# Targeting Mathematics

## Student's Companion

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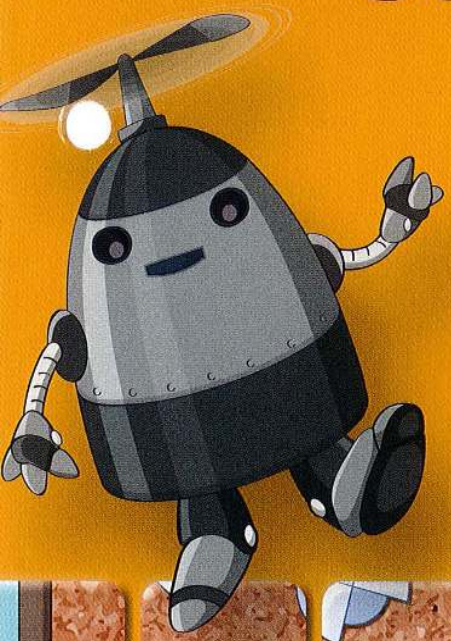
Dr Joseph Yeo Kai Kow



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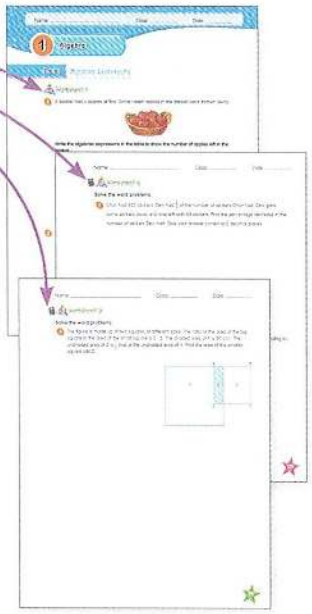
# Preface

The Targeting Mathematics Student's Companion series provides additional exercises and practices for pupils to reinforce concepts learnt.

## Level 1, 2, 3 Worksheets



**L1 worksheets** assess pupils' understanding of basic concepts to help them acquire the necessary process skills.

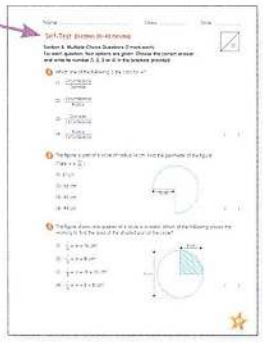
**L2 worksheets** assess pupils' understanding of moderately difficult concepts to help them acquire higher-order thinking skills.

**L3 worksheets** assess pupils' understanding of concepts at a deeper level and aim to develop pupils' creative and critical thinking skills.

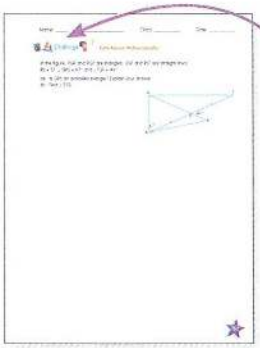
## Problem Solving

**Problem Solving** provides pupils with opportunities to develop a deeper understanding of mathematical concepts as they attempt to solve the problems.

## Self-Test



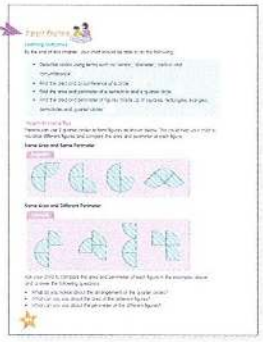
**Self-Test** trains pupils to complete their questions within a time limit.



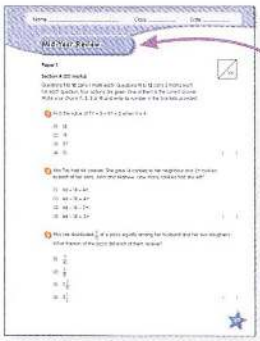
## Challenge

**Challenge** provides questions that draw on processing and reasoning skills to solve non-routine problems.

## Parent Pointers



**Parent Pointers** provides parents with learning outcomes and tips for teaching mathematical concepts.



## Mid-Year Review

**Mid-Year Review** provides questions for revision.

# Contents

Name: _____ Class: _____ Date: _____

# 1 Algebra

## Part I Algebraic Expressions

### Worksheet 1

1 A basket had $x$ apples at first. Some rotten apples in the basket were thrown away.

**Write the algebraic expressions in the table to show the number of apples left in the basket.**

| | Number of apples in the basket |
|---|---|
| Number of apples at first | $x$ |
| Throw away 1 apple | |
| Throw away 2 apples | |
| Throw away 5 apples | |
| Throw away 8 apples | |

2 **Fill in the blanks.**

There are 6 bags. Each bag has $b$ cookies. How many cookies are there altogether?


Total number of cookies = _____ + _____ + _____ + _____ + _____ + _____

= _____ × _____

= _____

**3** **Write an algebraic expression for each statement.**

| Statement | Algebraic Expression |
|---|---|
| (a) Sum of $n$ and 3 | |
| (b) 11 more than $b$ | |
| (c) One-fifth added to $j$ | |
| (d) 4 less than $p$ | |
| (e) Subtract 5 from $a$ | |
| (f) Product of a number, $s$, and 7 | |
| (g) Two times as many as $t$ | |
| (h) A number, $g$, divided by 9 | |
| (i) 12 groups of $y$ | |
| (j) A number, $r$, decreased by 4 | |
| (k) One-quarter of $h$ | |
| (l) Thrice of $w$ | |
| (m) Add 29 to $k$ and then divide the result by 3 | |
| (n) Subtract 17 from $m$ and then divide the result by 9 | |
| (o) Subtract 17 from half of a number, $d$ | |

Name: _____ Class: _____ Date: _____

## L2 Worksheet 2

**Write an algebraic expression for each of the following.**

1. There are 3 times as many boys as girls in a class. If there are $s$ boys, how many girls are there?

2. The base of a triangle is $b$ cm. Its height is 10 cm. Find the area of the triangle.

3 Jane is 23 years old now. Her mother is $2p$ years older than she is. How old will her mother be when Jane is 37 years old?

4 John completed a race in 160 seconds. He was $w$ seconds slower than Martin. How long did Martin take to complete the race?

5 The usual price of a T-shirt was $\$m$. Roy bought a T-shirt at a discount of \$4. How much did he pay for the T-shirt in terms of $m$?

6 John paid $\$x$ for a pen and a ruler. The pen cost \$3 more than the ruler. What was the cost of a ruler? Give your answer in terms of $x$.

7 The ratio of Ali's height to David's height is $h : 7$. David is 175 cm tall. How tall is Ali in terms of $h$?

8 Andy took $(w + 12)$ min to complete a jigsaw puzzle. Ben took 10 min more than Andy to complete the jigsaw puzzle. What was the total time taken by the two boys to complete the jigsaw puzzle?

Name: _____ Class: _____ Date: _____

## Part 2 Simplifying Algebraic Expressions

### L1 Worksheet 3

**1** **Simplify the following algebraic expressions.**

| | |
|---|---|
| (a) $y + y + y$ | (b) $3c + 2c - c$ |
| (c) $e + e + 3e + e$ | (d) $7f + 2f + 3f + 8f$ |
| (e) $7d + d - 2d + d$ | (f) $17g - 2g + 4g - 6g$ |
| (g) $18h - h + 4h + h$ | (h) $9m + 2m - m + 3m$ |
| (i) $19p + p + p + p - 5p$ | (j) $29n + 2n - 7n + 5n - 6n$ |

**2** **Simplify the following algebraic expressions.**

| | |
|---|---|
| (a) $c + 3c + 2c + 5$ | (b) $3b + 2 - b + 7$ |
| (c) $4q + q + 3q - 7$ | (d) $6x + 2x + 3 + 3x$ |
| (e) $7y + 9 - 2y + 9y$ | (f) $27 - 13 + 7u - 4u$ |
| (g) $18 + j + 4j + 7j + 11$ | (h) $19k + 8k - k + 7 - 4$ |
| (i) $19r + 9 + r - 1 - 5r$ | (j) $29 + 24s - 7s + 5s - 6$ |

Name: _____ Class: _____ Date: _____

## Part 3 Evaluating Algebraic Expressions

### Worksheet 4

**1** **Find the value of each expression when $x = 3$.**

| | |
|---|---|
| (a) $2 + x$ | (b) $x + 18$ |
| (c) $x - 1$ | (d) $19 - x$ |
| (e) $9x$ | (f) $6x + 1$ |
| (g) $27 - 4x$ | (h) $7x - 19$ |
| (i) $\frac{x}{3}$ | (j) $\frac{x+9}{2}$ |
| (k) $\frac{4x}{3}$ | (l) $\frac{4x}{3} + 2$ |

2 Find the value of $10b - 8b - 9 + 4b + 7$ when $b = 10$.

3 Find the value of $\frac{6x - 10}{4}$ when $x = 7$.

4 What is the value of $2y + \frac{4y}{5} - 11$ when $y = 5$?

5 What is the value of $9k - \frac{5k}{2} + 3$ when $k = 4$?

Name: _____ Class: _____ Date: _____

## L2 Worksheet 5

**Solve the word problems.**

1. There are $z$ rows of desks with chairs in a classroom. There are 5 desks with chairs in each row. When all the students are seated, 3 desks are not occupied.
   (a) Express the total number of students in the class in terms of $z$.
   (b) Find the number of students in the class when $z = 8$.

2. Mrs Smith had \$7$t$ left after buying 6 cakes at \$3 each.
   (a) How much money did Mrs Smith have at first in terms of $t$?
   (b) If $t = 5$, how much money did she have at first?

3 Mary's height is $h$ cm. John is 9 cm taller than Mary. Benny is 4 cm shorter than Mary.

(a) Find the total height of the 3 children in terms of $h$.

(b) If $h = 142$, find the total height of the 3 children.

4 Alice's mass is $a$ kg. Bethany's mass is $2a$ kg. Caili's mass is $(a + 3)$ kg.

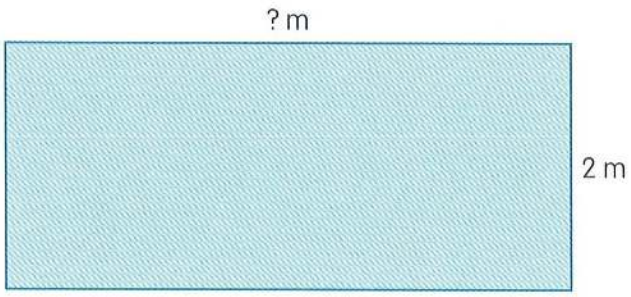
(a) What is the average mass of the 3 girls in terms of $a$?

(b) If $a = 24$, what is their average mass?

5 The perimeter of a rectangular whiteboard is $6p$ m. The breadth of the whiteboard is 2 m.

(a) What is the length of the whiteboard in terms of $p$?

(b) If $p = 2$, what is the length of the whiteboard?



6 Steve bought 6 packets of cheese. He gave the shopkeeper $\$w$ and received a change of \$2.

(a) How much did one packet of cheese cost in terms of $w$?

(b) If $w = 50$, what was the cost of one packet of cheese?

7 Paul had 7 packets of cookies at first. There were $k$ cookies in each packet. His father gave him 18 more cookies. Paul and his 3 siblings shared all the cookies equally among themselves.

(a) How many cookies did each person receive?

(b) If $k = 6$, how many cookies did each person receive?

Name: _____ Class: _____ Date: _____

## L3 Worksheet 6

**Solve the word problems.**

1. $\frac{2}{3}$ of a number is $4y$. What is the number in terms of $y$?
   If $y = 12$, what is the number?

2. The average of 3 numbers is $11w$. Two of the numbers are $5w$ and 31.
   If $w = 4$, find the third number.

3 The table shows the prices of different types of files sold at a bookshop.

| Type of file | Price per file |
|---|---|
| Box | $\$(f + 3)$ |
| Clip | $\$(f + 1)$ |
| Ring | $\$f$ |

(a) Peiyi bought 2 box files and 4 clip files. How much money did she spend altogether?

(b) Dinesh paid \$22 for 2 ring files and some clip files. How many clip files did he buy if a ring file cost \$2?

Name: _____ Class: _____ Date: _____

# Part 4 Solving Equations

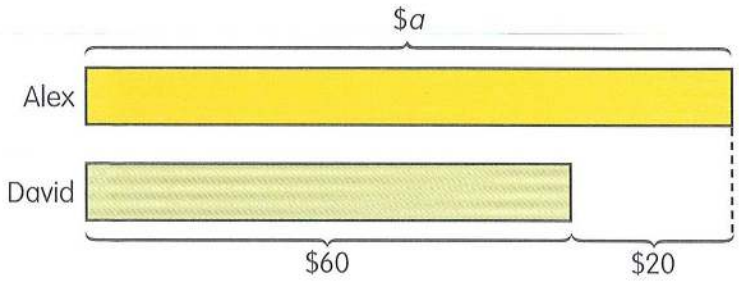
## Worksheet 7

**Solve the word problems.**

1. Alex has $\$a$. David has \$20 less than Alex.

   (a) How much does David have in terms of $a$?

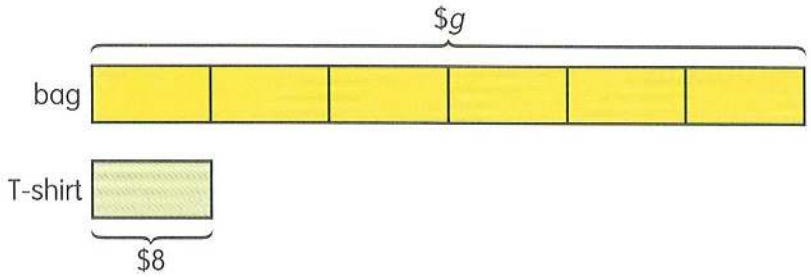
   (b) How much money does Alex have if David has \$60?



2 A bag costs $\$g$. It costs six times as much as a T-shirt.

(a) How much does a T-shirt cost in terms of $g$?

(b) If the cost of the T-shirt is \$8, what is the cost of the bag?



Name: _____ Class: _____ Date: _____

## L2 Worksheet 8

**Solve the word problems.**

1. The total mass of Agnes, Betty and Cheryl is 152 kg. Agnes is as heavy as Betty. Cheryl's mass is 34 kg and Agnes' mass is $b$ kg.

   (a) Express the total mass of Agnes and Betty in terms of $b$.

   (b) Find Betty's mass.

2 Ruyin is $n$ years old now. She is 3 years older than Zaleha.

(a) What will their total age be in 2 years' time in terms of $n$?

(b) Find their total age in 2 years' time if Zaleha is 12 years old now.

3 Alex, Benjamin and Calvin have a total of 54 cookies. Alex has $x$ cookies. Benjamin has twice as many cookies as Alex. Calvin has 3 times as many cookies as Alex. How many cookies does Alex have?

4 A swordfish cost $\$y$. A goldfish cost 3 times as much as a swordfish. An angelfish cost \$2 less than a goldfish. Peter bought a swordfish, a goldfish and an angelfish. The total cost of the 3 fish was \$19. What was the cost of a swordfish?

Name: _____ Class: _____ Date: _____

## L3 Worksheet 9

**Solve the word problems.**

1. Jane had 29 sweets left after filling up Box A and Box B with sweets. Box A had $m$ sweets and Box B had 18 sweets more than Box A.

   (a) How many sweets were there in Box B in terms of $m$?

   (b) Box B had 49 sweets. How many sweets did Jane have at first?

2 Mabel has $3r$ stickers. Clement has $(r + 2)$ stickers more than Mabel. Sue has 15 stickers. Mabel has twice as many stickers as Sue. How many stickers do they have altogether?

Name: _____ Class: _____ Date: _____

## L3 Problem Solving

1. Mrs Chong has 35 coins in her purse. These are fifty-cent, twenty-cent and ten-cent coins. There are $d$ twenty-cent coins and twice as many ten-cent coins as fifty-cent coins. She has fewer twenty-cent coins than fifty-cent coins.

   (a) How many fifty-cent coins does she have in terms of $d$?

   (b) If $d = 8$, what is the total value of the 35 coins in dollars and cents?

2 Meijun had $\$x$. Jane had 3 times as much money as Meijun. After Jane had spent \$110 and Meijun had spent \$30, they each had an equal amount of money left. How much money did Jane have at first?

Name: _____ Class: _____ Date: _____

## Self-Test (Duration: 30–45 minutes)

20

**Section A: Multiple-Choice Questions (1 mark each)**
**For each question, four options are given. Choose the correct answer and write its number (1, 2, 3 or 4) in the brackets provided.**

1. Express $9 + 14c - 5 - 7c + 18$ in the simplest form.

   (1) $4 - 7c$

   (2) $4 + 21c$

   (3) $22 + 21c$

   (4) $22 + 7c$ (  )

2. Ravi weighs $m$ kg. Navin is 10 kg heavier than Ravi. What is the total mass of Ravi and Navin?

   (1) $10m$ kg

   (2) $12m$ kg

   (3) $(m + 20)$ kg

   (4) $(2m + 10)$ kg (  )

3. Find the value of $y + \frac{32y}{10} - 3$ when $y = 5$.

   (1) 8

   (2) 14

   (3) 18

   (4) 24 (  )

4 Janice has $\$x$. May has 4 times as much money as Janice. Siti has \$25 more than May. How much money does Siti have in terms of $x$?

(1) $\$(4 + x)$

(2) $\$(25 + x)$

(3) $\$(25 + 4x)$

(4) $\$(100 + x)$ (  )

5 David is $b$ years old now. His father is 32 years older than he is. What was their total age 8 years ago in terms of $b$?

(1) $(2b + 16)$ years

(2) $(2b + 24)$ years

(3) $(2b + 32)$ years

(4) $(2b + 48)$ years (  )

**Section B: Short-Answer Questions (8 marks)**

**For each question, write your answer in the space provided. The number of marks available is shown in brackets [ ] at the end of each question.**

6 Simplify $5y + 9 - 2y + 3y - 4$.

Ans: _____ [1]

7 Find the value of $\frac{5a - 10}{3}$ if $a = 8$.

Ans: _____ [1]

8 Lily had $\$r$ at first. She spent half of the money on dinner and bought 4 muffins at \$2.50 each. How much money had she left? Express your answer in terms of $r$.

Ans: \$ _____ [ 2 ]

9 Alan's mass is 23 kg. Benny is $b$ times as heavy as Alan. Chung is $3b$ kg lighter than Benny. What is the total mass of the boys? Express your answer in terms of $b$.

Ans: _____ kg [ 2 ]

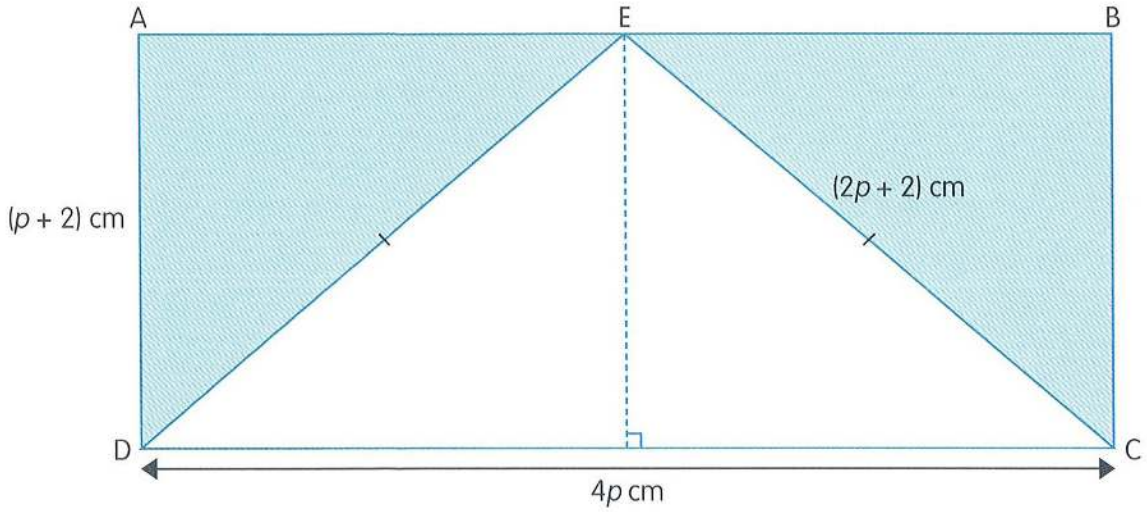
10 Mrs Chen sold $(5 + n)$ muffins on Monday. She sold $n$ more muffins on Tuesday than on Monday. Altogether, she sold 40 muffins on the two days. How many muffins did Mrs Chen sell on Tuesday?

Ans: _____ [ 2 ]

## Section C: Long-Structured Questions (7 marks)

**Show your working clearly. The number of marks available is shown in brackets [ ] at the end of each part-question.**

11 ABCD is a rectangle and CDE is an isosceles triangle. The length of the rectangle is $4p$ cm and its breadth is $(p + 2)$ cm.




(a) Find the perimeter of the shaded part.
Give your answer in the simplest form in terms of $p$.

(b) If $p = 3$, find the perimeter of the shaded part.

Ans: (a) _____ cm [ 2 ]

(b) _____ cm [ 1 ]

12 At first, Hamid and Mark had \$47 each. The two boys then spent some money and saved the rest. Hamid saved \$3$y$ more than Mark. Altogether, they spent \$15$y$.

(a) How much did Hamid save?
(b) How much did Mark save?
Give your answers in terms of $y$.

Ans: (a) \$ _____ [ 2 ]

(b) \$ _____ [ 2 ]

Name: _____ Class: _____ Date: _____


(Let's Reason Mathematically)

Sulin creates number patterns as shown below.

1st row

| 14 | |
|---|---|
| 1 | 4 |

2nd row

| 25 | |
|---|---|
| 2 | 5 |

3rd row

| 36 | |
|---|---|
| 3 | 6 |

⋮

10th row

| 113 | |
|---|---|
| 10 | 13 |

11th row

| 124 | |
|---|---|
| 11 | 14 |

12th row

| 135 | |
|---|---|
| 12 | 15 |

⋮

(a) Write down the number pattern for the 21st row.

(b) The number pattern for the $n$th row is shown below. Express $a$ in terms of $n$.

| $a$ | |
|---|---|
| $n$ | $n+3$ |

(c) The value of $a$ in the $n$th row is 289. Find the value of $n$.

## Parent Pointers

### Learning Outcomes

By the end of this chapter, your child should be able to do the following.

- Use letters to represent unknown numbers and write a simple algebraic expression in one variable for a given situation
- Simplify simple algebraic expressions
- Evaluate simple algebraic expressions by substitution
- Solve word problems involving simple algebraic expressions
- Form and solve simple linear equations and make explicit link with model drawing

### Teach-At-Home Tips

Parents can construct word problems and solve them together with your children.

**Example**

**Step 1:** Parent begins a word problem with a letter to represent an unknown number.

> *Mary buys x stickers.*

**Step 2:** Ask your child to roll a dice to get a number. Use the number to write a sentence to continue the word problem.

> *Mary buys x stickers.*
> *Her sister gives Mary another 6 stickers.*

**Step 3:** Ask your child to roll a dice again. Use this number and the unknown letter to form a simple algebraic expression. Ask your child to use this algebraic expression to write the third sentence to continue the word problem.

> *Mary buys x stickers.*
> *Her sister gives Mary another 6 stickers.*
> *Sue gives Mary (x + 5) stickers.*

**Step 4:** Parent rolls the dice to get a number. Form a question and use the number to substitute for *x*.

> *Mary buys x stickers.*
> *Her sister gives Mary another 6 stickers.*
> *Sue gives Mary (x + 5) stickers.*
> *If x = 4, how many stickers does Mary have now?*

**Step 5:** Parent and child solve the word problem together.

Name: _____ Class: _____ Date: _____

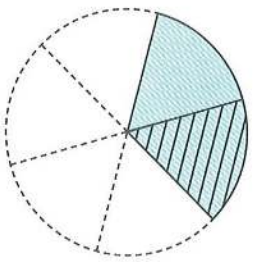
# 2 Fractions

## Part 1 Dividing a Proper Fraction by a Whole Number

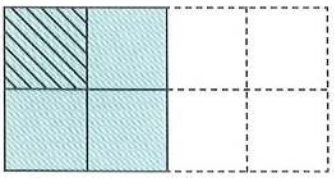
### Worksheet 1

**1** **Divide. Express each answer as a fraction in its simplest form.**

(a) $\frac{1}{3} \div 2$



(b) $\frac{1}{2} \div 4$



**2** **Divide. Express each answer as a fraction in its simplest form.**

| | |
|---|---|
| (a) $\frac{1}{3} \div 3$ | (b) $\frac{2}{5} \div 4$ |
| (c) $\frac{3}{7} \div 6$ | (d) $\frac{3}{4} \div 5$ |
| (e) $\frac{8}{9} \div 2$ | (f) $\frac{7}{10} \div 14$ |
| (g) $\frac{5}{12} \div 15$ | (h) $\frac{9}{11} \div 18$ |

Name: _____ Class: _____ Date: _____

## Worksheet 2

**Solve the word problems. Express each answer as a fraction in its simplest form.**

1. Jane cut a string of length $\frac{3}{4}$ m into 2 equal pieces. What is the length of each piece of string?

2. $\frac{8}{9}$ kg of flour was shared equally among 4 boys. What was the mass of the flour that each boy received?

3 Alice had $\frac{3}{7}$ of a cake. She shared it with a classmate. What fraction of the cake did each girl get?

4 Samad had some cookies. He gave $\frac{4}{9}$ of his cookies to his sons. He gave the rest of the cookies to 5 friends. What fraction of the cookies did each friend receive?

Name: _____ Class: _____ Date: _____

## Worksheet 3

**Solve the word problems.**

1. 3 girls and 4 boys shared $\frac{2}{3}$ of a pizza equally. What fraction of the pizza did the 3 girls get?

2 4 cups can hold $\frac{7}{8}\ \ell$ of water altogether. How many litres of water can 12 such cups hold? Leave your answer as a mixed number in its simplest form.

3 The total length of 3 ribbons is $\frac{9}{10}$ m. The length of Ribbon B is twice the length of Ribbon A. The length of Ribbon C is 3 times the length of Ribbon B. What is the length of Ribbon B? Give the answer in the simplest form.

4 Jason bought a bag of rice for his family. They ate an equal amount of rice each day. After 12 days, he had $\frac{3}{4}$ of the rice left. After another 6 days, he had 21 kg left. How much rice did Jason buy?

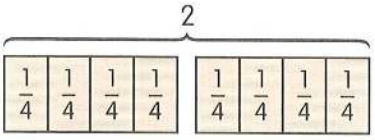
Name: _____ Class: _____ Date: _____

## Part 2 Dividing a Whole Number by a Proper Fraction

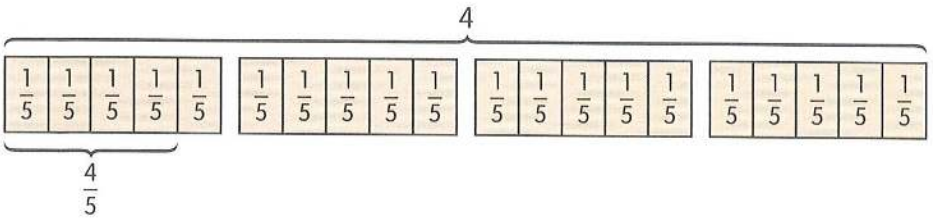
### Worksheet 4

**1** **Divide. Find the value of the following.**

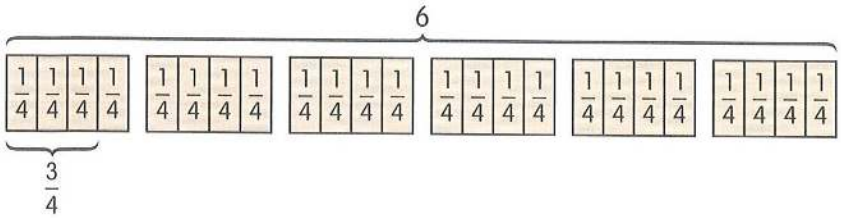
(a) $2 \div \frac{1}{4}$




(b) $4 \div \frac{4}{5}$




(c) $6 \div \frac{3}{4}$



**2** **Divide. Find the value of the following.**

| | |
|---|---|
| (a) $3 \div \frac{1}{10}$ | (b) $7 \div \frac{1}{5}$ |
| (c) $12 \div \frac{3}{5}$ | (d) $24 \div \frac{6}{7}$ |

**3** **Divide. Express each answer as a mixed number.**

| | |
|---|---|
| (a) $2 \div \frac{5}{9}$ | (b) $5 \div \frac{3}{8}$ |
| (c) $6 \div \frac{4}{7}$ | (d) $10 \div \frac{3}{10}$ |

Name: _____ Class: _____ Date: _____

## Worksheet 5

**Solve the word problems.**

1. Ben bought 7 chocolate bars. He cuts each of the chocolate bars into halves. How many pieces of half chocolate bars did he have?

2. Mr Tan had 5 cakes. He cut the cake equally into fifths. How many slices of cake did he get?

3 Mr Teo bought 4 kg of potatoes. He stored the potatoes in small packs of $\frac{2}{3}$ kg each. How many small packs of potatoes were there?

4 Janice has a roll of ribbon that is 12 m long. She cuts them into shorter lengths of $\frac{3}{5}$ m each. How many shorter pieces of ribbon will she get?

Name: _____ Class: _____ Date: _____

## L2 Worksheet 6

**Solve the word problems.**

1. The area of a rectangular noticeboard is 6 $m^2$. Its breadth is $\frac{6}{7}$ m.
   (a) What is the length of the rectangular noticeboard?
   (b) What is its perimeter?

2 David was given 8 m of rope. He cut the rope into shorter pieces of length $\frac{3}{8}$ m each.

(a) How many shorter pieces of rope did he get?

(b) Find the length of rope left.

3 Cindy uses a container with a capacity of $\frac{7}{8}\ \ell$ to fill a tank with a capacity of 12 $\ell$. What is the least number of times that Cindy must fill her container completely in order to fill the tank to the brim?

4 Chef Tan had 4 kg of brown rice. He used $\frac{2}{5}$ kg of the brown rice on Monday and $\frac{9}{15}$ kg of the brown rice on Tuesday. He packed the remaining brown rice into small boxes each containing $\frac{3}{8}$ kg of brown rice. How many small boxes of brown rice did Chef Tan pack?

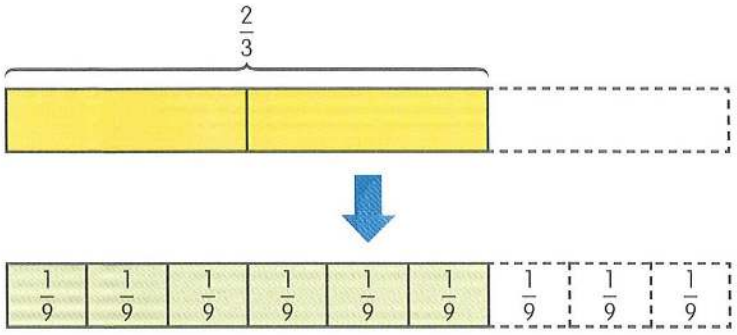
Name: _____ Class: _____ Date: _____

## Part 3 Dividing a Proper Fraction by a Proper Fraction

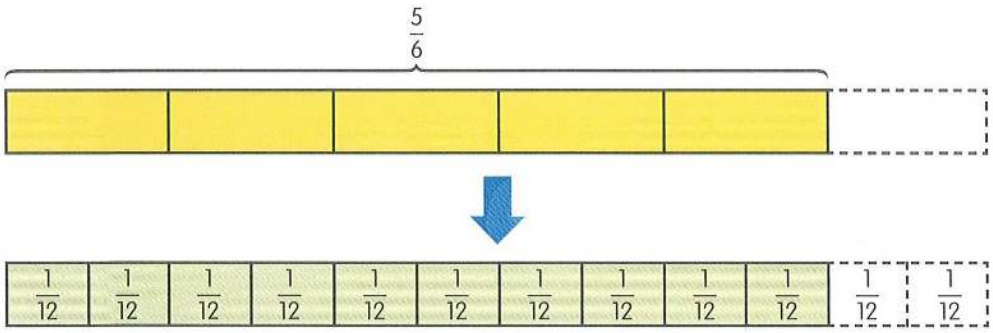
### Worksheet 7

**1** **Divide. Find the value of the following.**

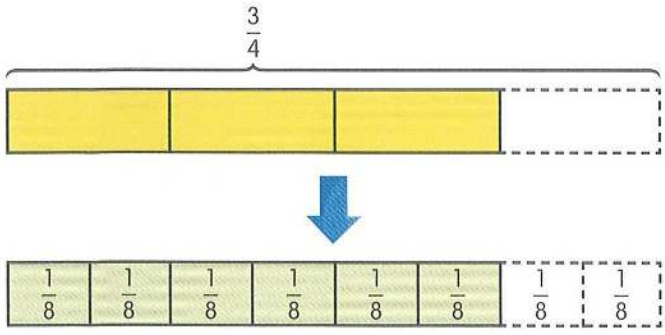
(a) $\frac{2}{3} \div \frac{1}{9}$




(b) $\frac{5}{6} \div \frac{1}{12}$




(c) $\frac{3}{4} \div \frac{3}{8}$



**2** **Divide. Give the answer in the simplest form.**

| | |
|---|---|
| (a) $\frac{1}{5} \div \frac{1}{10}$ | (b) $\frac{3}{7} \div \frac{1}{14}$ |
| (c) $\frac{1}{4} \div \frac{3}{8}$ | (d) $\frac{2}{3} \div \frac{2}{7}$ |

**3** **Divide. Express each answer as a mixed number.**

| | |
|---|---|
| (a) $\frac{7}{9} \div \frac{5}{9}$ | (b) $\frac{3}{4} \div \frac{5}{8}$ |
| (c) $\frac{5}{12} \div \frac{1}{6}$ | (d) $\frac{11}{20} \div \frac{3}{10}$ |

Name: _____ Class: _____ Date: _____

## Worksheet 8

**Solve the word problems.**

1. John cut a string $\frac{3}{4}$ m long into a few pieces. Each piece was $\frac{1}{12}$ m long. How many shorter pieces of string were there altogether?

2. Jane uses $\frac{1}{10}$ cup of chocolate chips for a cake. How many such cakes can she bake with $\frac{3}{5}$ cup of chocolate chips?

3 Mrs Lee has $\frac{7}{8}$ kg of cookies. She packs them into smaller packets of mass $\frac{7}{16}$ kg each. How many smaller packets of cookies does she pack?

4 Amiya has $\frac{9}{10}\ \ell$ of vinegar. She wants to pour all the vinegar into some identical bottles. Each bottle has a capacity of $\frac{2}{5}\ \ell$. Find the least number of bottles she need.

Name: _____ Class: _____ Date: _____

## L2 Worksheet 9

**Solve the word problems.**

1. Joy had 3 m of ribbon. She used $2\frac{1}{2}$ m of it to tie a parcel. She then gave the rest of the ribbon to some friends. Each friend received $\frac{1}{10}$ m of the ribbon. How many friends did she give the remaining ribbon to?

2 Emily had $\frac{4}{5}$ kg of seasoning powder. She gave $\frac{1}{4}$ of the seasoning powder to her friend and packed the remainder into packets of exactly $\frac{1}{20}$ kg each. How many such packets did she pack?

Name: _____ Class: _____ Date: _____

## Part 4 Word Problems

### L2 Worksheet 10

**Solve the word problems.**

1. Mr Lim had a piece of wire 10 m long. He cut 4 shorter pieces of wire from it. The length of each shorter piece of wire was $\frac{1}{2}$ m long. He cut the remaining wire into some pieces, each of length $\frac{2}{5}$ m. How many pieces of wire of length $\frac{2}{5}$ m each were there?

2 Peter ate $\frac{1}{2}$ of a pie and his sister ate $\frac{3}{4}$ of the remaining pie. The rest of the pie was then shared equally between his two friends. What fraction of the pie did each friend receive?

3 A fruitseller had 294 apples. $\frac{5}{7}$ of the apples were red and the rest were green. He bought some more green apples. In the end, $\frac{1}{3}$ of the apples were green.

(a) How many red apples were there?

(b) How many green apples did he buy?

4 Alex and Ben had 162 marbles altogether at first. Then Alex gave away 30 of his marbles and Ben gave away $\frac{1}{6}$ of his marbles and they had the same number of marbles left. How many marbles did Alex have at first?

Name: _____ Class: _____ Date: _____

## L3 Worksheet 11

**Solve the word problems.**

1. A group of girls shared 400 stickers among themselves. Half of them received 5 stickers each, $\frac{1}{6}$ of them received 4 stickers each and the rest received 3 stickers each. How many girls were there altogether?

2 There were 150 pupils in the hall. $\frac{3}{5}$ of them were boys. Some boys left the hall and $\frac{4}{7}$ of the remaining pupils were boys. How many boys left the hall?

Name: _____ Class: _____ Date: _____

## L3 Problem Solving

1. At a bakery, $\frac{2}{3}$ of the cakes were walnut cakes and the rest were butter cakes. $\frac{1}{2}$ of the total number of cakes were sold. $\frac{2}{3}$ of the cakes sold were walnut cakes and 30 butter cakes were left unsold. How many walnut cakes were sold?

2 Alex and David had a total of \$100. Alex gave $\frac{3}{7}$ of his money to David. David then gave $\frac{1}{6}$ of the total amount of money he had to Alex. In the end, both of them had the same amount of money.

(a) How much money did David have at first?

(b) How much more money did Alex have than David at first?

Name: _____ Class: _____ Date: _____

## Self-Test (Duration: 30–45 minutes)

20

**Section A: Multiple-Choice Questions (1 mark each)**
**For each question, four options are given. Choose the correct answer and write its number (1, 2, 3 or 4) in the brackets provided.**

1. $\frac{4}{9} \div \frac{2}{3}$ is the same as _____.

   (1) $\frac{9}{4} \times \frac{2}{3}$

   (2) $\frac{9}{4} \times \frac{3}{2}$

   (3) $\frac{4}{9} \times \frac{2}{3}$

   (4) $\frac{4}{9} \times \frac{3}{2}$ ( )

2. Find the value of $\frac{8}{9} \div \frac{4}{3}$.

   (1) $\frac{8}{27}$

   (2) $\frac{2}{3}$

   (3) $\frac{32}{27}$

   (4) $\frac{32}{9}$ ( )

3. Lily had $\frac{9}{10}\ \ell$ of orange juice. She drank $\frac{1}{3}$ of it and poured the remainder equally into 4 cups. How much orange juice was there in each cup?

   (1) $\frac{3}{5}\ \ell$

   (2) $\frac{3}{10}\ \ell$

   (3) $\frac{3}{20}\ \ell$

   (4) $\frac{3}{40}\ \ell$ ( )

4 Mr Lee had 1 kg of salt. He used $\frac{1}{4}$ kg of it and packed the rest into smaller packets of $\frac{1}{8}$ kg each. How many smaller packets of salt would he get?

(1) 6

(2) 5

(3) 4

(4) 3 (  )

5 At a concert, 120 people in the audience were adults. $\frac{1}{4}$ of the audience were children. $\frac{3}{5}$ of the children were boys. How many girls were at the concert?

(1) 48

(2) 40

(3) 24

(4) 16 (  )

**Section B: Short-Answer Questions (8 marks)**

**For each question, write your answer in the space provided. The number of marks available is shown in brackets [ ] at the end of each question.**

6 Find the value of $\frac{4}{15} \div 6$.

Express your answer as a fraction in the simplest form.

Ans: _____ [1]

7 What is the missing fraction in the box?

$\frac{6}{7} \div$ ☐ $= 14$

Ans: _____ [1]

8 Mr Lim had $\frac{2}{5}$ of a pizza. He shared the pizza equally among his 3 daughters. What fraction of the pizza did each daughter get?

Ans: _____ [1]

9 A tank contains 10 $\ell$ of water. All the water in the tank is poured into some bottles. Each bottle contains $\frac{2}{5}$ $\ell$ of water. How many bottles can all the water in the tank fill?

Ans: _____ [1]

10 Aunt Mary bought $\frac{9}{10}$ kg of curry powder. She used $\frac{1}{3}$ of it to cook curry chicken and packed the rest of the curry powder equally into 6 packets. What was the mass of each packet of curry powder?

Ans: _____ kg [ 2 ]

11 Mrs Kee buys a cake. She keeps $\frac{1}{2}$ of it for her husband. Her children share the remaining cake. Each child gets $\frac{1}{6}$ of the cake. How many children does Mrs Kee have?

Ans: _____ [ 2 ]

**Section C: Long-Structured Questions (7 marks)**

**Show your working clearly. The number of marks available is shown in brackets [ ] at the end of each part-question.**

12 Alice had a bag of flour. She used $\frac{1}{3}$ of the flour and divided $\frac{1}{4}$ of what she had left equally between Belinda and Cindy. Finally, Alice had 437.5 g of flour more than Belinda. How much flour did Alice use? Leave the answer in grams.

Ans: _____ g [ 3 ]

13 The mass of a box filled completely with salt is 4860 g. The mass of the box when it is $\frac{1}{5}$ filled with salt is 1300 g.

(a) What is the mass of the empty box?

(b) What is the mass of the box when it is $\frac{1}{2}$ filled with salt?

Ans: (a) _____ g [ 2 ]

(b) _____ g [ 2 ]

Name: _____ Class: _____ Date: _____


(Let's Reason Mathematically)

Ben spent $\frac{4}{9}$ of his money on 32 cookies and 32 sweets. The cost of a sweet is $\frac{1}{6}$ that of a cookie. He then used the rest of his money to buy another 9 cookies and some sweets.

(a) If Ben had spent $\frac{4}{9}$ of his money on sweets only, how many sweets could he buy?

(b) How many sweets did Ben actually buy altogether?

## Parent Pointers

### Learning Outcomes

By the end of this chapter, your child should be able to do the following.

- Divide a proper fraction by a whole number **without calculator**
- Divide a whole number by a proper fraction **without calculator**
- Divide a proper fraction by a proper fraction **without calculator**
- Solve word problems on fractions involving the 4 operations
- Solve multi-step word problems and non-routine problems

### Teach-At-Home Tips

Study the two tables below with your children. Then ask your child to use a calculator to find the answers to the questions in each table and compare the answers.

| Table 1 |
|---|
| $\frac{1}{3} \div 3$ |
| $\frac{1}{3} \div 4$ |
| $\frac{1}{3} \div 9$ |
| $\frac{1}{3} \div 10$ |
| $\frac{1}{3} \div 15$ |
| $\frac{1}{3} \div 20$ |
| $\frac{1}{3} \div 27$ |

| Table 2 |
|---|
| $3 \div \frac{1}{3}$ |
| $3 \div \frac{1}{4}$ |
| $4 \div \frac{1}{6}$ |
| $4 \div \frac{1}{8}$ |
| $6 \div \frac{1}{8}$ |
| $9 \div \frac{1}{9}$ |
| $10 \div \frac{1}{10}$ |

Circle the correct response.

(a) If a proper fraction is divided by a whole number, then the answer is (less than / more than) the whole number.

(b) If a whole number is divided by a proper fraction, then the answer is (less than / more than) the whole number.

Name: _____ Class: _____ Date: _____

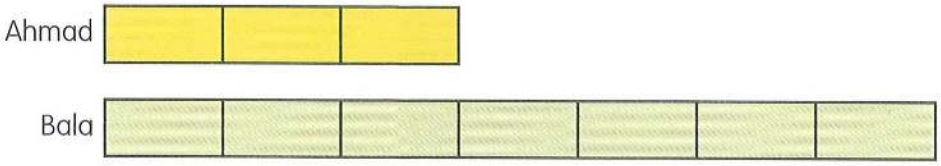
# 3 Ratio

## Part 1 Ratio and Fraction

### LI Worksheet 1

**1** **Write the ratio as a fraction.**

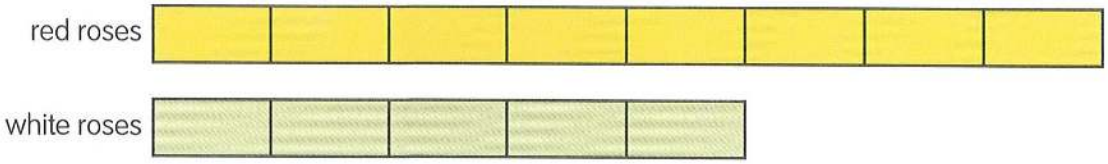
The ratio of the number of Ahmad's sweets to the number of Bala's sweets is 3 : 7.




Ahmad has _____ as many sweets as Bala.

**2** **Write as fractions.**

In a vase, the ratio of the number of red roses to the number of white roses is 8 : 5.




(a) The number of red roses is _____ of the number of white roses.

(b) The number of white roses is _____ of the number of red roses.

(c) The number of red roses is _____ of the total number of flowers.

(d) The total number of flowers is _____ of the number of white roses.

**3** **Write the ratios based on the given statement.**

| | |
|---|---|
| Brenda's mass is $\frac{4}{5}$ of Yati's mass. | Brenda's mass : Yati's mass<br><br>Yati's mass : Brenda's mass |

**4** **Fill in the blanks. Give each answer in its simplest form.**

In a fish tank, there are 12 guppies for every 8 swordtails.

(a) The ratio of the number of swordtails to the number of guppies is _____.

(b) The number of swordtails is _____ of the number of guppies.

(c) The number of guppies is _____ of the total number of swordtails and guppies.

**5** Jenny has 3 times as many postcards as Linda.

(a) What is the ratio of Jenny's number of postcards to Linda's number of postcards?

(b) What fraction of Jenny's postcards is Linda's postcards?

**6** In a school camp, the number of teachers is $\frac{4}{7}$ of the number of students.

(a) What is the ratio of the number of students to the number of teachers?

(b) What is the ratio of the number of teachers to the total number of people?

(c) What is the ratio of the total number of people to the number of students?

Name: _____ Class: _____ Date: _____

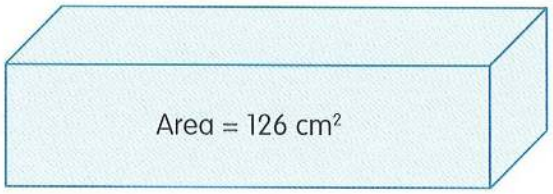
## Part 2 Word Problems

### L2 Worksheet 2

**Solve the word problems.**

1. Siti has $\frac{2}{5}$ as many paper clips as Hazel. Hazel has 24 more paper clips than Siti. How many paper clips do the two girls have altogether?

2. The rectangular face of the cuboid has an area of 126 cm$^2$. The length of the rectangular face is $\frac{7}{2}$ of its breadth. Find the length of the rectangular face.



3 Danny had a packet of stickers to share with Ravi and Samad. He kept 93 stickers for himself and gave the remaining stickers to Ravi and Samad in the ratio 2 : 3.
The number of stickers that Ravi received was $\frac{1}{4}$ of the total number of stickers.

(a) How many stickers did Danny have at first?

(b) How many stickers did Danny give away?

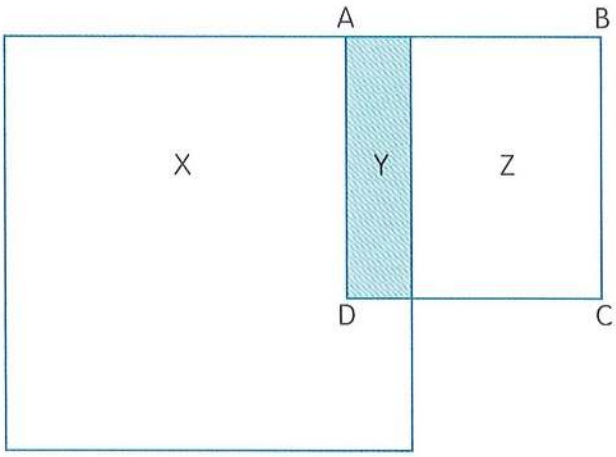
4 The ratio of the number of females to that of males at a concert was 5 : 6. The ratio of the number of girls to that of women at the same concert was 2 : 3. The ratio of the number of boys to that of men was 5 : 7. What fraction of the people were children? Express the answer in the simplest form.

Name: _____ Class: _____ Date: _____

## L3 Worksheet 3

**Solve the word problems.**

1. The figure is made up of two squares of different sizes. The ratio of the area of the big square to the area of the small square is 5 : 2. The shaded area of Y is 30 $cm^2$. The unshaded area of Z is $\frac{1}{3}$ that of the unshaded area of X. Find the area of the smaller square ABCD.



2 The ratio of the number of curry puffs to the number of buns in Mr Teo's bakery was 3 :4. Each curry puff cost $3. Each bun cost $1. Mr Teo collected a total of $5668 from selling **all** his curry puffs and buns.

(a) How many buns were there?

(b) How many curry puffs were there?

Name: _____ Class: _____ Date: _____

## Part 3 Ratios of Three Quantities

### Worksheet 4

**Find the ratios of 3 quantities.**

1. The ratio of the area of Rectangle X to the area of Triangle Y is 7 : 6. The ratio of the area of Triangle Y to the area of Square Z is 3 : 4. What is the ratio of the area of Rectangle X to the area of Triangle Y to the area of Square Z?

2. A : B = 2 : 3 and B : C = 5 : 6. Find the ratio of A : B : C.

3 In an aquarium, the ratio of the number of goldfish to the number of swordtails is 1 : 2. The ratio of the number of guppies to the number of swordtails is 5 : 4. What is the ratio of the number of goldfish to the number of swordtails to the number of guppies?

4 Julie, Mary and Sandy share a sum of money. The ratio of Julie's share to Mary's share is 4 : 5. The ratio of Julie's share to Sandy's share is 2 : 3.

(a) Who has the largest share?

(b) What is the ratio of Julie's share to Mary's share to Sandy's share?

Name: _____ Class: _____ Date: _____

## L2 Worksheet 5

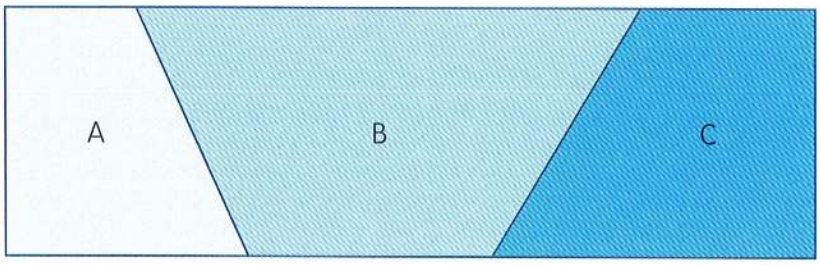
**Solve the word problems.**

1. The ratio of the number of red apples to the number of green apples to the number of pears is 5 : 4 : 3. There are 84 more apples than pears. How many fruits are there altogether?

2 Jenny has twice as much money as Lily. Siti has half as much money as Lily. What is the ratio of Siti's money to Lily's money to Jenny's money?

3 Jane bought some carnations, roses and tulips in the ratio 3 : 5 : 2. The cost of each stalk of carnation is $2. The cost of each stalk of rose is $5. Jane spent a total of $93 on carnations and roses. How many stalks of tulips did she buy?

4 The figure shows a rectangle that is divided into three parts, A, B and C. The ratio of the area of A to the area of B is 1 : 2. The ratio of the area of B to the area of C is 3 : 2. The difference between the area of A and the area of C is 9 $cm^2$. What is the area of the rectangle?

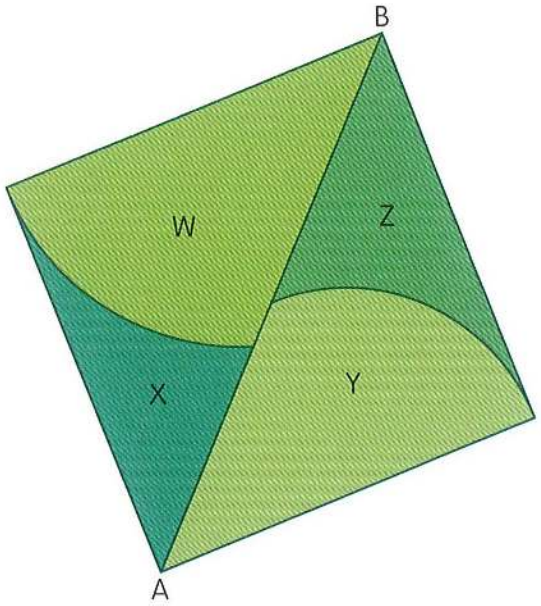


Name: _____ Class: _____ Date: _____

## L3 Worksheet 6

**Solve the word problems.**

1. The figure shows a square that is divided into four parts, W, X, Y and Z. The line AB divides the square in half. The ratio of the area of W to the area of X is 5 : 3. The ratio of the area of X to the area of Y is 2 : 3. The area of Z is 210 cm². What is the area of the square?



2 At a bakery, Mrs Lim sold a cupcake for $1 and a tart for $2. The price of a muffin was twice the price of a tart. During a public holiday, she sold thrice as many cupcakes as the total number of tarts and muffins sold. The ratio of the number of tarts sold to the number of muffins sold was 8 : 5. The total sum of money Mrs Lim collected from selling the pastries was $3750.

(a) How many cupcakes were sold on that day?

(b) How much more money was collected from selling the cupcakes than the muffins?

Name: _____ Class: _____ Date: _____

## Part 4 Changing Ratios

### L2 Worksheet 7

**Solve the word problems.**

1. Agnes and Siti shared some ribbons in the ratio 3 : 1. After Agnes had given away 16 ribbons, the ratio of the number of ribbons Agnes had to the number of ribbons Siti had became 7 : 3. How many ribbons did Siti have?

2. David and Roy had some magnets. The ratio of the number of magnets David had to the number of magnets Roy had was 1 : 2 at first. David bought 9 more magnets and the ratio became 2 : 1. How many magnets did David have at first?

3 The ratio of the number of 10-cent coins to the number of 50-cent coins in a purse was 1 : 2. When 12 more 10-cent coins were added into the purse, the ratio of the number of 10-cent coins to the number of 50-cent coins became 5 : 4. What was the total amount of all the coins in the purse at first?

4 On the first day of a learning journey, the number of students in Bus A to the number of students in Bus B was in the ratio 5 : 4. On the second day, 14 students were transferred from Bus A to Bus B and the ratio became 1 : 2. How many students were there in Bus A before the transfer?

5 The number of employees in Company P to that of Company Q was in the ratio 7 : 5. Mr Tan bought over the two companies and transferred 55 employees from Company P to Company Q. After the transfer, the ratio of the number of employees in Company P to that of Company Q became 2 : 3. How many employees were there in Company Q at first?

6 At first, the number of sweets Ali had to the number of sweets Raja had was in the ratio 6 : 5. After each of them gave away 20 sweets, the ratio of the number of sweets Ali had to the number of sweets Raja had became 13 : 10. How many sweets did Ali have at first?

7 A florist had 40 stalks of carnations at first. She had 4 times as many stalks of tulips as carnations. After buying an equal number of stalks of carnations and tulips, the ratio of the number of carnations to the number of tulips became 5 : 9. How many stalks of carnations and tulips did she buy altogether?

Name: _____ Class: _____ Date: _____

## L3 Worksheet 8

**Solve the word problems.**

1. The ratio of the number of Janice's stickers to the number of Wendy's stickers was 3 : 5 at first. After each of them had received 10 stickers, Janice had $\frac{5}{8}$ as many stickers as Wendy. Janice then bought another 30 stickers. How many more stickers did Wendy have than Janice in the end?

2 The ratio of the amount of money Aini had to the amount of money Bob had was 3 : 1. Aini had $400 more than Bob. How much money must Bob give to Aini so that the ratio of the amount of money Aini had to the amount of money Bob had would become 7 : 1?

Name: _____ Class: _____ Date: _____

## L3 Problem Solving

1. Mr Wang had the same number of red, blue and black pens at first. He gave away 29 black pens and some red and blue pens. He had 87 pens left. The number of red pens and blue pens left was in the ratio 2 : 1. There were 18 fewer black pens than red pens left.

   (a) How many red pens were left?

   (b) How many blue pens were given away?

2 Two bags, P and Q, contain some red and green apples. In Bag P, the ratio of the number of red apples to the number of green apples is 2 : 1. In Bag Q, the ratio of the number of red apples to the number of green apples is 1 : 3. Bag P has 3 times as many apples as Bag Q.

(a) Find the ratio of the number of red apples in Bag P to the number of green apples in Bag Q.

(b) When 14 red apples are taken out from Bag P and put into Bag Q, the ratio of the number of red apples to the number of green apples in Bag Q becomes 3 : 2. What is the total number of apples in the two bags at first?

Name: _____ Class: _____ Date: _____

## Self-Test (Duration: 30–45 minutes)

20

**Section A: Multiple-Choice Questions (1 mark each)**
**For each question, four options are given. Choose the correct answer and write its number (1, 2, 3 or 4) in the brackets provided.**

1. In a class, $\frac{5}{7}$ of the pupils are girls. What is the ratio of the number of boys to the number of girls in the class?

   (1) 2 : 5
   (2) 5 : 2
   (3) 2 : 7
   (4) 5 : 7

   (  )

2. Two girls have 7 storybooks altogether. 3 of the storybooks are Felicia's and the rest are Huiling's. Which of the following statements is **true**?

   (1) The number of storybooks Felicia has is $\frac{3}{7}$ of the number of storybooks Huiling has.
   (2) The number of storybooks Felicia has is $\frac{7}{4}$ of the number of storybooks Huiling has.
   (3) The number of storybooks Felicia has is $\frac{4}{7}$ of the number of storybooks Huiling has.
   (4) The number of storybooks Felicia has is $\frac{3}{4}$ of the number of storybooks Huiling has.

   (  )

3. The ratio of Alan's savings to Ben's savings is 2 : 3. The ratio of Ben's savings to Cindy's savings is also 2 : 3. What is the ratio of Alan's savings to Cindy's savings?

   (1) 2 : 3
   (2) 3 : 2
   (3) 4 : 9
   (4) 9 : 4

   (  )

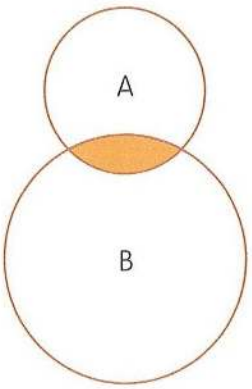
4 In the figure, Circle A overlaps Circle B as shown. The area of Circle A is half the area of Circle B. The ratio of the area of Circle A to its shaded area is 5 : 1. What is the ratio of the shaded area to the total area of the figure?

(1) 1 : 16

(2) 1 : 15

(3) 1 : 14

(4) 1 : 13




( )

5 The ratio of the number of Caili's stamps to the number of Grace's stamps was 3 : 5. After Grace gave 33 of her stamps to her brother, she had 7 stamps more than Caili. How many stamps did Grace have at first?

(1) 20

(2) 40

(3) 60

(4) 100

( )

**Section B: Short-Answer Questions (8 marks)**

**For each question, write your answer in the space provided. The number of marks available is shown in brackets [ ] at the end of each question.**

6 There are 130 students in a computer club. There are 50 more girls than boys. What is the ratio of the number of girls to the number of boys in the computer club?

Ans: _____ [ 2 ]

7 The ratio of the number of clips Marvin has to the number of clips Roy has is 3 : 7. After giving away 34 clips, Roy still has 22 clips left. How many clips does Marvin have?

Ans: _____ [ 2 ]

8 In a box, the ratio of the number of red pens to the number of green pens to the number of blue pens is 1 : 2 : 9. Express the number of blue pens as a fraction of the total number of pens in the box. Leave your answer in its simplest form.

Ans: _____ [ 2 ]

9 Meng had $\frac{5}{7}$ as many buns as Kelvin. As Kelvin did not want to have so many buns, he decided to give Meng 24 buns. In the end, Kelvin had $\frac{1}{2}$ as many buns as Meng. How many buns did Kelvin have at first?

Ans: _____ [ 2 ]

**Section C: Long-Structured Questions (7 marks)**

**Show your working clearly. The number of marks available is shown in brackets [ ] at the end of each part-question.**

10 The number of coins in Purse A and Purse B are in the ratio 3 : 2. All the coins in Purse B are Malaysian coins. The ratio of the number of Malaysian coins to the number of Singapore coins in Purse A is 4 : 5. There are 16 more Malaysian coins in Purse B than in Purse A. How many Singapore coins are there?

Ans: _____ [ 3 ]

11 Alice, Beatrice and Candy share a box of buttons in the ratio 2 : 3 : 1. Candy gives all her 22 buttons equally to Alice and Beatrice.

(a) What is the ratio of the number of buttons Beatrice has to the number of buttons Alice has now?

(b) How many buttons does Alice have now?

Ans: (a) _____ [ 2 ]

(b) _____ [ 2 ]

Name: _____ Class: _____ Date: _____


**(Let's Reason Mathematically)**

Tim had a total of 104 blue balloons and green balloons. The ratio of the number of blue balloons to the number of green balloons was 7 : 6. After bursting an equal number of blue and green balloons, the ratio of the number of blue balloons left to the number of green balloons left was 7 : 3.

(a) Did the fraction of blue balloons increase, decrease or remain the same in the end?

(b) How many balloons did Tim burst altogether?

## Parent Pointers

### Learning Outcomes

By the end of this chapter, your child should be able to do the following.

- Rewrite the fraction statements using ratio
- Find the whole when a whole is divided into parts in a given ratio
- Find one part when a whole is divided into parts in a given ratio
- Use equivalent ratios and the before-after concept to solve problems involving changing ratios
- Solve word problems involving ratios

### Teach-At-Home Tips

Parents may engage your children in the following activity and lead them to observe the change in ratios. Parents may use different types of items such as coloured counters, coloured ice-cream sticks or coloured square tiles.

**Part 1** *(Before the Change in Ratios)*

**Step 1:** Gather a total of 26 blue, white and green items. The ratio of the number of blue items to that of white items is 2 : 3 and the ratio of the number of white items to that of green items is 2 : 1.

**Part 2** *(After the Change in Ratios)*

**Step 2:** Change some white items to blue items so that there are as many blue items as white items.

Ask your child the following questions:

- What is the number of items for each of the 3 colours before and after the change in ratios.
- What is the new ratio of the number of blue items to that of white items to that of green items?
- What can you say about the total number of items after the change in ratios?

Name: _____ Class: _____ Date: _____

# 4 Percentage

## Part 1 Finding the Whole Given a Part and the Percentage

### Worksheet 1

**Solve the word problems.**

1. Ali paid $20 for a dictionary. This was 80% of the usual price. What was the usual price of the dictionary?

2. David gives 15% of his salary to his father every month. His father receives $420 from David. What is David's monthly salary?

3 At first, a container was full of oil. After 30% of the oil was poured out, there were 490 ml of oil left. What was the amount of oil in the container at first?

4 Lily is thinking of a whole number. 60% of that whole number is 540. Find the whole number.

Name: _____ Class: _____ Date: _____

## L2 Worksheet 2

**Solve the word problems.**

1. At a bakery, the number of muffins sold on Friday was 75. This was 50% of the number of muffins sold on Saturday. How many muffins were sold on Saturday?

2. Serene had a sum of money. After spending 25% of the money, her father gave her $38. In the end, she had $128. How much money did Serene have at first?

3 Susan read a total of 152 pages of a storybook on Friday and Saturday. On Sunday, she read $\frac{1}{4}$ of the remainder. She was left with 18% of the pages of the storybook to be read. What was the total number of pages in the storybook?

Name: _____ Class: _____ Date: _____

## L3 Worksheet 3

**Solve the word problems.**

1. Robert spent 30% of his money on a bag and $\frac{2}{5}$ of the remaining money on a shirt. He had $96.60 left.

   (a) What percentage of his money was left?

   (b) How much did Robert have at first?

2 Paul baked some cookies. He sold 256 of the cookies on Monday. On Tuesday, he sold $\frac{2}{9}$ of the remainder. He was left with 28% of the cookies he had baked.

(a) How many cookies did he sell on Tuesday?

(b) How many cookies did Paul bake at first?

3 Alice and Billy have some coins. 40% of Alice's coins is equal to 25% of Billy's. Billy has 90 more coins than Alice. How many coins does Alice have?

4 The usual price of a computer was 20% more than the usual price of a mobile phone. During a promotion, a 20% discount was given on the price of the computer and a 25% discount was given on the price of the mobile phone. Due to the promotion, the money collected from one computer was $105 more than that of one mobile phone. What was the usual price of the mobile phone?

Name: _____ Class: _____ Date: _____

## Part 2 Finding Percentage Increase or Decrease

### Worksheet 4

**Solve the word problems.**

1. During a sale, the price of a bed dropped from $250 to $215. Find the percentage decrease in the price.

2. One year ago, Rachel's mass was 50 kg. Now, her mass is 55 kg. What is the percentage increase in Rachel's mass?

3 Noraini scored 75 marks in her first test. In her second test, she scored 60 marks. Find the percentage decrease in her test score.

4 There are 1715 boys in a school this year. This is 315 more than the number of boys in the school last year. Find the percentage increase in the number of boys in the school.

Name: _____ Class: _____ Date: _____

## Worksheet 5

**Solve the word problems.**

1. The number of stamps Marvin collected increased by 32% to 792 stamps. How many stamps did Marvin collect before the increase?

2. Mr Tan's salary was increased by 20% to $3600. How much was his salary before the increase?

3 Roy scored 63 marks for his second Chinese test. This was a 30% decrease in marks from his first Chinese test. How many marks did he score for his first Chinese test?

4 Sally had some roses. She bought more roses and the total number of roses increased by 50%. Her mother gave her another 20 roses and she had 80 roses in the end. How many roses did she have at first?

Name: _____ Class: _____ Date: _____

## Worksheet 6

**Solve the word problems.**

1. Chun had 420 stickers. Devi had $\frac{2}{7}$ of the number of stickers Chun had. Devi gave some stickers away and was left with 44 stickers. Find the percentage decrease in the number of stickers Devi had. Give your answer correct to 2 decimal places.

2. Mike spent $1300 of his salary and saved the rest. When he increased his spending by 10%, his savings decreased by 20%. What was Mike's salary?

3 A florist had 315 stalks of carnations and roses in her shop at first. 20% of her flowers were carnations. She bought some more stalks of carnations and the percentage of the carnations she had increased to 30%. How many stalks of carnations did she buy?

Name: _____ Class: _____ Date: _____

## Part 3 Word Problems

### L2 Worksheet 7

**Solve the word problems.**

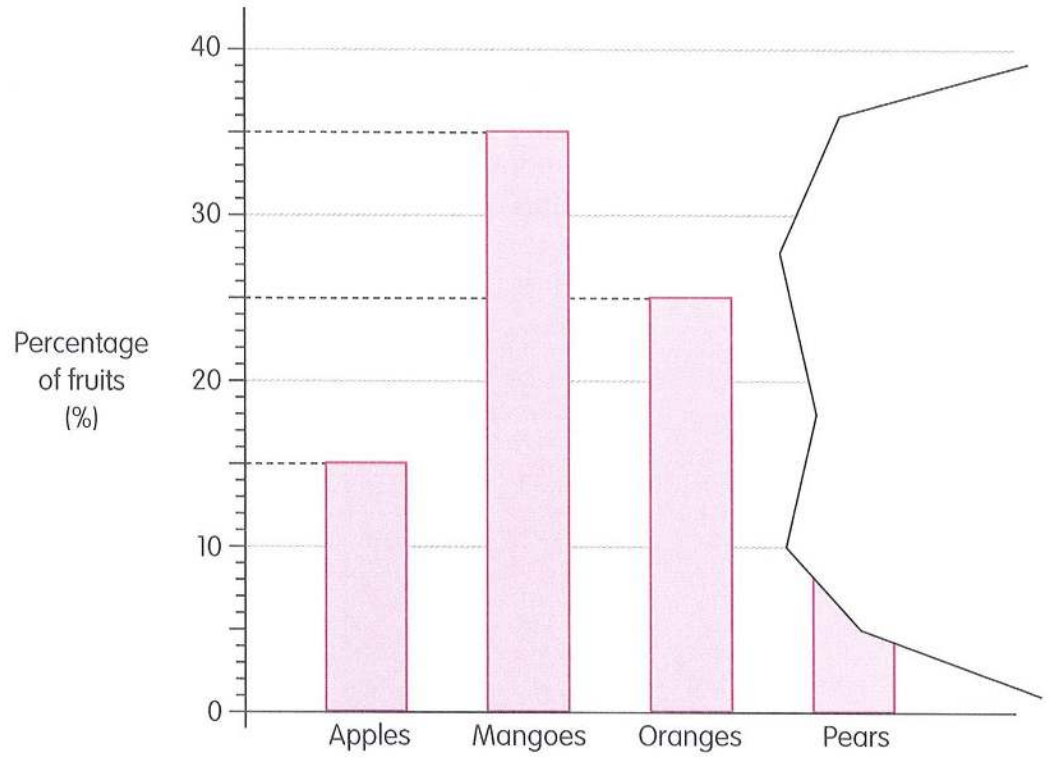
1. In a class, there are as many boys as girls. 50% of the girls and 25% of the boys do **not** wear watches. There are 20 children who wear watches. How many children do **not** wear watches?

2. Mr Chen and Mr Lee each owns a shop that sells scooters. Both of them sold a total of 330 scooters in a particular month. In that month, Mr Chen sold 65% of the number of scooters that Mr Lee sold. How many more scooters did Mr Lee sell than Mr Chen?

3 At a concert, 60% of the audience were adults. 450 of the adults were men. 25% of the adults were women. There were 219 boys.

(a) How many adults attended the concert?
(b) How many children attended the concert?
(c) What percentage of the audience were girls?

4 Mr Wong had 280 apples, mangoes, oranges and pears in total at first.
The bar graph shows the percentage for each type of fruit. The bar representing the percentage of pears was torn off as shown below.




Mr Wong threw away 2 rotten pears and bought some more mangoes.
In the end, the percentage of mangoes increased to 40%.

(a) What was the percentage decrease in the number of pears?
Give your answer correct to 2 decimal places.

(b) How many mangoes did Mr Wong have in the end?

5 Three tins, A, B and C, contained 340 marbles altogether. There were 25% more marbles in Tin A than in Tin B. The number of marbles in Tin C was 25% of the number of marbles in Tin B. How many more marbles were there in Tin A than in Tin C?

Name: _____ Class: _____ Date: _____

## L3 Worksheet 8

**Solve the word problems.**

1. Mary bought a bracelet and a necklace at a discount. She spent a total of $143.50 on these two items. The necklace cost $3.50 more than the bracelet.

   (a) How much did Mary pay for the bracelet?

   (b) She was given a 20% discount on the necklace. The total discount given for the two items was $42. What was the percentage discount given for the necklace?

2 John had some beads. 60% of the beads were blue and the rest were yellow. He gave away 150 blue beads and bought 150 more yellow beads. The percentage of blue beads then decreased to 35%.

(a) What fraction of the beads were yellow beads in the end?
Give the answer in the simplest form.

(b) How many beads did he have altogether at first?

Name: _____ Class: _____ Date: _____

## L3 Problem Solving

1. Alex, Ben and Cindy decided to buy a gift for their father. Alex agreed to contribute 25% of the cost of the gift. Ben agreed to pay 30% of the remaining amount. Cindy would pay the rest of the cost of the gift. When the cost of the gift increased by 20%, Cindy had to pay $107.10 for her share.

   (a) What was the original cost of the gift?

   (b) How much did Ben have to pay in the end?

2 In 2016, the number of girls enrolled at an enrichment centre was $\frac{4}{5}$ of the number of boys. In 2017, 44 more boys enrolled in the enrichment centre and there was a 20% increase in the number of boys. In 2018, the enrichment centre relocated and the number of children enrolled decreased by 25%.

(a) What was the total number of children enrolled in the enrichment centre in 2017?

(b) What was the overall percentage increase or decrease in the number of children enrolled in the enrichment centre from 2016 to 2018?
Give your answer correct to 1 decimal place.

Name: _____ Class: _____ Date: _____

## Self-Test (Duration: 30–45 minutes)

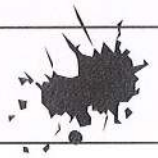
20

**Section A: Multiple-Choice Questions (1 mark each)**
**For each question, four options are given. Choose the correct answer and write its number (1, 2, 3 or 4) in the brackets provided.**

1. In a class of 90 children, 63 were boys. What percentage of the children were girls?

(1) 27%
(2) 30%
(3) 63%
(4) 70% ( )

2. The table shows a list of the number of items in the school general office. One of the numbers is covered by an ink blot.

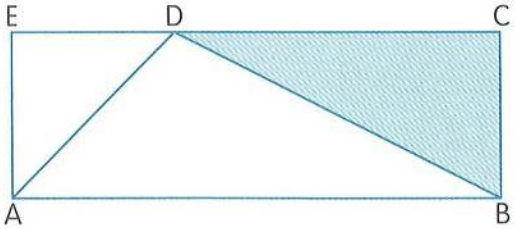
| Type of items | Number of items |
|---|---|
| Files | 32 |
| Pens | 28 |
| Rulers |  |

20% of the total number of items are rulers. How many rulers are there?

(1) 12
(2) 15
(3) 20
(4) 75 ( )

3. In the figure, ABCE is a rectangle. The length of CD is twice the length of DE. What percentage of the figure is shaded? Round your answer to the nearest whole number.

(1) 33%
(2) 34%
(3) 66%
(4) 67% ( )



4 The table shows the number of fiction books read by 4 groups of pupils.

| Group | Number of pupils | Number of fiction books each pupil read |
|---|---|---|
| A | 32 | 1 |
| B | 10 | 2 |
| C | 8 | 3 |
| D | 11 | 4 |

Which group of pupils read 20% of the total number of fiction books?

(1) A
(2) B
(3) C
(4) D

( )

5 The length and breadth of a rectangle were both decreased by 10%. What was the percentage decrease in the area of the rectangle?

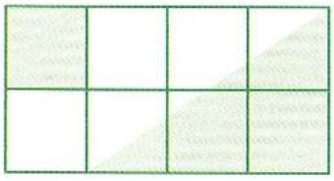
(1) 10%
(2) 19%
(3) 81%
(4) 90%

( )

**Section B: Short-Answer Questions (8 marks)**

**For each question, write your answer in the space provided. The number of marks available is shown in brackets [ ] at the end of each question.**

6 The figure is made up of 8 identical squares. What percentage of the figure is shaded?



Ans: _____ [1]

7 The price of a ring was $135. Janice spent 30% of her money to buy the ring. How much did Janice have at first?

Ans: $ _____ [ 1 ]

8 Mrs Chew bought 3 watches at $80 each. She sold one of the watches at 25% more than what she had paid and the other 2 watches at 40% less than what she had paid. How much money did she receive from selling the 3 watches in total?

Ans: $ _____ [ 2 ]

9 A container full of rice had a mass of 32 kg. When the same container was 40% filled with rice, it had a mass of 14 kg. What was the mass of the empty container?

Ans: _____ kg [ 2 ]

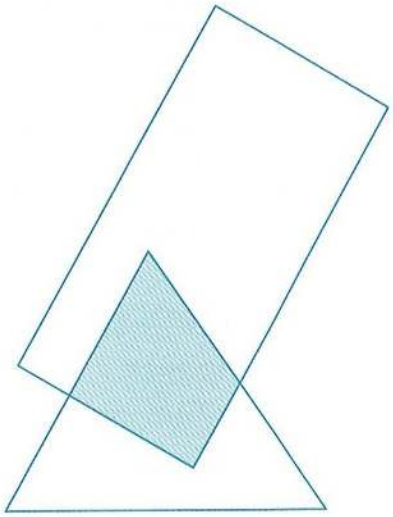
10 In a tank, 60% of the fish were angelfish and the rest were goldfish. When 8 goldfish were added, the number of goldfish increased by 10%. How many angelfish were there in the tank at first?

Ans: _____ [ 2 ]

## Section C: Long-Structured Questions (7 marks)

**Show your working clearly. The number of marks available is shown in brackets [ ] at the end of each part-question.**

11 The figure is made up of a rectangle and a triangle. The ratio of the area of the shaded part to the area of the triangle is 3 : 5. 30% of the rectangle is shaded. What fraction of the figure is shaded? Express your answer in its simplest form.



Ans: _____ [ 3 ]

12 The table shows the membership of a fitness club in 2017.

| Members | Number of members |
|---|---|
| Men | 82 |
| Women | 42 |
| Children | 160 |
| Senior Citizens | ? |

(a) In 2017, 50% of the members were children. How many members were senior citizens?

(b) In 2018, the number of senior citizens in the club increased to 86 but the number of children decreased to 132.

(i) What was the overall increase or decrease in the number of members in the fitness club in 2018?

(ii) What was the overall percentage increase or decrease in the membership of the fitness club in 2018? Give your answer correct to 2 decimal places.

Ans: (a) _____ [ 2 ]

(b) (i) _____ [ 1 ]

(ii) _____% [ 1 ]

Name: _____ Class: _____ Date: _____


**(Let's Reason Mathematically)**

Mrs Tang bought a computer for $2000. She wanted to sell it to Mrs Lim at 10% more than the price she had bought it for. Mrs Lim disagreed and would only buy the computer if Mrs Tang decreased the price by 10%. Mrs Tang refused and claimed that she would lose money if she did that.

Do you agree with Mrs Tang's response? Explain your answer.

## Parent Pointers

### Learning Outcomes

By the end of this chapter, your child should be able to do the following.

- Find the whole given a part and the percentage
- Find percentage increase and decrease
- Solve word problems involving percentage

### Teach-At-Home Tips

Parents can give real-life examples of percentage change (increase or decrease) and explain how the percentage change is calculated. Parents can also go through the following exercises with your child to show how the percentage change is calculated.

Ask your child to fill in the missing numbers.

1. When the price of car is increased by 10%, it means that the price of the car is increased by _____% of the usual price. Therefore, the usual price is taken to be _____%.

2. When the price of a mobile phone is increased by 18%, the increased price is _____% of the usual price.

3. When the increased price of a smart television is 106% of the usual price, the increase in price is _____% of the usual price.

4. When the price of a table is decreased by 15%, the decreased price is _____% of the usual price.

5. When the decreased price of a computer is 92% of the usual price, the decrease in price is _____% of the usual price.

6. When the price of a bicycle is increased by 20% to $120, the usual price is $_____.

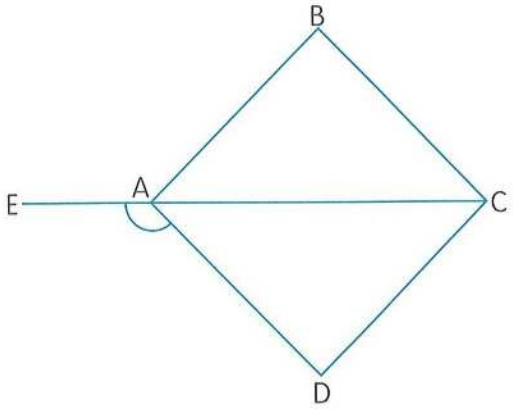
Name: _____ Class: _____ Date: _____

# 5 Angles in Geometrical Figures

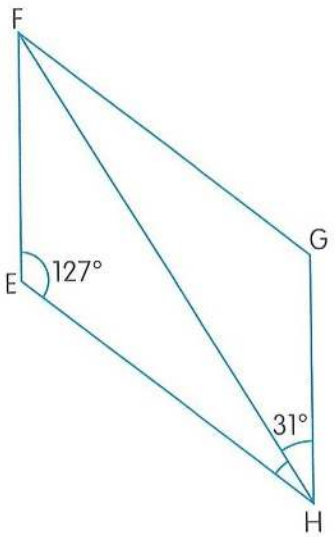
## Part 1 Finding Unknown Angles in Geometrical Figures

### L1 Worksheet 1

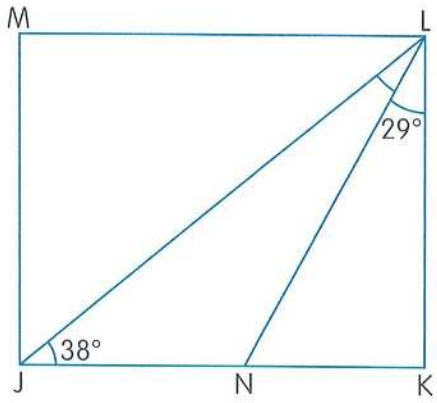
1. ABCD is a square. Find ∠EAD.



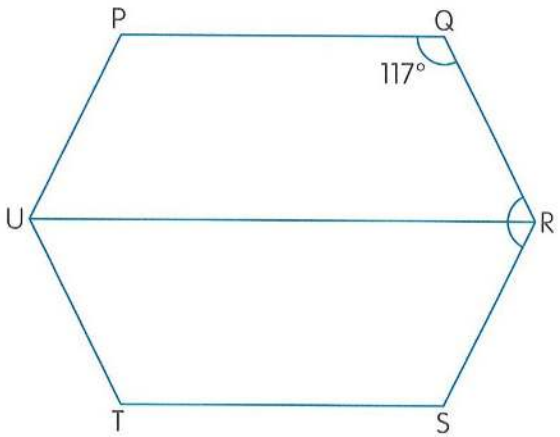

2. EFGH is a parallelogram. ∠HEF = 127° and ∠GHF = 31°. Find ∠FHE.



3 JKLM is a rectangle. $\angle LJN = 38°$ and $\angle KLN = 29°$. Find $\angle NLJ$.



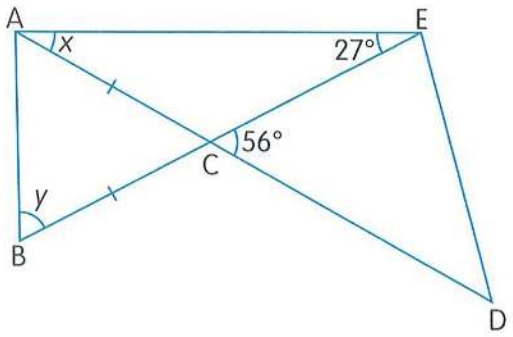

4 The figure is made up of two identical trapeziums RQPU and RSTU. Find $\angle QRS$.



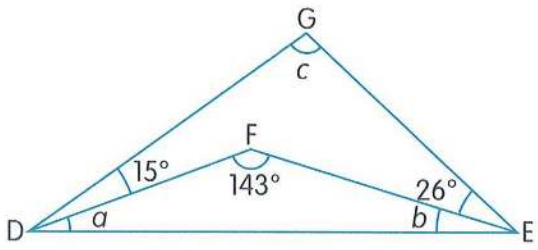
Name: _____ Class: _____ Date: _____

## L2 Worksheet 2

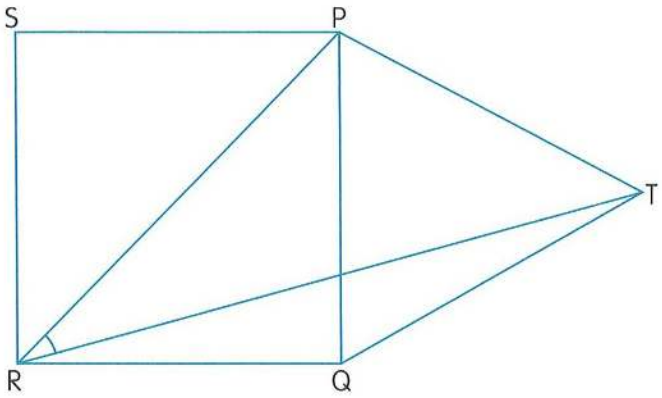
1. In the figure, ABC is an isosceles triangle. AC = BC, ∠AEC = 27° and ∠DCE = 56°. ACD and BCE are straight lines. Find ∠$x$ and ∠$y$.



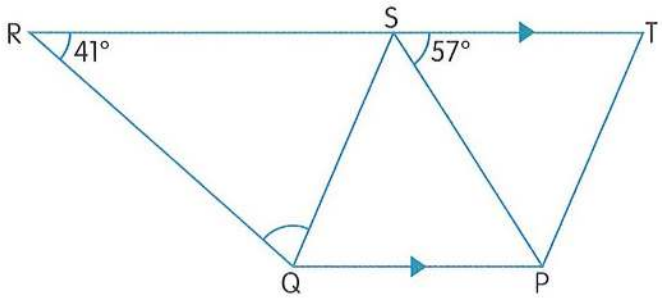

2. In the figure, DEF and DEG are triangles.
   (a) Find the sum of ∠$a$ and ∠$b$.
   (b) Find ∠$c$.



3 In the figure, PQRS is a square and PTQ is an equilateral triangle. RT is a straight line. Find ∠TRP.



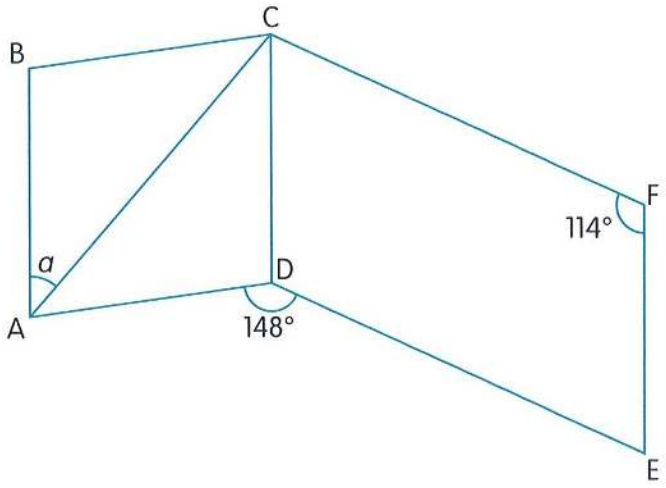

4 PQST is a rhombus and PQRT is a trapezium. ∠PST = 57° and ∠QRS = 41°. Find ∠SQR.



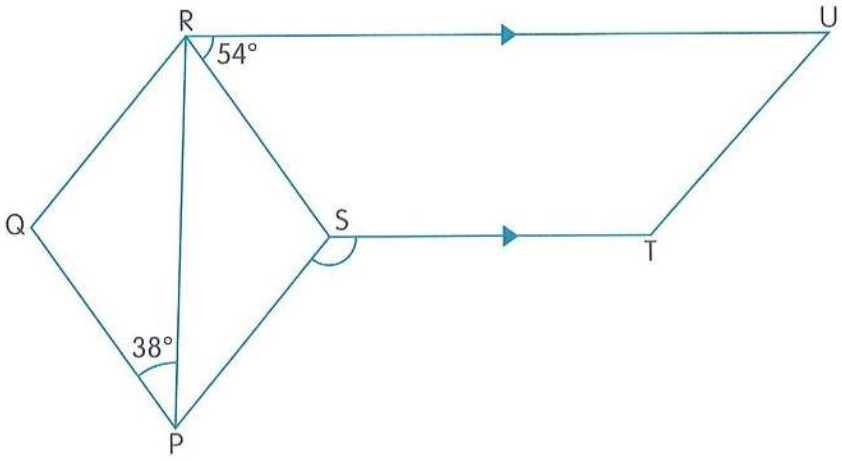
Name: _____ Class: _____ Date: _____

## L3 Worksheet 3

1. In the figure, ABCD is a rhombus and CDEF is a parallelogram. $\angle ADE = 148°$ and $\angle CFE = 114°$. Find $\angle a$.



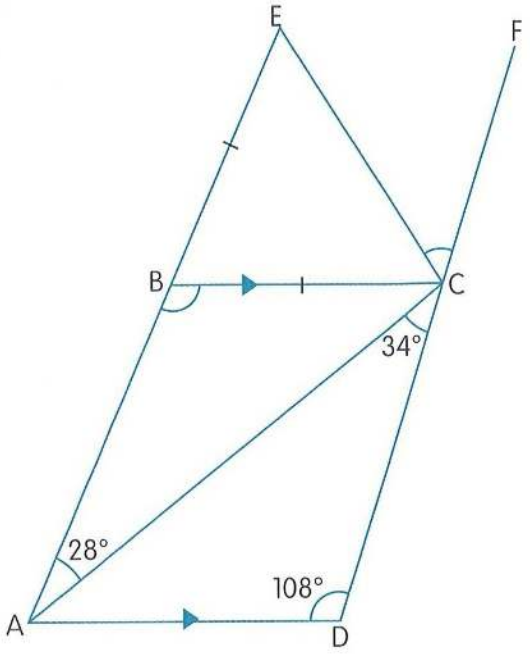
2 In the figure, PQRS is a rhombus with $\angle RPQ = 38°$. RSTU is a trapezium with RU parallel to ST and $\angle URS = 54°$. Find $\angle TSP$.



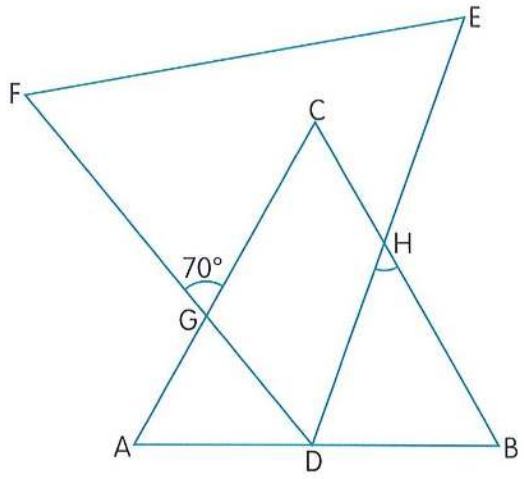
3 In the figure, ABCD is a trapezium and BEC is an isosceles triangle. $\angle CDA = 108°$, $\angle ACD = 34°$ and $\angle CAB = 28°$. DCF is a straight line.

(a) Find $\angle ABC$.

(b) Find $\angle FCE$.



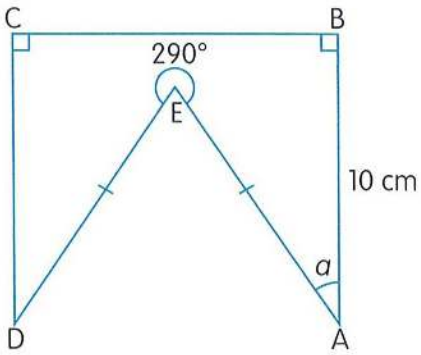
4 In the figure, ABC and DEF are equilateral triangles. $\angle FGC = 70°$. Find $\angle BHD$.



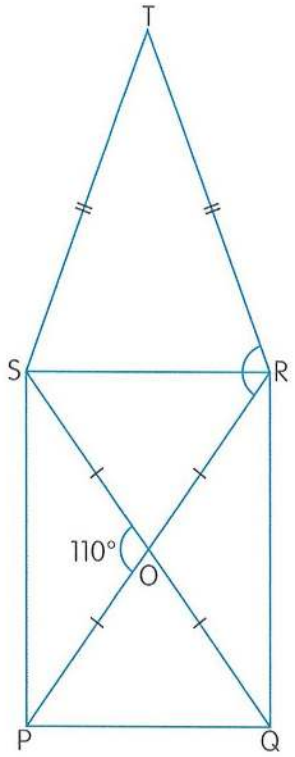
Name: _____ Class: _____ Date: _____

## L3 Problem Solving

1. In the figure, CD = BA = 10 cm, DE = AE, ∠DEA = 290°. Find ∠$a$.



2 In the figure, PQRS is a rectangle and RST is an isosceles triangle. PO = QO = RO = SO and the size of ∠TRS is twice that of ∠STR. Find ∠PRT.



Name: _____ Class: _____ Date: _____

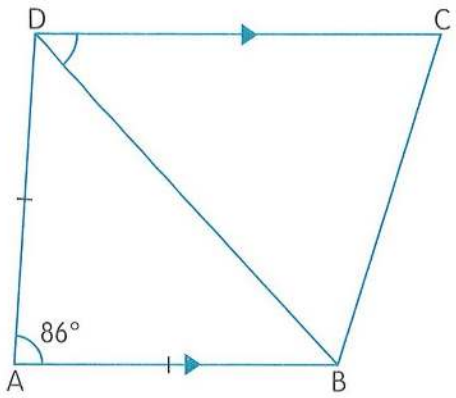
## Self-Test (Duration: 30–45 minutes)

20

**Section A: Multiple-Choice Questions (1 mark each)**
**For each question, four options are given. Choose the correct answer and write its number (1, 2, 3 or 4) in the brackets provided.**

1. ABCD is a trapezium. ABD is an isosceles triangle with AB = AD. Find ∠CDB.

(1) 43°
(2) 47°
(3) 86°
(4) 94°

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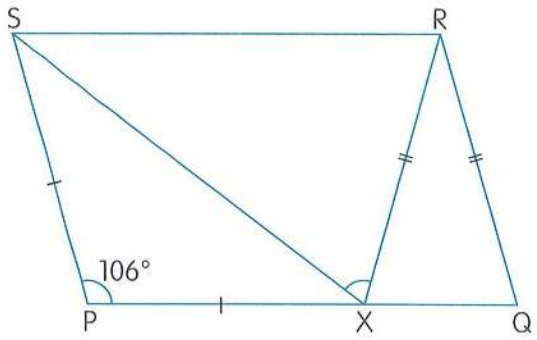
2. PQRS is a parallelogram. PXS and XQR are isosceles triangles. Find ∠SXR.

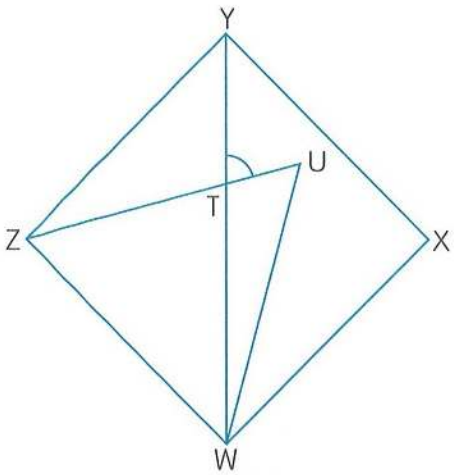
(1) 32°
(2) 37°
(3) 69°
(4) 74°




( )

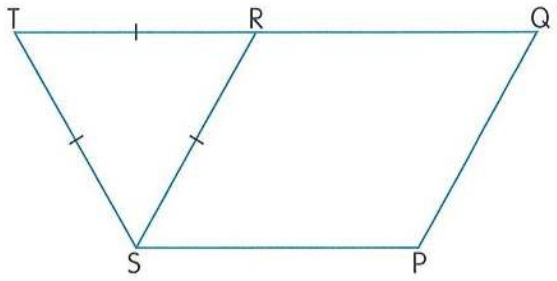
3. In the figure, WXYZ is a square. WUZ is an equilateral triangle. WTY is a straight line. Find ∠YTU.

(1) 135°
(2) 105°
(3) 75°
(4) 60°




( )

4 In the figure, PQRS is a parallelogram and RST is an equilateral triangle.




Which one of the following is **false**?

(1) QR = RS

(2) RS = TR

(3) SP = RQ

(4) ST = PQ ( )

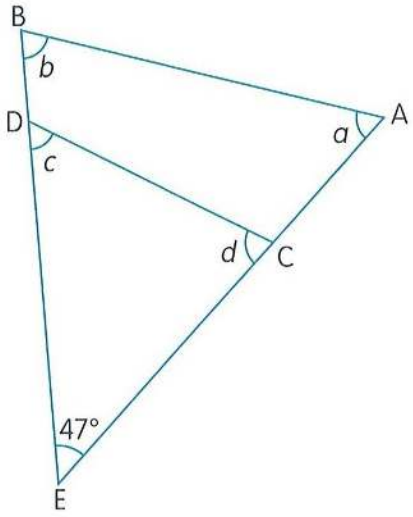
5 In the figure, ABE and CDE are triangles. What is the sum of $\angle a$, $\angle b$, $\angle c$ and $\angle d$?

(1) 133°

(2) 180°

(3) 266°

(4) 360°

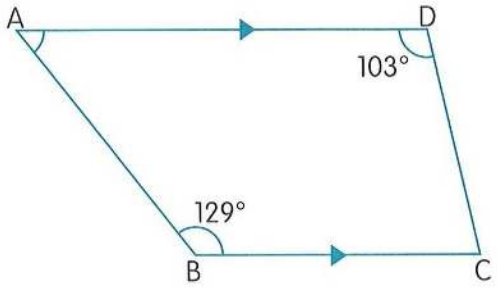



( )

**Section B: Short-Answer Questions (8 marks)**

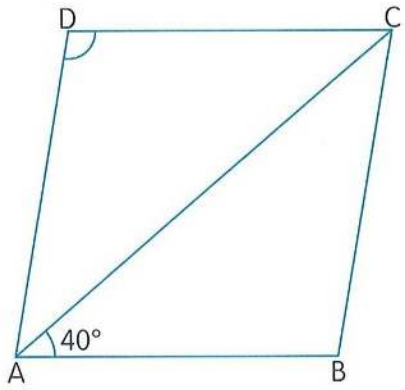
**For each question, write your answer in the space provided. The number of marks available is shown in brackets [ ] at the end of each question.**

6 In the figure, ABCD is a trapezium. AD is parallel to BC, $\angle CDA = 103°$ and $\angle ABC = 129°$. Find $\angle DAB$.



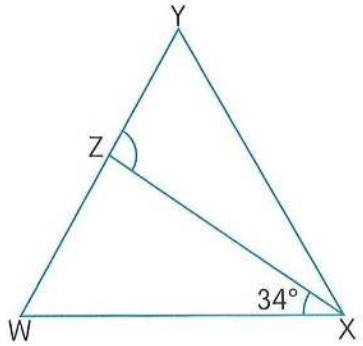

Ans: _____° [1]

7 In the figure, ABCD is a rhombus and $\angle CAB = 40°$. Find $\angle CDA$.



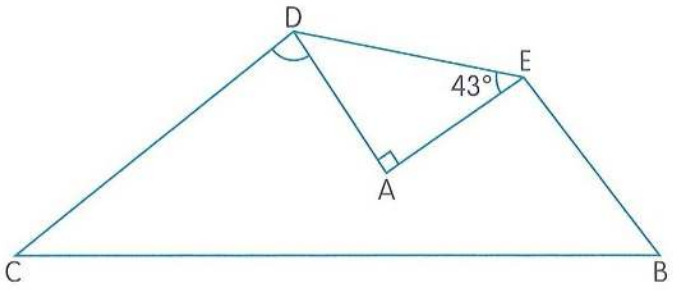

Ans: _____° [1]

8 In the figure, WXY is an equilateral triangle and $\angle WXZ = 34°$. Find $\angle YZX$.



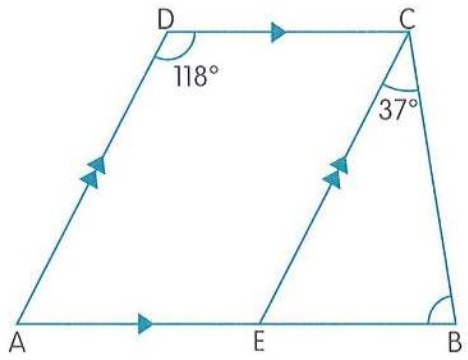

Ans: _____° [2]

9 In the figure, a triangular piece of paper is folded as shown. Find ∠ADC.




Ans: _____° [ 2 ]

10 In the figure, AECD is a parallelogram and EBC is a triangle. AEB is a straight line. Find ∠EBC.




Ans: _____° [ 2 ]

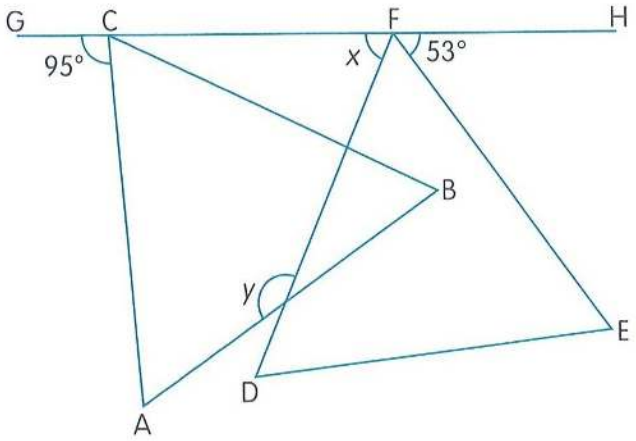
## Section C: Long-Structured Questions (7 marks)

**Show your working clearly. The number of marks available is shown in brackets [ ] at the end of each part-question.**

**11** ABC and DEF are equilateral triangles. GCFH is a straight line. $\angle ACG = 95°$ and $\angle HFE = 53°$.

(a) Find $\angle x$.

(b) Find $\angle y$.




Ans: (a) _____ ° [ 1 ]

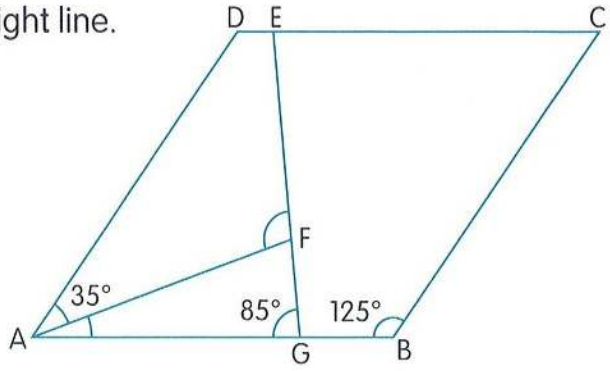
(b) _____ ° [ 2 ]

12 In the figure, ABCD is a rhombus. EFG is a straight line. $\angle GBC = 125°$, $\angle AGF = 85°$ and $\angle DAF = 35°$.

(a) Name an angle that is equal to $\angle BCD$.

(b) Find $\angle FAG$.

(c) Find $\angle AFE$.




Ans: (a) _____° [1]

(b) _____° [1]

(c) _____° [2]

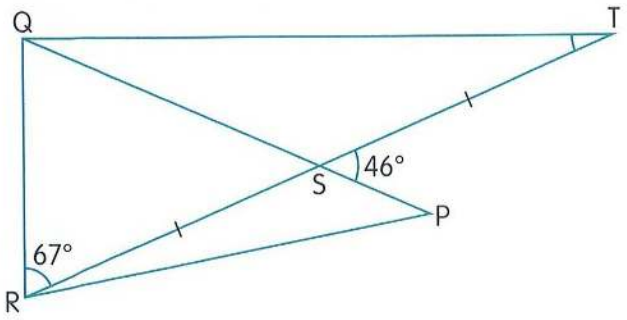
Name: _____ Class: _____ Date: _____

## L3 Challenge (Let's Reason Mathematically)

In the figure, PQR and RQT are triangles. QSP and RST are straight lines.
RS = ST, ∠QRS = 67° and ∠TSP = 46°.

(a) Is QRS an isosceles triangle? Explain your answer.

(b) Find ∠STQ.



## Parent Pointers

### Learning Outcomes

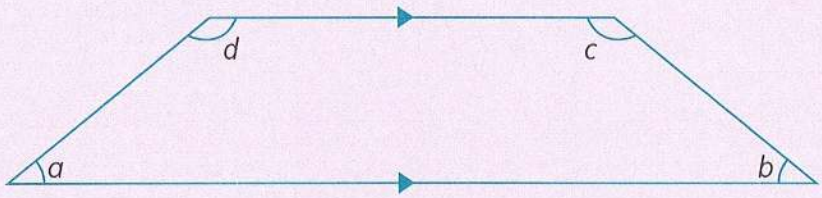
By the end of this chapter, your child should be able to do the following.

- Use the properties of triangles to find unknown angles
- Use the properties of special quadrilaterals (square, rectangle, parallelogram, rhombus and trapezium) to find unknown angles

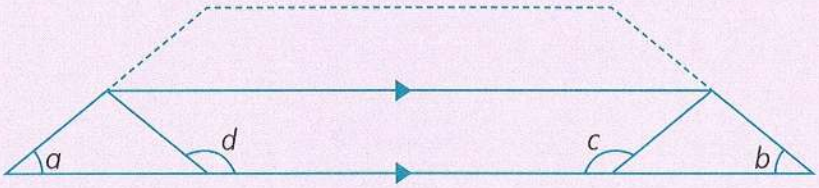
### Teach-At-Home Tips

Parents can demonstrate the property, *the sum of a pair of angles between two parallel sides is 180°*, by folding a paper trapezium as shown below.

**Step 1:** Cut out a trapezium and label the angles as shown below on both sides of the trapezium.




**Step 2:** Fold the trapezium at the middle until the two parallel lines coincide.




Now, fold $\angle a$ towards $\angle d$ until the two sides touch each other. Similarly, fold $\angle b$ towards $\angle c$.

Ask your child the following questions:

- What do you notice about each pair of angles?
- What is the sum of $\angle a$ and $\angle d$?
- What is the sum of $\angle b$ and $\angle c$?

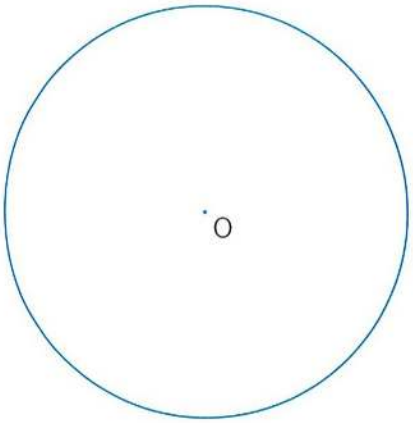
Name: _____ Class: _____ Date: _____

# 6 Circles

## Part 1 Parts of a Circle

### Worksheet 1

1. In the circle below, O is the centre.




(a) Draw a radius of the circle and name the radius as OA.
(b) Draw a diameter of the circle and name the diameter as BOC.
(c) Colour the circumference.

2. **Fill in the missing number in the box.**
In any circle:

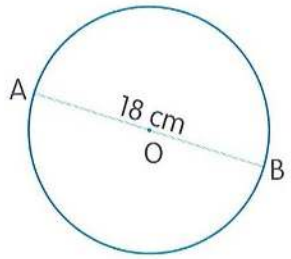
Diameter = ☐ × Radius

Radius = Diameter ÷ ☐

3. The diameter of a circle is 7 cm. What is its radius?

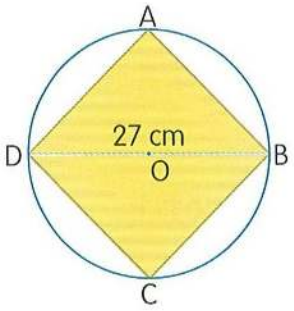
**4** **Find the radius of each circle.**

(a) O is the centre and AB is the diameter of the circle.




Radius = _____ cm

(b) O is the centre of a circle and ABCD is a square.

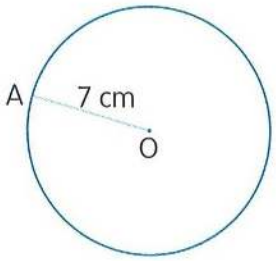



Radius = _____ cm

**5** The radius of a circle is 12 cm. What is its diameter?

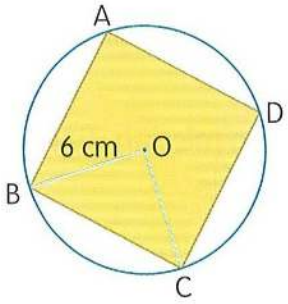
**6** **Find the diameter of each circle.**

(a) O is the centre and OA is the radius of the circle.




Diameter = _____ cm

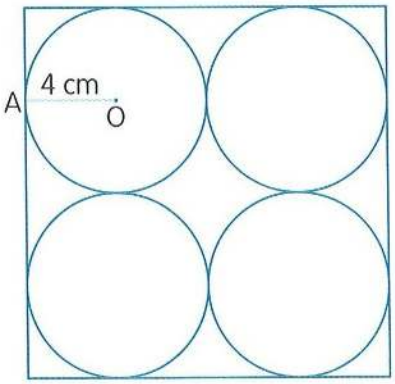
(b) O is the centre of a circle and ABCD is a square.




Diameter = _____ cm

**7** The figure shows four identical circles in a big square. The radius of each small circle is 4 cm.

(a) Find the diameter of each small circle.
(b) Find the side of the big square.



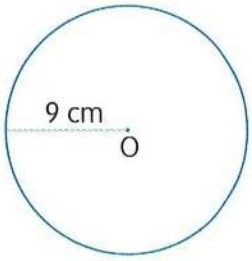
Name: _____ Class: _____ Date: _____

## Part 2 Circumference of a Circle

### Worksheet 2

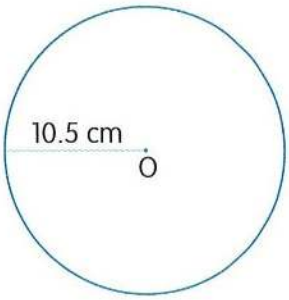
**1** **For each circle, O is the centre.**
**Find the circumference of each circle. Give your answer in terms of $\pi$.**

(a)




Circumference = _____ cm

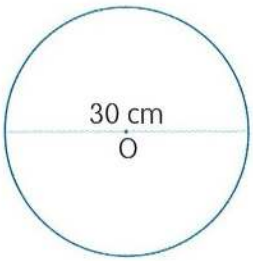
(b)




Circumference = _____ cm

**2** **For each circle, O is the centre.**
**Estimate the circumference of each circle. Then use a calculator to find the circumference. Give each answer correct to 2 decimal places.**

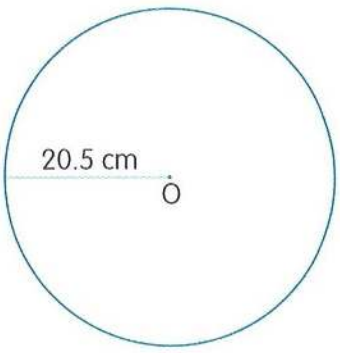
(a)




Estimated circumference = _____ cm

Calculated circumference = _____ cm

(b)

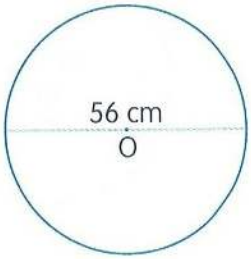



Estimated circumference = _____ cm

Calculated circumference = _____ cm

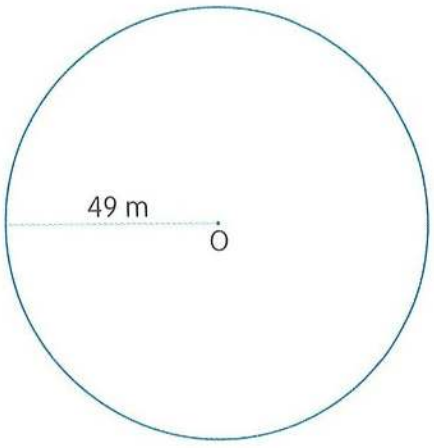
**3** **For each circle, O is the centre.**
**Find the circumference of each circle. (Take $\pi = \frac{22}{7}$.)**

(a)




Circumference = _____ cm

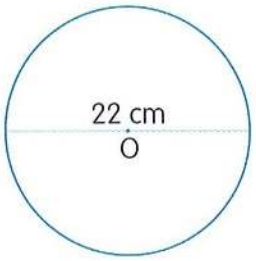
(b)




Circumference = _____ m

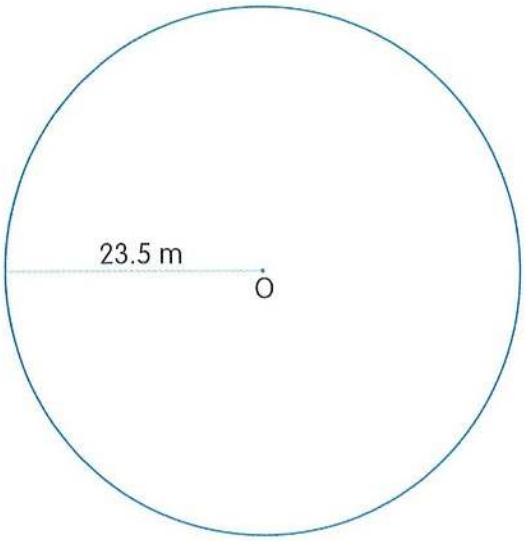
**4** **For each circle, O is the centre.**
**Find the circumference of each circle. (Take $\pi = 3.14$.)**

(a)




Circumference = _____ cm

(b)



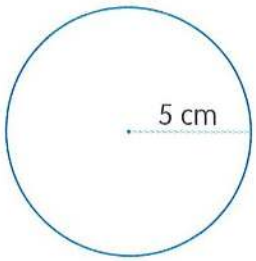

Circumference = _____ m

Name: _____ Class: _____ Date: _____

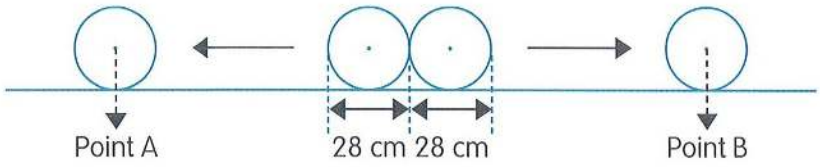
## L2 Worksheet 3

**Solve the word problems.**

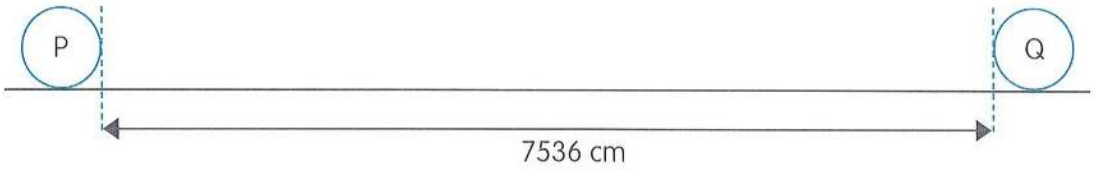
1. Kelvin uses a wire measuring 10 m to form circles. Each circle has a radius of 5 cm. What is the greatest number of such circles Kelvin can form? (Take $\pi = 3.14$.)




2. Rashid put 2 identical wheels of diameter 28 cm each, side by side, as shown below. The wheels were rolled along a straight line in opposite directions. After both wheels had made one complete turn, they stopped at Point A and Point B. What was the distance between Point A and Point B? (Take $\pi = \frac{22}{7}$.)



3 Two identical wheels, P and Q, are placed 7536 cm apart along a straight path as shown below. The radius of each wheel is 20 cm. Both wheels are pushed towards each other at the same time. Wheel P and Wheel Q make one complete turn per second. How many seconds does it take for both wheels to hit each other? (Take $\pi = 3.14$.)



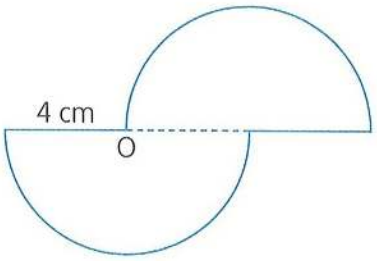
Name: _____ Class: _____ Date: _____

## Part 3 Perimeter of a Semicircle and a Quarter Circle

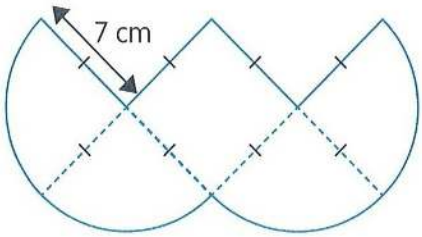
### L2 Worksheet 4

**Solve the word problems.**

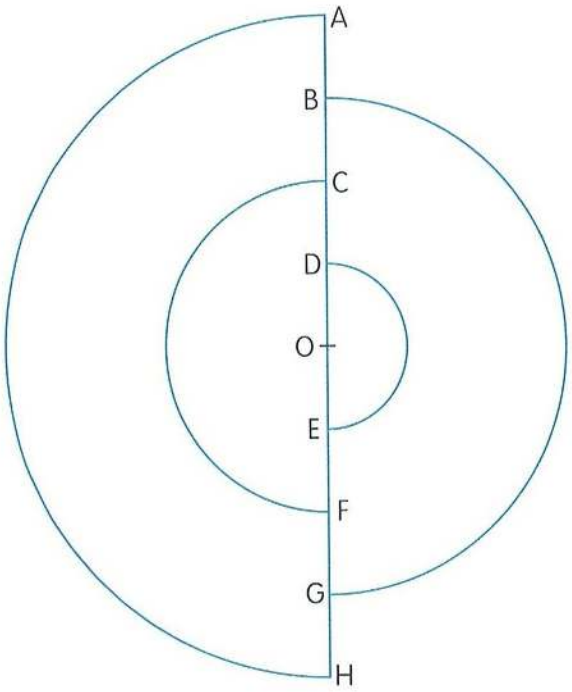
1. The figure shows 2 identical semicircles with a radius of 4 cm each. O is the centre of a circle. Find the perimeter of the figure. Give your answer in terms of $\pi$.



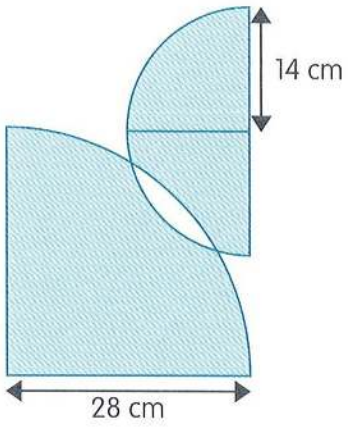
2 The figure is made up of 4 identical quarter circles and a square. The radius of each quarter circle is 7 cm. Find the perimeter of the figure. (Take $\pi = \frac{22}{7}$.)



3 Janice used a length of wire to form a figure that is made up of 4 semicircles as shown below. AB = BC = CD = DO = OE = EF = FG = GH = 14 cm. Find the total length of the wire used. (Take $\pi = \frac{22}{7}$.)



4 The figure is made up of a quarter circle and a semicircle as shown. The radius of the big quarter circle is 28 cm and the radius of the small semicircle is 14 cm. Find the perimeter of the shaded part. (Take $\pi = \frac{22}{7}$.)



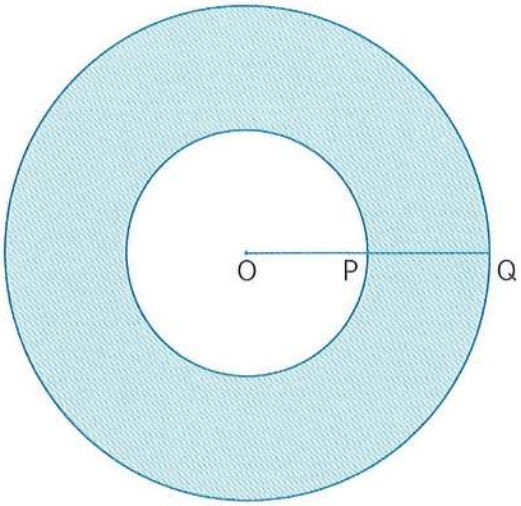
Name: _____ Class: _____ Date: _____

## Part 4 Area of a Circle, a Semicircle and a Quarter Circle

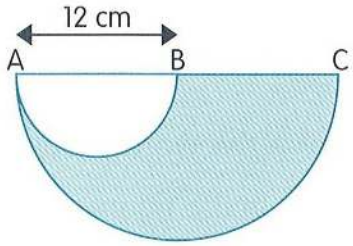
### L2 Worksheet 5

**Solve the word problems.**

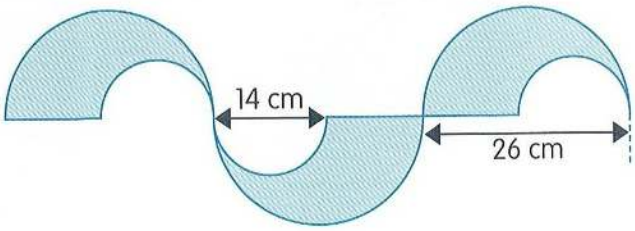
1. In the figure, O is the centre of the two circles and OP = PQ = 10 cm. Use the calculator value of $\pi$ to find the area of the shaded part, correct to 2 decimal places.



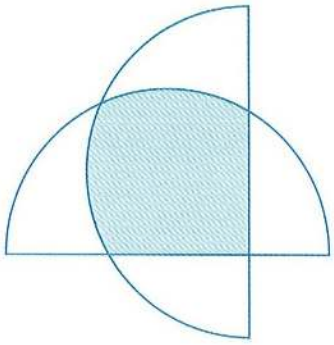
2 The figure is made up of 2 semicircles. AB = 12 cm which is half of AC. Find the area of the shaded part. Leave your answer in terms of $\pi$.



3 The figure is made up of 3 identical big semicircles and 3 identical small semicircles. What is the total area of the shaded parts? (Take $\pi = 3.14$.)



4 The figure is made up of 2 identical semicircles, each with a diameter of 28 cm. The shaded area of the figure is 144 $cm^2$. What is the total area of the unshaded parts? (Take $\pi = \frac{22}{7}$.)



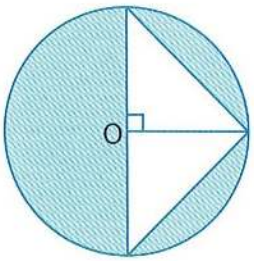
Name: _____ Class: _____ Date: _____

## Part 5 Area and Perimeter of Composite Figures

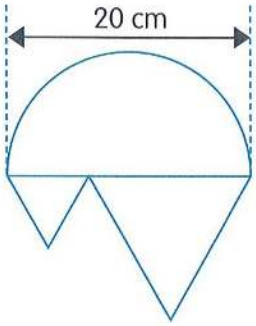
### L2 Worksheet 6

**Solve the word problems.**

1. In the figure, an isosceles triangle lies within a semicircle. The radius of the circle is 12 cm and O is the centre of the circle. What is the area of the shaded part? Leave your answer in terms of $\pi$.



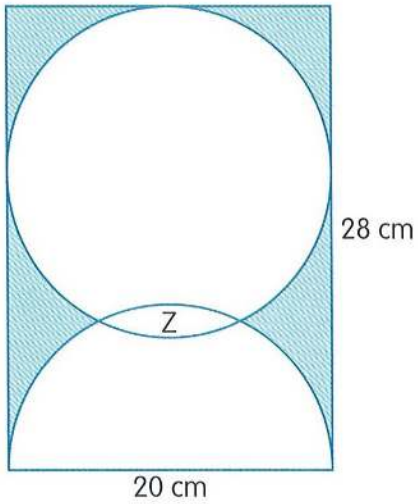

2. The figure is made up of a semicircle and 2 equilateral triangles. The diameter of the semicircle is 20 cm. What is the perimeter of the figure? (Take $\pi = 3.14$.)



3 The figure shows a semicircle and a circle overlapping each other within a rectangle of length 28 cm and breadth 20 cm. The shaded area of the figure is 112 cm$^2$.

(a) Find the area of the circle.

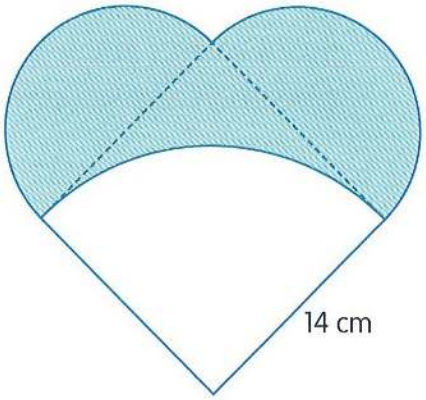
(b) Find the area of part Z. (Take $\pi = 3.14$.)



4 The figure is made up of a square, 2 semicircles and a quarter circle. The radius of the quarter circle is 14 cm. (Take $\pi = \frac{22}{7}$.)

(a) Find the perimeter of the shaded part.

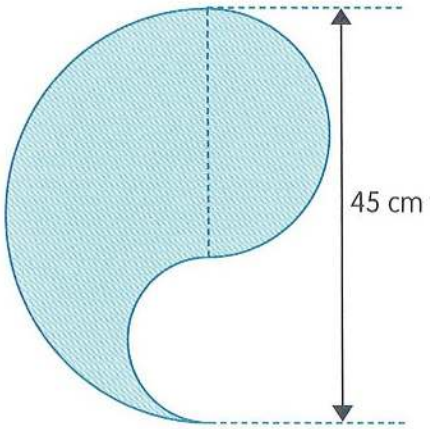
(b) Find the area of the shaded part.



5 The figure is made up of 3 semicircles. Its outline consists of a large semicircle, a medium semicircle and a small semicircle. The diameter of the large semicircle is 45 cm. The ratio of the diameter of the medium semicircle to the diameter of the small semicircle is 3 : 2.
Use the calculator value of $\pi$ to find

(a) the perimeter of the shaded part,
(b) the area of the shaded part.

Give each answer correct to 1 decimal place.



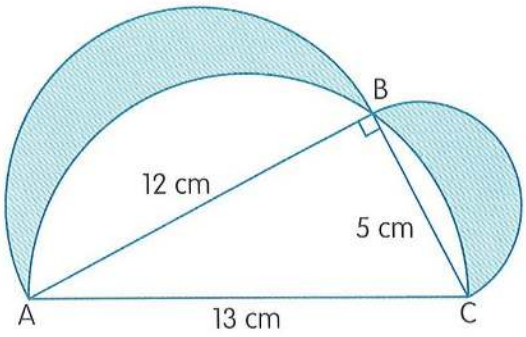
Name: _____ Class: _____ Date: _____

## L3 Worksheet 7

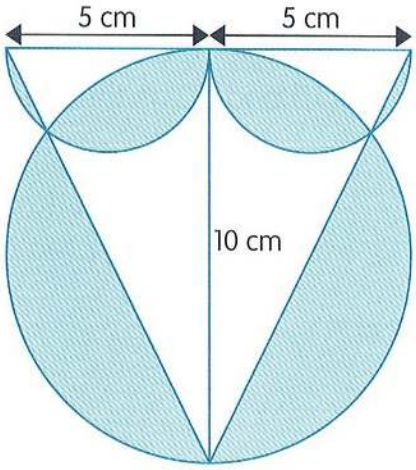
**Solve the word problems.**

1. The figure is made up of 3 semicircles and a right-angled triangle ABC. The right-angled triangle ABC is inside the big semicircle. The other two semicircles are drawn with AB and BC as their diameters. AB = 12 cm, BC = 5 cm and AC = 13 cm. (Take $\pi = 3.14$.)

   (a) Find the perimeter of the shaded part.
   (b) What is the area of triangle ABC?
   (c) What is the area of the shaded part?



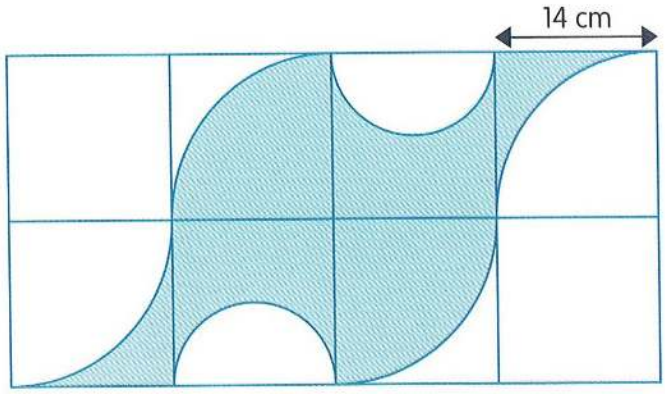
2 The figure is made up of a circle, a triangle and two identical semicircles. The diameter of the circle is 10 cm and the diameter of each semicircle is 5 cm. Find the total area of the shaded parts. (Take $\pi = 3.14$.)



3 The rectangle is made up of 8 identical squares of sides 14 cm each. The shaded figure is drawn inside the rectangle as shown. The outline of the figure consists of the length of arcs of 4 identical quarter circles, the length of arcs of 2 identical semicircles and two sides of a square.

(a) What is the perimeter of the shaded figure?
(b) What is the area of the shaded figure?

(Take $\pi = \frac{22}{7}$.)

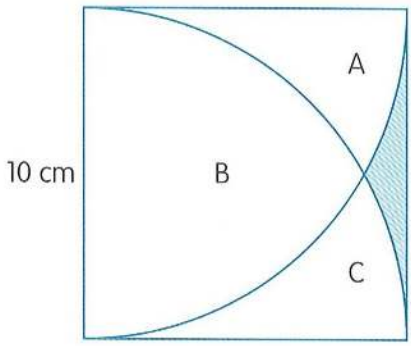


4 In the figure, two identical quarter circles are drawn inside a square of side 10 cm. The area of the shaded part is $\frac{1}{4}$ of the area of A.

(a) Find the area of B.

(b) Find the percentage of the square that is shaded.

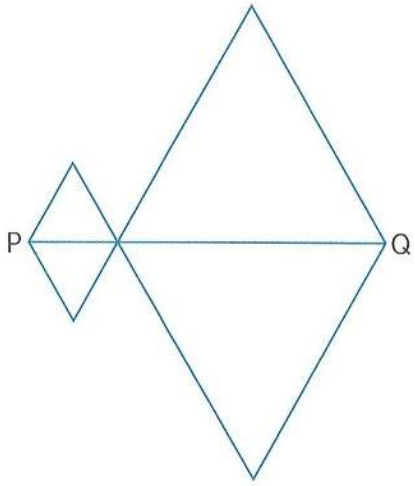
(Take $\pi = 3.14$.)



Name: _____ Class: _____ Date: _____

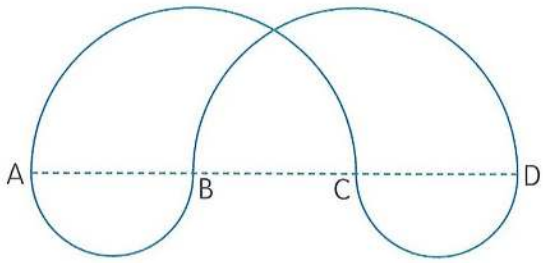
## L3 Problem Solving

1. Mary used all her copper wire to form a figure as shown below. There are 4 equilateral triangles and the length of PQ is 46 cm.

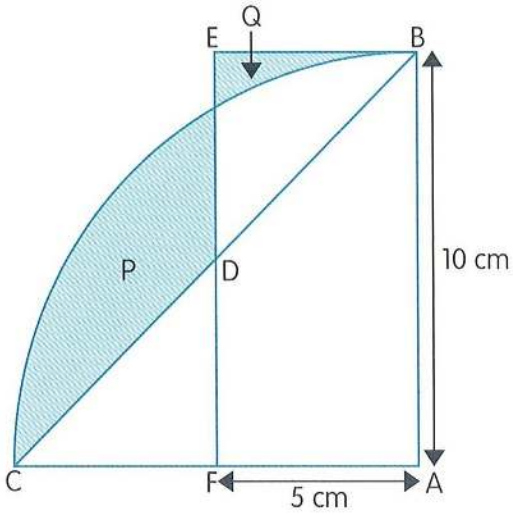



Mary then reused the copper wire and form the figure shown below. The figure is made up of 4 semicircles and ABCD is a straight line. AB = BC = CD = 21 cm. In the end, she had some copper wire left. What was the length of copper wire she had left?

(Take $\pi = \frac{22}{7}$.)



2 The figure is made up of a rectangle, a quarter circle and an isosceles triangle BDE. The radius of the quarter circle is 10 cm. AB = 10 cm, AF = 5 cm and DE = 5 cm. Use the calculator value of $\pi$ to find the **difference** between the shaded areas of P and Q, correct to 2 decimal places.



Name: _____ Class: _____ Date: _____

## Self-Test (Duration: 30–45 minutes)

20

**Section A: Multiple-Choice Questions (1 mark each)**
**For each question, four options are given. Choose the correct answer and write its number (1, 2, 3 or 4) in the brackets provided.**

1. Which one of the following is the ratio for $\pi$?

   (1) $\frac{\text{Circumference}}{\text{Diameter}}$

   (2) $\frac{\text{Circumference}}{\text{Radius}}$

   (3) $\frac{\text{Diameter}}{\text{Circumference}}$

   (4) $\frac{\text{Radius}}{\text{Circumference}}$ ( )

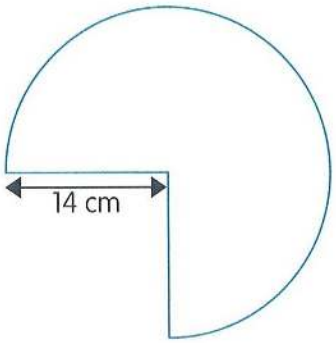
2. The figure is part of a circle of radius 14 cm. Find the perimeter of the figure. (Take $\pi = \frac{22}{7}$.)

   (1) 61 cm

   (2) 66 cm

   (3) 80 cm

   (4) 94 cm




( )

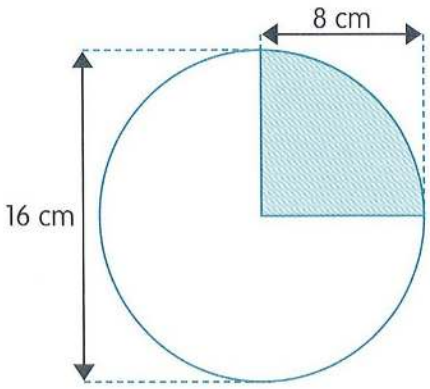
3. The figure shows one quarter of a circle is shaded. Which of the following shows the working to find the area of the shaded part of the circle?

   (1) $(\frac{1}{4} \times \pi \times 16)$ cm$^2$

   (2) $(\frac{1}{4} \times \pi \times 8)$ cm$^2$

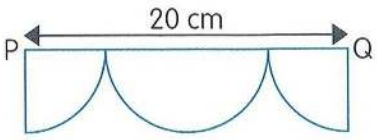
   (3) $(\frac{1}{4} \times \pi \times 16 \times 16)$ cm$^2$

   (4) $(\frac{1}{4} \times \pi \times 8 \times 8)$ cm$^2$




( )

4 The figure is formed by two identical quarter circles and a semicircle of radius 5 cm. The length of PQ is 20 cm. Find the perimeter of the figure. (Take $\pi = 3.14$.)




(1) 31.4 cm

(2) 45.7 cm

(3) 61.4 cm

(4) 78.5 cm ( )

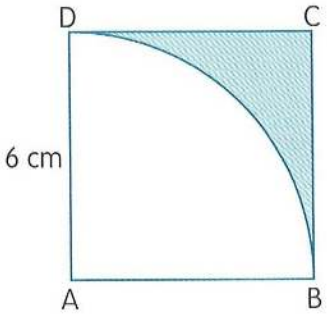
5 ABCD is a square cardboard of side 6 cm. A quarter circle is drawn on the cardboard. If the quarter circle is cut out, what is the area of the remaining cardboard in terms of $\pi$.

(1) $(36 - 3\pi)$ cm$^2$

(2) $(36 - 6\pi)$ cm$^2$

(3) $(36 - 9\pi)$ cm$^2$

(4) $(36 - 36\pi)$ cm$^2$ ( )



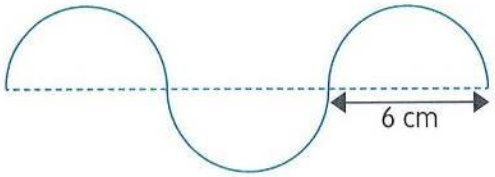
**Section B: Short-Answer Questions (8 marks)**

**For each question, write your answer in the space provided. The number of marks available is shown in brackets [ ] at the end of each question.**

6 The diameter of a bicycle wheel is 70 cm. Find the number of complete turns made by the wheel when the bicycle covered a distance of 220 m. (Take $\pi = \frac{22}{7}$.)

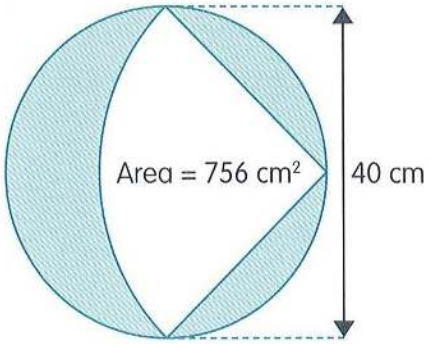

Ans: _____ [ 2 ]

7 A wire is bent to form three identical semicircles. Find the length of the wire in terms of $\pi$.



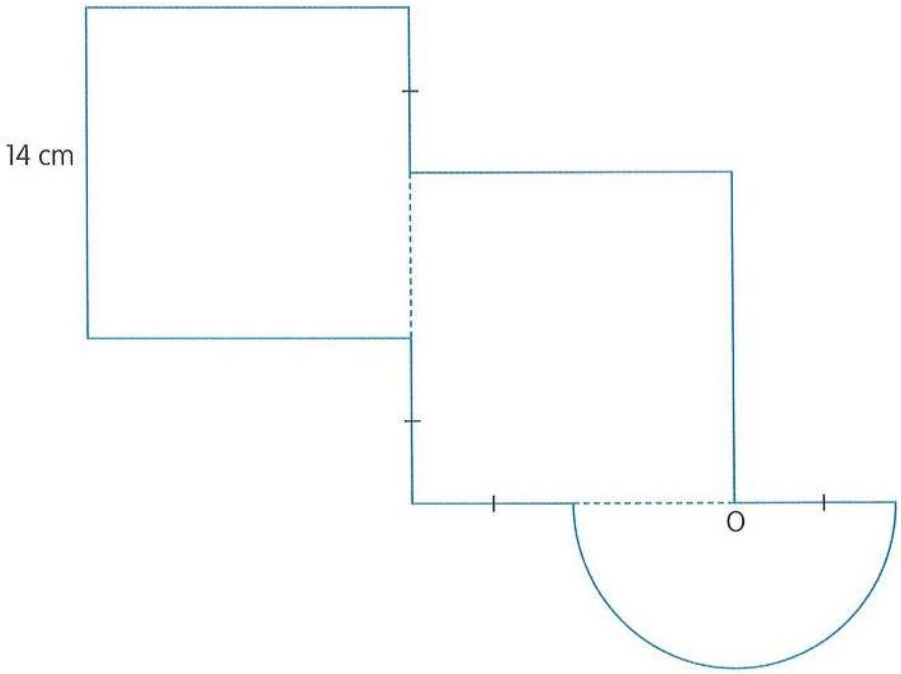

Ans: _____ cm [ 2 ]

8 The figure shows a quarter circle inside a circle. The area of the quarter circle is 756 $cm^2$. The diameter of the circle is 40 cm. Find the area of the shaded part. (Take $\pi = 3.14$.)




Ans: _____ $cm^2$ [ 2 ]

9 The figure is made up of a semicircle and 2 identical squares. O is the centre of a circle. Find the perimeter of the figure. (Take $\pi = \frac{22}{7}$.)




Ans: _____ cm [ 2 ]

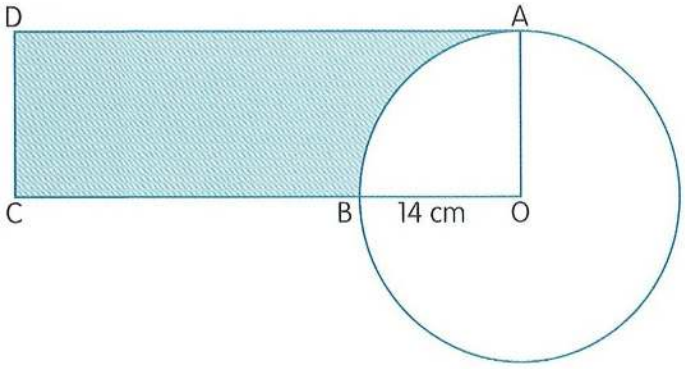
## Section C: Long-Structured Questions (7 marks)

**Show your working clearly. The number of marks available is shown in brackets [ ] at the end of each part-question.**

**10** In the figure, O is the centre of the circle with radius 14 cm and OAB is a quarter circle. The circle has the same area as the rectangle AOCD.

(a) Find the area of the circle.

(b) Find the perimeter of the shaded part. (Take $\pi = \frac{22}{7}$.)




Ans: (a) _____ $cm^2$ [1]

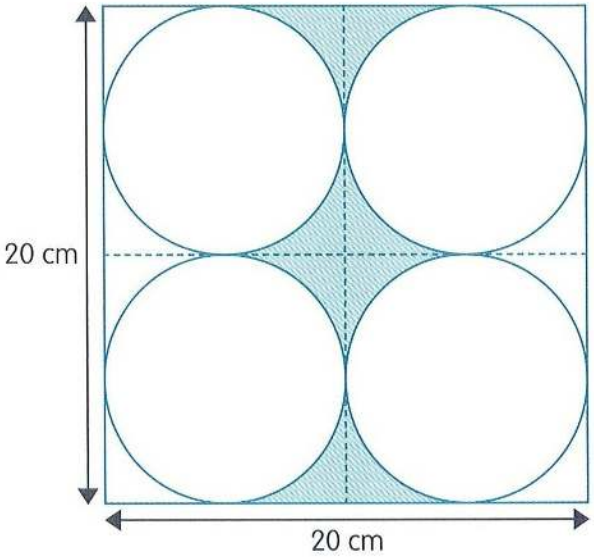
(b) _____ cm [2]

11 Four identical circles are drawn on a square piece paper of length 20 cm as shown.

(a) What is the total perimeter of the shaded parts?

(b) What is the total area of the shaded parts?

(Take $\pi = 3.14$.)




Ans: (a) _____ cm [ 2 ]

(b) _____ $cm^2$ [ 2 ]

Name: _____ Class: _____ Date: _____

## L3 Challenge (Let's Reason Mathematically)

Peiyi folded a square paper twice as shown below. She punched three circular holes on the folded paper as shown in Figure 4. The radius of each hole is 0.5 cm.

(a) How many holes were there when Figure 4 was unfolded? Explain.
(b) Find the area of the remaining piece of paper when Figure 4 was unfolded.

(Take $\pi = 3.14$.)

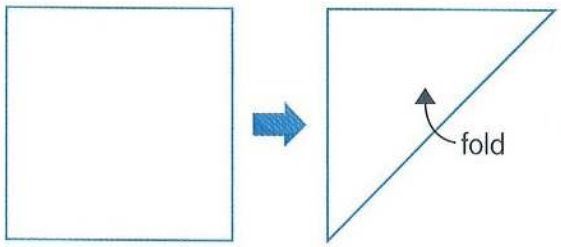


Figure 1




Figure 2

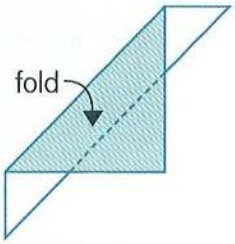



Figure 3

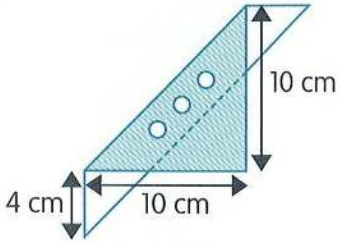



Figure 4

## Parent Pointers

### Learning Outcomes

By the end of this chapter, your child should be able to do the following.

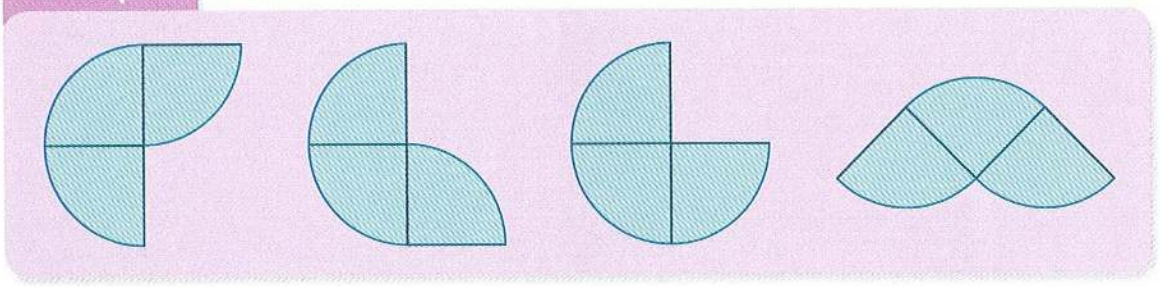
- Describe circles using terms such as 'centre', 'diameter', 'radius' and 'circumference'
- Find the area and circumference of a circle
- Find the area and perimeter of a semicircle and a quarter circle
- Find the area and perimeter of figures made up of squares, rectangles, triangles, semicircles and quarter circles

### Teach-At-Home Tips

Parents can use 3 quarter circles to form figures as shown below. This could help your child to visualise different figures and compare the area and perimeter of each figure.

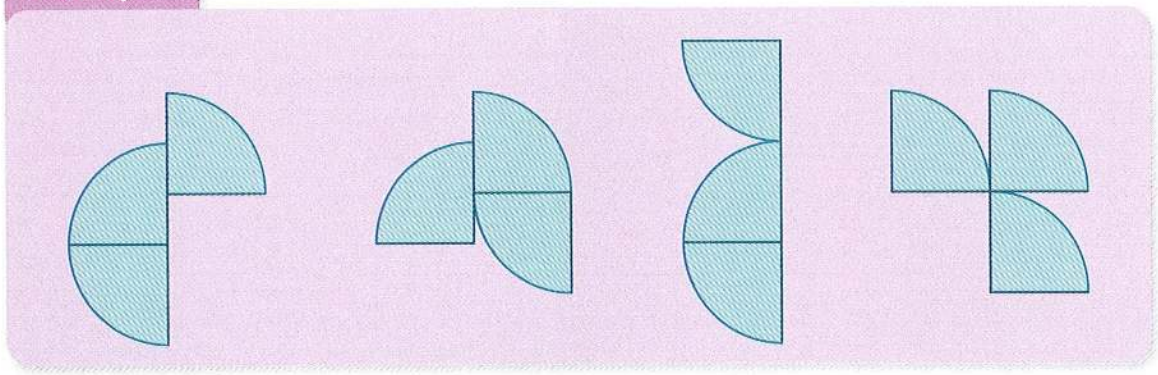
**Same Area and Same Perimeter**

**Example**



**Same Area and Different Perimeter**

**Example**



Ask your child to compare the area and perimeter of each figure in the examples above and answer the following questions.

- What do you notice about the arrangement of the quarter circles?
- What can you say about the area of the different figures?
- What can you say about the perimeter of the different figures?

Name: _____ Class: _____ Date: _____

# Mid-Year Review

100

## Paper 1

### Section A (20 marks)

Questions **1** to **10** carry 1 mark each. Questions **11** to **15** carry 2 marks each.
For each question, four options are given. One of them is the correct answer.
Make your choice (1, 2, 3 or 4) and write its number in the brackets provided.

**1** Find the value of $7h + 5 - 4h + 2$ when $h = 4$.

(1) 15
(2) 19
(3) 37
(4) 51 ( )

**2** Mrs Tay had 66 cookies. She gave 18 cookies to her neighbour and $2n$ cookies to each of her sons, John and Mathew. How many cookies had she left?

(1) $66 - 18 - 4n$
(2) $66 - 18 + 4n$
(3) $66 - 18 - 2n$
(4) $66 - 18 + 2n$ ( )

**3** Mrs Lee distributed $\frac{9}{10}$ of a pizza equally among her husband and her two daughters. What fraction of the pizza did each of them receive?

(1) $\frac{9}{40}$
(2) $\frac{3}{10}$
(3) $2\frac{7}{10}$
(4) $3\frac{1}{3}$ ( )

4 Mrs Wong had $\frac{7}{8}$ kg of rice. She packed them into smaller packets of $\frac{1}{4}$ kg each. What is the mass of the remaining rice?

(1) $\frac{7}{32}$ kg

(2) $\frac{1}{8}$ kg

(3) $\frac{7}{16}$ kg

(4) $\frac{5}{8}$ kg ( )

5 Helen is $\frac{2}{3}$ as tall as Dave. What is the ratio of Dave's height to Helen's height?

(1) 2 : 3

(2) 2 : 5

(3) 3 : 2

(4) 3 : 5 ( )

6 The ratio of Alex's salary to Calvin's salary is 7 : 5. The ratio of Calvin's salary to the total of Alex's salary and Bob's salary is 4 : 9. What is the ratio of Alex's salary to Bob's salary to Calvin's salary?

(1) 5 : 17 : 7

(2) 7 : 17 : 5

(3) 20 : 17 : 28

(4) 28 : 17 : 20 ( )

7 Which one of the following has the least value?

(1) 0.06

(2) 60%

(3) $\frac{1}{6}$

(4) $\frac{6}{1000}$ ( )

8 All items in a sports shop were sold at 20% discount. Meimei bought a pair of running shoes for \$120. What was the price of the pair of running shoes before discount?

(1) \$96

(2) \$144

(3) \$150

(4) \$180 (  )

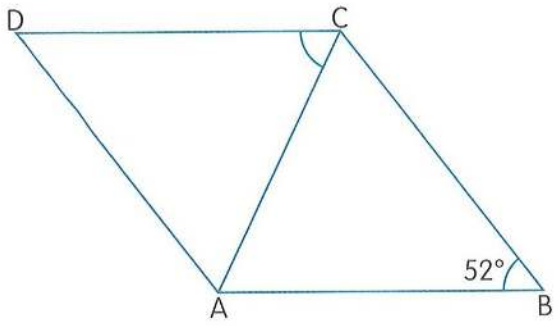
9 In the figure, ABCD is a rhombus. $\angle ABC = 52°$. Find $\angle ACD$.

(1) 26°

(2) 64°

(3) 104°

(4) 128° (  )



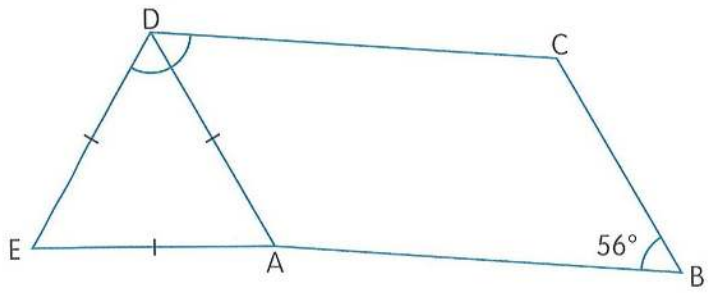

10 The figure is made up of a parallelogram ABCD and an equilateral triangle ADE. $\angle ABC = 56°$. Find $\angle CDE$.

(1) 110°

(2) 116°

(3) 124°

(4) 126° (  )




11 In a cafe, each table has either 3 or 5 people. The ratio of the number of tables to the number of people is 7 : 23. What fraction of the tables have 5 people? Express your answer in the simplest form.

(1) $\frac{1}{7}$

(2) $\frac{3}{7}$

(3) $\frac{5}{7}$

(4) $\frac{6}{7}$ (  )

12 Christina saved $90 of her pocket money and spent the rest. When she increased her savings by 20%, her spending would decrease by 30%. How much was her pocket money?

(1) $100

(2) $108

(3) $150

(4) $180 (  )

13 Mr Tay spent $\frac{4}{7}$ of his money on transport and 25% of the remainder on food. What was the ratio of the amount of money spent on food to the amount of money he had at first?

(1) 25 : 7

(2) 3 : 28

(3) 1 : 7

(4) 12 : 16 (  )

14 A computer club had a membership of 96 pupils. The ratio of the number of girls to the number of boys was 5 : 3. When 54 new members joined the computer club, the ratio of girls to boys became 3 : 2. How many of the new members were boys?

(1) 18

(2) 24

(3) 27

(4) 30 (  )

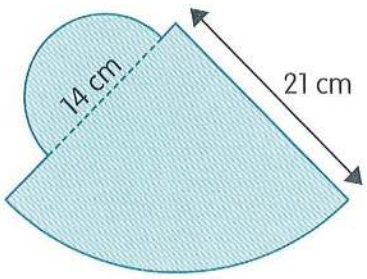
15 The figure is made up of a quarter circle of radius 21 cm and a semicircle of diameter 14 cm. Find the perimeter of the figure. (Take $\pi = \frac{22}{7}$.)

(1) 55 cm

(2) 83 cm

(3) 97 cm

(4) 111 cm (  )



**Section B (25 marks)**

Questions **16** to **20** carry 1 mark each. Write your answers in the spaces provided. For questions which require units, give your answers in the units stated.

16 Simplify $3m - 29 + 14m + 32$.

Ans: _____

17 A smart TV was sold for \$1600 after a discount of 20% at the Great Singapore Sale. What was the price of the smart TV before discount?

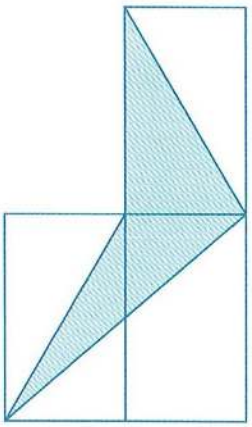
Ans: \$ _____

18 Find the value of $\frac{3}{4} \div 9$.

Express your answer as a fraction in its simplest form.

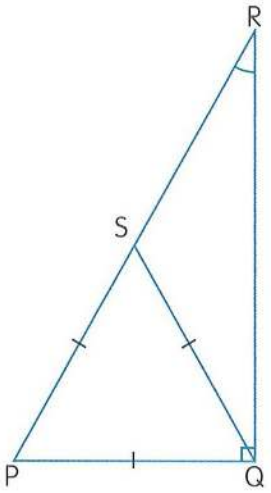
Ans: _____

19 The figure is made up of 3 identical rectangles. What is the ratio of the unshaded part to the shaded part of the figure?



Ans: _____

20 In the figure, PQR is a right-angled triangle and PQS is an equilateral triangle. Find ∠QRP.




Ans: _____°

Questions **21** to **30** carry 2 marks each. Show your working clearly and write your answers in the spaces provided. For questions which require units, give your answers in the units stated.

**21** Find the value of $7 \div \frac{3}{8}$.

Give your answer as a mixed number in the simplest form.

Ans: _____

**22** $\frac{2}{3}$ of Jane's stickers is equal to $\frac{1}{6}$ of Pauline's stickers. What is the ratio of the number of stickers Jane has to the total number of stickers the two girls have?

Express your answer in the simplest form.

Ans: _____

23 Lily bought 23 packets of biscuits with \$30. Each packet of biscuits costs $p$ cents. How much change did she receive? Express your answer in terms of $p$.

Ans: \$ _____

24 A tailor bought a piece of ribbon, $\frac{8}{9}$ m long, to make some bow ties. $\frac{1}{6}$ m of ribbon was needed to make each bow tie. He used his ribbon to make as many bow ties as he could. What was the length of ribbon left?

Ans: _____ m

25 In a box, 60% of the apples are green apples and the rest are red apples. There are 36 green apples in the box. How many apples are there in the box altogether?

Ans: _____

26 Ali and Lionel have some fifty-cent coins in the ratio 4 : 7. Lionel has $9 more than Ali. How many fifty-cent coins does Ali have?

Ans: _____

27 Each side of a square is decreased by 50%. What is the percentage decrease in the area of the square?

Ans: _____ %

28 The ratio of Alex's money to Mary's money was 4 : 3. Alex gave $\frac{3}{8}$ of his money to Mary. What is the new ratio of Alex's money to Mary's money?

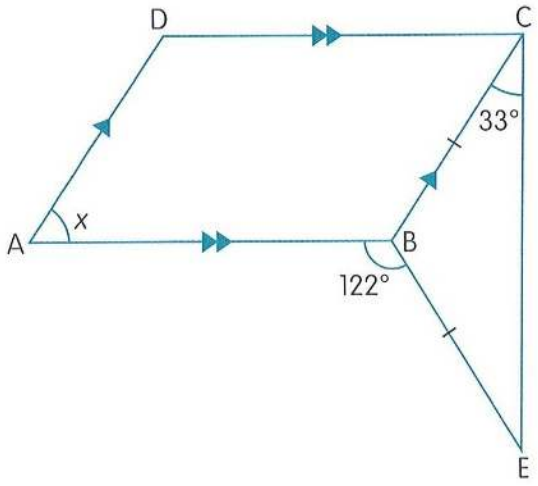
Ans: _____

29 In a tank, 22% of the fish are angelfish, 25% of them are goldfish and 23% of them are swordtails. The remaining 30 fish are guppies.

Each sentence below is either **true**, **false** or **not possible to tell** based on the information given. For each sentence, put a tick (√) in the correct column.

| Sentence | True | False | Not possible to tell |
|---|---|---|---|
| (a) There are fewer angelfish than guppies. | | | |
| (b) There are 18 goldfish in the tank. | | | |

30 In the figure, ABCD is a parallelogram. BEC is an isosceles triangle and BC = BE. $\angle EBA = 122°$ and $\angle ECB = 33°$. Find $\angle x$.




Ans: _____°

**End of Paper 1**

## Paper 2

### Section A (10 marks)

Questions **1** to **5** carry 2 marks each. Show your working clearly and write your answers in the spaces provided. For questions which require units, give your answers in the units stated.

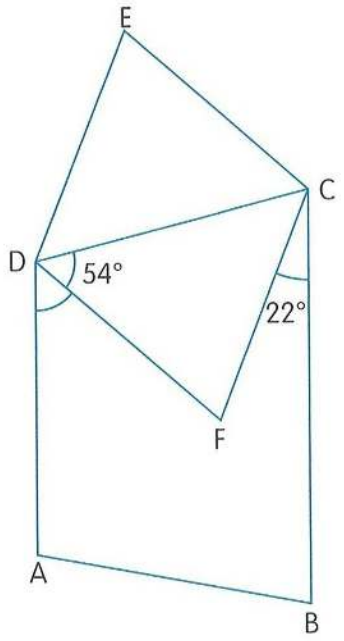
**1** The table shows the amount of time Ravi spent on each activity on a particular Sunday.

| Activity | Time spent |
|---|---|
| Doing homework | $1\frac{1}{2}$ h |
| Reading | $1\frac{1}{2}$ h |
| Swimming | 1 h |
| Shopping | 2 h |
| Playing computer games | 2 h |

What percentage of the total time did Ravi spend on shopping?

Ans: _____ %

2 In the figure, ABCD is a trapezium and CEDF is a rhombus. $\angle CDF = 54°$ and $\angle BCF = 22°$. Find $\angle ADF$.



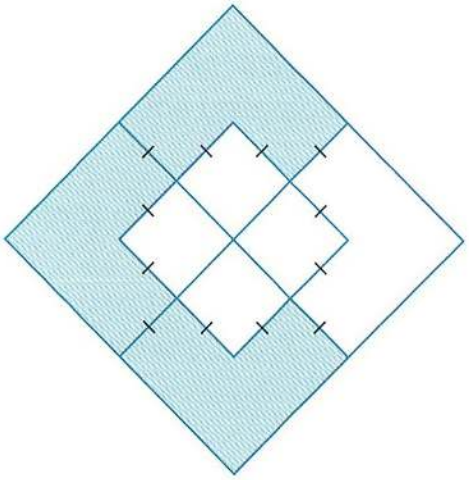

Ans: _____ °

3 Fill in the missing fraction in the box.

$\frac{4}{11} \times 7 + \frac{1}{11} \times 7 = \square \times 7 - \frac{2}{11} \times 7$

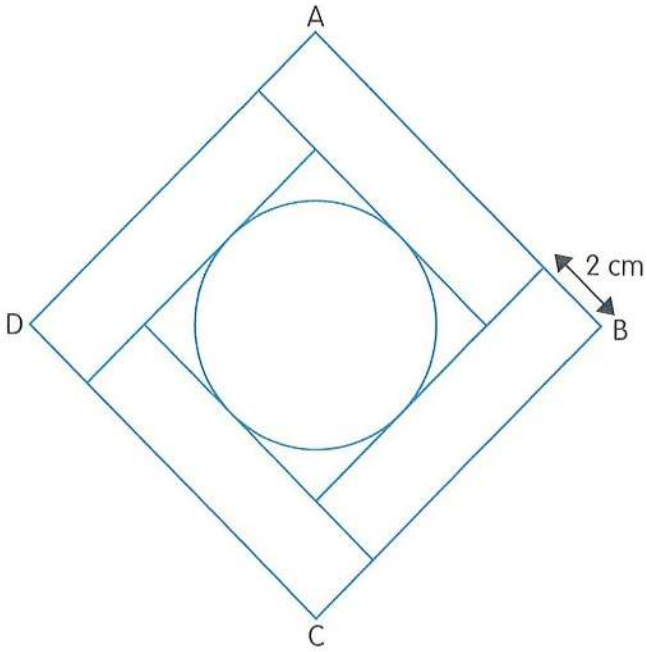
Ans: _____

4 The figure is made up of squares. What percentage of the figure is shaded?



Ans: _____ %

5 The figure shows a square ABCD formed by four identical rectangles and a small square in the middle. A circle is drawn within the small square as shown below. The area of the whole square ABCD is 100 $cm^2$ and the breadth of each of the rectangles is 2 cm. What is the radius of the circle?




Ans: _____ cm

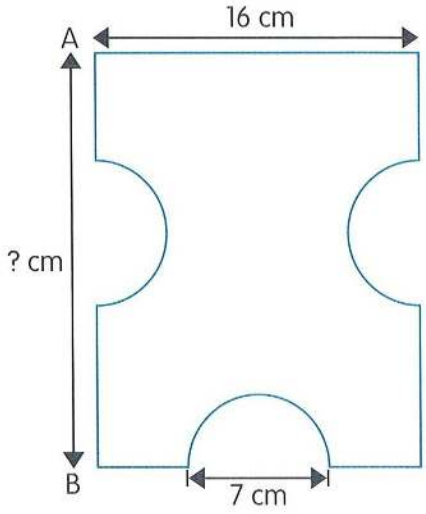
**Section B (45 marks)**

For questions **6** to **17**, show your working clearly and write your answers in the spaces provided. The number of marks available is shown in brackets [ ] at the end of each question or part question.

6 Huiling had $\frac{5}{7}$ as many cupcakes as Eva. Then Eva gave Huiling 12 cupcakes. In the end, Eva had $\frac{1}{2}$ as many cupcakes as Huiling. How many cupcakes did Eva have at first?

Ans: _____ [ 3 ]

7 From a rectangular piece of cardboard, 3 identical semicircles are cut out to form a piece of jigsaw for a puzzle. The perimeter of this piece of jigsaw is 84 cm and the diameter of each semicircle is 7 cm. Find the length of AB. (Take $\pi = \frac{22}{7}$.)




Ans: _____ cm [ 3 ]

8 Mr Lee employed both foreigners and locals for his construction firm. In January, 25% of his workers were locals. In February, he employed an equal number of locals to handle new projects and no new foreigners were employed.

(a) Did the percentage of foreigners increase, decrease or remain the same?

(b) What percentage of all his workers were foreigners in February?

Ans: (a) _____ [ 1 ]

(b) _____ % [ 2 ]

9 Devi's age is $\frac{1}{2}$ of her mother's age now. The sum of their ages in 5 years' time is 97.

(a) What is the sum of their ages now?

(b) How old is her mother now?

Ans: (a) _____ [ 1 ]

(b) _____ [ 2 ]

10 The table shows the number of toys produced in a factory last week.

| Day | Number of toys produced |
|---|---|
| Monday to Friday | $m$ per day |
| Saturday | $m + 5$ |
| Sunday | $m - 4$ |

(a) What was the total number of toys produced last week? Express your answer in terms of $m$ in its simplest form.

(b) If the total number of toys produced last week was 701, find the value of $m$.

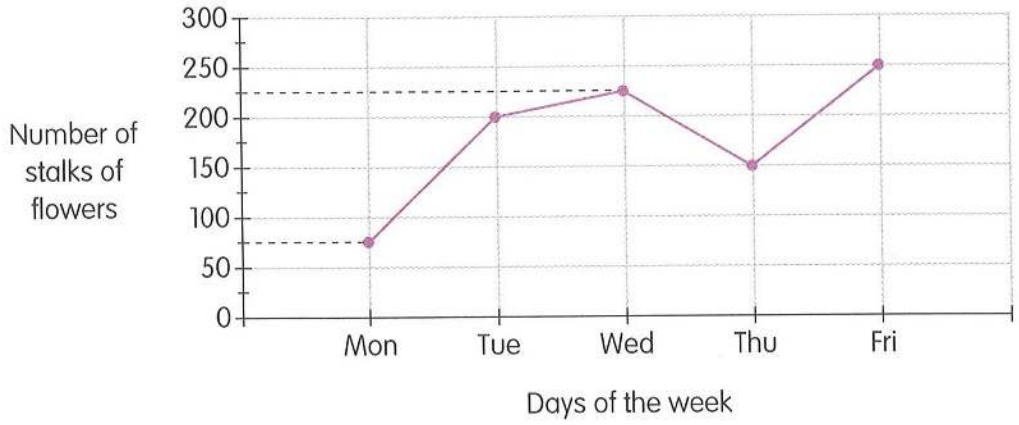
Ans: (a) _____ [1]

(b) _____ [2]

11 There were 400 pupils who sat for a Mathematics quiz. 40% of the pupils were boys. 80% of the boys and 60% of the girls passed the Mathematics quiz. What percentage of the pupils passed the Mathematics quiz?

Ans: (a) _____ % [ 3 ]

12 The line graph shows the number of stalks of flowers sold over a 5-day period by a florist.




(a) What was the total number of stalks of flowers sold from Monday to Friday?

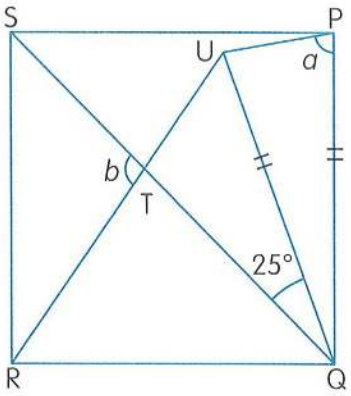
(b) The ratio of the number of stalks of carnations to that of orchids to that of roses sold from Monday to Friday was 2 : 7 : 3. How many more stalks of orchids than carnations were sold from Monday to Friday?

Ans: (a) _____ [ 2 ]

(b) _____ [ 2 ]

13 PQRS is a square and STQ is a straight line. PQ = UQ and $\angle UQT = 25°$.
Find

(a) $\angle a$,
(b) $\angle b$.




Ans: (a) _____° [ 2 ]

(b) _____° [ 2 ]

14 At first, Gopal had only ten-dollar notes and Elaine had only two-dollar notes. The number of notes Gopal had was $\frac{2}{3}$ the number of notes Elaine had. After Gopal had given Elaine $360, the number of notes Gopal had was $\frac{1}{6}$ the number of notes Elaine had.

(a) How much money did Gopal have at first?

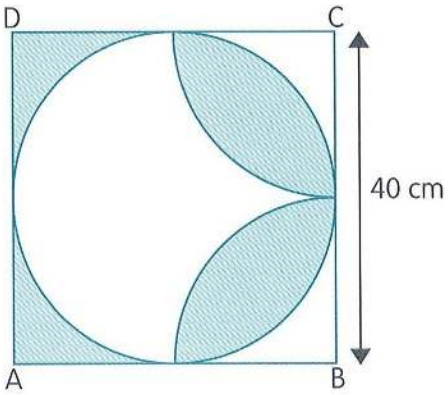
(b) What was the difference in the amount of money they had in the end?

Ans: (a) $ _____ [ 2 ]

(b) $ _____ [ 2 ]

15 The figure shows a square, ABCD, a circle and two quarter circles. The length of the square is 40 cm.

(a) Find the area of the shaded figure.
(b) Find the perimeter of the shaded figure.
(Take $\pi = 3.14$.)




Ans: (a) _____ $cm^2$ [ 2 ]

(b) _____ cm [ 2 ]

16 Mei collected both small and large plastic bottles for recycling. She had collected 600 plastic bottles. 30% of them were small plastic bottles and the rest were large ones. After her neighbour gave her more small plastic bottles, the percentage of small plastic bottles in her collection increased to 40%.

(a) How many small plastic bottles did she have at first?

(b) How many small plastic bottles did her neighbour give her?

Ans: (a) _____ [ 2 ]

(b) _____ [ 3 ]

17 Mr Chen baked 160 more egg tarts than muffins. After selling $\frac{3}{4}$ of the egg tarts and $\frac{1}{2}$ of the muffins, he had a total of 118 egg tarts and muffins left.

(a) How many egg tarts were **not** sold?

(b) How many egg tarts and muffins did he sell altogether?

Ans: (a) _____ [ 3 ]

(b) _____ [ 2 ]

**End of Paper 2**

# Answers

## 1 Algebra

### Part 1: Algebraic Expressions

#### Worksheet 1

1.

| | Number of apples in the basket |
|---|---|
| Number of apples at first | $x$ |
| Throw away 1 apple | $x - 1$ |
| Throw away 2 apples | $x - 2$ |
| Throw away 5 apples | $x - 5$ |
| Throw away 8 apples | $x - 8$ |

2. $b + b + b + b + b + b$
   $b \times 6$ or $6 \times b$
   $6b$

3. (a) $n + 3$ or $3 + n$
   (b) $11 + b$ or $b + 11$
   (c) $j + \frac{1}{5}$ or $\frac{1}{5} + j$
   (d) $p - 4$
   (e) $a - 5$
   (f) $7s$
   (g) $2t$
   (h) $\frac{g}{9}$
   (i) $12y$
   (j) $r - 4$
   (k) $\frac{1}{4}h$
   (l) $3w$
   (m) $\frac{(k + 29)}{3}$ or $\frac{(29 + k)}{3}$
   (n) $\frac{(m - 17)}{9}$
   (o) $\frac{1}{2}d - 17$

#### Worksheet 2

1. There are $\frac{s}{3}$ girls.

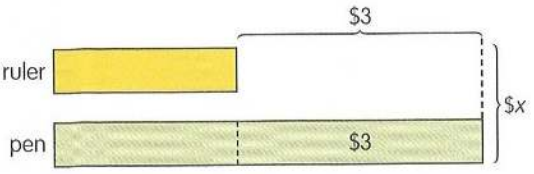
2. Area of triangle $= \frac{1}{2} \times$ base $\times$ height
   $= \frac{1}{2} \times b \times 10$
   $= 5b$ cm$^2$

3. $37 - 23 = 14$
   $23 + 2p + 14 = 37 + 2p$ or $2p + 37$
   Her mother will be $(37 + 2p)$ years old.

4. Martin took $(160 - w)$ seconds to complete the race.

5. Price of the T-shirt after discount $= \$m - \$4$ or $\$(m - 4)$

6.




   The cost of a ruler is $\$(\frac{x - 3}{2})$.

7. $\frac{175}{7} \times h = 25h$
   Ali is $25h$ cm tall.

8. $w + 12 + w + 12 + 10 = 2w + 34$
   The total time taken by the two boys to complete the jigsaw puzzle was $(2w + 34)$ min.

### Part 2: Simplifying Algebraic Expressions

#### Worksheet 3

1. (a) $3y$ (b) $4c$ (c) $6e$ (d) $20f$
   (e) $7d$ (f) $13g$ (g) $22h$ (h) $13m$
   (i) $17p$ (j) $23n$

2. (a) $6c + 5$ or $5 + 6c$
   (b) $2b + 9$ or $9 + 2b$
   (c) $8q - 7$
   (d) $11x + 3$ or $3 + 11x$
   (e) $14y + 9$ or $9 + 14y$
   (f) $14 + 3u$ or $3u + 14$
   (g) $12j + 29$ or $29 + 12j$
   (h) $26k + 3$ or $3 + 26k$
   (i) $15r + 8$ or $8 + 15r$
   (j) $23 + 22s$ or $22s + 23$

### Part 3: Evaluating Algebraic Expressions

#### Worksheet 4

1 (a) 5 (b) 21 (c) 2 (d) 16
   (e) 27 (f) 19 (g) 15 (h) 2
   (i) 1 (j) 6 (k) 4 (l) 6

2. 58

3. 8

4. 3

5. 29

#### Worksheet 5

1. (a) The total number of students in the class is $5z - 3$.

   (b) When $z = 8$,
   $5z - 3 = 5 \times 8 - 3$
   $= 37$
   The number of students in the class is 37.

2. (a) $6 \times \$3 + \$7t = \$(18 + 7t)$

Mrs Smith had $\$(18 + 7t)$ at first.

(b) If $t = 5$,

$$\begin{aligned}\$(18 + 7t) &= \$(18 + 7 \times 5)\\ &= \$(18 + 35)\\ &= \$53\end{aligned}$$

She had \$53 at first.

3. (a) $h + (h + 9) + (h - 4) = 3h + 9 - 4$

$$= 3h + 5$$

The total height of the 3 children is $(3h + 5)$ cm.

(b) If $h = 142$,

$$\begin{aligned}3h + 5 &= 3 \times 142 + 5\\ &= 431\end{aligned}$$

The total height of the 3 children is 431 cm.

4. (a) $a + 2a + (a + 3) = (4a + 3)$

The total mass of the 3 girls is $(4a + 3)$ kg.

Their average mass is $\frac{(4a + 3)}{3}$ kg.

(b) If $a = 24$,

$$\begin{aligned}\frac{(4a + 3)}{3} &= \frac{4 \times 24 + 3}{3}\\ &= \frac{99}{3}\\ &= 33\end{aligned}$$

Their average mass is 33 kg.

5. (a) $6p - 2 - 2 = 6p - 4$

$$(6p - 4) \div 2 = \frac{(6p - 4)}{2}$$

The length of the whiteboard is $\frac{(6p - 4)}{2}$ m.

(b) If $p = 2$,

$$\begin{aligned}\frac{(6p - 4)}{2} &= \frac{(6 \times 2 - 4)}{2}\\ &= \frac{8}{2}\\ &= 4\end{aligned}$$

The length of the whiteboard is 4 m.

6. (a) The cost of 6 packets of cheese is $\$(w - 2)$.

$$\$(w - 2) \div 6 = \$\left(\frac{w - 2}{6}\right)$$

One packet of cheese cost $\$\left(\frac{w - 2}{6}\right)$.

(b) If $w = 50$,

$$\begin{aligned}\$\left(\frac{w - 2}{6}\right) &= \$\left(\frac{50 - 2}{6}\right)\\ &= \$\left(\frac{48}{6}\right)\\ &= \$8\end{aligned}$$

The cost of one packet of cheese was \$8.

7. (a) Paul had $(7k + 18)$ cookies.

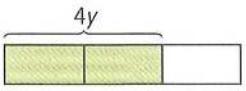
Each person received $\frac{(7k + 18)}{4}$ cookies.

(b) If $k = 6$,

$$\begin{aligned}\frac{(7k + 18)}{4} &= \frac{(7 \times 6 + 18)}{4}\\ &= \frac{(42 + 18)}{4}\\ &= \frac{60}{4}\\ &= 15\end{aligned}$$

Each person received 15 cookies.

**Worksheet 6**

1. 


2 units $= 4y$

1 unit $= 4y \div 2$

$= 2y$

3 units $= 3 \times 2y$

$= 6y$

The number is $6y$.

If $y = 12$,

$$\begin{aligned}6y &= 6 \times 12\\ &= 72\end{aligned}$$

The number is 72.

2. $11w \times 3 = 33w$

The total of the 3 numbers is $33w$.

$33w - 5w - 31 = 28w - 31$

The third number is $28w - 31$.

If $w = 4$,

$$\begin{aligned}28w - 31 &= 28 \times 4 - 31\\ &= 81\end{aligned}$$

The third number is 81.

3. (a) $f + 3 + f + 3 + f + 1 + f + 1 + f + 1 + f + 1 = 6f + 10$

Peiyi spent $\$(6f + 10)$ altogether.

(b) If $f = 2$,

$$\begin{aligned}2f &= 2 \times 2\\ &= 4\\ 22 - 4 &= 18\end{aligned}$$

The total cost of the clip files was \$18.

$$\begin{aligned}\text{Cost of 1 clip file} &= \$(f + 1)\\ &= \$(2 + 1)\\ &= \$3\end{aligned}$$

$\$18 \div \$3 = 6$

Dinesh bought 6 clip files.

## Part 4: Solving Equations

### Worksheet 7

1. (a) David has $\$(a - 20)$.

   (b) $\$a = \$60 + \$20$
   $= \$80$

   Alex has \$80.

2. (a) $\$g \div 6 = \$(\frac{g}{6})$

   A T-shirt costs $\$(\frac{g}{6})$.

   (b) $\$(\frac{g}{6}) = \$8$
   $\$g = 6 \times \$8$
   $= \$48$

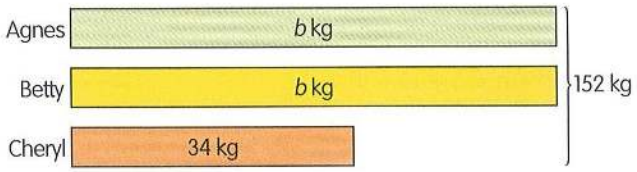
   The cost of the bag is \$48.

### Worksheet 8

1. (a) $b + b = 2b$

   The total mass of Agnes and Betty is $2b$ kg.

   (b)



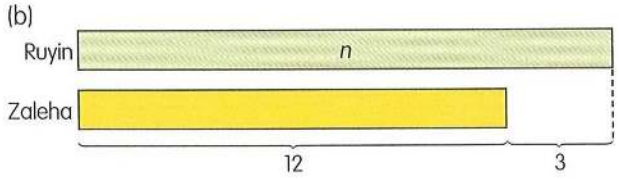

   $2b = 152 - 34$
   $= 118$
   $b = 118 \div 2$
   $= 59$

   Betty's mass is 59 kg.

2. (a) $n + n - 3 + 2 + 2 = 2n + 1$

   Their total age will be $(2n + 1)$ years in 2 years' time.

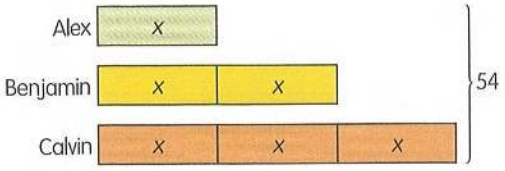
   (b)




   $n = 12 + 3$
   $= 15$
   $2n + 1 = 2 \times 15 + 1$
   $= 31$

   Their total age is 31 years in 2 years' time.

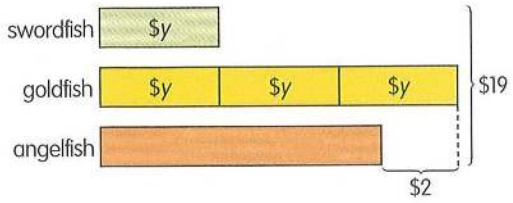
3.




   $x + x + x + x + x + x = 54$
   $6x = 54$
   $x = 9$

   Alex has 9 cookies.

4.

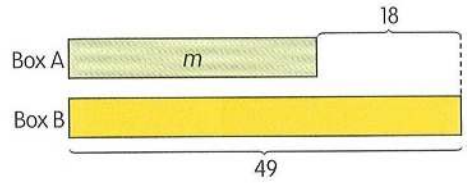



   $\$y + \$3y + \$3y = \$19 + \$2$
   $\$7y = \$21$
   $\$y = \$21 \div 7$
   $= \$3$

   The cost of a swordfish was \$3.

### Worksheet 9

1.




   (a) $m + 18$

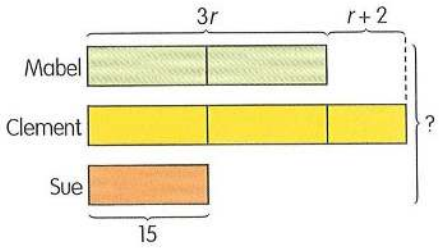
   There were $(m + 18)$ sweets in Box B.

   (b) $m = 49 - 18$
   $= 31$

   $31 + 49 + 29 = 109$

   Jane had 109 sweets at first.

2.



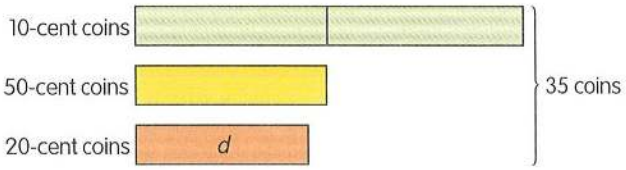

   $3r = 15 + 15$
   $r = 30 \div 3$
   $= 10$

   $3r + 3r + r + 2 + 15 = 7r + 17$
   $= 7 \times 10 + 17$
   $= 87$

   They have 87 stickers altogether.

## Problem Solving

1. (a)




3 units = $35 - d$

1 unit = $\frac{35 - d}{3}$

Mrs Chong has $(\frac{35 - d}{3})$ fifty-cent coins.

(b) If $d = 8$,

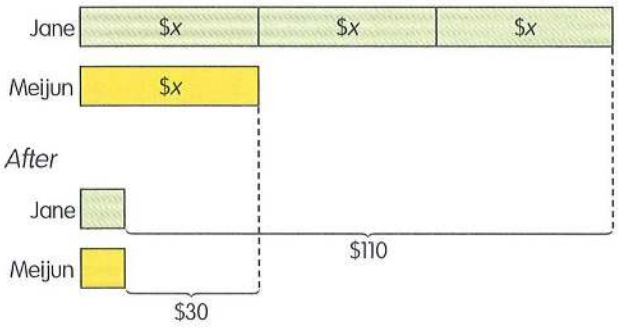
Number of 20-cent coins = 8

Number of 50-cent coins = $\frac{35 - 8}{3}$
= 9

Number of 10-cent coins = 9 × 2
= 18

Total amount of the 35 coins
= (8 × 20 cents) + (9 × 50 cents) + (18 × 10 cents)
= 160 cents + 450 cents + 180 cents
= 790 cents
= $7.90

2. *Before*




Meijun had $x, then Jane would have $3x.

$2x = $110 − $30
= $80

$x = $80 ÷ 2
= $40

$3x = 3 × $40
= $120

Jane had $120 at first.

## Self-Test 1

*Section A*

1. (4) 2. (4) 3. (3) 4. (3) 5. (1)

*Section B*

6. $5y + 9 - 2y + 3y - 4 = 5y - 2y + 3y + 9 - 4$
$= 6y + 5$

7. If $a = 8$,

$\frac{5a - 10}{3} = \frac{5 \times 8 - 10}{3}$
$= \frac{40 - 10}{3}$
$= \frac{30}{3}$
$= 10$

8. $\$(r - \frac{1}{2}r - 2.5 \times 4) = \$(\frac{1}{2}r - 10)$

She had $\$(\frac{1}{2}r - 10)$ left.

9. Mass of Alan = 23 kg

Mass of Benny = 23 × $b$
= $23b$ kg

Mass of Chung = $23b - 3b$
= $20b$ kg

Total mass of 3 boys = $23 + 23b + 20b$
= $(43b + 23)$ kg

10. $5 + n + 5 + n + n = 40$
$3n + 10 = 40$
$3n = 30$
$n = 30 \div 3$
$= 10$

$5 + n + n = 5 + 10 + 10$
$= 25$

Mrs Chen sold 25 muffins on Tuesday.

*Section C*

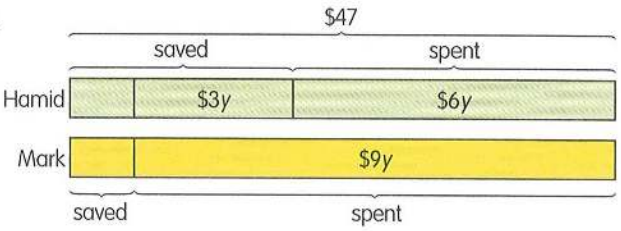
11. (a) $p + 2 + p + 2 + 4p + 2p + 2 + 2p + 2 = 10p + 8$

The perimeter of the shaded part is $(10p + 8)$ cm.

(b) If $p = 3$,
$10p + 8 = 10 \times 3 + 8$
$= 38$

The perimeter of the shaded part is 38 cm.

12.




(a) $\$15y - \$3y = \$12y$

$\$(\frac{12y}{2}) = \$6y$

Hamid spent $6y.

Hamid saved $(47 − 6y).

(b) $\$(15y - 6y) = \$9y$

Mark spent $9y.

Mark saved $(47 − 9y).

**Challenge**

(a)

| 234 | |
|---|---|
| 21 | 24 |

(b) $a = 10n + (n + 3)$
$= 10n + n + 3$
$= 11n + 3$

(c) $11n + 3 = 289$
$11n = 286$
$n = 286 \div 11$
$= 26$

## 2 Fractions

### Part 1: Dividing a Proper Fraction by a Whole Number

**Worksheet 1**

1. (a) $\frac{1}{6}$ (b) $\frac{1}{8}$

2. (a) $\frac{1}{9}$ (b) $\frac{1}{10}$ (c) $\frac{1}{14}$ (d) $\frac{3}{20}$
(e) $\frac{4}{9}$ (f) $\frac{1}{20}$ (g) $\frac{1}{36}$ (h) $\frac{1}{22}$

**Worksheet 2**

1. $\frac{3}{4} \div 2 = \frac{3}{4} \times \frac{1}{2}$
$= \frac{3}{8}$

The length of each piece of string is $\frac{3}{8}$ m.

2. $\frac{8}{9} \div 4 = \frac{\cancel{8}^{2}}{9} \times \frac{1}{\cancel{4}_{1}}$
$= \frac{2}{9}$

The mass of flour that each boy received was $\frac{2}{9}$ kg.

3. $\frac{3}{7} \div 2 = \frac{3}{7} \times \frac{1}{2}$
$= \frac{3}{14}$

Each girl got $\frac{3}{14}$ of the cake.

4. $1 - \frac{4}{9} = \frac{5}{9}$
$\frac{5}{9} \div 5 = \frac{\cancel{5}^{1}}{9} \times \frac{1}{\cancel{5}_{1}}$
$= \frac{1}{9}$

Each friend received $\frac{1}{9}$ of the cookies.

**Worksheet 3**

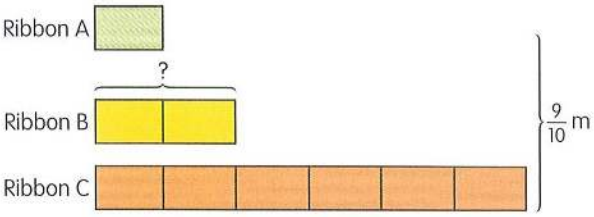
1. $\frac{2}{3} \div 7 = \frac{2}{3} \times \frac{1}{7}$
$= \frac{2}{21}$
$\frac{2}{\cancel{21}_{7}} \times \cancel{3}^{1} = \frac{2}{7}$

The 3 girls got $\frac{2}{7}$ of the pizza.

2. $\frac{7}{8} \div 4 = \frac{7}{8} \times \frac{1}{4}$
$= \frac{7}{32}$
$\frac{7}{32} \times 12 = 2\frac{5}{8}$

12 such cups can hold $2\frac{5}{8}$ $\ell$ of water.

3.



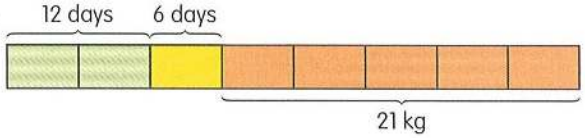

9 units $= \frac{9}{10}$ m

1 unit $= \frac{9}{10} \div 9$
$= \frac{\cancel{9}^{1}}{10} \times \frac{1}{\cancel{9}_{1}}$
$= \frac{1}{10}$ m

2 units $= \frac{1}{\cancel{10}_{5}} \times \cancel{2}^{1}$
$= \frac{1}{5}$ m

The length of Ribbon B is $\frac{1}{5}$ m.

4.




Fraction of rice eaten in 12 days $= \frac{1}{4}$

Fraction of rice eaten per day $= \frac{1}{4} \div 12$
$= \frac{1}{4} \times \frac{1}{12}$
$= \frac{1}{48}$

Fraction of rice eaten in 18 days $= \frac{1}{\cancel{48}_{8}} \times \cancel{18}^{3}$
$= \frac{3}{8}$

Fraction of rice left after 18 days $= \frac{5}{8}$

$\frac{5}{8}$ of the rice $= 21$ kg
$\frac{1}{8}$ of the rice $= 21 \div 5$
$= 4.2$ kg
$\frac{8}{8}$ of the rice $= 4.2 \times 8$
$= 33.6$ kg

Jason bought 33.6 kg of rice.

### Part 2: Dividing a Whole Number by a Proper Fraction

**Worksheet 4**

1. (a) 8 (b) 5 (c) 8

2. (a) 30 (b) 35 (c) 20 (d) 28

3. (a) $3\frac{3}{5}$ (b) $13\frac{1}{3}$ (c) $10\frac{1}{2}$ (d) $33\frac{1}{3}$

**Worksheet 5**

1. $7 \div \frac{1}{2} = 7 \times 2$
$= 14$

He had 14 pieces of half chocolate bars.

2. $5 \div \frac{1}{5} = 5 \times 5$
$= 25$

He got 25 slices of cake.

3. $4 \div \frac{2}{3} = \cancel{4}^{2} \times \frac{3}{\cancel{2}_{1}}$
$= 6$

There were 6 small packs of potatoes.

4. $12 \div \frac{3}{5} = \cancel{12}^{4} \times \frac{5}{\cancel{3}_{1}}$
$= 20$

She will get 20 shorter pieces of ribbon.

**Worksheet 6**

1. (a) $6 \div \frac{6}{7} = \cancel{6}^{1} \times \frac{7}{\cancel{6}_{1}}$
$= 7$

The length of the rectangular noticeboard is 7 m.

(b) $7 + \frac{6}{7} + 7 + \frac{6}{7} = 14 + \frac{12}{7}$
$= 14 + \frac{7}{7} + \frac{5}{7}$
$= 15\frac{5}{7}$

Its perimeter is $15\frac{5}{7}$ m.

2. (a) $8 \div \frac{3}{8} = 8 \times \frac{8}{3}$
$= 21\frac{1}{3}$

He got 21 shorter pieces of rope.

(b) $\frac{1}{\cancel{3}_{1}} \times \frac{\cancel{3}^{1}}{8} = \frac{1}{8}$

The length of rope left was $\frac{1}{8}$ m.

3. $12 \div \frac{7}{8} = 12 \times \frac{8}{7}$
$= \frac{96}{7}$
$= 13\frac{5}{7}$

The least number of times that Cindy must fill her container in order to fill the tank completely is 14.

4. $4 - \frac{2}{5} - \frac{9}{15} = 4 - \frac{2}{5} - \frac{3}{5}$
$= 3$

Chef Tan had 3 kg of brown rice left.

$3 \div \frac{3}{8} = 3 \times \frac{8}{3}$
$= 8$

Chef Tan packed 8 small boxes of brown rice.

**Part 3: Dividing a Proper Fraction by a Proper Fraction**

**Worksheet 7**

1. (a) 6 (b) 10 (c) 2

2 (a) 2 (b) 6 (c) $\frac{2}{3}$ (d) $\frac{7}{3}$ or $2\frac{1}{3}$

3. (a) $1\frac{2}{5}$ (b) $1\frac{1}{5}$ (c) $2\frac{1}{2}$ (d) $1\frac{5}{6}$

**Worksheet 8**

1. $\frac{3}{4} \div \frac{1}{12} = \frac{3}{\cancel{4}_{1}} \times \cancel{12}^{3}$
$= 9$

There were 9 shorter pieces of string altogether.

2. $\frac{3}{5} \div \frac{1}{10} = \frac{3}{\cancel{5}_{1}} \times \cancel{10}^{2}$
$= 6$

She can bake 6 such cakes.

3. $\frac{7}{8} \div \frac{7}{16} = \frac{\cancel{7}^{1}}{\cancel{8}_{1}} \times \frac{\cancel{16}^{2}}{\cancel{7}_{1}}$
$= 2$

Mrs Lee packs 2 smaller packets of cookies.

4. $\frac{9}{10} \div \frac{2}{5} = \frac{9}{\cancel{10}_{2}} \times \frac{\cancel{5}^{1}}{2}$
$= \frac{9}{4}$
$= 2\frac{1}{4}$

The least number of bottles she needs is 3.

**Worksheet 9**

1. $3 - 2\frac{1}{2} = \frac{1}{2}$
$\frac{1}{2} \div \frac{1}{10} = \frac{1}{\cancel{2}_{1}} \times \cancel{10}^{5}$
$= 5$

She gave the remaining ribbon to 5 friends.

2. $1 - \frac{1}{4} = \frac{3}{4}$
$\frac{3}{4} \times \frac{4}{5} = \frac{3}{5}$
$\frac{3}{5} \div \frac{1}{20} = \frac{3}{\cancel{5}_{1}} \times \cancel{20}^{4}$
$= 12$

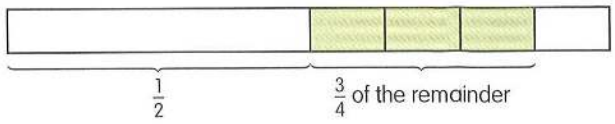
She packed 12 such packets.

**Worksheet 10**

1. $\frac{1}{2} \times 4 = 2$
$10 - 2 = 8$
$8 \div \frac{2}{5} = \cancel{8}^{4} \times \frac{5}{\cancel{2}_{1}}$
$= 20$

There were 20 pieces of wire of length $\frac{2}{5}$ m each.

2.




$1 - \frac{1}{2} = \frac{1}{2}$

$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$

$1 - \frac{1}{2} - \frac{3}{8} = \frac{1}{8}$

$\frac{1}{8} \div 2 = \frac{1}{8} \times \frac{1}{2}$

$= \frac{1}{16}$

Each friend received $\frac{1}{16}$ of the pie.

3. (a) $\frac{5}{7} \times 294 = 210$

There were 210 red apples.

(b) *Before,*

$294 - 210 = 84$

There were 84 green apples at first.

*After,*

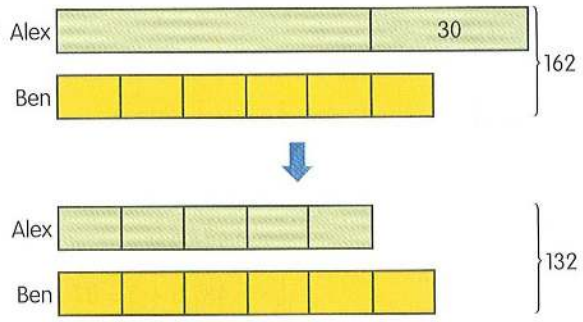
$\frac{2}{3}$ of the apples = 210 (red apples)

$\frac{1}{3}$ of the apples = 105 (green apples)

$105 - 84 = 21$

He bought 21 green apples.

4.




When Alex gave away 30 marbles, the number of marbles left is (162 – 30) = 132.

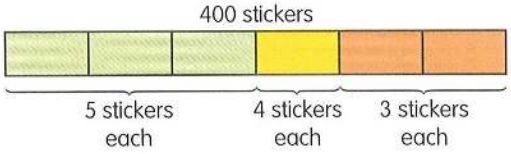
From the bar model,

11 units = 132
1 unit = 132 ÷ 11
= 12
5 units = 12 × 5
= 60

Alex had (60 + 30) = 90 marbles at first.

**Worksheet 11**

1.




$(5 \times 3) + (4 \times 1) + (3 \times 2) = 25$

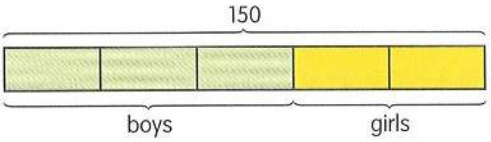
25 units = 400
1 unit = 400 ÷ 25
= 16

$\frac{1}{6}$ of the girls = 16

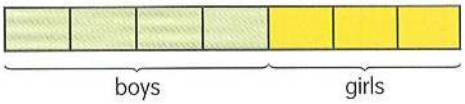
$\frac{6}{6}$ of the girls = 16 × 6
= 96

There were 96 girls altogether.

2. *Before*




*After*




*Before*

5 units = 150
1 unit = 150 ÷ 5
= 30
3 units = 3 × 30
= 90

There were 90 boys.

2 units = 2 × 30
= 60

There were 60 girls.

*After*

3 units = 60 (number of girls remained the same)
1 unit = 60 ÷ 3
= 20
4 units = 4 × 20
= 80

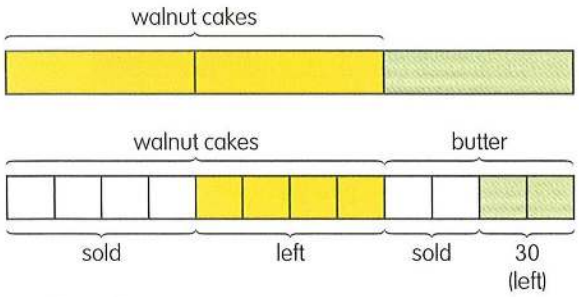
There were 80 boys left in the hall.

90 – 80 = 10

10 boys left the hall.

## Problem Solving

1.




2 units = 30
1 unit = 30 ÷ 2
= 15
4 units = 4 × 15
= 60

60 walnut cakes were sold.

**OR**

$\frac{2}{3}$ of $\frac{1}{2} = \frac{2^{1}}{3} \times \frac{1}{2_{1}}$
$= \frac{1}{3}$

$\frac{1}{3}$ of the total number of cakes that were sold were walnut cakes.

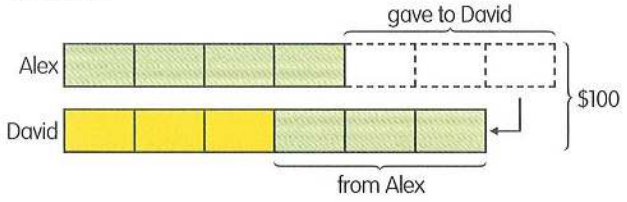
$\frac{1}{2} - \frac{1}{3} = \frac{3}{6} - \frac{2}{6}$
$= \frac{1}{6}$

$\frac{1}{6}$ of the total number of cakes that were sold were butter cakes.

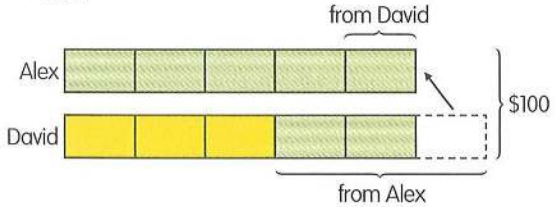
$\frac{1}{3} - \frac{1}{6} = \frac{1}{6}$
$\frac{1}{6}$ of the cakes = 30
$\frac{2}{6}$ of the cakes = 2 × 30
= 60

60 walnut cakes were sold.

2. (a) *Before*




*After*




10 units = $100
1 unit = $100 ÷ 10
= $10
3 units = 3 × $10
= $30

David had $30 at first.

(b) 7 units – 3 units = 4 units

4 units = 4 × $10
= $40

or

7 units = 7 × $10
= $70

$70 – $30 = $40

Alex had $40 more than David at first.

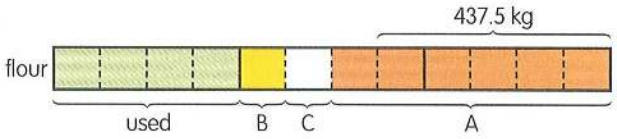
## Self-Test 1

*Section A*

1. (4) 2. (2) 3. (3) 4. (1) 5. (4)

*Section B*

6. $\frac{2}{45}$
7. $\frac{3}{49}$
8. $\frac{2}{15}$
9. 25
10. $\frac{1}{10}$ kg
11. 3
12.




6 units – 1 unit = 5 units
5 units = 437.5 g
1 unit = 437.5 ÷ 5
= 87.5 g
4 units = 4 × 87.5
= 350 g

or $\frac{1}{4} \times \frac{2}{3} = \frac{1}{6}$ (Belinda and Cindy)

$\frac{1}{6} \div 2 = \frac{1}{6} \times \frac{1}{2}$
$= \frac{1}{12}$ (Belinda)

$\frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$ (Alice)

$\frac{1}{2} - \frac{1}{12} = \frac{5}{12}$ (Difference)

$\frac{5}{12} \rightarrow$ 437.5 g

$\frac{1}{12} \rightarrow$ 437.5 ÷ 5 = 87.5 g

$\frac{4}{12} \rightarrow$ 4 × 87.5 = 350 g

Alice used 350 g of flour.

13. (a) 4860 – 1300 = 3560 ($\frac{4}{5}$ filled with salt)

4 units = 3560 g
1 unit = 3560 ÷ 4
= 890 g

1300 – 890 = 410
The mass of the empty box is 410 g.

(b) 4860 – 410 = 4450

$\frac{1}{2} \times 4450 = 2225$

2225 + 410 = 2635

The mass of the box when it is $\frac{1}{2}$ filled with salt is 2635 g.

**Challenge**

(a) $32 \times 6 = 192$
$32 + 192 = 224$

He could buy 224 sweets.

(b) $\frac{4}{9}$ of his money $\rightarrow$ 224

$\frac{1}{9}$ of his money $\rightarrow 224 \div 4 = 56$

$\frac{5}{9}$ of his money $\rightarrow 56 \times 5 = 280$

$9 \times 6 = 54$

Cost of 9 cookies = Cost of 54 sweets
$280 - 54 = 226$
$226 + 32 = 258$

Ben bought 258 sweets altogether.

## 3 Ratio

### Part 1: Ratio and Fraction

**Worksheet 1**

1. $\frac{3}{7}$

2. (a) $\frac{8}{5}$ (b) $\frac{5}{8}$ (c) $\frac{8}{13}$ (d) $\frac{13}{5}$

3. 4 : 5, 5 : 4

4. (a) 2 : 3 (b) $\frac{2}{3}$ (c) $\frac{3}{5}$

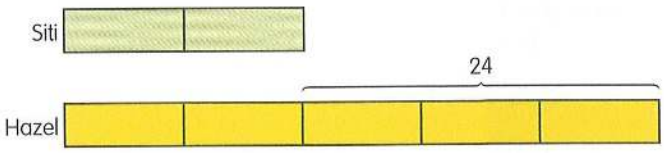
5. (a) 3 : 1 (b) $\frac{1}{3}$

6. (a) 7 : 4 (b) 4 : 11 (c) 11 : 7

### Part 2: Word Problems

**Worksheet 2**

1.




3 units = 24
1 unit = 24 ÷ 3
= 8
7 units = 7 × 8
= 56

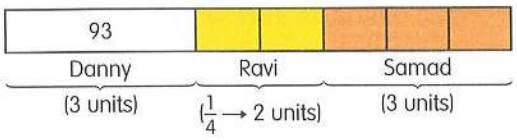
The two girls have 56 paper clips altogether.

2.

| | Length | : | Breadth | : | Area | Check |
|---|---|---|---|---|---|---|
| = | 7 | : | 2 | : | 14 | ✗ |
| = | 14 | : | 4 | : | 56 | ✗ |
| = | 21 | : | 6 | : | 126 | ✓ |

The length of the rectangular face is 21 cm.

3. (a)



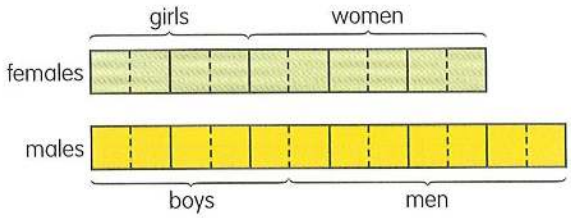

3 units = 93
1 unit = 93 ÷ 3
= 31
8 units = 8 × 31
= 248

Danny had 248 stickers at first.

(b) 5 units = 5 × 31
= 155

Danny gave away 155 stickers.

4.




| | Number of females | : | Number of males |
|---|---|---|---|
| = | 5 | : | 6 |
| = | 10 | : | 12 |

| | Number of girls | : | Number of women |
|---|---|---|---|
| = | 2 | : | 3 |
| = | 4 | : | 6 |

| | Number of boys | : | Number of men |
|---|---|---|---|
| = | 5 | : | 7 |

5 units + 4 units = 9 units
10 units + 12 units = 22 units

$\frac{9}{22}$ of the people were children.

**Worksheet 3**

1.

| | X + Y | : | Y + Z | : | X − Z |
|---|---|---|---|---|---|
| = | 5 | : | 2 | : | 3 |
| = | 10 | : | 4 | : | 6 |

| | X | : | Z | : | X − Z |
|---|---|---|---|---|---|
| = | 3 | : | 1 | : | 2 |
| = | 9 | : | 3 | : | 6 |

Total area of X and Y = 10 units
Area of X = 9 units

Total area of Y and Z = 4 units
Area of Z = 3 units

Area of Y = 1 unit
1 unit = 30 cm²
4 units = 4 × 30
= 120 cm²

The area of the smaller square ABCD is 120 cm².

2. (a) For every 3 curry puffs, there were 4 buns.

Cost of 3 curry puffs = \$3 × 3
= \$9

Cost of 4 buns = \$1 × 4
= \$4

\$9 + \$4 = \$13 (3 curry puffs and 4 buns)
5668 ÷ 13 = 436
436 × 4 = 1744

There were 1744 buns.

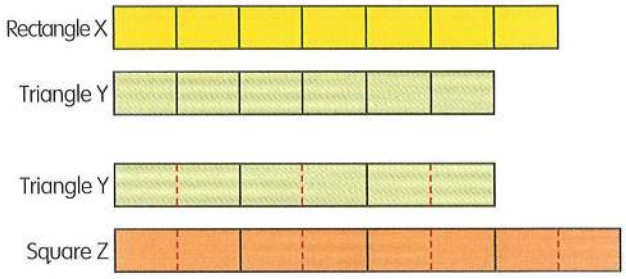
(b) 436 × 3 = 1308

There were 1308 curry puffs.

### Part 3: Ratios of Three Quantities

### Worksheet 4

1.




The ratio of the area of Rectangle X to the area of Triangle Y to the area of Square Z is 7 : 6 : 8.

2. First common multiple of 3 and 5 is 15.

| | A | : | B | | | B | : | C |
|---|---|---|---|---|---|---|---|---|
| = | 2 | : | **3** | = | | **5** | : | 6 |
| = | 10 | : | **15** | = | | **15** | : | 18 |

(×5 on A, ×5 on B; ×3 on B, ×3 on C)

The ratio of A : B : C is 10 : 15 : 18.

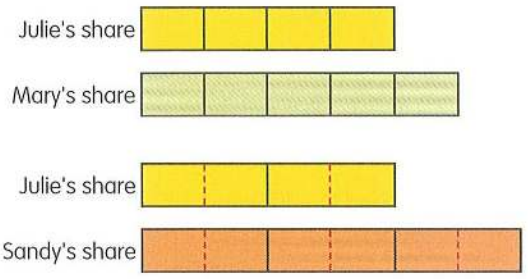
3. First common multiple of 2 and 4 is 4.

| Number of goldfish | : | Number of swordtails | | Number of guppies | : | Number of swordtails |
|---|---|---|---|---|---|---|
| 1 | : | **2** | = | 5 | : | **4** |
| 2 | : | **4** | | | | |

(×2 on goldfish, ×2 on swordtails)

The ratio of the number of goldfish to the number of swordtails to the number of guppies is 2 : 4 : 5.

4. (a)




Sandy has the largest share.

(b) The ratio of Julie's share to Mary's share to Sandy's share is 4 : 5 : 6.

### Worksheet 5

1. 5 units + 4 units + 3 units = 12 units (total number of fruits)

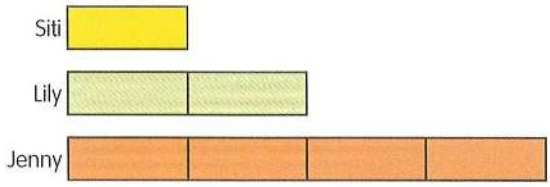
5 units + 4 units = 9 units (total number of apples)

9 units − 3 units = 6 units (difference between number of apples and of pears)

6 units = 84
1 unit = 84 ÷ 6
= 14
12 units = 12 × 14
= 168

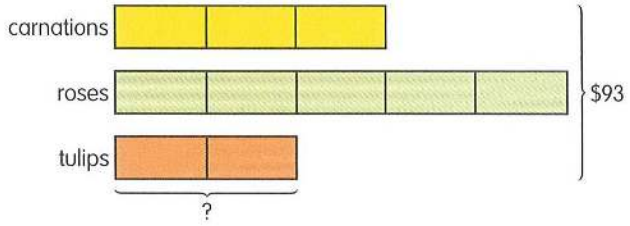
There are 168 fruits altogether.

2.




The ratio of Siti's money to Lily's money to Jenny's money is 1 : 2 : 4.

3.




Jane bought 3 stalks of carnations for every 5 stalks of roses and 2 stalks of tulips she bought.

Cost of 3 stalks of carnations = 3 × \$2
= \$6

Cost of 5 stalks of roses = 5 × \$5
= \$25

Total amount Jane spent on carnations and roses = \$93

\$6 + \$25 = \$31 (3 stalks of carnations and 5 stalks of roses)
93 ÷ 31 = 3
3 × 2 = 6

Jane bought 6 stalks of tulips.

4. First common multiple of 2 and 3 is 6.

| Area of A | : | Area of B | | Area of B | : | Area of C |
|---|---|---|---|---|---|---|
| 1 | : | **2** | = | **3** | : | 2 |
| 3 | : | **6** | | **6** | : | 4 |

(×3 on A, ×3 on B; ×2 on B, ×2 on C)

A : B : C = 3 : 6 : 4

4 units − 3 units = 1 unit
1 unit = 9 cm²
13 units = 13 × 9
= 117 cm²

The area of the rectangle is 117 cm².

**Worksheet 6**

1. First common multiple of 2 and 3 is 6.

| | Area of W | : | Area of X | | Area of X | : | Area of Y |
|---|---|---|---|---|---|---|---|
| = | 5 (×2) | : | 3 (×2) | = | 2 (×3) | : | 3 (×3) |
| = | 10 | : | 6 | = | 6 | : | 9 |

W : X : Y = 10 : 6 : 9

Area of W + Area of X = Area of Y + Area of Z
10 units + 6 units = 9 units + 210 cm²

16 units – 9 units = 7 units
7 units = 210 cm²
1 unit = 210 ÷ 7
= 30 cm²
25 units = 25 × 30
= 750 cm²
750 + 210 = 960

The area of the square is 960 cm².

2. (a) Price of one muffin = \$2 × 2
= \$4

8 units + 5 units = 13 units

3 × 13 units = 39 units

The number of cupcakes sold can be represented by 39 units.

| | Number of cupcakes | : | Number of tarts | : | Number of muffins |
|---|---|---|---|---|---|
| = | 39 | : | 8 | : | 5 |

(39 × \$1) + (8 × \$2) + (5 × \$4) = \$75
\$3750 ÷ \$75 = 50
39 × 50 = 1950

1950 cupcakes were sold on that day.

(b) Number of muffins sold = 50 × 5
= 250

Amount collected from the sales of muffins = 250 × \$4
= \$1000

Amount collected from the sales of cupcakes = 1950 × \$1
= \$1950

Difference = \$1950 – \$1000
= \$950

\$950 more was collected from selling the cupcakes than the muffins.

**Part 4: Changing Ratios**

**Worksheet 7**

1.

| | Number of ribbons Agnes had | : | Number of ribbons Siti had |
|---|---|---|---|
| *Before* | 3 (×3) | : | 1 (×3) |
| | 9 | : | 3 |
| *After* | 7 | : | 3 |

9 units – 7 units = 2 units
2 units = 16
1 unit = 16 ÷ 2
= 8
3 units = 3 × 8
= 24

Siti had 24 ribbons.

2.

| | Number of magnets David had | : | Number of magnets Roy had |
|---|---|---|---|
| *Before* | 1 | : | 2 |
| *After* | 2 (×2) | : | 1 (×2) |
| | 4 | : | 2 |

4 units – 1 unit = 3 units
3 units = 9
1 unit = 9 ÷ 3
= 3

David had 3 magnets at first.

3.

| | Number of 10-cent coins | : | Number of 50-cent coins |
|---|---|---|---|
| *Before* | 1 (×2) | : | 2 (×2) |
| | 2 | : | 4 |
| *After* | 5 | : | 4 |

5 units – 2 units = 3 units
3 units = 12
1 unit = 12 ÷ 3
= 4

Number of 10-cent coins at first = 2 × 4
= 8

Amount in 10-cent coins at first = 8 × 10 cents
= 80 cents

Number of 50-cent coins at first = 4 × 4
= 16

Amount in 50-cent coins at first = 16 × 50 cents
= 800 cents

Total amount of all the coins at first = 800 + 80 or \$8 + \$0.80
= 880 cents or \$8.80

4.

| | Number of students in Bus A | : | Number of students in Bus B | : | Total number of students |
|---|---|---|---|---|---|
| *Before* | 5 | : | 4 | : | **9** |
| *After* | 1 (×3) → 3 | : | 2 (×3) → 6 | : | 3 (×3) → **9** |

6 units – 4 units = 2 units or 5 units – 3 units = 2 units
2 units = 14
1 unit = 14 ÷ 2
= 7
5 units = 5 × 7
= 35

There were 35 students in Bus A before the transfer.

5.

| | Number of employees in Company P | : | Number of employees in Company Q | : | Total number of employees |
|---|---|---|---|---|---|
| *Before* | 7 (×5) → 35 | : | 5 (×5) → 25 | : | 12 (×5) → **60** |
| *After* | 2 (×12) → 24 | : | 3 (×12) → 36 | : | 5 (×12) → **60** |

36 units – 25 units = 11 units or 35 units – 24 units = 11 units
11 units = 55
1 unit = 55 ÷ 11
= 5
25 units = 25 × 5
= 125

There were 125 employees in Company Q at first.

6.

| | Number of sweets Ali had | : | Number of sweets Raja had | Difference |
|---|---|---|---|---|
| *Before* | 6 (×3) → 18 | : | 5 (×3) → 15 | 1 (×3) → **3** |
| *After* | 13 | : | 10 | **3** |

18 units – 13 units = 5 units or 15 units – 10 units = 5 units
5 units = 20
1 unit = 20 ÷ 5
= 4
18 units = 18 × 4
= 72

Ali had 72 sweets at first.

7.

| | Number of stalks of carnations | : | Number of stalks of tulips | : | Difference |
|---|---|---|---|---|---|
| *Before* | 1 (×4) → 4 | : | 4 (×4) → 16 | : | 3 (×4) → **12** |
| *After* | 5 (×3) → 15 | : | 9 (×3) → 27 | : | 4 (×3) → **12** |

15 units – 4 units = 11 units or 27 units – 16 units = 11 units
4 units = 40
1 unit = 40 ÷ 4
= 10
11 units = 11 × 10
= 110

110 + 110 = 220

She bought 220 stalks of carnations and tulips altogether.

**Worksheet 8**

1.

| | Number of stickers Janice had | : | Number of stickers Wendy had | Difference |
|---|---|---|---|---|
| *Before* | 3 (×3) → 9 | : | 5 (×3) → 15 | 2 (×3) → **6** |
| *After* | 5 (×2) → 10 | : | 8 (×2) → 16 | 3 (×2) → **6** |

10 units – 9 units = 1 unit or 16 units – 15 units = 1 unit
1 unit = 10
10 units = 10 × 10
= 100

100 + 30 = 130

Janice had 130 stickers.

16 units = 16 × 10
= 160

Wendy had 160 stickers.

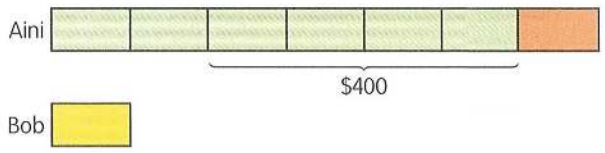
160 – 130 = 30

Wendy had 30 more stickers than Janice in the end.

2. *Before*


| | Amount of money Aini had | : | Amount of money Bob had | : | Total amount of money |
|---|---|---|---|---|---|
| = | 3 (×2) | : | 1 (×2) | : | 4 (×2) |
| = | 6 | : | 2 | : | **8** |

*After*



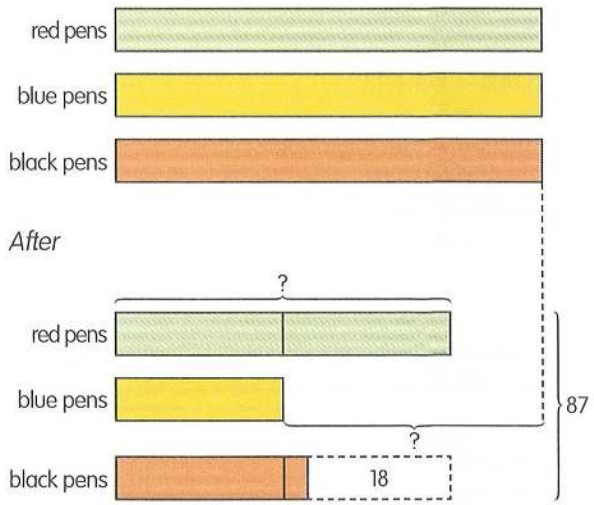

| | Amount of money Aini had | : | Amount of money Bob had | : | Total amount of money |
|---|---|---|---|---|---|
| = | 7 | : | 1 | : | **8** |

6 units – 2 units = 4 units
4 units = $400
1 unit = $400 ÷ 4
= $100

Bob must give $100 to Aini so that the ratio of the amount of money Aini had to the amount of money Bob had would become 7 : 1.

**Problem Solving**

1. (a) *Before*




*After*




87 + 18 = 105

5 units = 105
1 unit = 105 ÷ 5
= 21
2 units = 2 × 21
= 42

42 red pens were left.

(b) 42 – 18 = 24

24 black pens were left.

29 + 24 = 53

There were 53 black pens at first.

53 – 21 = 32

32 blue pens were given away.

2. (a)

**Bag P**

| | Number of red apples | : | Number of green apples | : | Total number of apples |
|---|---|---|---|---|---|
| = | 2 (×4) | : | 1 (×4) | : | 3 (×4) |
| = | 8 | : | 4 | : | 12 |

**Bag Q**

| | Number of red apples | : | Number of green apples | : | Total number of apples |
|---|---|---|---|---|---|
| = | 1 | : | 3 | : | 4 |

The ratio of the number of red apples in Bag P to the number of green apples in Bag Q is 8 : 3.

(b)

**Bag Q**

| | Number of red apples | : | Number of green apples | : | Total number of apples |
|---|---|---|---|---|---|
| *Before* | 1 (×2) | : | 3 (×2) | : | 4 (×2) |
| | 2 | : | **6** | : | 8 |
| *After* | 3 (×3) | : | 2 (×3) | : | 5 (×3) |
| | 9 | : | **6** | : | 15 |

9 units – 2 units = 7 units
7 units = 14
1 unit = 14 ÷ 7
= 2
8 units = 8 × 2
= 16
16 × 3 = 48
48 + 16 = 64

The total number of apples in the two bags at first is 64.

**Self-Test**

*Section A*

1. (1) 2. (4) 3. (3) 4. (3) 5. (4)

*Section B*

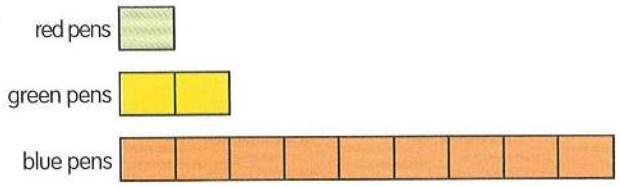
6. 130 – 50 = 80
80 ÷ 2 = 40
(50 + 40) : 40 = 90 : 40
= 9 : 4

The ratio of the number of girls to the number of boys is 9 : 4.

7. $34 + 22 = 56$
$7 \text{ units} = 56$
$1 \text{ unit} = 56 \div 7$
$= 8$
$3 \text{ units} = 3 \times 8$
$= 24$

Marvin has 24 clips.

8.




1 unit + 2 units + 9 units = 12 units

$\frac{9}{12} = \frac{3}{4}$

The number of blue pens is $\frac{3}{4}$ of the total number of pens.

9.

| | Number of buns Meng had | : | Number of buns Kelvin had | : | Total number of buns |
|---|---|---|---|---|---|
| *Before* | 5 | : | 7 | : | **12** |
| *After* | 2 (×4) → 8 | : | 1 (×4) → 4 | : | 3 (×4) → **12** |

8 units − 5 units = 3 units or 7 units − 4 units = 3 units
$3 \text{ units} = 24$
$1 \text{ unit} = 24 \div 3$
$= 8$
$7 \text{ units} = 7 \times 8$
$= 56$

Kelvin had 56 buns at first.

10. **Purse A**

| | Number of Malaysian coins | : | Number of Singapore coins |
|---|---|---|---|
| = | 4 | : | 5 |
| = | 3 (×3) → 9 | : | 2 (×3) → 6 |

4 units + 5 units = 9 units

The total number of coins in Purse A is represented by 9 units.

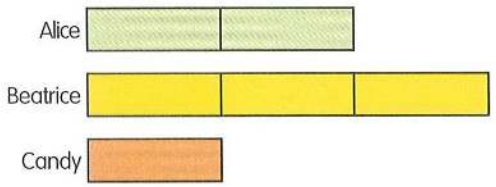
| | Number of coins in Purse A | : | Number of coins in Purse B |
|---|---|---|---|
| = | 3 (×3) → 9 | : | 2 (×3) → 6 |

The total number of coins in Purse B is represented by 6 units.

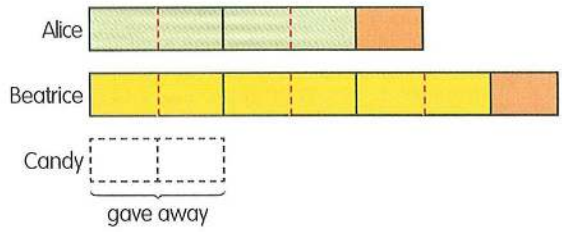
6 units − 4 units = 2 units
$2 \text{ units} = 16$
$1 \text{ unit} = 16 \div 2$
$= 8$
$5 \text{ units} = 5 \times 8$
$= 40$

There are 40 Singapore coins.

11. (a) *Before*




*After*




The ratio of the number of buttons Beatrice has to the number of buttons Alice has now is 7 : 5.

(b) $22 \div 2 = 11$
$1 \text{ small unit} = 11$
$5 \text{ small units} = 5 \times 11$
$= 55$

Alice has 55 buttons now.

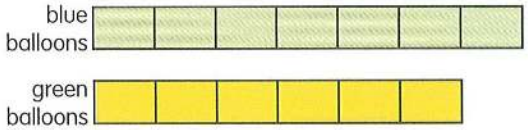
**Challenge**

(a) Fraction of blue balloons at first = $\frac{7}{13}$

Fraction of blue balloons in the end = $\frac{7}{10}$

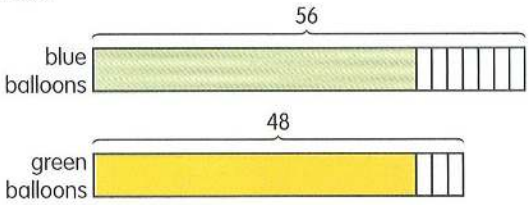
The fraction of blue balloons increased in the end.

(b) *Before*




$13 \text{ units} = 104$
$1 \text{ unit} = 104 \div 13$
$= 8$
$7 \text{ units} = 7 \times 8$ (blue balloons)
$= 56$
$6 \text{ units} = 6 \times 8$ (green balloons)
$= 48$

*After*




7 units − 3 units = 4 units
$4 \text{ units} = 56 - 48$
$= 8$
$1 \text{ unit} = 8 \div 4$
$= 2$
$7 \text{ units} = 7 \times 2$
$= 14$

There are 14 blue balloons left.

3 units = 3 × 2
= 6

There are 6 green balloons left.

56 – 14 = 42 (blue balloons)
48 – 6 = 42 (green balloons)
42 + 42 = 84

Tim burst 84 balloons altogether.

## 4 Percentage

### Part 1: Finding the Whole Given a Part and the Percentage

#### Worksheet 1

1. 80% → $20
1% → $20 ÷ 80 = $0.25
100% → $0.25 x 100 = $25

The usual price of the dictionary was $25.

2. David's monthly salary → 100%

15% → $420
1% → $420 ÷ 15 = $28
100% → $28 × 100 = $2800

David's monthly salary is $2800.

3. 100% – 30% = 70%

70% → 490 ml
1% → 490 ÷ 70 = 7 ml
100% → 7 × 100 = 700 ml

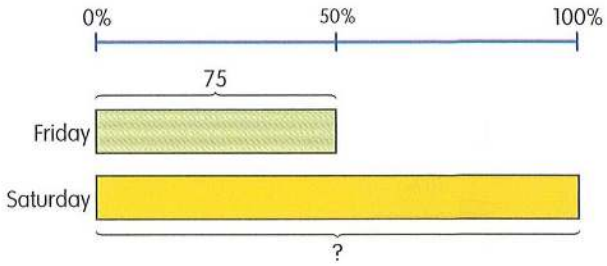
The amount of oil in the container was 700 ml at first.

4. 60% → 540
1% → 540 ÷ 60 = 9
100% → 9 × 100 = 900

The whole number is 900.

#### Worksheet 2

1.




50% → 75
100% → 75 × 2 = 150

150 muffins were sold on Saturday.

2. $128 – $38 = $90

75% → $90
1% → $90 ÷ 75 = $1.20
100% → $1.20 × 100 = $120

Serene had $120 at first.

3.


3 small units = 18%

1 small unit = 18% ÷ 3
= 6%

4 small units = 4 × 6%
= 24%

100% – 24% = 76%

76% → 152
1% → 152 ÷ 76 = 2
100% → 2 × 100 = 200

The total number of pages in the storybook was 200.

#### Worksheet 3

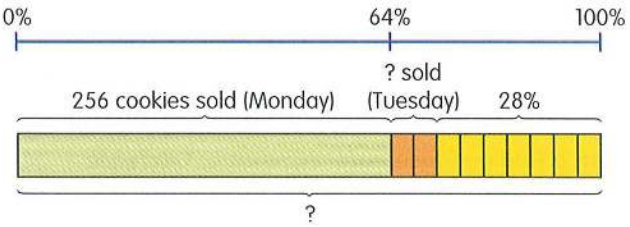
1. (a) $\frac{3}{5} \times 70\% = 42\%$ or $\frac{2}{5} \times 70\% = 28\%$
28% + 30% = 58%
100% – 58% = 42%

42% of his money was left.

(b) 42% → $96.60
1% → $96.60 ÷ 42 = $2.30
100% → $2.30 × 100 = $230

Robert had $230 at first.

2. (a)




7 small units = 28% or $\frac{7}{9}$ of remainder → 28%

1 small unit = 28% ÷ 7
= 4%
$\frac{1}{9}$ of remainder → 28% ÷ 7
= 4%

9 small units = 9 × 4%
= 36%
$\frac{9}{9}$ of remainder → 9 × 4%
= 36%

100% – 36% = 64%

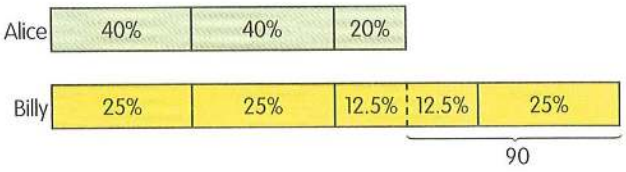
64% → 256
1% → 256 ÷ 64 = 4
8% → 4 × 8 = 32

Paul sold 32 cookies on Tuesday.

(b) 100% → 4 × 100 = 400

Paul baked 400 cookies at first.

3.




25% ÷ 2 = 12.5%
25% + 12.5% = 37.5%

37.5% → 90
1% → 90 ÷ 37.5 = 2.4

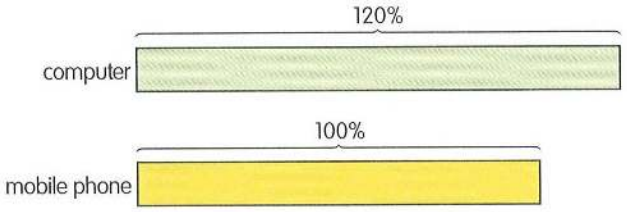
25% + 25% + 12.5% = 62.5%

62.5% of Billy's coins is equal to 100% of Alice's coins.

62.5% × 2.4 = 150

Alice has 150 coins.

4.




$\frac{80}{100}$ × 120% = 96% (computer)

$\frac{75}{100}$ × 100% = 75% (mobile phone)

96% – 75% = 21%

21% → $105
1% → $105 ÷ 21 = $5
100% → $5 × 100 = $500

The usual price of the mobile phone was $500.

## Part 2: Finding Percentage Increase or Decrease

### Worksheet 4

1. $250 – $215 = $35

$\frac{35}{250}$ × 100% = 14%

The percentage decrease in the price is 14%.

2. 55 – 50 = 5

$\frac{5}{50}$ × 100% = 10%

The percentage increase in Rachel's mass is 10%.

3. 75 – 60 = 15

$\frac{15}{75}$ × 100% = 20%

The percentage decrease in her test score is 20%.

4. 1715 – 315 = 1400

$\frac{315}{1400}$ × 100% = 22.5%

The percentage increase in the number of boys is 22.5%.

### Worksheet 5

1. 132% → 792
1% → 792 ÷ 132 = 6
100% → 6 × 100 = 600

Marvin collected 600 stamps before the increase.

2. 120% → $3600
1% → $3600 ÷ 120 = $30
100% → $30 × 100 = $3000

His salary was $3000 before the increase.

3. 70% → 63
1% → 63 ÷ 70 = 0.9
100% → 0.9 × 100 = 90

He scored 90 marks for his first Chinese test.

4. 80 – 20 = 60

150% → 60
1% → 60 ÷ 150 = 0.4
100% → 0.4 × 100 = 40

She had 40 roses at first.

### Worksheet 6

1. $\frac{2}{7}$ × 420 = 120

120 – 44 = 76

$\frac{76}{120}$ × 100% = 63.33% (correct to 2 decimal places)

The percentage decrease in the number of stickers Devi had was about 63.33%.

2. 20% of his savings was 10% of his spending.

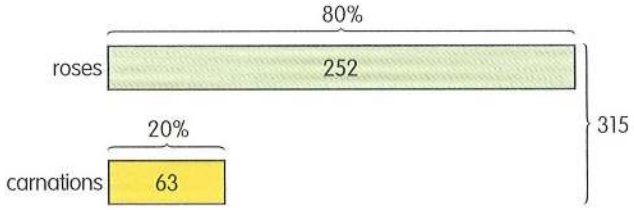
20% of his savings → $\frac{10}{100}$ × $1300 = $130

100% of his savings → $130 × 5 = $650

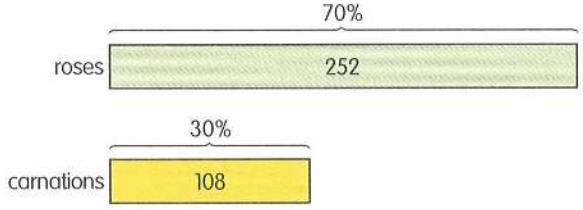
$1300 + $650 = $1950

Mike's salary was $1950.

3. *Before*




*After*




$\frac{80}{100}$ × 315 = 252

She had 252 roses at first.

315 − 252 = 63

She had 63 carnations at first.

70% ⟶ 252
1% ⟶ 252 ÷ 70 = 3.6
30% ⟶ 3.6 × 30 = 108

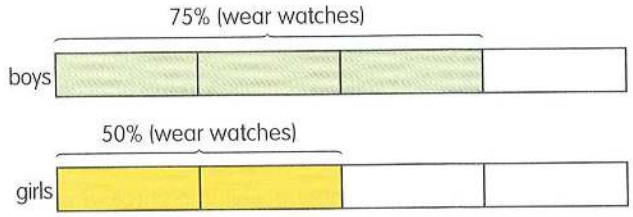
108 − 63 = 45

She bought 45 stalks of carnations.

## Part 3: Word Problems

### Worksheet 7

1.




5 units = 20 (children who wear watches)
1 unit = 20 ÷ 5
= 4

3 units = 3 × 4
= 12

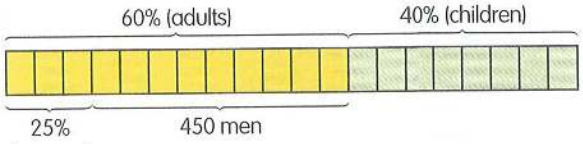
12 children do not wear watches.

2. Mr Chen ⟶ 65%
Mr Lee ⟶ 100%

165% ⟶ 330
1% ⟶ 330 ÷ 165 = 2
35% ⟶ 2 × 35 = 70

Mr Lee sold 70 more scooters than Mr Chen.

3. (a)




$\frac{25}{100} \times 60\% = 15\%$

15% of the audience were women.

60% − 15% = 45%

45% of the audience were men.

45% ⟶ 450
1% ⟶ $\frac{450}{45} = 10$
60% ⟶ 10 × 60 = 600

600 adults attended the concert.

(b) 60% ⟶ 600
1% ⟶ 600 ÷ 60 = 10
40% ⟶ 10 × 40 = 400

400 children attended the concert.

(c) 400 − 219 = 181 (girls)
600 + 400 = 1000

$\frac{181}{1000} \times 100\% = 18.1\%$

18.1% of the audience were girls.

4. (a) 100% − 15% − 25% − 35% = 25%

The percentage of pears was 25% at first.

Number of pears = $\frac{25}{100} \times 280$
= 70

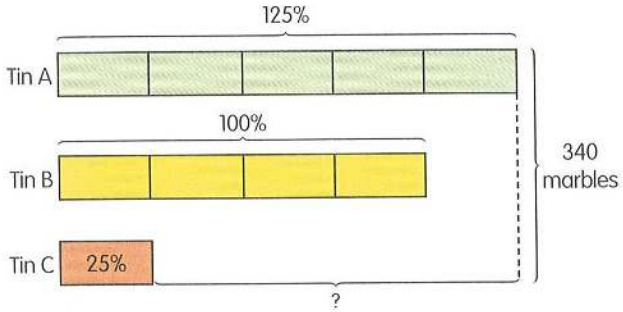
Percentage decrease in the number of pears
= $\frac{2}{70} \times 100\%$
= 2.86% (correct to 2 decimal places)

(b) Number of apples, oranges and pears left in the end
= $(\frac{15 + 25 + 25}{100} \times 280) - 2$
= 180

60% of new total ⟶ 180
1% of new total ⟶ 180 ÷ 60 = 3
40% of new total ⟶ 3 × 40 = 120

Mr Wong had 120 mangoes in the end.

5.



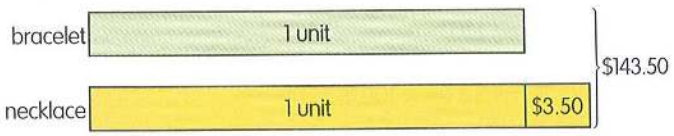

| Marbles in Tin A | : | Marbles in Tin B | : | Marbles in Tin C |
|---|---|---|---|---|
| = 5 | : | 4 | : | 1 |

10 units = 340
1 unit = 340 ÷ 10
= 34
4 units = 34 × 4
= 136

There were 136 more marbles in Tin A than in Tin C.

### Worksheet 8

1. (a)




2 units + $3.50 = $143.50

2 units = $143.50 − $3.50
= $140

1 unit = $140 ÷ 2
= $70

Mary paid $70 for the bracelet.

(b) 100% – 20% = 80%

80% → \$70
20% → \$70 ÷ 4 = \$17.50

The discount for the bracelet was \$17.50.

\$42 – \$17.50 = \$24.50

The discount for the necklace was \$24.50.

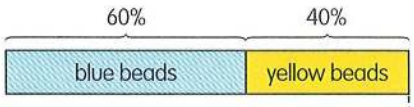
\$70 + \$3.50 + \$24.50 = \$98

The actual price of the necklace was \$98.

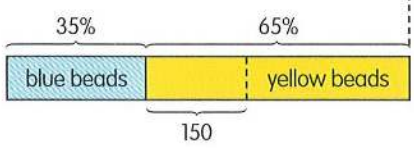
$\frac{24.50}{98} \times 100\% = 25\%$

The percentage discount given for the necklace was 25%.

2. *Before*




*After*




(a) 100% – 35% = 65%

In the end, 65% of the beads were yellow beads.

$65\% = \frac{65}{100}$

$= \frac{13}{20}$

$\frac{13}{20}$ of the beads were yellow beads.

(b) 60% – 35% = 25%

25% → 150

$100\% \rightarrow \frac{150}{25} \times 100 = 600$

John had 600 beads at first.

**Problem Solving**

1. (a) Total Cost → Alex (25%); Remainder (75%) → Ben (30%); Cindy (70%)

Alex → 25%

Ben → $\frac{30}{100} \times 75\% = 22.5\%$ (of total)

Cindy → $\frac{70}{100} \times 75\% = 52.5\%$ (of total)

52.5% → \$107.10
1% → \$107.10 ÷ 52.5 = \$2.04
100% → \$2.04 × 100 = \$204

120% → \$204
1% → \$204 ÷ 120 = \$1.70
100% → \$1.70 × 100 = \$170

The original cost of the gift was \$170.

(b) 22.5% → \$2.04 × 22.5 = \$45.90

Ben had to pay \$45.90 in the end.

2. (a) 20% → 44

$1\% \rightarrow \frac{44}{20} = 2.2$

100% → 2.2 × 100 = 220 (number of boys in 2016)

$\frac{4}{5} = 80\%$

$80\% \rightarrow \frac{220}{100} \times 80 = 176$ (number of girls in 2016)

220 + 44 + 176 = 440

The total number of children enrolled in 2017 was 440.

(b) In 2018,

100% → 440
1% → 440 ÷ 100 = 4.4
75% → 4.4 × 75 = 330

There were 330 children enrolled in the enrichment centre in 2018.

220 + 176 = 396
In 2016, the total number of children enrolled was 396.

396 – 330 = 66
Decrease in number of children enrolled from 2016 to 2018 was 66.

$\frac{66}{396} \times 100\% = 16.7\%$ (correct to 1 decimal place)

The overall percentage decrease in the number of children enrolled from 2016 to 2018 was 16.7%.

**Self-Test 1**

*Section A*

1. (2) 2. (2) 3. (1) 4. (3) 5. (2)

*Section B*

6. 50%

7. 30% → \$135
1% → \$135 ÷ 30 = \$4.50
100% → \$4.50 × 100 = \$450

8. $\frac{125}{100} \times \$80 = \$100$

$\frac{60}{100} \times \$80 = \$48$

\$48 × 2 = \$96
\$100 + \$96 = \$196

9. 60% of rice without the mass of the box = 32 – 14
= 18 kg
10% of rice without the mass of the box = 18 ÷ 6
= 3 kg
40% of rice without the mass of the box = 4 × 3
= 12 kg
Mass of the empty box = 14 – 12
= 2 kg

10. 60% → angelfish
40% → goldfish

10% of 40% = $\frac{10}{100} \times 40\%$
= 4%

4% → 8
1% → 8 ÷ 4 = 2
60% → 2 × 60 = 120

11. Area of shaded part : Area of triangle

= 3 : 5

Area of triangle → 5 units
Area of shaded part of triangle → 3 units
Area of rectangle → 10 units
Area of shaded part of triangle → 30% of 10 units

$= \frac{30}{100} \times 10$

= 3 units

Area of figure → 15 units − 3 units = 12 units

Fraction of figure that is shaded $= \frac{3}{12}$

$= \frac{1}{4}$

12. (a) 50% → 160
100% → 160 × 2 = 320

Number of senior citizens = 320 − 82 − 42 − 160
= 36

(b) (i) Increase = 86 − 36
= 50
Decrease = 160 − 132
= 28
New total = 82 + 42 + 132 + 86
= 342
Overall Increase = 342 − 320
= 22

(b) (ii) 100% → 320

Percentage increase $= \frac{22}{320} \times 100\%$

= 6.88% (correct to 2 decimal places)

**Challenge**

Asking price $= \$2000 + \$2000 \times \frac{10}{100}$

= \$2200

Discounted selling price $= \$2200 \times \frac{90}{100}$

= \$1980

Therefore, Mrs Tang would lose money if she sold the computer at 10% discount.

## 5 Angles in Geometrical Figures

### Part 1: Finding Unknown Angles in Geometrical Figures

**Worksheet 1**

1. ∠DAC = 90° ÷ 2
= 45°

∠EAD = 180° − 45°
= 135°

2. ∠FHE = 180° − 127° − 31°
= 22°

3. ∠NLJ = 180° − 90° − 38° − 29°
= 23°

4. ∠QRU = 180° − 117°
= 63°

∠QRS = 63° × 2
= 126°

**Worksheet 2**

1. ∠$y$ = (180° − 56°) ÷ 2
= 62°

180° − 56° = 124°

∠$x$ = 180° − 124° − 27°
= 29°

2. (a) ∠$a$ + ∠$b$ = 180° − 143°
= 37°

(b) ∠$c$ = 180° − 15° − 26° − 37°
= 102°

3. ∠QRP = 90° ÷ 2
= 45°
∠TQR = 90° + 60°
= 150°
∠QRT = (180° − 150°) ÷ 2
= 15°
∠TRP = 45° − 15°
= 30°

4. ∠TPS = ∠SPQ = ∠QSP = 57°
∠RSQ = 180° − 57° − 57°
= 66°
∠SQR = 180° − 66° − 41°
= 73°

**Worksheet 3**

1. ∠EDC = 114°
∠CDA = 360° − 148° − 114°
= 98°
∠ABC = 98°
∠$a$ = (180° − 98°) ÷ 2
= 41°

2. ∠PSR = 180° − 38° − 38°
= 104°
∠RST = 180° − 54°
= 126°
∠TSP = 360° − 104° − 126°
= 130°

3. (a) ∠DAC = 180° − 108° − 34°
= 38°
∠ABC = 180° − 38° − 28°
= 114°

(b) ∠CBE = 180° − 114°
= 66°
∠ECB = (180° − 66°) ÷ 2
= 57°
∠FCE = 180° − 34° − 38° − 57°
= 51°

4. **Method 1**

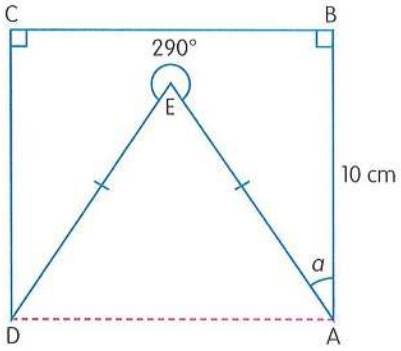
$\angle CGD = 180° - 70°$
$= 110°$
$\angle DGA = 180° - 110°$
$= 70°$
$\angle ADG = 180° - 70° - 60°$
$= 50°$
$\angle EDB = 180° - 60° - 50°$
$= 70°$
$\angle BHD = 180° - 70° - 60°$
$= 50°$

**Method 2**

$\angle CGD = 180° - 70°$
$= 110°$
$\angle DHC = 360° - 110° - 60° - 60°$
$= 130°$
$\angle BHD = 180° - 130°$
$= 50°$

**Problem Solving**

1. Draw a line AD which is parallel to BC.
DAE is an isosceles triangle.




$\angle DEA = 360° - 290°$
$= 70°$
$\angle EAD = (180° - 70°) \div 2$
$= 55°$
$\angle a = 90° - 55°$
$= 35°$

2. $\angle STR$ = 1 unit, then $\angle TRS$ = 2 units.

In triangle RST, 5 units = 180°
1 unit = 180° ÷ 5
= 36°
$\angle TRS$ = 2 units
= 2 × 36°
= 72°
$\angle SOR = 180° - 110°$
$= 70°$
$\angle ORS = (180° - 70°) \div 2$
$= 55°$
$\angle PRT = 72° + 55°$
$= 127°$

**Self-Test 1**

*Section A*

1. (2) 2. (3) 3. (3) 4. (1) 5. (3)

*Section B*

6. $\angle DAB = 180° - 129°$
$= 51°$

7. $\angle CDA = 180° - 40° - 40°$
$= 100°$

8. $\angle ZXY = 60° - 34°$
$= 26°$
$\angle YZX = 180° - 60° - 26°$
$= 94°$

9. $\angle EDA = 180° - 90° - 43°$
$= 47°$
$\angle ADC = 180° - 47° - 47°$
$= 86°$

10. $\angle ECD = 180° - 118°$
$= 62°$
$\angle EBC = 180° - 62° - 37°$
$= 81°$

11. (a) $\angle x = 180° - 60° - 53°$
$= 67°$

(b) $\angle FCB = 180° - 60° - 95°$
$= 25°$
$180° - 67° - 25° = 88°$
$180° - 60° - 88° = 32°$
$\angle y = 180° - 32°$
$= 148°$

12. (a) $\angle DAG$ or $\angle DAB$

(b) $\angle DAB = 180° - 125°$
$= 55°$
$\angle FAG = 55° - 35°$
$= 20°$

(c) $\angle GFA = 180° - 85° - 20°$
$= 75°$
$\angle AFE = 180° - 75°$
$= 105°$

**Challenge**

(a) $\angle PSR = 180° - 46°$
$= 134°$
$\angle RSQ = 46°$
$\angle SQR = 180° - 67° - 46°$
$= 67°$
Since $\angle SQR = \angle QRS$, SQ = SR.
Thus, QRS is an isosceles triangle.

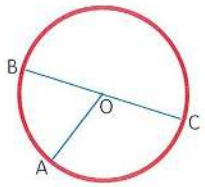
(b) $\angle QST = 180° - 46°$
$= 134°$
$\angle STQ = (180° - 134°) \div 2$
$= 23°$

## 6 Circles

### Part 1: Parts of a Circle

#### Worksheet 1

1. Answers vary.




2. Diameter = **2** × Radius
   Radius = Diameter ÷ **2**

3. $7 \div 2 = 3.5$
   Its radius is 3.5 cm.

4. (a) 9 cm
   (b) 13.5 cm

5. $12 \times 2 = 24$
   Its diameter is 24 cm.

6. (a) 14 cm
   (b) 12 cm

7. (a) $4 \times 2 = 8$
   The diameter of each small circle is 8 cm.

   (b) $8 \times 2 = 16$
   The side of the big square is 16 cm.

### Part 2: Circumference of a Circle

#### Worksheet 2

1. (a) Circumference $= 2 \times \pi \times 9$
   $= 18\pi$ cm

   (b) Circumference $= 2 \times \pi \times 10.5$
   $= 21\pi$ cm

2. (a) Answer varies for estimated circumference
   Calculated circumference $= \pi \times 30$
   $= 94.25$ cm

   (b) Answer varies for estimated circumference
   Calculated circumference $= 2 \times \pi \times 20.5$
   $= 128.81$ cm

3. (a) Circumference $= \pi \times 56$
   $= 176$ cm

   (b) Circumference $= 2 \times \pi \times 49$
   $= 308$ m

4. (a) Circumference $= \pi \times 22$
   $= 69.08$ cm

   (b) Circumference $= 2 \times \pi \times 23.5$
   $= 147.58$ m

#### Worksheet 3

1. Circumference of one circle $= 2 \times \pi \times 5$
   $= 3.14 \times 10$
   $= 31.4$ cm

   10 m = 1000 cm
   $1000 \div 31.4 \approx 31.85$

   The greatest number of such circles Kelvin can form is 31.

2. Distance between Point A and Point B
   $= \frac{22}{7} \times 28 + 28 + \frac{22}{7} \times 28$
   $= 204$ cm

3. Distance covered by one wheel $= 2 \times 3.14 \times 20$
   $= 3.14 \times 40$
   $= 125.6$ cm

   Total distance covered by Wheel P and Wheel Q in one second $= 125.6 + 125.6$
   $= 251.2$ cm

   Time taken for both wheels to hit each other
   $= 7536 \div 251.2$
   $= 30$ seconds

### Part 3: Perimeter of a Semicircle and a Quarter Circle

#### Worksheet 4

1. Perimeter of figure $= (\pi \times 4) + 4 + (\pi \times 4) + 4$
   $= 4\pi + 4 + 4\pi + 4$
   $= (8 + 8\pi)$ cm

2. Perimeter of figure $= 2 \times \frac{1}{2} \times \frac{22}{7} \times 14 + 7 + 7 + 7 + 7$
   $= 72$ cm

3. Length of arc DE $= \frac{1}{2} \times \frac{22}{7} \times 28$
   $= 44$ cm

   Length of arc CF $= \frac{1}{2} \times \frac{22}{7} \times 56$
   $= 88$ cm

   Length of arc BG $= \frac{1}{2} \times \frac{22}{7} \times 84$
   $= 132$ cm

   Length of arc AH $= \frac{1}{2} \times \frac{22}{7} \times 112$
   $= 176$ cm

   Length of AH $= 8 \times 14$
   $= 112$ cm

   Total length of wire used $= 44 + 88 + 132 + 176 + 112$
   $= 552$ cm

4. Length of arc of quarter circle $= \frac{1}{4} \times \frac{22}{7} \times 56$
   $= 44$ cm

   Length of arc of semicircle $= \frac{1}{2} \times \frac{22}{7} \times 28$
   $= 44$ cm

   Perimeter of shaded part $= 44 + 44 + 14 + 14 + 28 + 28$
   $= 172$ cm

## Part 4: Area of a Circle, a Semicircle and a Quarter Circle

### Worksheet 5

1. Area of shaded part $= \pi \times 20 \times 20 - \pi \times 10 \times 10$
$= 400\pi - 100\pi$
$= 300\pi$
$= 942.48 \text{ cm}^2$ (correct to 2 decimal places)

2. Area of unshaded semicircle $= \frac{1}{2} \times \pi \times 6 \times 6$
$= 18\pi \text{ cm}^2$
Area of big semicircle $= \frac{1}{2} \times \pi \times 12 \times 12$
$= 72\pi \text{ cm}^2$
Area of shaded part $= 72\pi - 18\pi$
$= 54\pi \text{ cm}^2$

3. Area of big semicircle $= \frac{1}{2} \times 3.14 \times 13 \times 13$
$= 265.33 \text{ cm}^2$
Area of small semicircle $= \frac{1}{2} \times 3.14 \times 7 \times 7$
$= 76.93 \text{ cm}^2$
Area of one shaded part $= 265.33 - 76.93$
$= 188.4 \text{ cm}^2$
Total area of shaded parts $= 188.4 \times 3$
$= 565.2 \text{ cm}^2$

4. Area of two semicircles $= \frac{22}{7} \times 14 \times 14$
$= 616 \text{ cm}^2$
Total area of unshaded parts $= 616 - 144 - 144$
$= 328 \text{ cm}^2$

## Part 5: Area and Perimeter of Composite Figures

### Worksheet 6

1. Area of triangle $= \frac{1}{2} \times 24 \times 12$
$= 144 \text{ cm}^2$
Area of circle $= \pi \times 12 \times 12$
$= 144\pi \text{ cm}^2$
Area of shaded part $= (144\pi - 144) \text{ cm}^2$

2. Perimeter of figure $= \frac{1}{2} \times 3.14 \times 20 + 40$
$= 71.4 \text{ cm}$

3. (a) Area of circle $= 3.14 \times 10 \times 10$
$= 314 \text{ cm}^2$

(b) Area of rectangle $= 28 \times 20$
$= 560 \text{ cm}^2$
Area of semicircle excluding part Z $= 560 - 314 - 112$
$= 134 \text{ cm}^2$
Area of semicircle $= 314 \div 2$
$= 157 \text{ cm}^2$
Area of part Z $= 157 - 134$
$= 23 \text{ cm}^2$

4. (a) $\frac{22}{7} \times 14 + \frac{1}{4} \times \frac{22}{7} \times 28 = 66$
The perimeter of the shaded part is 66 cm.

(b) $\frac{22}{7} \times 7 \times 7 = 154$
$14 \times 14 = 196$
$\frac{1}{4} \times \frac{22}{7} \times 14 \times 14 = 154$
$154 + 196 - 154 = 196$
The area of the shaded part is 196 $\text{cm}^2$.

5. (a) 5 units = 45 cm
1 unit = 9 cm
Radius of the small semicircle $= 18 \div 2$
$= 9 \text{ cm}$
Radius of the medium semicircle $= 27 \div 2$
$= 13.5 \text{ cm}$
Radius of the large semicircle $= 45 \div 2$
$= 22.5 \text{ cm}$
Perimeter of shaded part
$= (\pi \times 22.5) + (\pi \times 13.5) + (\pi \times 9)$
$= 141.4 \text{ cm}$ (correct to 1 decimal place)

(b) Area of shaded part
$= (\frac{1}{2} \times \pi \times 22.5 \times 22.5) + (\frac{1}{2} \times \pi \times 13.5 \times 13.5)$
$- (\frac{1}{2} \times \pi \times 9 \times 9)$
$= 954.3 \text{ cm}^2$ (correct to 1 decimal place)

### Worksheet 7

1. (a) Length of arc of the big semicircle
$= \frac{1}{2} \times 3.14 \times 13$
$= 20.41 \text{ cm}$
Length of arc of the semicircle with AB as diameter
$= \frac{1}{2} \times 3.14 \times 12$
$= 18.84 \text{ cm}$
Length of arc of the semicircle with BC as diameter
$= \frac{1}{2} \times 3.14 \times 5$
$= 7.85 \text{ cm}$
Perimeter of the shaded part $= 20.41 + 18.84 + 7.85$
$= 47.1 \text{ cm}$

(b) Area of triangle ABC $= \frac{1}{2} \times 5 \times 12$
$= 30 \text{ cm}^2$

(c) Area of semicircle with BC as diameter
$= \frac{1}{2} \times 3.14 \times 2.5 \times 2.5$
$= 9.8125 \text{ cm}^2$
Area of semicircle with AB as diameter
$= \frac{1}{2} \times 3.14 \times 6 \times 6$
$= 56.52 \text{ cm}^2$
Total area of figure $= 30 + 9.8125 + 56.52$
$= 96.3325 \text{ cm}^2$
Area of semicircle with AC as diameter
$= \frac{1}{2} \times 3.14 \times 6.5 \times 6.5$
$= 66.3325 \text{ cm}^2$
Area of shaded part $= 96.3325 - 66.3325$
$= 30 \text{ cm}^2$

2. Area of the big circle $= 3.14 \times 5 \times 5$
$= 78.5 \text{ cm}^2$

Area of the 2 semicircles $= 3.14 \times 2.5 \times 2.5$
$= 19.625 \text{ cm}^2$

Area of the triangle $= \frac{1}{2} \times 10 \times 10$
$= 50 \text{ cm}^2$

Total area of shaded parts $= 78.5 + 19.625 - 50$
$= 48.125 \text{ cm}^2$

3. (a) Length of arc of 1 big quarter circle
$= \frac{1}{4} \times \frac{22}{7} \times 28$
$= 22 \text{ cm}$

Length of arc of 4 big quarter circles $= 22 \times 4$
$= 88 \text{ cm}$

Length of arc of 1 small semicircle $= \frac{22}{7} \times 7$
$= 22 \text{ cm}$

Length of arc of 2 small semicircles $= 22 \times 2$
$= 44 \text{ cm}$

Perimeter of shaded figure $= 88 + 44 + (2 \times 14)$
$= 160 \text{ cm}$

(b) Total area of 4 squares $= 4 \times 14 \times 14$
$= 784 \text{ cm}^2$

Area of 1 small circle $= \frac{22}{7} \times 7 \times 7$
$= 154 \text{ cm}^2$

Area of shaded figure $= 784 - 154$
$= 630 \text{ cm}^2$

4. (a) Area of a square $= 10 \times 10$
$= 100 \text{ cm}^2$

Area of one quarter circle $= \frac{1}{4} \times 3.14 \times 10 \times 10$
$= 78.5 \text{ cm}^2$

Total area of A and the shaded part $= 100 - 78.5$
$= 21.5 \text{ cm}^2$

Area of shaded part : Area of A
1 : 4

5 units $= 21.5 \text{ cm}^2$
1 unit $= 21.5 \div 5$
$= 4.3 \text{ cm}^2$
4 units $= 4.3 \times 4$
$= 17.2 \text{ cm}^2$

Area of B $= 78.5 - 17.2$
$= 61.3 \text{ cm}^2$

(b) $\frac{4.3}{100} \times 100\% = 4.3\%$

The percentage of the square that is shaded is 4.3%.

**Problem Solving**

1. Length of copper wire $= 46 \times 5$
$= 230 \text{ cm}$

2 big semicircles form a big circle.

Circumference of big circle $= 2 \times \frac{22}{7} \times 21$
$= 132 \text{ cm}$

2 small semicircles form a small circle.

Circumference of small circle $= \frac{22}{7} \times 21$
$= 66 \text{ cm}$

Length of copper wire used for the second figure
$= 132 + 66$
$= 198 \text{ cm}$

Length of copper wire left $= 230 - 198$
$= 32 \text{ cm}$

2. Area of quarter circle $= \frac{1}{4} \times \pi \times 10 \times 10$
$= 25\pi \text{ cm}^2$

Area of triangle ABC $= \frac{1}{2} \times 10 \times 10$
$= 50 \text{ cm}^2$

Area of triangle BDE $= \frac{1}{2} \times 5 \times 5$
$= 12.5 \text{ cm}^2$

Difference between the shaded areas of P and Q
$= 25\pi - 50 - 12.5$
$= 16.04 \text{ cm}^2$ (correct to 2 decimal places)

**Self-Test 1**

*Section A*

1. (1) 2. (4) 3. (4) 4. (3) 5. (3)

*Section B*

6. For one complete turn, distance covered
$= \frac{22}{7} \times 70$
$= 220 \text{ cm}$

220 m = 22 000 cm

Number of complete turns made $= 22\,000 \div 220$
$= 100$

7. Length of arc of 1 semicircle $= \frac{1}{2} \times \pi \times 6$
$= 3\pi \text{ cm}$

Length of arc of 3 semicircles $= 3\pi \times 3$
$= 9\pi \text{ cm}$

The length of the wire is $9\pi$ cm.

8. Area of circle $= 3.14 \times 20 \times 20$
$= 1256 \text{ cm}^2$

Area of shaded part $= 1256 - 756$
$= 500 \text{ cm}^2$

9. $7 \times 14 = 98$

$(\frac{1}{2} \times 2 \times \frac{22}{7} \times 7) = 22$

$98 + 22 = 120$

The perimeter of the figure is 120 cm.

10. (a) Area of circle = Area of rectangle

$= \frac{22}{7} \times 14 \times 14$

$= 616 \text{ cm}^2$

(b) Breadth of Rectangle = Radius of circle

Length of Rectangle $= 616 \div 14$

$= 44$

$44 - 14 = 30$ cm

Length of arc of quarter circle $= \frac{1}{4} \times \frac{22}{7} \times 28$

$= 22$ cm

Perimeter of shaded part $= 44 + 22 + 30 + 14$

$= 110$ cm

11. (a) Length of arc of 1 semicircle $= \frac{1}{2} \times 3.14 \times 10$

$= 15.7$ cm

Length of arc of 4 semicircles $= 4 \times 15.7$

$= 62.8$ cm

Total perimeter of the shaded parts $= 62.8 + 10 + 10$

$= 82.8$ cm

(b) Area of rectangle $= 20 \times 10$

$= 200 \text{ cm}^2$

Area of 1 semicircle $= \frac{1}{2} \times 3.14 \times 5 \times 5$

$= 39.25 \text{ cm}^2$

Area of 4 semicircles $= 4 \times 39.25$

$= 157 \text{ cm}^2$

Total area of shaded parts $= 200 - 157$

$= 43 \text{ cm}^2$

**Challenge**

(a) There were 12 holes when Figure 4 was unfolded since the square paper was folded twice.

(b) Length of original square $= 10 + 4$

$= 14$ cm

Area of square $= 14 \times 14$

$= 196 \text{ cm}^2$

Area of 12 circles $= 12 \times 3.14 \times 0.5 \times 0.5$

$= 9.42 \text{ cm}^2$

Area of the remaining piece of paper

$= (196 - 9.42)$

$= 186.58 \text{ cm}^2$

## Mid-Year Review

**Paper 1**

*Section A*

| | | | | |
|---|---|---|---|---|
| 1. (2) | 2. (1) | 3. (2) | 4. (2) | 5. (3) |
| 6. (4) | 7. (4) | 8. (3) | 9. (2) | 10. (2) |
| 11. (1) | 12. (3) | 13. (2) | 14. (2) | 15. (2) |

*Section B*

16. $3m + 14m + 32 - 29 = 17m + 3$

17. 80% → \$1600

1% → \$1600 ÷ 80 = \$20

100% → \$20 × 100 = \$2000

18. $\frac{1}{12}$

19. 4 : 2 = 2 : 1

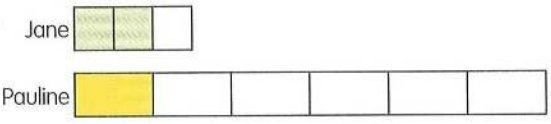
20. $\angle SPQ = 60°$

$\angle QRP = 180° - 90° - 60°$

$= 30°$

21. $18\frac{2}{3}$

22.




$\frac{2}{3}$ of Jane's stickers = $\frac{1}{6}$ of Pauline's stickers

$\frac{1}{6} = \frac{2}{12}$

| | Number of stickers Jane has | : | Total number of stickers |
|---|---|---|---|
| = | 3 | : | 12 + 3 |
| = | 3 | : | 15 |
| = | 1 | : | 5 |

23. $p \times 23 = 23p$ cents

$23p$ cents = \$0.23$p$

\$(30 − 0.23$p$)

24. $\frac{8}{9} \div \frac{1}{6} = \frac{8}{9_3} \times \frac{6^2}{1}$

$= \frac{16}{3}$

$= 5\frac{1}{3}$

He could make 5 bow ties.

$\frac{1}{3} \times \frac{1}{6} \text{ m} = \frac{1}{18} \text{ m}$

The length of ribbon left was $\frac{1}{18}$ m.

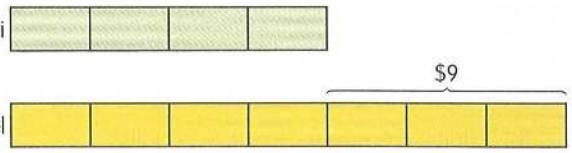
25. 60% → 36

1% → $36 \div 60 = \frac{6}{10}$

100% → $\frac{6}{10} \times 100 = 60$

There are 60 apples in the box altogether.

26.




3 units = $9

1 unit = $9 ÷ 3
= $3

4 units = 4 × $3
= $12

$12 = 1200 cents

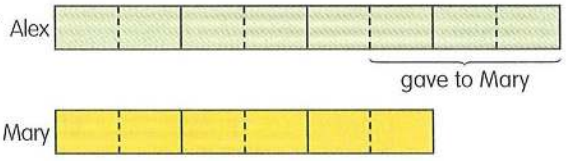
Number of fifty-cent coins Ali has = $\frac{1200}{50}$
= 24

27. Assuming the side of a square is 4 cm, then the area is 16 cm$^2$.
After the length is decreased by 50%, the new length is 2 cm and the new area is 4 cm$^2$.
Difference in area = 12 cm$^2$

Percentage decrease = $\frac{12}{16} \times 100\%$
= 75%

(Accept any other assumptions for length and follow through.)

28.




*Before*

| | Alex's money | : | Mary's money |
|---|---|---|---|
| = | 4 | : | 3 |
| = | 8 | : | 6 |

*After*

8 units – 3 units = 5 units (Alex's money)

6 units + 3 units = 9 units (Mary's money)

The new ratio of Alex's money to Mary's money is 5 : 9.

29.

| Sentence | True | False | Not possible to tell |
|---|---|---|---|
| (a) There are fewer angelfish than guppies. | ✓ | | |
| (b) There are 18 goldfish in the tank. | | ✓ | |

30. 180° – (33° + 33°) = 114°
360° – (114° + 122°) = 124°
$\angle x$ = 180° – 124°
= 56°

**Paper 2**

*Section A*

1. $1\frac{1}{2}$ h + $1\frac{1}{2}$ h + 1 h + 2 h + 2 h = 8 h

$\frac{2}{8} \times 100\% = 25\%$

2. $\angle$FCD = 54°
$\angle$ADF = 180° – 54° – 54° – 22°
= 50°

3. $\frac{7}{11}$

4. 4 × 4 = 16
3 × 3 = 9
$\frac{9}{16} \times 100\% = 56.25\%$

5. Length of square = 10 cm
10 – 2 – 2 = 6
6 ÷ 2 = 3

The radius of the circle is 3 cm.

*Section B*

6.

| | Number of cupcakes Huiling had | : | Number of cupcakes Eva had | : | Total number of cupcakes |
|---|---|---|---|---|---|
| *Before* | 5 | : | 7 | : | **12** |
| *After* | 2 (×4) → 8 | : | 1 (×4) → 4 | : | 3 (×4) → **12** |

7 units – 4 units = 3 units or 8 units – 5 units = 3 units
3 units = 12
1 unit = 12 ÷ 3
= 4
7 units = 7 × 4
= 28

Eva had 28 cupcakes at first.

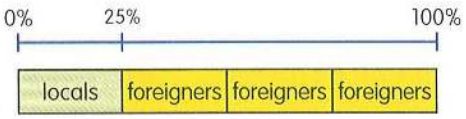
7. Length of arc of each semicircle = $\frac{1}{2} \times \pi \times d$
= $\frac{1}{2} \times \frac{22}{7} \times 7$
= 11 cm

Length of arc of 3 semicircles = 3 × 11
= 33 cm

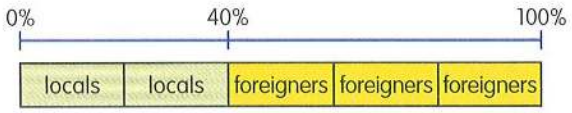
84 – 33 – 16 – 9 = 26
26 ÷ 2 = 13

Length of AB = 13 + 7
= 20 cm

8. *Before*




*After*




(a) decreased
(b) 60%

9. (a) Sum of Devi's age and her mother's age now
$= 97 - 5 - 5$
$= 87$ years

(b) $87 \div 3 = 29$
$29 \times 2 = 58$

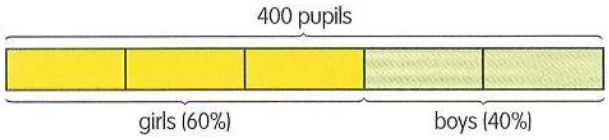
Devi's mother is 58 years old now.

10. (a) $5 \times m + m + 5 + m - 4 = 5m + 2m + 1$
$= 7m + 1$

The total number of toys produced last week was $(7m + 1)$.

(b) $7m + 1 = 701$
$7m = 700$
$m = 700 \div 7$
$= 100$

11.




Number of boys $= \frac{40}{100} \times 400$
$= 160$

Number of girls $= 400 - 160$
$= 240$

Number of boys who passed the Mathematics quiz
$= \frac{80}{100} \times 160$
$= 128$

Number of girls who passed the Mathematics quiz
$= \frac{60}{100} \times 240$
$= 144$

Total number of pupils who passed the Mathematics quiz
$= 128 + 144$
$= 272$

$\frac{272}{400} \times 100\% = 68\%$
68% of the pupils passed the Mathematics quiz.

12. (a) Total number of stalks of flowers sold
$= 75 + 200 + 225 + 150 + 250$
$= 900$

(b) 2 units + 7 units + 3 units = 12 units
12 units = 900
1 unit = $900 \div 12$
$= 75$

7 units – 2 units = 5 units
5 units = $5 \times 75$ or $525 - 150 = 375$
$= 375$

375 more stalks of orchids than carnations were sold from Monday to Friday.

13. (a) $\angle PQU = 45° - 25°$
$= 20°$

$\angle a = (180° - 20°) \div 2$
$= 80°$

(b) $\angle UQR = 25° + 45°$
$= 70°$

UQ = RQ, so UQR is an isosceles triangle.

$\angle RUQ = (180° - 70°) \div 2$
$= 55°$

$\angle b = 180° - (25° + 55°)$
$= 100°$

14. (a)

| | Number of notes Gopal had | : | Number of notes Elaine had | : | Total number of notes |
|---|---|---|---|---|---|
| *Before* | 2 (×7) 14 | : | 3 (×7) 21 | : | 5 (×7) 35 |
| *After* | 1 (×5) 5 | : | 6 (×5) 30 | : | 7 (×5) 35 |

$\$360 \div \$10 = 36$ (ten-dollar notes)

14 units – 5 units = 9 units or 30 units – 21 units = 9 units
9 units = 36
1 unit = $36 \div 9$
$= 4$

5 units = $5 \times 4$
$= 20$

$20 \times \$10 = \$200$

$\$200 + \$360 = \$560$

Gopal had \$560 at first.

(b) At first, the number of notes Elaine had was represented by 21 units.
21 units = $21 \times 4$
$= 84$

$84 \times \$2 = \$168$
$\$168 + \$360 = \$528$
$\$528 - \$200 = \$328$

The difference in the amount of money they had in the end was \$328.

15. (a) Area of shaded figure = Area of two quarter circles

$= 2 \times (\frac{1}{4} \times 3.14 \times 20 \times 20)$

$= 628 \text{ cm}^2$

(b) Perimeter of shaded figure

= (6 x length of arc of a quarter circle) + (20 × 4)

$= (6 \times \frac{1}{4} \times 3.14 \times 40) + (20 \times 4)$

$= 268.4 \text{ cm}$

16. (a) $\frac{30}{100} \times 600 = 180$

Mei had 180 small plastic bottles at first.

(b) $600 - 180 = 420$

$100\% - 40\% = 60\%$

$60\% \rightarrow 420$

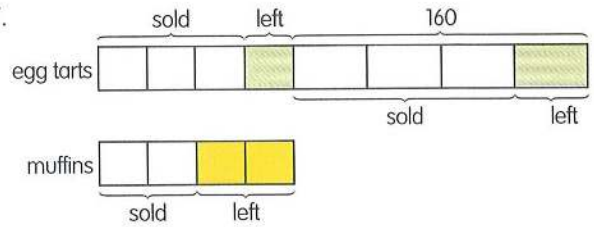
$1\% \rightarrow 420 \div 60 = 7$

$40\% \rightarrow 7 \times 40 = 280$

$280 - 180 = 100$

Mei's neighbour gave her 100 small plastic bottles.

17.




(a) $\frac{3}{4} \times 160 = 120$

Total number of egg tarts sold = 3 units + 120

$160 - 120 = 40$

Total number of egg tarts left = 1 unit + 40

Total number of muffins sold = Total number of muffins left

= 2 units

1 unit + 40 + 2 units = 118

3 units = 118 − 40

= 78

1 unit = 78 ÷ 3

= 26

1 unit + 40 = 26 + 40

= 66

66 egg tarts were not sold.

(b) 3 units + 120 + 2 units = 5 units + 120

$= 5 \times 26 + 120$

= 250

He sold 250 egg tarts and muffins altogether.

# Targeting Mathematics

The Targeting Mathematics Student's Companion is a series that provides pupils with additional practice to complement the Targeting Mathematics Textbooks and Workbooks. Challenging questions in each chapter provide opportunities for pupils to engage in higher-order thinking and problem solving.

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