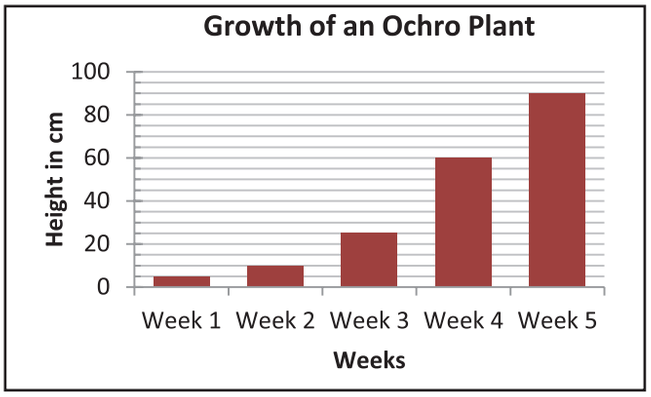

(a) How many more students are in Garnet than in Sapphire?

(b) If the number of students who are in Amethyst and Opal represent half of the total number of students, what is the total number of students?

(c) Draw the bar to show the number of students in Topaz.

(d) Calculate the mean number of students in each house.

**12.** The bar graph below shows growth of a plant over a period of 5 weeks.






Chapter 31 Statistics.indd 385 16/04/18 11:37 AM

(a) In which week did the plant have the greatest height?

(b) In which week did the plant have the most growth?

(c) How much taller is the plant in Week 3 than in Week 1?

## Chapter Review

**Answer the questions.**

1. The mean of 32 and 48 is the same as 50 and ☐.

   What number does ☐ represent?

2. During science class the students recorded the height of their plants in centimetres. The heights were: 10, 12, 12, 13, 15, 14, 16, 12, 24, 15, 20. What is the modal height of the plants?

3. The chart below shows the number of goals that a team scored in a football games.

| Goals Scored in Football Games | |
|---|---|
| Game 1 | ⚽⚽⚽ |
| Game 2 | ⚽⚽◐ |
| Game 3 | |
| Game 4 | ⚽◐ |

⚽ = 2 goals ◐ = 1 goal

(a) The team scored 18 goals. Complete the table to show the number of goals that were scored in Game 3.

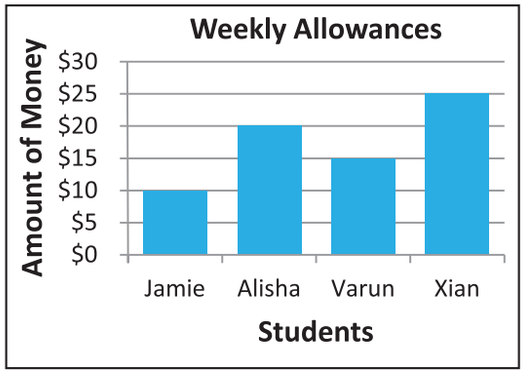
(b) Which game represents the mode?

4. The table below shows Adam's test scores for five subjects.

| Subjects | Test Scores |
|---|---|
| Mathematics | 69 |
| ELA | 86 |
| Social Studies | 95 |
| Science | 88 |
| VAPA | 92 |

Calculate his mean score for the test.

5. The bar graph shows four students' weekly allowances.




(a) Which student had a $15 allowance?



Chapter 31 Statistics.indd 386 16/04/18 11:37 AM

(b) What is the difference between Xian's and Jamie's allowances?

(c) What is the mean allowance?

6. The table below shows the time taken by 5 runners in a 100 m race.

| Runner | Time in seconds |
|---|---|
| Aaron | 14.4 |
| Jayden | 14.9 |
| Avinash | 13.9 |
| Aiden | 13.7 |
| Daniel | 14.6 |

(a) Which runner won the race?

(b) Calculate the time difference between the fastest runner and the slowest runner?

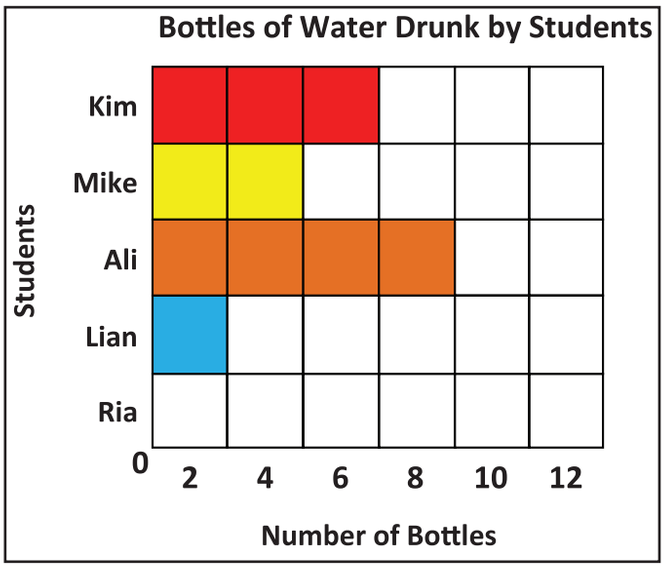
(c) Calculate the mean time for the race.

7. The table below shows the amount of money that Gian saved over four months.

| Month | Amount Saved |
|---|---|
| January | $25 |
| February | $50 |
| March | $65 |
| April | $40 |

Use the data in the table to create a bar graph.

8. The incomplete block graph shows the number of bottles of water 5 students drank during a sports meeting.




(a) Ria drank 10 bottles of water. Complete the block graph to show this.

(b) How many students drank at least 4 bottles of water?

(c) If each bottle contained 500 ml of water, how many litres of water did the 5 children drink?



Chapter 31 Statistics.indd 387 16/04/18 11:37 AM

# PRACTICE TEST 1

**READ THE FOLLOWING DIRECTIONS CAREFULLY**

**1. This test is divided into THREE sections.**
**2. Make sure you read the instructions before you start to work on any section.**

**SECTION I**

**1.** Write in figures: two hundred and seven thousand, and thirteen.

Answer: _____

**2.** Arrange the following numbers in order: from largest to smallest.

2, 2.2, 2.1, 2.02

Answer: _____

**3.** Write the missing value in the expanded notation below.

$72.48 = (7 \times 10) + (2 \times 1) + (4 \times \_\_\_\_\_) + (8 \times \frac{1}{100})$

Answer: _____

**4.** What is the total value of the coins shown below?




Answer: _____

**5.** How many fifths are there in $3\frac{4}{5}$?

Answer:_____

**6.** Express 36% as a decimal number.

Answer: _____



Practice Test.indd 388 20/04/18 1:59 PM

**7.** Four boys share 3 sandwiches equally. How many sandwiches does each boy get?

Answer: _____

**8.** What is 50% of $350?

Answer: _____

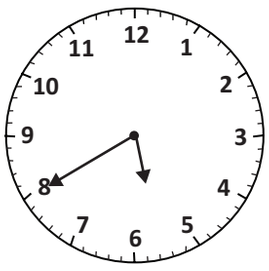
**9.** Round 7 426 to the **NEAREST** hundred.

Answer: _____

**10.** $26\overline{)3\,276}$

Answer: _____

**11.** State the time shown on the clock below.

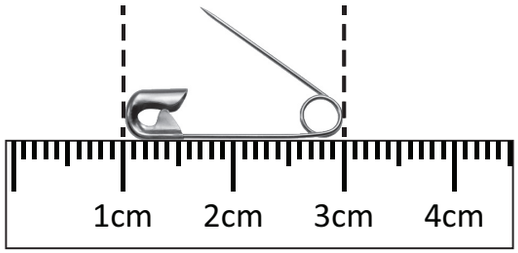



Answer: _____



Practice Test.indd 389 20/04/18 1:59 PM

**12.** What is the length of the pin?

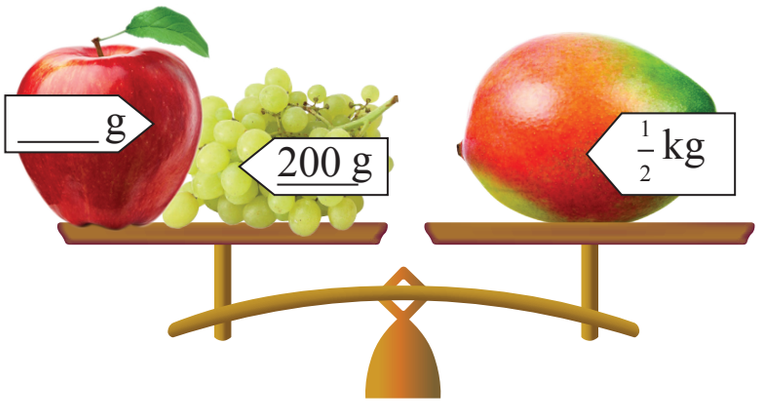



Answer: _____

**13.** 1.55 litres = ☐ millilitres.

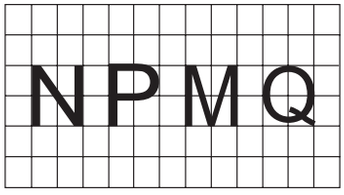
Answer: _____

**14.** Calculate the mass of the apple.




Answer: _____

**15.** Four letters are shown on the grid below. Which letter has a line of symmetry?

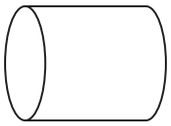



Answer: _____



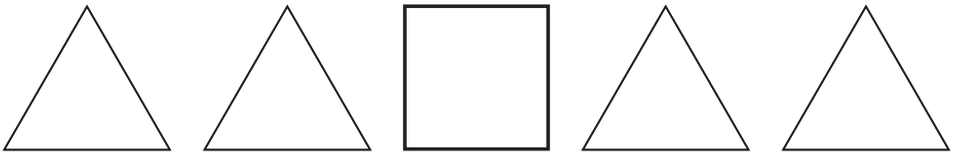
Practice Test.indd 390 20/04/18 1:59 PM

**16.** What is the name of the solid shown below?



Answer: _____

**17.** Write the name of the solid which can be formed using ALL the faces below.



Answer: _____

**18.** The numbers below shows the test scores of seven children.

85, 69, 70, 85, 70, 65, 70

Which score represents the mode?

Answer: _____

**19.** The pictograph shows the number of times four children were late during the term.

| Student | Number of Times Late |
|---|---|
| Josiah | ⊗⊗⊗⊗⊗ |
| Matthew | ⊗ |
| Leanna | ⊗⊗ |
| Arun | ⊗⊗⊗ |

⊗ = 4 times

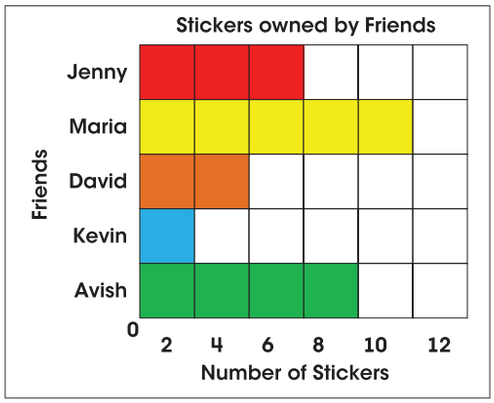
What is the total number of times they were late during the term?

Answer: _____



Practice Test.indd 391 20/04/18 1:59 PM

**20.** The block graph below shows the number of stickers owned by five friends.

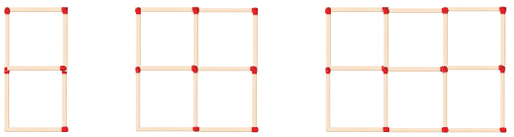



How many more stickers does Maria own than David?

Answer: _____

## SECTION II

**21.** Joshua uses matchsticks to form figures that follow a pattern as shown below.



1st 2nd 3rd _____ 4th

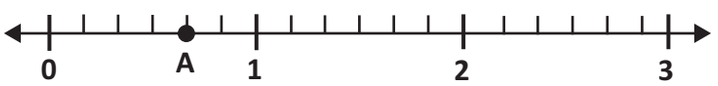
How many matchsticks will he use in the 4th figure?

(2 marks)

Answer: _____

**22.** Which of the following fractions can be placed at Point A on the number line below?

$\frac{2}{3}$, $\frac{3}{4}$, $1\frac{1}{4}$, $\frac{3}{6}$




(2 marks)

Answer: _____



Practice Test.indd 392 20/04/18 1:59 PM

**23.** There are 288 people in a hall. There are twice as many adults as children. There are 36 more boys than girls. How many girls are in the hall?

(3 marks)

Answer: _____

**24.** Joshua gets a daily allowance of $30. Each day he spends 60% of it on lunch, $\frac{1}{2}$ of the remainder on transport and saves the rest. Calculate the amount he saves each week.

(3 marks)

Answer: _____

**25.** The product of two numbers is 900. One of the numbers 20. What is the difference between the two numbers?

(2 marks)

Answer: _____

**26.** 25 apples were bought for $3 each and sold at 5 apples for $30. Calculate the profit made?

(2 marks)

Answer: _____

**27.** Mr. Persad borrowed $6 000 at 9% per annum for 2 years. Calculate the amount of money he will repay each month for 2 years if he pays equal monthly instalments.

(3 marks)

Answer: _____



Practice Test.indd 393 20/04/18 1:59 PM

**28.** Mother bakes some cupcakes for a party. She fills 20 trays with 12 cupcakes each. She has 11 cupcakes left over. How many trays can she fill if she puts 8 cupcakes on each tray?

(3 marks)

Answer: _____

**29.** Lal planted 124 sweet pepper seedlings. Shammi planted 26 more than Lal and 46 less than Ralph. How many sweet pepper seedlings were planted ALTOGETHER?

(3 marks)

Answer: _____

**30.** One eraser costs 30 cents and a packet of 5 erasers cost $1.00. Jeremy bought 27 erasers and spent the least possible amount of money.

(3 marks)

Explain how Jeremy spent his money.

_____

_____

_____

_____

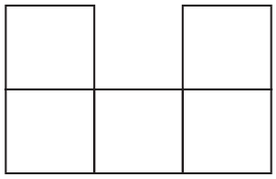
**31.** A marathon runner started to run at 5:45 am and stopped after 2 hours and 36 minutes. At what time did he stop running?

(2 marks)

Answer: _____

**32.** The figure shown below is made up of 5 identical squares. If the length of each side of a square is 3 cm, what is the perimeter of the figure?

(2 marks)



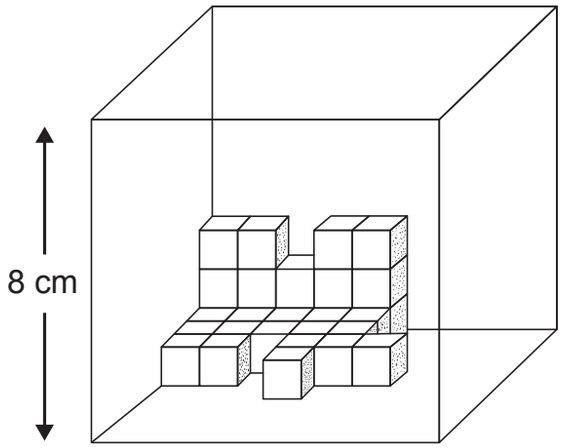
Answer: _____



Practice Test.indd 394 20/04/18 1:59 PM

**33.** A cube-shaped container with sides measuring 8 cm has identical 1-cm cubes packed in it as shown below. What is the volume of the empty space left in the container?

(3 marks)




Answer: _____

**34.** Miss Ali sold $\frac{1}{3}$ of her rice on Monday, $\frac{2}{5}$ kg on Tuesday and had 16 kg left. How much rice did she have at first?

(3 marks)

Answer: _____

**35.** Draw the next shape in the pattern.



_____

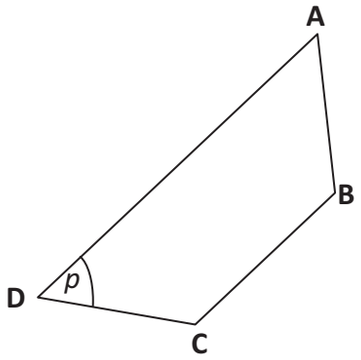
(2 marks)



Practice Test.indd 395 20/04/18 1:59 PM

**36.** The figure shown below is a quadrilateral.

(3 marks)




**(a)** Name the quadrilateral.

Answer: _____

**(b)** Describe the size of the angle marked *p*.

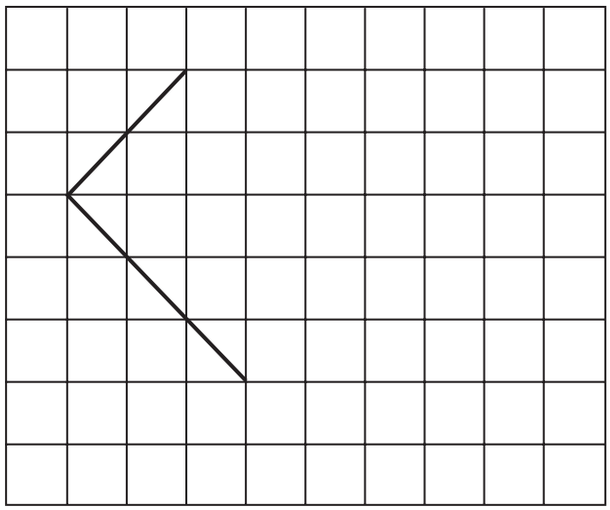
Answer: _____

**(c)** Tick the parallel sides.

Answer: _____

**37.** The following diagram shows two sides of an incomplete shape.

(2 marks)



Complete the shape by drawing the other sides to form a quadrilateral with opposite sides equal and parallel.



Practice Test.indd 396 20/04/18 1:59 PM

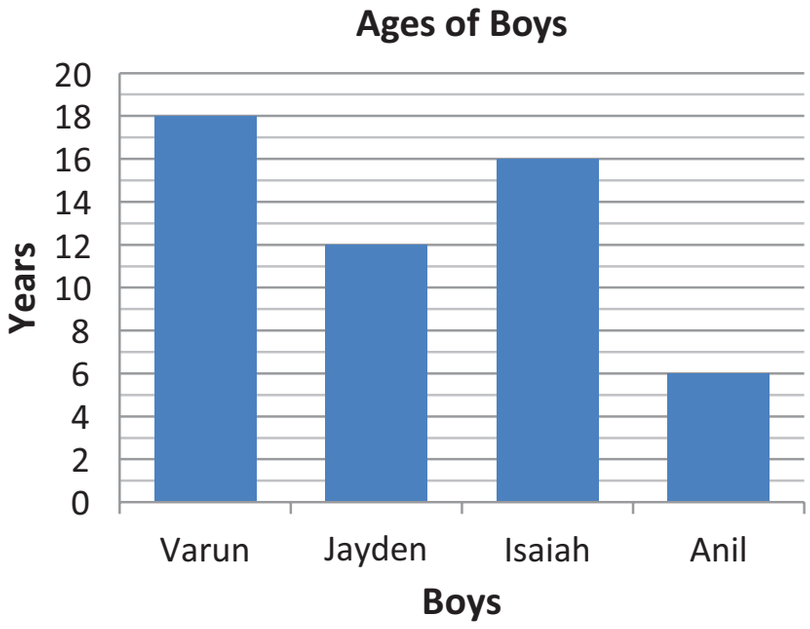
**38.** The tally chart below shows the favourite fruits of Standard 5 students. There are 40 students in Standard 5.

(2 marks)

| Fruits | Tally | Frequency |
|---|---|---|
| Oranges | 𝍸 𝍸 𝍸 | 16 |
| Guavas | 𝍸 \|\|\| | 8 |
| Cashew | | |
| Apples | 𝍸 𝍸 \|\| | 12 |

Complete the tally and frequency chart above.

**39.** The bar graph below shows the ages of four boys.




Calculate the MEAN age of the four boys?

(2 marks)

Answer: _____



Practice Test.indd 397 20/04/18 1:59 PM

**40.** The table below shows the total number of stars Miss Peters gave to the students of her class during 1 month of school.

| **Number of Stars** | 0 stars | 1 star | 2 stars | 3 stars |
|---|---|---|---|---|
| **Number of Students** | 5 | 16 | 14 | 5 |

What was the total number of stars Miss Peters gave to her class?

(3 marks)

Answer: _____

## SECTION III

**41.** A bakery sold 80% of a batch of cookies. It gave away 90% of the cookies that remained because they were broken. This left 40 cookies. Calculate how many cookies the bakery had at the beginning.

(4 marks)

Answer: _____

**42.** In a fruit stall, $\frac{3}{5}$ of the fruits were oranges, and $\frac{3}{8}$ of the remaining fruits were lemons. The rest of the fruits were apples. There were 133 more oranges than apples. How many fruits were in the stall altogether?

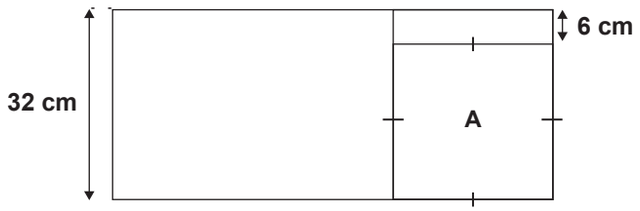
(4 marks)

Answer: _____



Practice Test.indd 398 20/04/18 1:59 PM

**43.** The figure below is made up of one square A and two rectangles. The perimeter of the figure is 206 cm. Find the total area of the two rectangles.

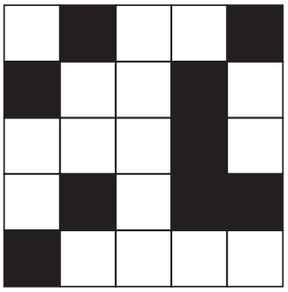



(4 marks)

Answer: _____

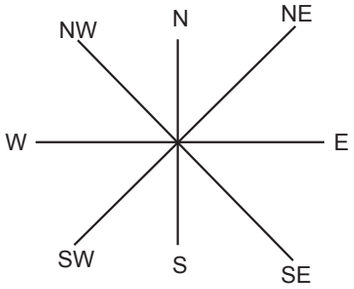
**44.** **(a)** The figure below is made up of squares. Shade two more squares so that the figure has a line of symmetry.

(3 marks)



**(b)** Jack is facing South-East. He makes a three quarter turn clockwise followed by a quarter turn. Which direction is he facing now?

(1 mark)

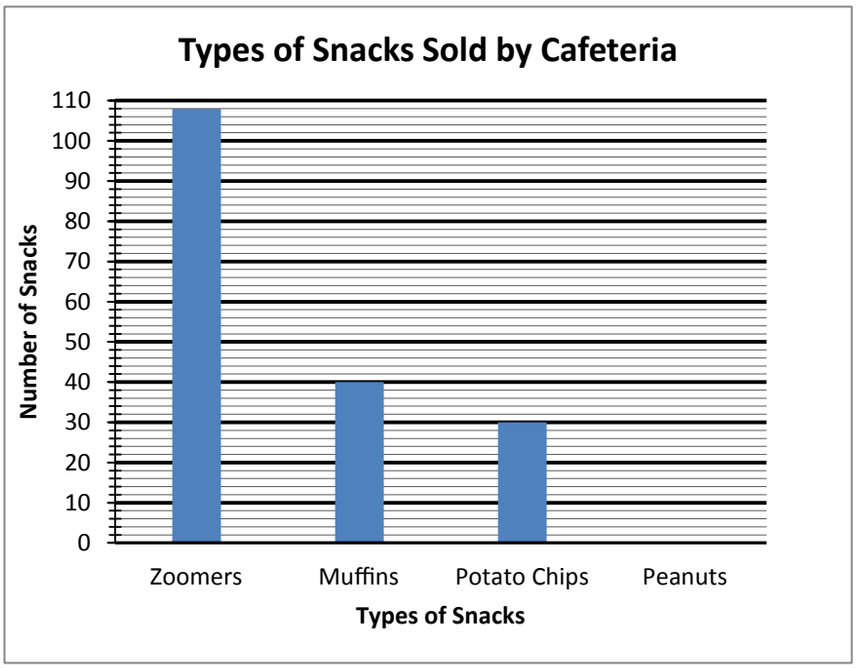



Answer: _____



Practice Test.indd 399 20/04/18 1:59 PM

**45.** The bar graph below shows the types of snacks sold by a school's cafeteria in one week.




**(a)** The number of packets of peanuts sold was $\frac{2}{3}$ of the number of Zoomers sold. Draw the bar to show the number of packets of peanuts.

(2 marks)

**(b)** The table below shows the prices of the snacks.

| Type of Snack | Price per Snack |
|---|---|
| Zoomers | $2.00 |
| Muffins | $4.00 |
| Potato Chips | $3.00 |
| Peanuts | $5.00 |

From which type of snack did the cafeteria collect the most money for the week?

(2 marks)

Answer: _____



Practice Test.indd 400 20/04/18 1:59 PM

# PRACTICE TEST 2

**READ THE FOLLOWING DIRECTIONS CAREFULLY**

**1. This test is divided into THREE sections.**
**2. Make sure you read the instructions before you start to work on any section.**

**SECTION I**

**1.** Write the **PLACE VALUE** of the underlined digit in 1<u>2</u>9 537

Answer: _____

**2.** Express $\frac{3}{4}$ as a percent.

Answer: _____

**3.** Write 72.48 in expanded notation.

Answer: _____

**4.** Round 36 704 to the NEAREST thousand.

Answer: _____

**5.** A class has 24 children. 75% of the class is girls. How many girls are in the class?

Answer: _____

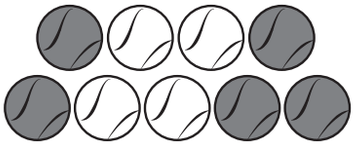
**6.** How many 10 cent coins are equivalent to $7.00?

Answer: _____



Practice Test.indd 401 20/04/18 1:59 PM

**7.** What fraction of the objects is shaded?



Answer: _____

**8.** What is the product of 409 × 64?

Answer: _____

**9.** ☐ + 60 = $9^2$

Answer: _____

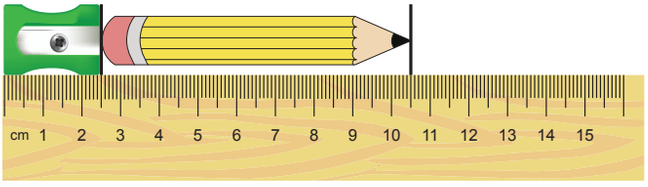
**10.** What is the value of 14 thousands + 21 hundreds?

Answer: _____

**11.** School starts at 8:15 a.m. Allegra arrived at school half an hour late. At what time did she arrive at school?

Answer: _____

**12.** What is the length of the pencil?

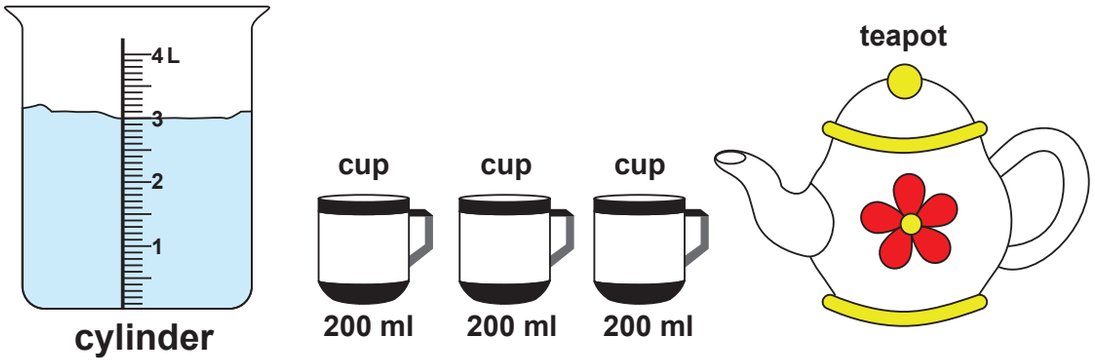



Answer: _____



Practice Test.indd 402 20/04/18 1:59 PM

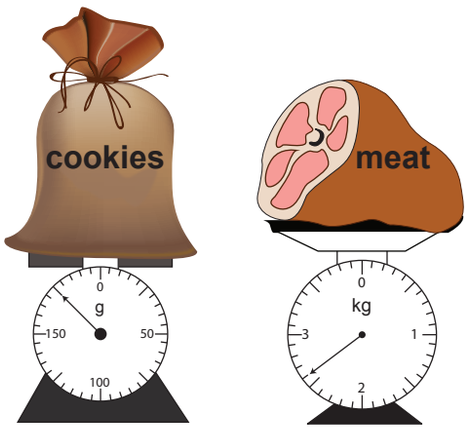
**13.** All the water in the cylinder is used to fill the three cups and the teapot completely.




How much water is in the teapot?

Answer: _____

**14.** Which object has the greater mass.




Answer: _____

**15.** Complete the table below.

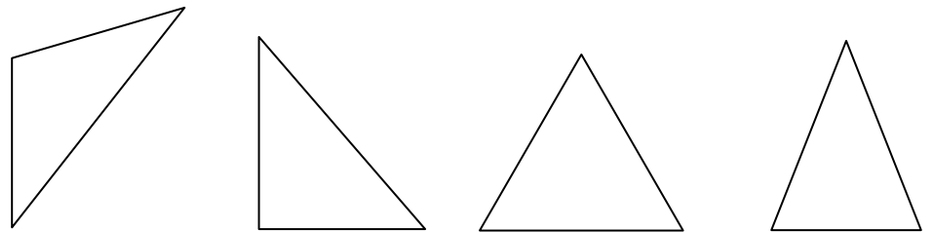
| Name of Shape | Faces | Edges | Vertices |
|---|---|---|---|
| | 1 square face 4 triangular faces | 8 | 5 |

Answer: _____



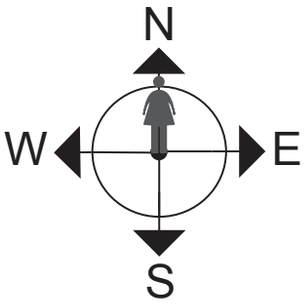
Practice Test.indd 403 20/04/18 1:59 PM

**16.** Which triangle below has 3 lines of symmetry.




Answer: _____

**17.** Jenny is standing in the centre facing South. She turns CLOCKWISE to face West.




What fraction of a complete turn did Jenny make?

Answer: _____

**18.** Which number below best represents the mode?

**5, 6, 8, 3, 6, 8, 6, 5**

Answer: _____



Practice Test.indd 404 20/04/18 1:59 PM

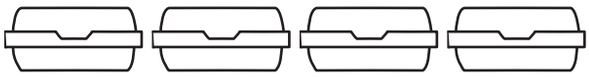
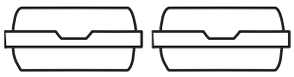
**19.** The table below shows the number wickets taken by 4 bowlers in a cricket competition.

| Bowler | Wickets |
|---|---|
| Matthew | 14 |
| Larry | 16 |
| Samad | 10 |
| Mohan | 8 |

What is the mean number of wickets taken?

Answer: _____

**20.** The pictograph below shows the number lunches that weren't eaten by children over 5 days.

| Days | Number of lunches |
|---|---|
| Monday |  |
| Tuesday |  |
| Wednesday |  |
| Thursday |  |
| Friday |  |

 = 5 lunches

How many more lunches were not eaten on Thursday than on Tuesday?

Answer: _____



Practice Test.indd 405 20/04/18 1:59 PM

## SECTION II

**21.** Three of the numbers below will produce a WHOLE number when added.

$$3\frac{1}{2},\ 6\frac{1}{8},\ 1\frac{1}{4},\ 5\frac{3}{4},\ 3\frac{3}{8}$$

What is the WHOLE number?

(3 marks)

Answer: _____

**22.** Tom is paid $40 for working 8 hours. At this rate, how many hours must he work to earn $480?

(2 marks)

Answer: _____

**23.** What are the next TWO numbers that would continue the number pattern below?

1, 3, 6, 10, 15, ____, ____

(2 marks)

Answer: _____

**24.** The picture below shows the price of mangoes at the market.




Joy paid $50.00 for some mangoes. What is the greatest possible number of mangoes she bought?

(3 marks)

Answer: _____



Practice Test.indd 406 20/04/18 1:59 PM

**25.** Mark and Ali had 60 marbles each. Mark gave 20% of his marbles to Ali. After receiving the sweets from Mark, Ali gave 50% of his total marbles to Ben. How many marbles had Ali left?

(3 marks)

Answer: _____

**26.** The table below shows the number of mangoes two vendors had for sale.

| | Julie Mango | Starch Mango | Total |
|---|---|---|---|
| Mohan | 25 | | 60 |
| James | 45 | 15 | |

What fraction of the total number of mangoes was Starch Mangoes?

(2 marks)

Answer: _____

**27.** Mr. Ramsaran fills 35 bags with 24 oranges each. He has 6 oranges remaining. How many bags would he be able to fill if he puts 18 oranges in each bag?

(2 marks)

Answer: _____

**28.** A basket contains mangoes and oranges. $\frac{5}{9}$ of the fruits are mangoes and the rest are oranges. $\frac{3}{10}$ of the mangoes are green. There are 15 green mangoes. How many fruits are in the basket?

(3 marks)

Answer: _____



Practice Test.indd 407 20/04/18 1:59 PM

**29.** For a field trip 62 students went to the zoo. How much did they pay for the tickets in all?

*Zoo Admission Ticket.*
*$30.00 each*
*20% discount for students*

(2 marks)

Answer: _____

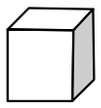
**30.** Jenny is 7 years older than her sister. Three years ago, their total age was 43. How old is Jenny now?

(3 marks)

Answer: _____

**31.** How many cubes with side 5 cm will completely fill the rectangular box that has a volume of 3 000 $cm^3$?

(2 marks)




Answer: _____

**32.** Mother mixes 0.55 litres of lemon juice with 1.85 litres of water. The mixture is then poured into bottles of 700 ml each. How many millilitres of mixture is left over?

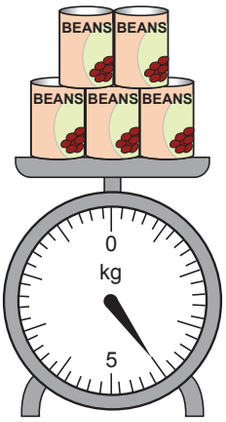
(2 marks)

Answer: _____



Practice Test.indd 408 20/04/18 1:59 PM

**33.** If each tin of peas has the same mass, what will be the mass of three such tins of peas in grams?




(3 marks)

Answer: _____

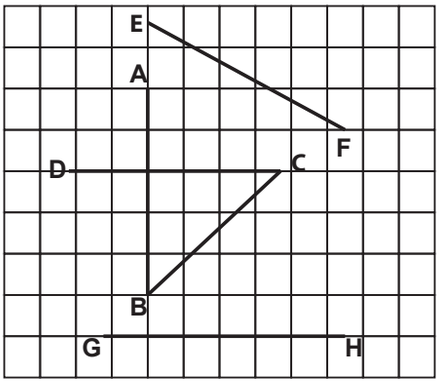
**34.** Sixteen trees are planted in a straight row at equal distances from each other. The distance between the fourth and the eleventh tree is 17.5 m. What is the distance between the first and the last tree?

(3 marks)

Answer: _____

**35.** The diagram below shows 5 straight lines AB, BC, CD, EF and GH on a square grid.

(2 marks)




**(a)** How many right angles are formed by the 5 lines in the diagram above.

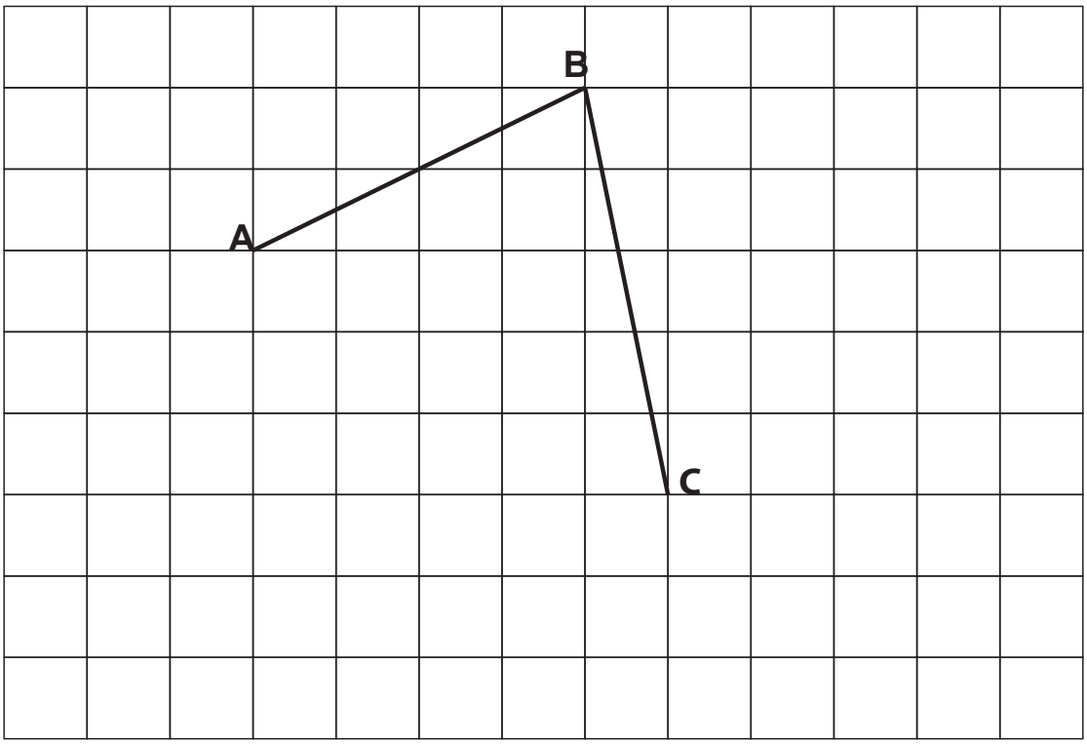
Answer: _____



Practice Test.indd 409 20/04/18 1:59 PM

**36.** In the square grid below, AB and BC are straight lines that form two sides of a parallelogram. Complete the drawing of the parallelogram.

(2 marks)




**37.** A pattern is shown below.

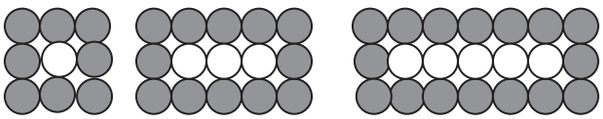


Figure 1 Figure 2 Figure 3

Draw the 5th figure in the pattern.

(3 marks)

Answer _____



Practice Test.indd 410 20/04/18 1:59 PM

**38.** Over a period of one week an Up Town Primary School recorded the number of students who were absent each day. The table below shows the results.

| **Day** | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|---|
| **Students absent** | 11 | 15 | 18 | 16 | 20 |

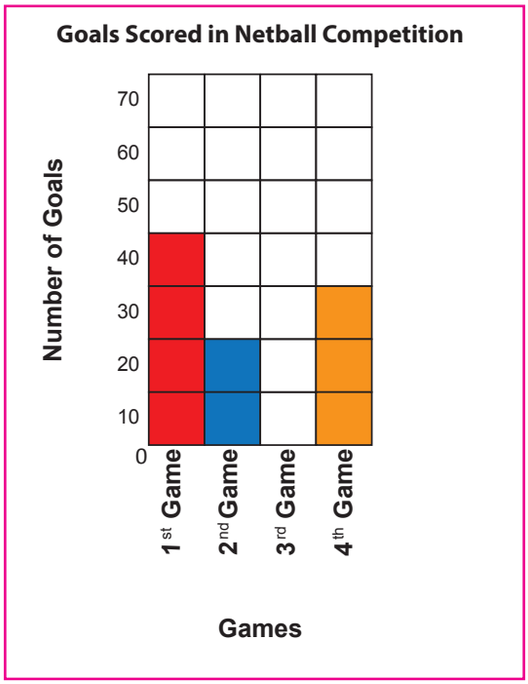
What percent of the total absenteeism was recorded on Friday?

(2 marks)

Answer: _____

**39.** The number of goals scored in the 3rd game was the total number of goals scored in the second and fourth game. Complete the block graph below.

(2 marks)

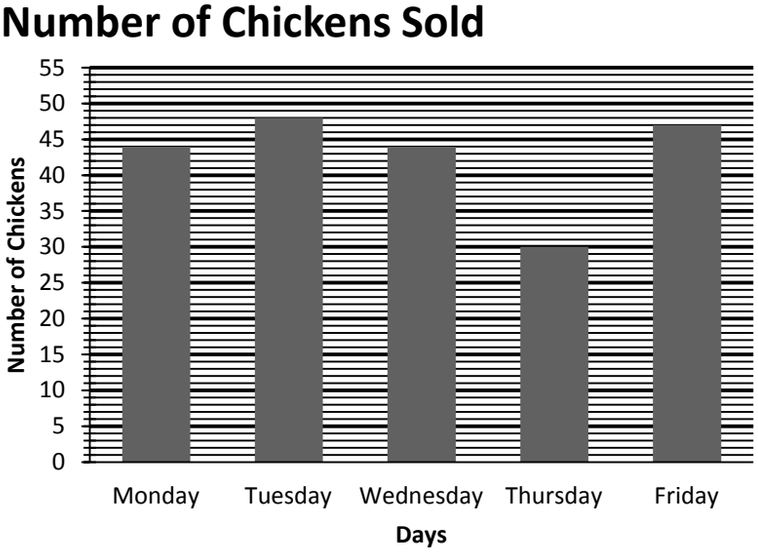



Answer: _____



Practice Test.indd 411 20/04/18 1:59 PM

**40.** The bar graph below shows the number of chicken sold at a meat shop over 5 days.




How many more chickens need to be sold on Thursday for the mean number of chickens sold to be 45?

(3 marks)

Answer: _____

## SECTION III

**41.** Every week David spends $\frac{2}{5}$ of his allowance on food, $\frac{4}{9}$ of the remainder on transportation and saves the rest. David is saving to buy a cricket bat that costs $360. If he spends $60 on food each week, how long will he take to save in order to buy the cricket bat?

(4 marks)

Answer: _____



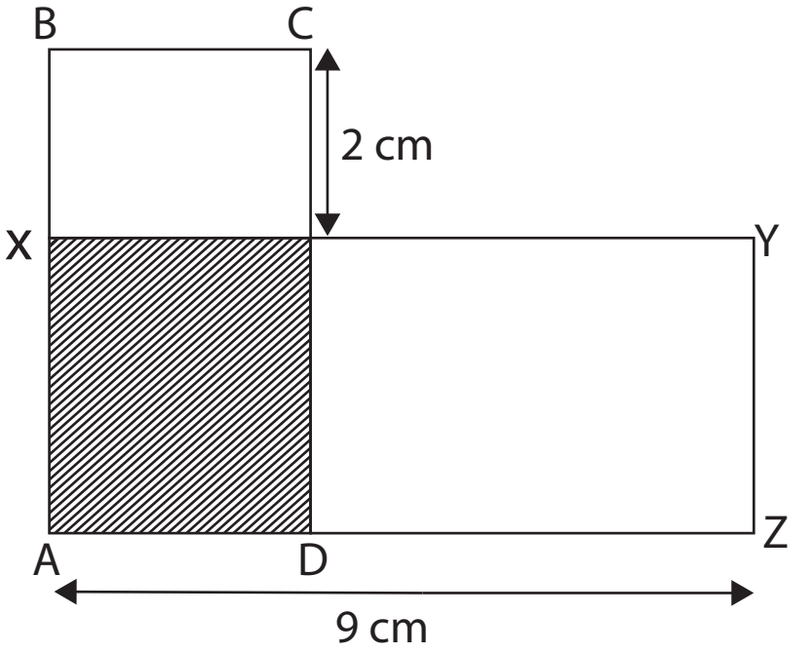
Practice Test.indd 412 20/04/18 1:59 PM

**42.** A furniture store offers 25% discount on cash purchases. The marked price on a wardrobe is $9 600 Mrs. Chin Fat paid cash for a wardrobe. What is the FINAL cost of the wardrobe, if VAT at 12.5% is calculated on the discounted price.

(4 marks)

Answer: _____

**43.** The figure below is made up of two rectangles. Rectangle **ABCD** has an area of 27 $cm^2$ and rectangle **AXYZ** has an area of 63 $cm^2$. What is the area of the shaded part?




(4 marks)

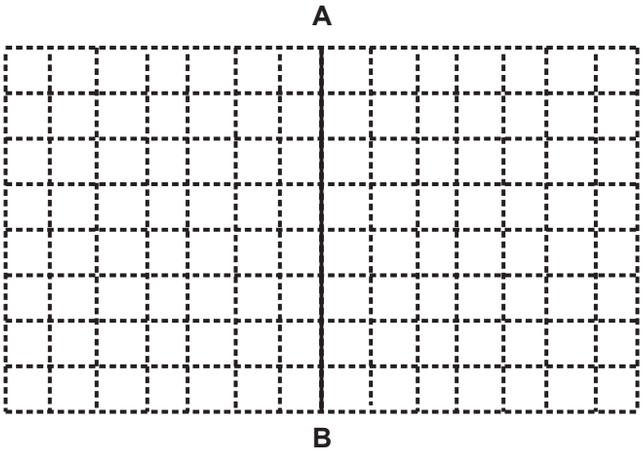
Answer: _____



Practice Test.indd 413 20/04/18 1:59 PM

**44.** **(a)** Draw 3 straight lines to form a symmetric shape with AB as the line of symmetry.

(3 marks)




**(b)** What is the name of the polygon drawn?

(1 mark)

Answer: _____

**45.** The table below shows the number of books read by each student in a class.

| Number of books read by each student | 0 | 4 | ? |
|---|---|---|---|
| Number of students | 3 | 20 | 7 |

The mean number of books read by the students in the class is 5. What is the missing number?

(4 marks)

Answer: _____



Practice Test.indd 414 20/04/18 1:59 PM

# PRACTICE TEST 3

**READ THE FOLLOWING DIRECTIONS CAREFULLY**

**1. This test is divided into THREE sections.**
**2. Make sure you read the instructions before you start to work on any section.**

**SECTION I**

**1.** Write in words the number that has the place values of 2 tens, 4 tenths, and 8 hundredths.

Answer: _____

_____

**2.** What is the value of 15 thousands and 23 hundreds?

Answer: _____

**3.** Round 12 452 to the nearest **thousand**.

Answer: _____

**4.** Write the total value of the bills and coins shown below.




Answer: _____

**5.** Which one of the following numbers is the smallest?

7.17, 7.01, 7.71, 7.07

Answer:_____



Practice Test.indd 415 20/04/18 2:01 PM

**6.** How many tenths are there in 3.8?

Answer: _____

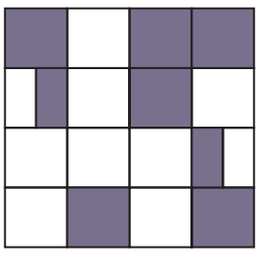
**7.** $\frac{1}{7}$ of a number is 140. What is the number?

Answer: _____

**8.** A number gives a quotient of 87 and a remainder of 4 when it is divided by 7. What is the number?

Answer: _____

**9.** What FRACTION of the square below is shaded?



Answer: _____

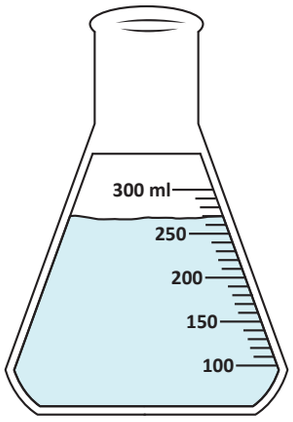
**10.** $11^2 - \square = 25 \times 3$

Answer: _____



Practice Test.indd 416 20/04/18 2:01 PM

**11.** How much water is in the container below?




Answer: _____

**12.** How much time does the BWA601aircraft take to complete its journey?

| Aircraft | Days | Departure Time | Arrival Time |
|---|---|---|---|
| BWA520 | Friday | 0012 | 0450 |
| BWA527 | Friday | 0135 | 0700 |
| BWA551 | Friday | 0104 | 0551 |
| BWA601 | Thursday | 2257 | 0425 |

Answer: _____

**13.** How many grams must be added to 3.75 kg to make 4 500 grams?

Answer: _____

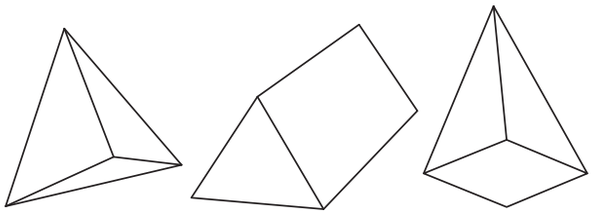
**14.** Which of the following is most likely the length of a new pencil?

- ☐ 20 metres
- ☐ 20 centimetres
- ☐ 20 millimetres



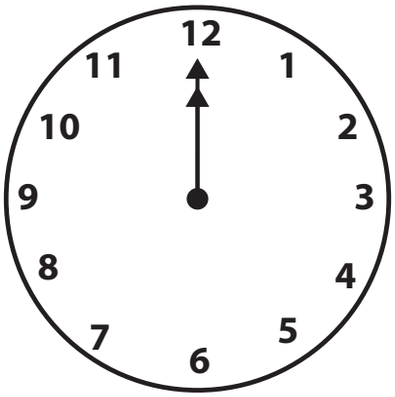
Practice Test.indd 417 20/04/18 2:01 PM

**15.** Write the name of the solid that has four faces.



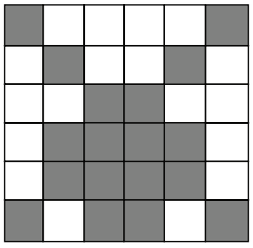
Answer:_____

**16.** It is 12:00 noon. How many right angle(s) does the minute hand make when it is 12:45 p.m.?




Answer:_____

**17.** Draw the line of symmetry in the figure below.



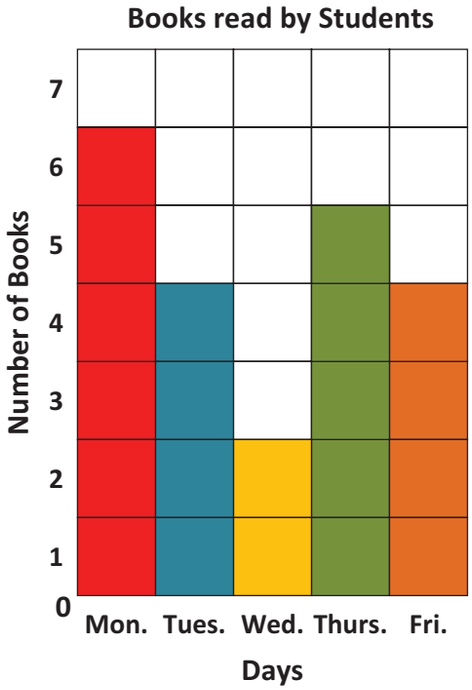
**18.** In 4 matches a basketball player scored 14, 6, 12 and 16 points. What is the mean number of points that he scored per match?

Answer:_____



Practice Test.indd 418 20/04/18 2:01 PM

**19.** The block graph below shows the number of books read by students of a class from Monday to Friday.




Which day shows the mode?

**20.** The tally chart shows the number of different types of fruits eaten by students during the week.

| Fruits | Tally |
|---|---|
| Oranges | 𝍸 𝍸 𝍸 \|\| |
| Bananas | 𝍸 𝍸 \|\|\| |
| Apples | 𝍸 𝍸 \|\| |
| Mangoes | 𝍸 𝍸 𝍸 𝍸 |

How many more mangoes were eaten than bananas?

Answer:_____



Practice Test.indd 419 20/04/18 2:01 PM

## SECTION II

**21.** What is the missing number in the box below?

$$\frac{\square}{24} = 4\frac{7}{8}$$

(2 marks)

Answer: _____

**22.** In a school's storeroom there is a total of 180 chairs and tables. There are 4 times as many chairs as there are tables. If 24 chairs are left in the storeroom and the rest of the chairs were shared equally among 6 classrooms, how many chairs did each class get?

(3 marks)

Answer: _____

**23.** If, $\square + \triangle = 1.12$

and, $\square - \triangle = 0.54$

What is the value of $\square$?

(3 marks)

Answer: _____

**24.** Cindy buys the blow-dryer shown below priced at $240.00.



**15% discount**

After the discount how much did she pay for the blow-dryer?

(2 marks)

Answer: _____



Practice Test.indd 420 20/04/18 2:01 PM

**25.** The table below shows the marks awarded for EACH correct answer in Sections I, II and III of a test.

| Section | Number of marks for each correct answer |
|---|---|
| I | 1 mark |
| II | 3 marks |
| III | 5 marks |

Marlon got 17 items correct in Section I and 5 items correct in Section III. How many items did Marlon get correct in Section II if scored 78 marks in the test?

(2 marks)

Answer:_____

**26.** The price list shows the cost of snacks at the school's cafeteria.

| Chocolate bar **$9.00** | Corn Curls **$4.00** | Red Mango **$3.00** |
|---|---|---|

Diana has $40.00 and wants to buy at least one of each kind of snack. Explain what is the maximum number of snacks she can buy.

(3 marks)

Answer:

_____

_____

_____

_____

**27.** In a library shelf containing 40 books, $\frac{2}{5}$ are non-fiction, $\frac{1}{4}$ are fantasy and the rest are adventure stories. How many books are adventure stories?

(3 marks)

Answer:_____



Practice Test.indd 421 20/04/18 2:01 PM

**28.** Seventy-five percent of the vehicles in a parking lot are cars and the rest are trucks. If there are a total of 48 vehicles in the parking lot, how many trucks are there?

(2 marks)

Answer:_____

**29.** Matthew had some marbles. 10% of them were red and the rest were green. He gave $\frac{1}{2}$ of the red marbles and 30% of the green marbles to his friends. What percentage of the marbles were given away?

(3 marks)

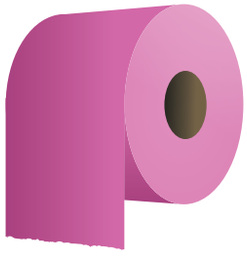
Answer:_____

**30.** Samantha gave 20% of her mangoes to Vashti and sold $\frac{1}{4}$ of the remainder to Neil. Samantha remained with 16 mangoes. How many mangoes Samantha had at first?

(3 marks)

Answer:_____

**31.** An entire roll of ribbon was cut into 32 equal pieces of length 600 cm. What was the TOTAL length of ribbon on the roll in metres?



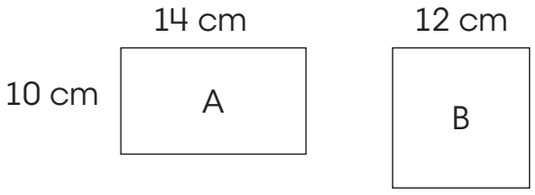
(2 marks)

Answer:_____



Practice Test.indd 422 20/04/18 2:01 PM

**32.** The diagram below shows a rectangle A and a square B.




Which of the two shapes has the greater area? Explain your answer.

(3 marks)

Answer:

_____

_____

_____

**33.** Alex went to a sports event. The event started at 9:10 a.m. and ended at 3:10 p.m. What fraction of a whole day did Alex spend at the event?

(2 marks)

Answer:_____

**34.** A baker wants to make cupcakes using the recipe below.

**Recipe for Cupcakes**
**(makes 24 cupcakes)**

125 g butter
100 g sugar
250 g flour



He has 400 g of butter, 250 g of sugar and 1kg of flour. What is the greatest number of cupcakes he can make?

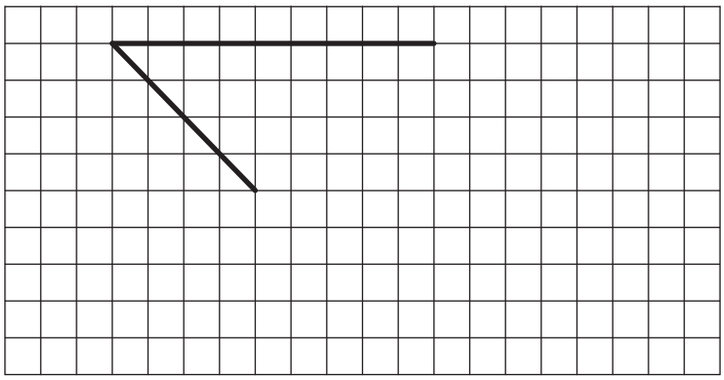
(3 marks)

Answer:_____



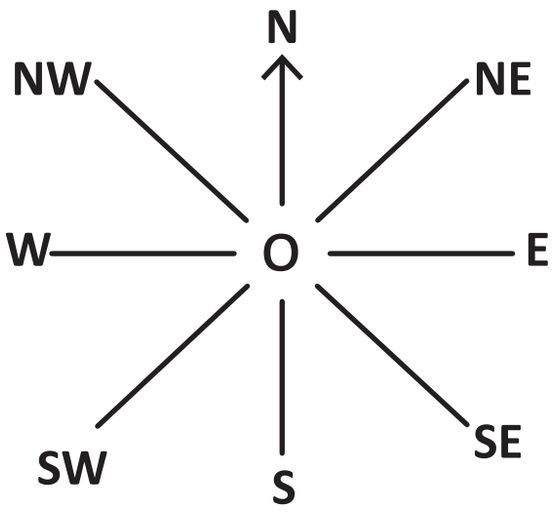
Practice Test.indd 423 20/04/18 2:01 PM

**35.** In the square grid below, two sides of a parallelogram are drawn. Complete the shape by drawing the other sides of the shape.



(2 marks)

**36.** Vanessa is standing at **O**. If she makes a $\frac{1}{2}$ turn clockwise, she will face West. Where will Vanessa face if she makes a $\frac{3}{4}$ turn anti-clockwise, from her first position?




(3 marks)

**37.** Explain how a **rhombus** and **square** are alike and how they are different.

(2 marks)

Answer:

_____

_____

_____



Practice Test.indd 424 20/04/18 2:01 PM

**38.** The pictograph shows the ice cream flavours chosen by a group of children.

| Flavour | Number of children |
|---|---|
| Coconut | |
| Soursop | |
| Peanut | |

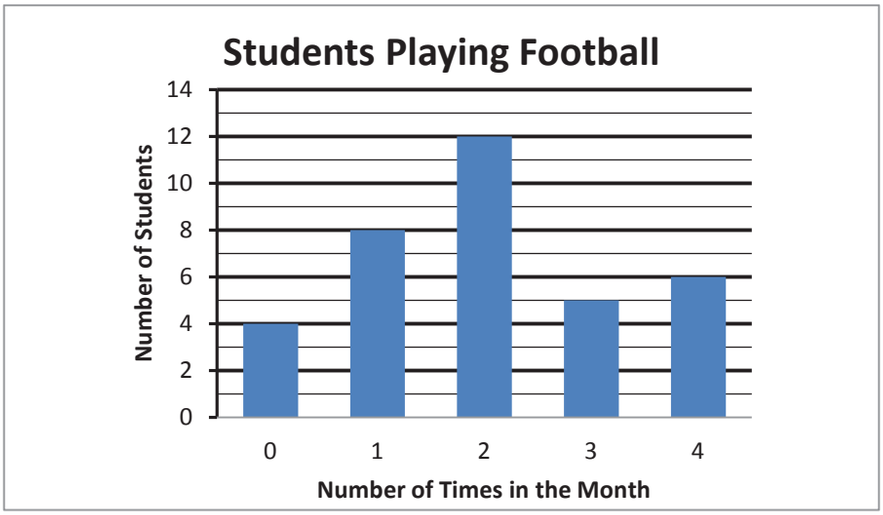
= 4 ice cream cones

How many children were in the group?

(2 marks)

Answer:_____

**39.** The bar graph below shows the number of students of a Standard 5 class who played football at the savannah last month.




How many students played football more than 2 times for the month?

(2 marks)

Answer:_____



Practice Test.indd 425 20/04/18 2:01 PM

**40.** The mean number of runs scored by Jack in 4 cricket matches is 27. When the runs from 1 match is removed, the mean is 24. How many runs were removed?

(3 marks)

Answer:_____

## SECTION III

**41.** Mrs. Linda made 185 more chicken pies than cheese pies. After selling $\frac{3}{5}$ of the chicken pies and $\frac{1}{2}$ of the cheese pies, she has 146 chicken pies left. How many cheese pies had she left?

(4 marks)

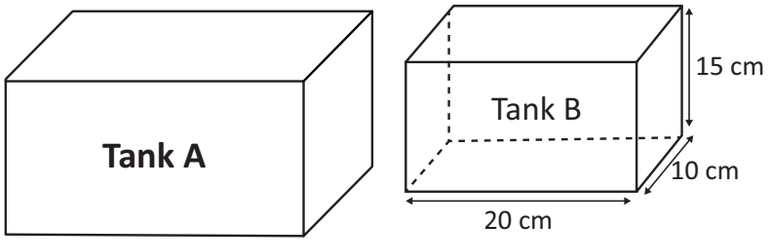
Answer:_____

**42.** Mrs. Doris bought 250 avocadoes for $500. 40% were ripe, 50% were green and the rest were damaged and had to be thrown away. If she sells each ripe avocado for $3.00 and each green avocado for $2.50, what will be her profit?

(4 marks)

Answer:_____

**43.** Tank A was full of water before $\frac{2}{5}$ of the water was poured into Tank B. Now Tank B is 70% full.




What is the capacity of tank A in litres?

1000 $cm^3$ = 1 litre

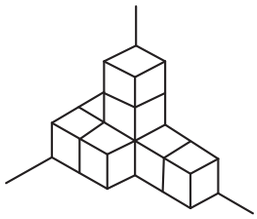
(4 marks)

Answer:_____



Practice Test.indd 426 20/04/18 2:01 PM

**44.** Eight identical cubes are stacked together to form the solid shown below.

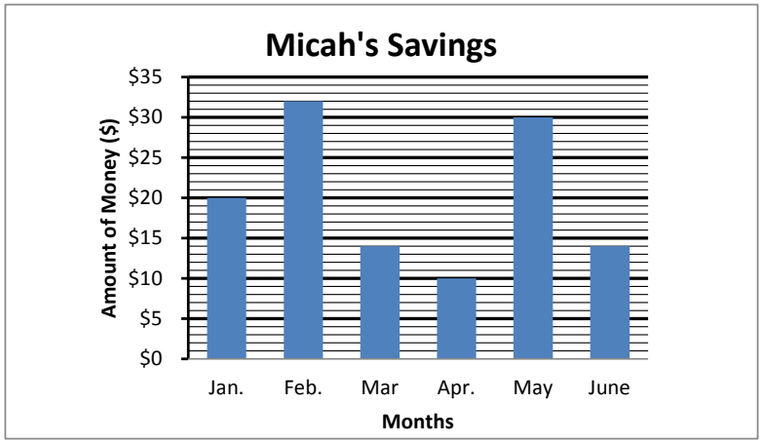


How many faces of the cubes are hidden from view?

(4 marks)

Answer:_____

**45.** The bar graph shows Micah's savings for the first half of the year.




**(a)** In which month did Micah save $\frac{1}{4}$ of the total amount of money that was saved for the six months?

(3 marks)

Answer:_____

**(b)** If Micah wanted to save $150 at the end of 6 months, how far is he from this amount of money?

(1 mark)

Answer:_____



Practice Test.indd 427 20/04/18 2:01 PM

# PRACTICE TEST 4

**READ THE FOLLOWING DIRECTIONS CAREFULLY**

**1. This test is divided into THREE sections.**
**2. Make sure you read the instructions before you start to work on any section.**

**SECTION I**

**1.** Write the numeral which represents:

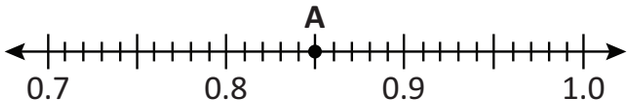
$$(8 \times 10\,000) + (7 \times 100) + (3 \times 10) + (4 \times \frac{1}{100})$$

Answer: _____

**2.** A number when rounded to the nearest thousand, is 45 000. What is the greatest possible number?

Answer: _____

**3.** What number can be found at Point A on the number line below?




Answer: _____

**4.** 9 583 ÷ 37 =

Answer: _____

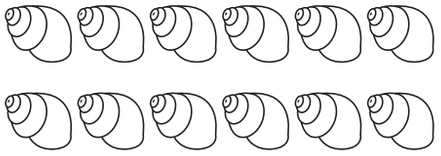
**5.** 0.3 of a number is 45. What is the number?

Answer: _____



Practice Test.indd 428 20/04/18 2:01 PM

**6.** Shade $\frac{3}{4}$ of the set of shells.



**7.** Express $7\frac{3}{4}$ as an IMPROPER fraction.

Answer: _____

**8.** Use the digits below to write the largest two-digit number which is a multiple of 4.

4, 6, 9

Answer: _____

**9.** 1 238 × 72 =

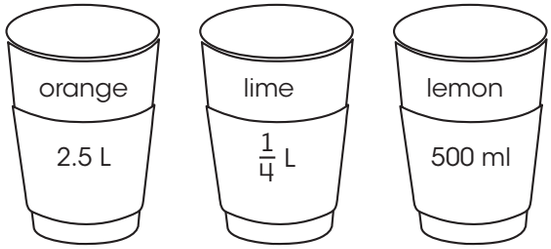
Answer: _____

**10.** What percent of the shape is shaded?



Answer: _____

**11.** Mala mixed the juices below to make a fruit punch. How much fruit punch did she make?

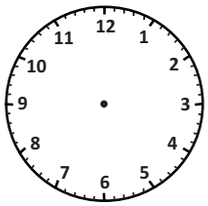



Answer: _____



Practice Test.indd 429 20/04/18 2:01 PM

**12.** A bus left the station at 2200 hours and arrived at its destination $2\frac{1}{4}$ hours later. Draw the hands on the clock to show what time it arrived.



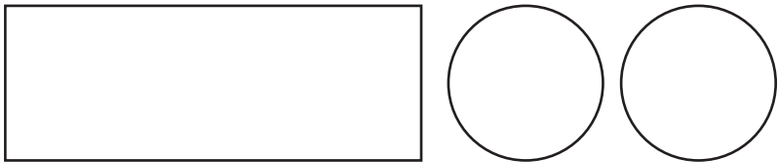

**13.** 40.08 kilograms = _____ grams.

Answer: _____

**14.** Tick is the best unit for measuring the area of a football field?

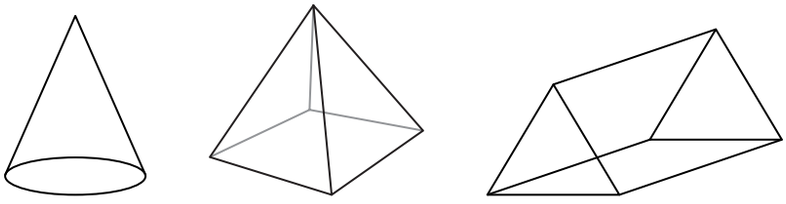
- ☐ centimetres
- ☐ metres
- ☐ kilometres

**15.** Name the solid that can be formed using all of the faces below.



Answer: _____

**16.** Write the name of the solid below, which has a uniform cross section.



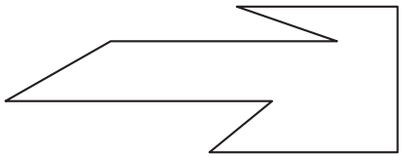
Answer: _____



Practice Test.indd 430 20/04/18 2:01 PM

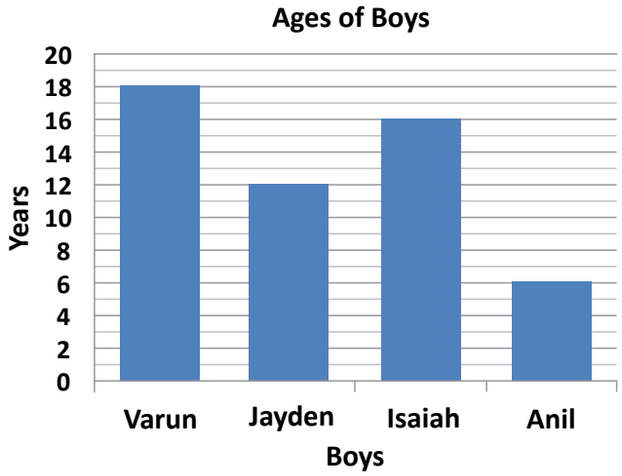
**17.** Study the polygon below. How many angles inside the polygon are smaller than a right angle.

(3 marks)



Answer: _____

**18.** The bar graph below shows the ages of four boys.




Calculate the MEAN age of the four boys.

_____

**19.** 15 students were asked to choose their favourite number from 1 to 5. The table below shows the results.

| **Favourite Number** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Number of Students** | 3 | 5 | 3 | 1 | 3 |

How many children chose an odd number as their favourite number?

Answer: _____



Practice Test.indd 431 20/04/18 2:01 PM

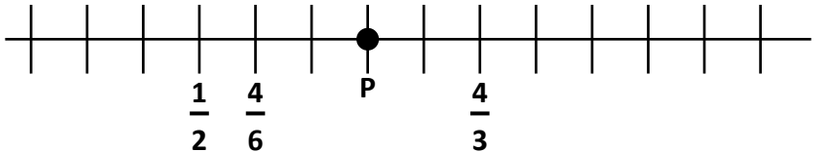
**20.** The tally chart below shows the type of breakfast 25 infant students prefer.

| Type of Breakfast | Tally |
|---|---|
| Corn Flakes | 𝍸 \|\|\| |
| Oatmeal | |
| Bread and Eggs | 𝍸 |
| Bake and Pumpkin | 𝍸 |

Complete the chart.

## SECTION II

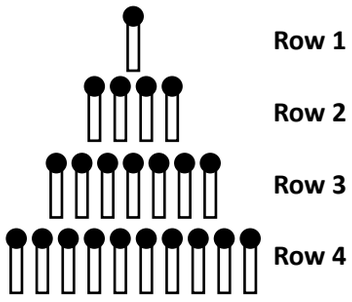
**21.** Write the fraction that is at Point P on the number line below.




(2 marks)

Answer: _____

**22.** Matchsticks are laid out in a pattern as shown below.




How many matchsticks will I need altogether to form a total of 10 rows?

(3 marks)

Answer: _____



Practice Test.indd 432 20/04/18 2:01 PM

**23.** Martin spends $\frac{3}{5}$ of his money on sandwich, $\frac{1}{4}$ of what remains on a juice and the rest on a snack. What percent of his money did he spend on the snack?

(3 marks)

Answer: _____

**24.** Mangoes are sold 5 for $8.00. What is the maximum number of mangoes Mrs. Lewis can buy with $34.20?



(2 marks)

Answer: _____

**25.** Using all of the digits below, what is the 4-digit number that will give the smallest possible answer, when subtracted from 6 000?

9 0 6 5

(2 marks)

Answer: _____

**26.** Ritesh has 35 marbles that are green, white or blue in colour. He has 21 green ones, and an equal number of white and blue ones. What percentage of his marbles is blue?

(3 marks)

Answer: _____



Practice Test.indd 433 20/04/18 2:01 PM

**27.** Wong Long restaurant can seat 96 persons. It has tables that can seat 2, 4 or 6 persons. There are 6 tables that can seat 6 persons and 12 tables that can seat 4 persons. How many tables are there that can seat 2 persons?

(3 marks)

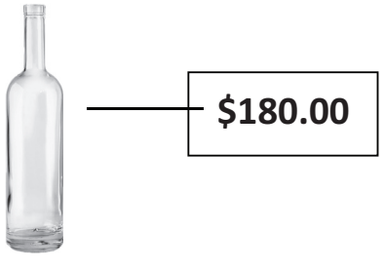
Answer: _____

**28.** Anil bought a book and a pen. The cost of the pen is 60% the price of the book. The book costs $10.00 more than the pen. How much money did Anil pay for both items?

(3 marks)

Answer: _____

**29.** The diagram below shows the cost of a bottle of medicine. Pensioners are given a discount of 40% on this type of medicine.




How much will a pensioner pay for a bottle of this medicine, if 12.5% VAT is added at the cashier?

(2 marks)

Answer: _____



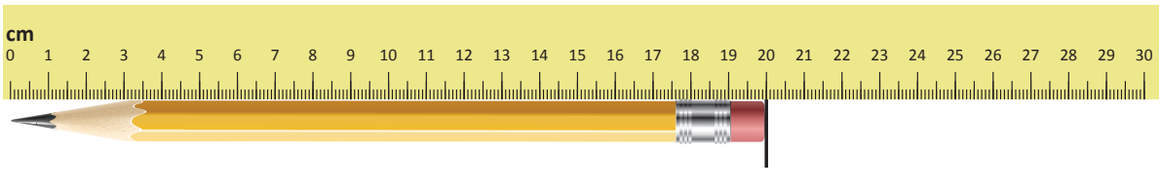
Practice Test.indd 434 20/04/18 2:01 PM

**30.** Chairs are arranged in rows of 16 in a school hall. There are 15 rows of chairs in the hall. How many more rows of chairs are needed if there are 432 children to be seated?

(3 marks)

Answer: _____

**31.** The picture below shows the length of Christian's pencil on Monday.




If on Friday the pencil is 25% shorter, what will be the length of his pencil then?

(2 marks)

Answer: _____

**32.** The table below shows the car park rates.

| Duration | Charges |
|---|---|
| First hour or part thereof | $3 |
| Subsequent half hour or part thereof | $2 |

Mr. Gaya parked his car at 2:00 p.m. and when he returned he was charged $9. What is the latest time he could have returned?

(2 marks)

Answer: _____



Practice Test.indd 435 20/04/18 2:01 PM

**33.** A rectangular box has a volume of 225 $cm^3$. The perimeter of its square base is 20 cm. What is the height of the box?

(3 marks)

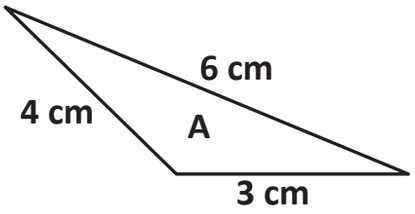
Answer: _____

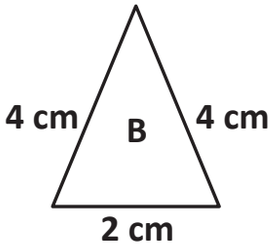
**34.** 250 ml bottles are filled with purified water and packed into cases of 12. How many cases can be filled from a 10-litre container of purified water?

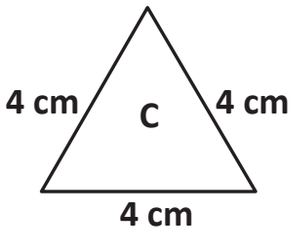
(3 marks)

Answer: _____

**35.** Use the shapes given to complete the table below.




| Triangle | Type of Triangle |
|---|---|
| Triangle A | |
| Triangle B | |
| Triangle C | |

(3 marks)



Practice Test.indd 436 20/04/18 2:01 PM

**36.** The basic shape of a fence post is made of two solids. Name the solids.

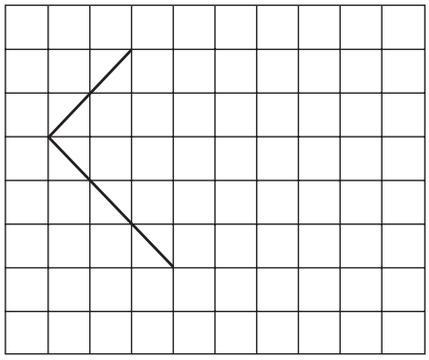


(2 marks)

Answer: _____

**37.** Complete the shape shown in the diagram by drawing the other sides to form a quadrilateral with one pair of parallel sides.

(2 marks)



**38.** The pictograph below shows the 100 cars that were caught speeding over a five-day period.

| | |
|---|---|
| Monday | 🚗 🚗 🚗 🚗 🚗 |
| Tuesday | 🚗 🚗 |
| Wednesday | 🚗 🚗 🚗 🚗 |
| Thursday | 🚗 🚗 🚗 |
| Friday | 🚗 🚗 🚗 🚗 🚗 🚗 |

How many cars does the symbol 🚗 represent?

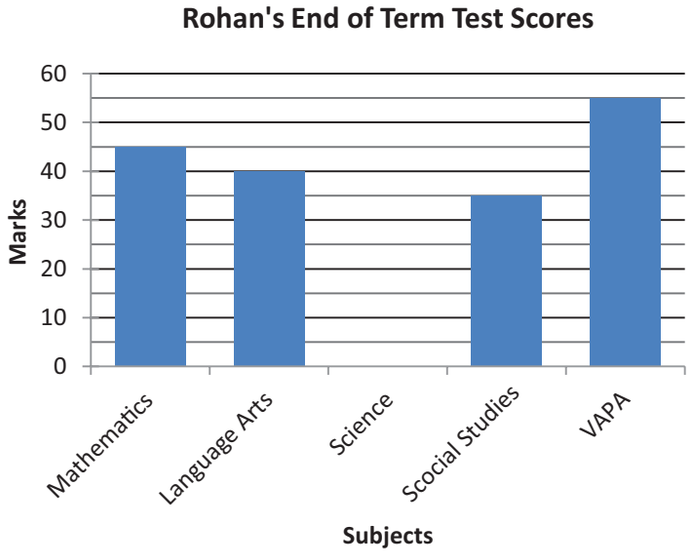
(2 marks)

Answer: _____



Practice Test.indd 437 20/04/18 2:01 PM

**39.** The incomplete graph below shows the marks Rohan scored during an End of Term Test.




Rohan scored a total of 225 marks for the test. Complete the graph to show how many marks he scored in Science.

(2 marks)

**40.** Maya has to complete 4 tests in the Mental Mathematics competition. The scores for Maya's first three tests are shown below.

| Tests | Score |
|---|---|
| Test 1 | 13 |
| Test 2 | 18 |
| Test 3 | 20 |
| Test 4 | ? |

Maya will qualify for the Semi-Final Round if her mean score is 20 or more. What is lowest score Maya must make to qualify for the Semi-Final Round?

(3 marks)

Answer: _____



Practice Test.indd 438 20/04/18 2:01 PM

## SECTION III

**41.** The table below shows the price of oranges and apples, in three fruit stalls.

| Fruit Stall | Price of Oranges | Price of Apples |
|---|---|---|
| A | 4 oranges for $11.00 | 1 apple for $5.50 |
| B | 1 orange for $2.50 | 5 apples for $25.35 |
| C | 6 oranges for $6.00 | 10 apples for $60.00 |

From which fruit stall should Mary buy 2 dozen apples and 2 dozen oranges if she wants to spend the least amount of money at the same stall? Explain how you solved the problem.

(4 marks)

**42.** A farmer sold $\frac{1}{3}$ of his oranges to a grocery. He gave away $\frac{1}{6}$ of his remaining oranges and an additional 260 oranges to a Children's Home. He then sold 200 oranges at the market and had 30 oranges left. How many oranges he had at first?

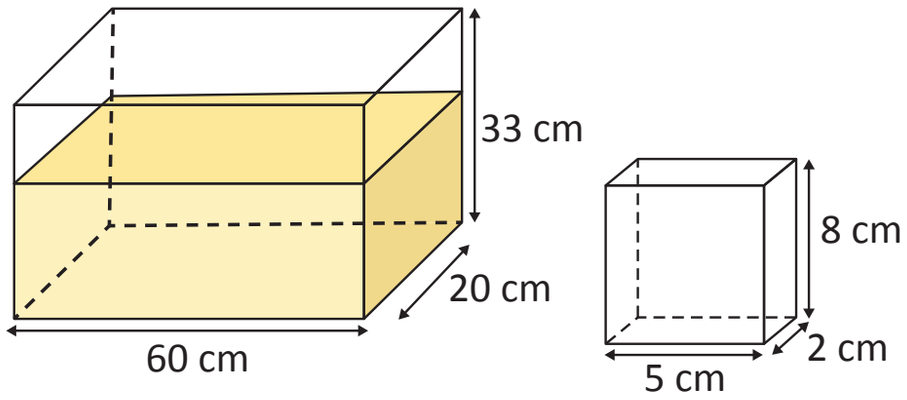
(4 marks)

Answer: _____



Practice Test.indd 439 20/04/18 2:01 PM

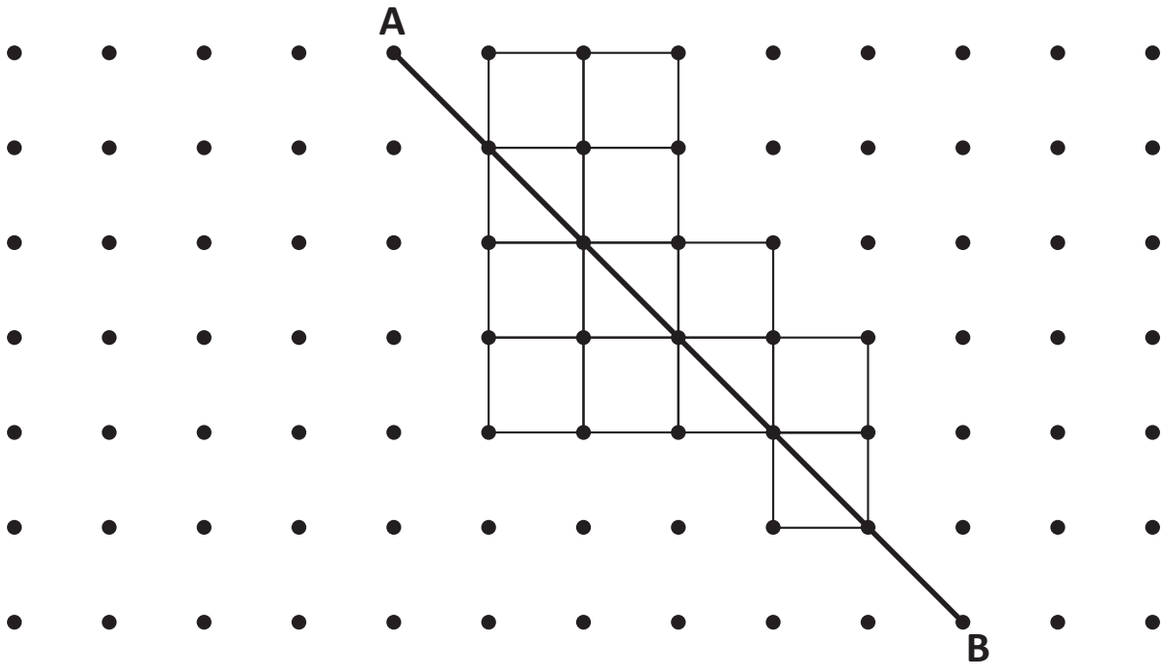
**43.** A rectangular container measuring 60 cm by 20 cm by 33 cm is $\frac{7}{10}$ filled with fruit juice. All the juice from the tank is poured into rectangular cartons measuring 5 cm by 2 cm by 8 cm to the brim. What is the height of the juice in the last carton?




(4 marks)

Answer: _____

**44.** The figure below shows 12 identical squares. Add 4 other squares so that line AB becomes a line of symmetry.

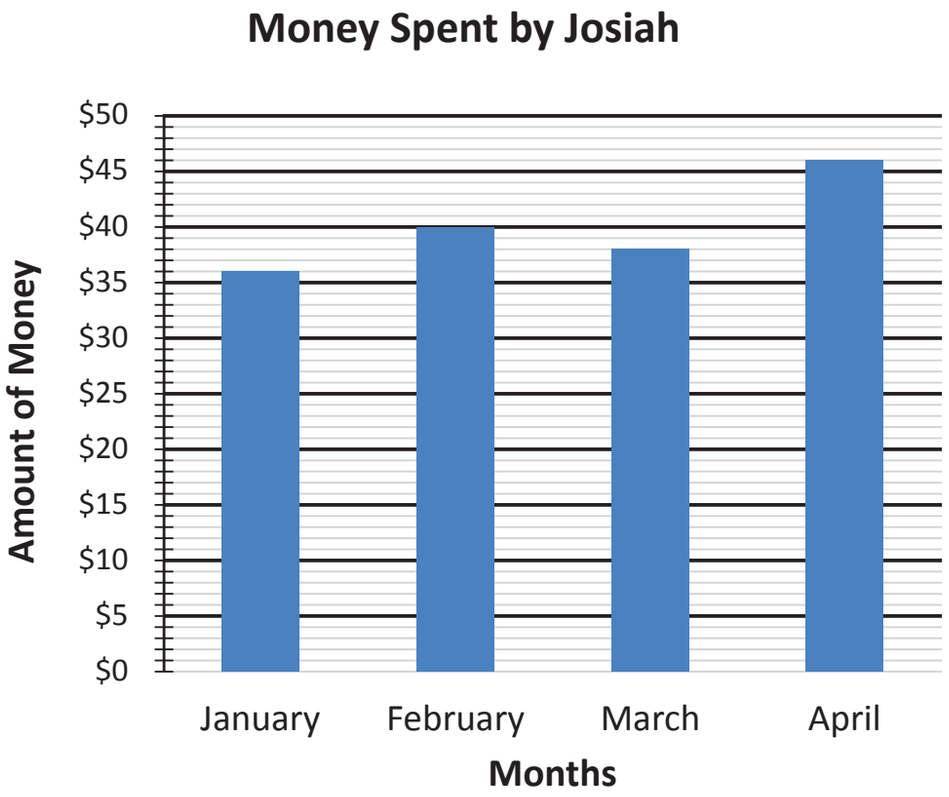



(4 marks)



Practice Test.indd 440 20/04/18 2:01 PM

**45.** The bar graph below shows the amount of money Josiah spent each month from his monthly $80 allowance.




**(a)** In which month did Josiah spend more than half of his allowance?

(1 mark)

Answer: _____

**(b)** If Josiah saved the rest of his allowance each month, what percentage of his total allowance did he save over the 4 months?

(3 marks)

Answer: _____



Practice Test.indd 441 20/04/18 2:01 PM

# PRACTICE TEST 5

**READ THE FOLLOWING DIRECTIONS CAREFULLY**

**1. This test is divided into THREE sections.**
**2. Make sure you read the instructions before you start to work on any section.**

**SECTION I**

**1.** What is the value of 2 ones, 8 tenths and 14 hundredths?

Answer: _____

**2.** What is 9 tens more than 99 190?

Answer: _____

**3.** Complete the table below to show the LEAST number of bills that has a total value of $92.

| Bill | $100 | $50 | $20 | $10 | $5 | $1 |
|---|---|---|---|---|---|---|
| Number of Bills | | | | | | |

**4.** What is 30% of $240?

Answer: _____

**5.** $\frac{1}{4} \times \square + 7 = 15$.

What is the missing number?

Answer: _____

**6.** Write these numbers in order from smallest to largest.

$$0.53,\ \frac{1}{10},\ \frac{1}{2},\ 0.4$$

Answer: _____



Practice Test.indd 442 20/04/18 2:01 PM

**7.** Round 16 641 to the nearest **hundred**.

Answer: _____

**8.** What is the sum of all the factors of 18?

Answer: _____

**9.** What number must be added to 5 347 to make 7 543?

Answer: _____

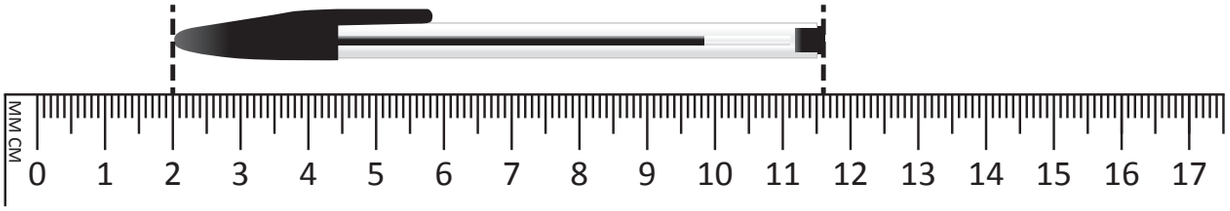
**10.** Express $2 + \frac{7}{10} + \frac{8}{100}$ as a single decimal fraction.

Answer: _____

**11.** 3 090 grams = ☐ kilograms

Answer: _____

**12.** What is the length of the pen to the nearest centimetre?

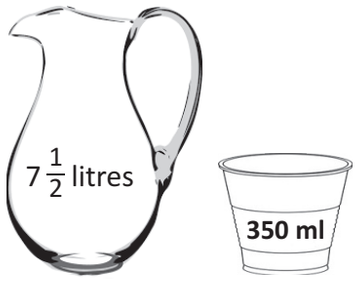



Answer: _____



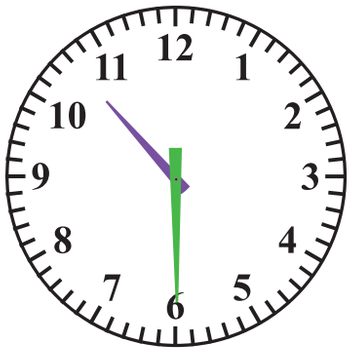
Practice Test.indd 443 20/04/18 2:01 PM

**13.** How many cups of juice can you get from the jug?



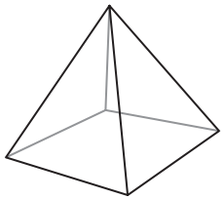

Answer: _____

**14.** The clock shown below is 35 minutes slow. What is the actual time?




Answer: _____

**15.** Name the shape of the solid shown.

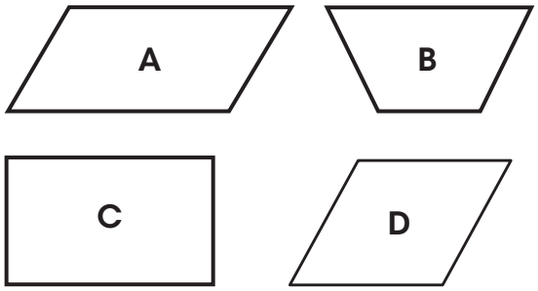


Answer: _____



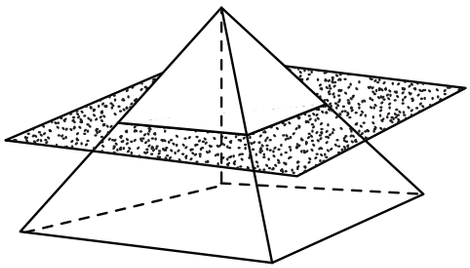
Practice Test.indd 444 20/04/18 2:01 PM

**16.** Name the quadrilateral below that has 4 right angles.




Answer: _____

**17.** A cross section is cut from the solid below. Write the name of the shape of the cross section?



Answer: _____

**18.** The heights of a group of students are given in the table below. What is the modal height?

| Name of students | Maria | Jim | Varun | Darius | Ritesh | Belle |
|---|---|---|---|---|---|---|
| Height in cm | 121 | 134 | 120 | 134 | 138 | 115 |

Answer: _____



Practice Test.indd 445 20/04/18 2:01 PM

**19.** The chart shows the number of ochroes harvested from 4 ochro plants.

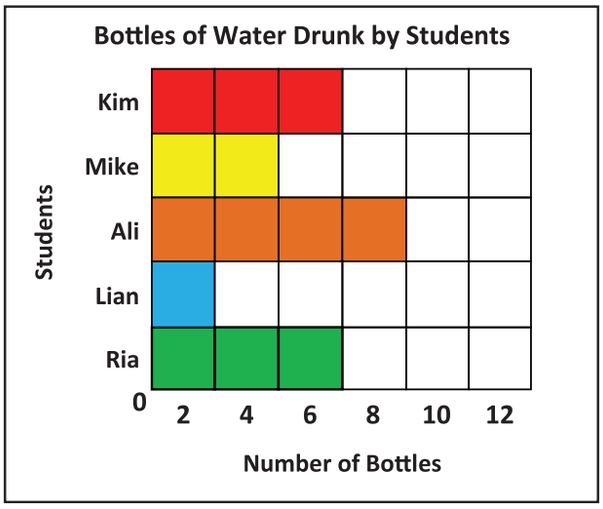
**Ochro Plant Yield**

| Plants | Tally | Frequency |
|---|---|---|
| Plant 1 | 𝍸 𝍸 𝍸 \| | 16 |
| Plant 2 | 𝍸 𝍸 \|\| | 12 |
| Plant 3 | 𝍸 𝍸 𝍸 \|\| | 17 |
| Plant 4 | 𝍸 𝍸 \| | 11 |

What is the mean number of ochroes harvested from each plant?

Answer: _____

**20.** The graph below shows the amount of water that 5 students drank.




How many more bottles of water Ria drank than Lian?

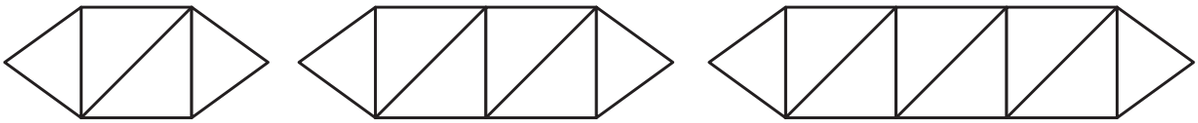
Answer: _____



Practice Test.indd 446 20/04/18 2:01 PM

## SECTION II

**21.** Ali made the pattern below with toothpicks.



1st term 2nd term 3rd term

He wants to continue the pattern to the 5th term. He has 10 toothpicks. How many more toothpicks does he need to complete the pattern?

(3 marks)

Answer: _____

**22.** Aliyah spent $42.00 on an equal number of oranges and limes. Each orange costs $1.95 and a lime costs $1.05. How many fruits did he buy altogether?

(2 marks)

Answer: _____

**23.** Lal planted 124 sweet pepper seedlings. Shammi planted 26 more than Lal and 46 less than Ralph. Calculate the number of sweet pepper seedlings planted ALTOGETHER.

(2 marks)

Answer: _____

**24.** Joshua gets a daily allowance of $30. Each day he spends 60% of his allowance and saves the rest. Calculate the amount he saves each week.

(2 marks)

Answer: _____



Practice Test.indd 447 20/04/18 2:01 PM

**25.** Errin has to multiply 385 by 17. She mistakenly multiplies 385 by 27 correctly. What is the difference between Errin's answer and the answer she should have gotten if she had used the correct multiplier?

(3 marks)

Answer: _____

**26.** A dining set with a marked price of $4 000 is being sold at a 20% discounted price. Calculate the final price of the dining set if Mr. Roopnarine is charged 12.5% VAT.

(3 marks)

Answer: _____

**27.** Ms. Noel packed party bags for her students' end-of-term party. In each bag she puts 5 snacks and 3 fruits. In total she packed 80 snacks. How many fruits did she pack in all the bags?

(2 marks)

Answer: _____

**28.** Maria baked a cake and gave $\frac{1}{2}$ of it to her mother. She ate $\frac{1}{4}$ of the remaining cake. Then she cut the rest of the cake into 2 equal pieces for her two daughters. What fraction of the cake did each daughter get?

(3 marks)

Answer: _____

**29.** Mr. Maraj worked 8 hours one day and shared the money he earned equally among his 4 children. One child bought a book for $22.80 with his share of the money and had $47.20 left. If Mr. Maraj worked for the same amount of money each hour, how much was his hourly pay?

(3 marks)

Answer: _____



Practice Test.indd 448 20/04/18 2:01 PM

**30.** At a football match, $\frac{1}{3}$ of the spectators were men, $\frac{1}{4}$ were women and the rest were children. If there were 300 more children than women, how many spectators were at the football match?

(3 marks)

Answer: _____

**31.** Richard's school starts at 8:30 a.m. He takes 35 minutes to complete his chores, 30 minutes to get ready for school and 15 minutes to walk to school. What is the LATEST time he can get up to reach to school on time?



(2 marks)

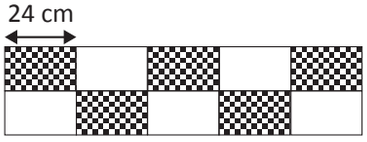
Answer: _____

**32.** Jenny used $\frac{2}{5}$ of a pack of flour to make bake, 210 grams of the flour to make accra and had 150 grams of flour left. How much flour was used for the bake?

(2 marks)

Answer: _____

**33.** Ten rectangular tiles of the same size are used to cover a counter with a perimeter of 3 m. The length of each rectangular tile is 24 cm. What is the area covered by the patterned tiles?




(3 marks)

Answer: _____



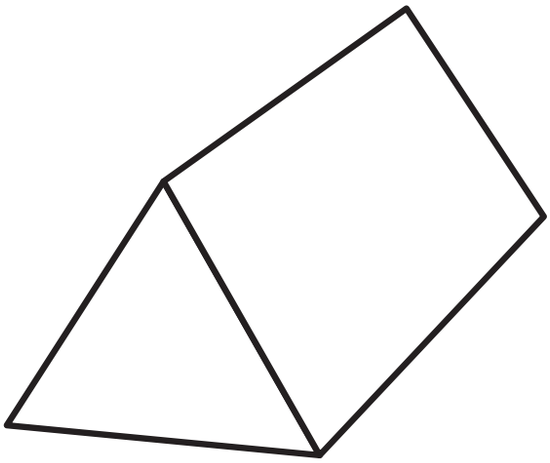
Practice Test.indd 449 20/04/18 2:01 PM

**34.** A cuboid shaped container measuring 30 cm long, 12 cm wide and 20 cm high is filled with 2.2 litres of water. How many more millitres of water must he added to the container such that it will be $\frac{2}{5}$ full?

(3 marks)

Answer: _____

**35.** Draw the plane shapes in the box that make up the faces of the solid below.

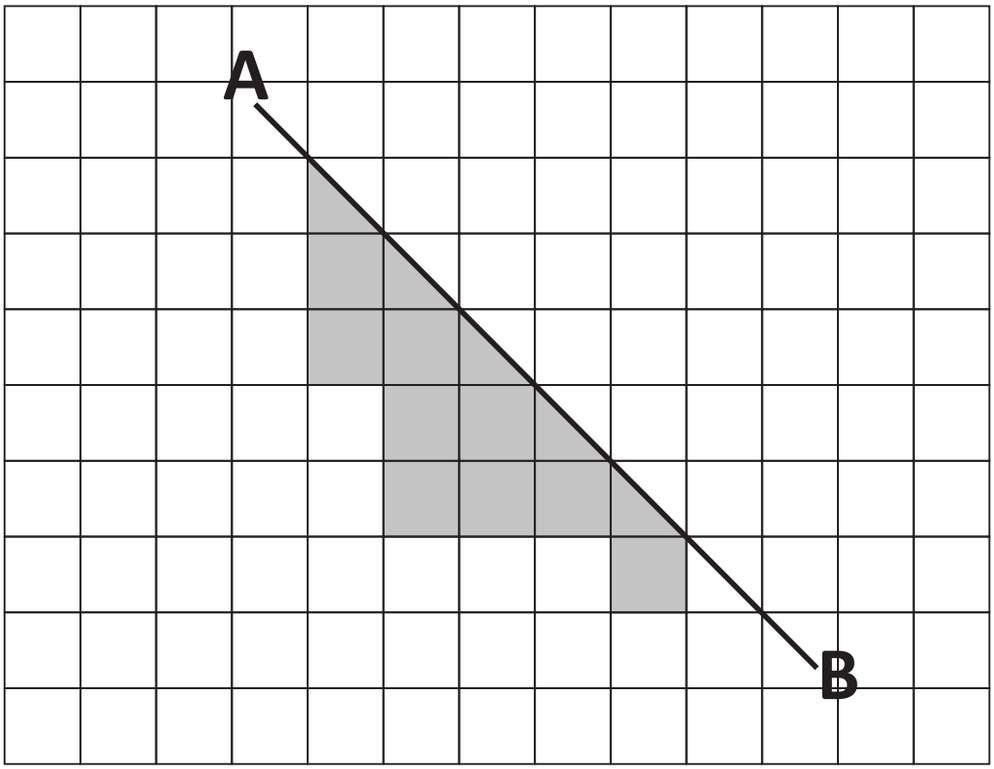


(2 marks)



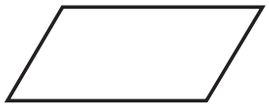
Practice Test.indd 450 20/04/18 2:01 PM

**36.** Complete the shape so that AB becomes a line of symmetry.




**37.** Write one property of each shape to complete the table.

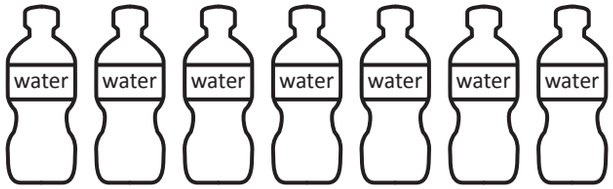
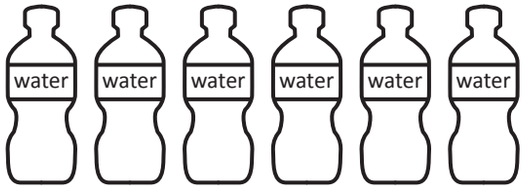
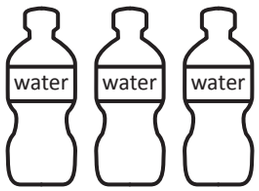
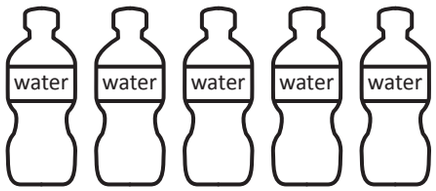
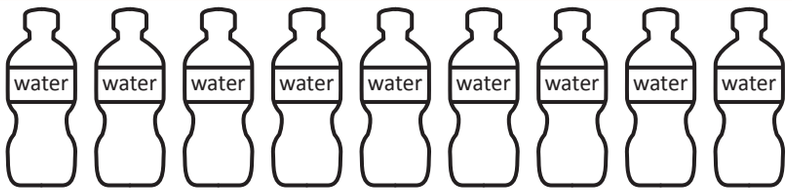
(3 marks)

| Shape | Name of Shape | Properties |
|---|---|---|
|  | rectangle | |
|  | parallelogram | |
|  | trapezium | |



Practice Test.indd 451 20/04/18 2:01 PM

**38.** The pictograph below shows the bottles of water sold by a school's cafeteria in one week.

| | |
|---|---|
| Monday |  |
| Tuesday |  |
| Wednesday |  |
| Thursday |  |
| Friday |  |



The cafeteria sold 60 bottles of water in that week. How many more bottles of water were sold on Friday than on Wednesday?

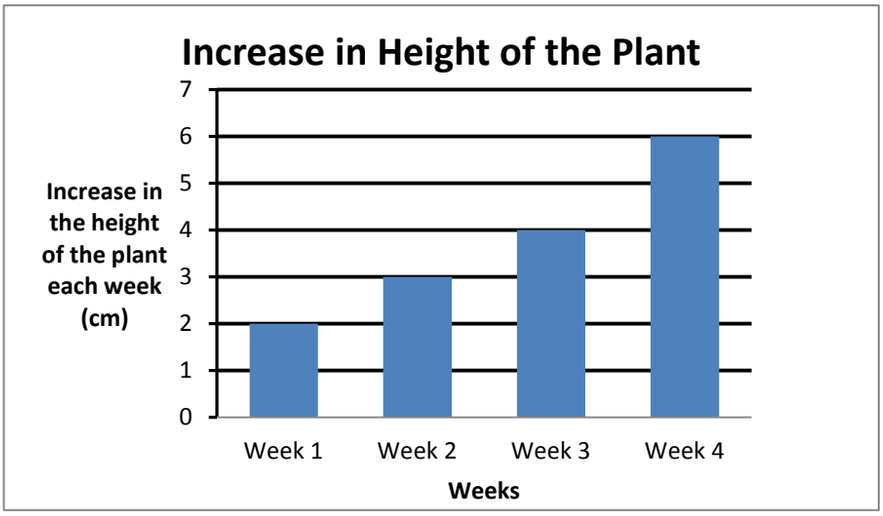
(2 marks)

Answer: _____



Practice Test.indd 452 20/04/18 2:01 PM

**39.** The bar graph below records the increase in height of a plant over four weeks.




If Ali bought the plant at 12 cm in height, in which week was the plant 21 cm in height?

(3 marks)

Answer: _____

**40.** The table below shows the marks obtained by five students for a Mathematics test.

| Students | Marks |
|---|---|
| Jordan | 45 |
| Christian | 37 |
| Aisha | 46 |
| Malik | 24 |
| Maya | 33 |

Which student(s) obtained more than the mean mark for the group?

(2 marks)

Answer: _____



Practice Test.indd 453 20/04/18 2:01 PM

## SECTION II

**41.**



**Queen's Park Zoo**

Tickets are priced at:
$25 for each adult
$20 for each child
For every 2 adults and 3 children tickets bought, a $10 discount will be given.

Four teachers took a class of 30 children to the Zoo. What is the minimum cost of all the tickets to be bought?

(4 marks)

Answer: _____

**42.** Mr. Jones saves 40% of his salary every month. He gives his wife $\frac{8}{10}$ of the remainder and divides what is left equally among his two sons and two daughters. If his two daughters receive a total of $480 from him, what is Mr. Jones monthly salary?

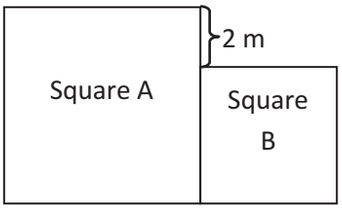
(4 marks)

Answer: _____



Practice Test.indd 454 20/04/18 2:01 PM

**43.** The figure below, which shows the floor of a room, is made up of two squares. The perimeter of Square A is 28 m.



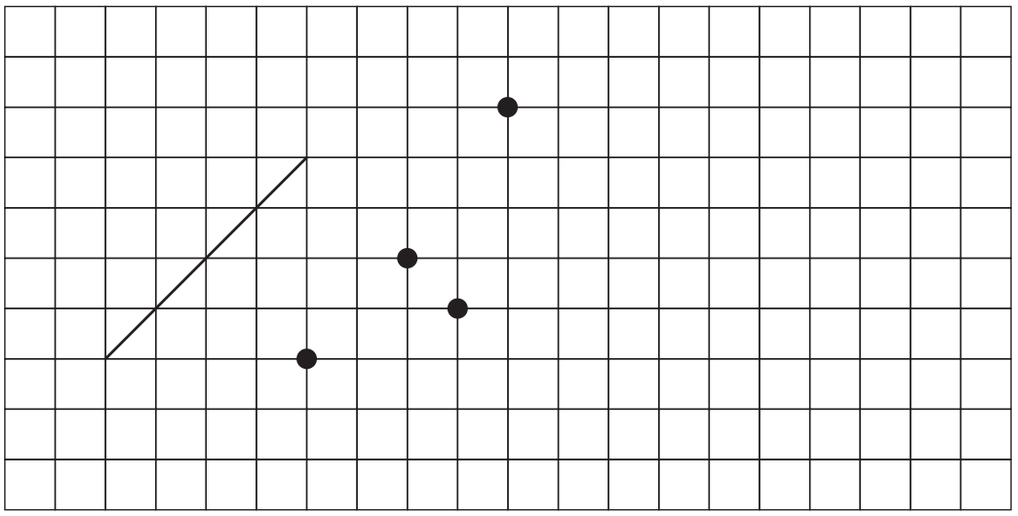

The owner has 50 $m^2$ of carpet which cost $399.95 per square metre. How much money does he need to buy the remaining piece of carpet to completely cover the floor space?

(4 marks)

Answer: _____

**44.** **(a)** Using the line below, join one of the dots to both ends of the line to form a triangle that has one of the angles greater than a right angle.

(3 marks)



**(b)** What is the name of the triangle formed?

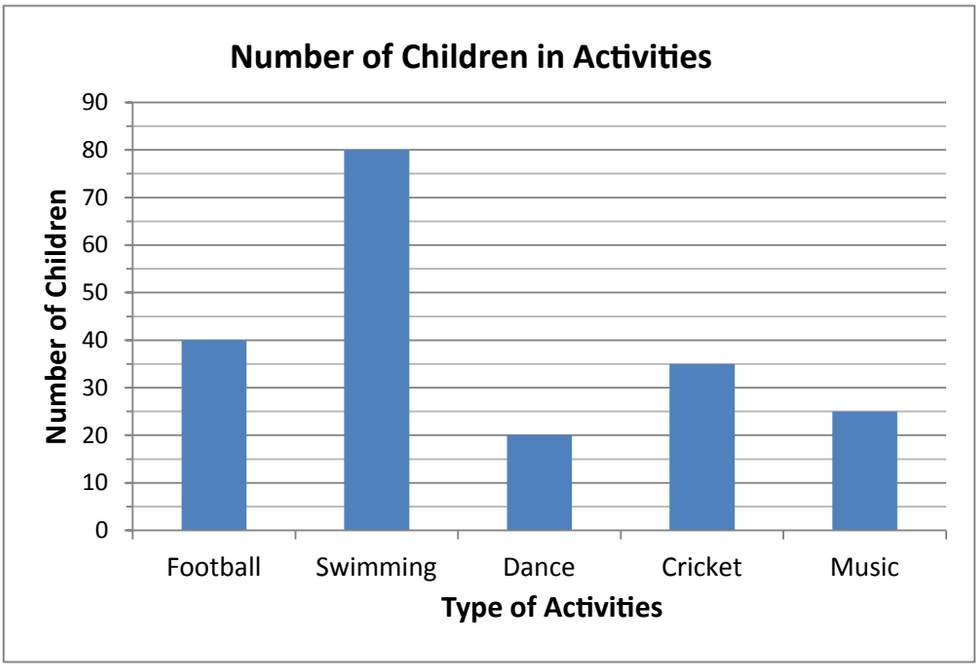
(1 mark)

Answer: _____



Practice Test.indd 455 20/04/18 2:01 PM

**45.** The graph below shows the number of children that take part in the activities at a Recreation Centre.




**(a)** The number of children in Football, Dance, Cricket and Music was adjusted so that each of these activities had the same number of children. How many children are in Music now?

(2 marks)

Answer: _____

**(b)** What percentage of the children are in Swimming?

(2 marks)

Answer: _____



Practice Test.indd 456 20/04/18 2:01 PM