

# Year 6 Textbook 6 B



Pearson

Series Editor: Tony Staneff



# Year 6 Textbook 6B



**Ash**  
Ash is curious.  
He loves to explore new concepts.

helpful



**Sparks**

brave



**Astrid**

curious



**Flo**

determined



**Dexter**

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This tells you  
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Are you ready  
for some  
more maths?



# How to use this book

These pages make sure we're ready for the unit ahead. Find out what we'll be learning and brush up on your skills!



## Unit II Measure – perimeter, area and volume

**In this unit we will ...**

- ✂ Find and draw shapes with the same area or perimeter
- ✂ Explore how the perimeter changes when the area changes and vice versa
- ✂ Calculate the area of parallelograms and triangles
- ✂ Calculate and estimate the volume of cubes and cuboids

This regular octagon and regular hexagon have the same perimeter. What is the length of one side of the hexagon?

6 cm

Here are some maths words we will be using. Which words are new?

area volume perimeter

parallelogram height perpendicular

width length square centimetres (cm<sup>2</sup>)

square metres (m<sup>2</sup>) base estimate

formula compound shape dimensions

cubic centimetres (cm<sup>3</sup>) cubic metres (m<sup>3</sup>)

Describe the pattern. Draw the next shape. Which shape has the largest perimeter? Which has the largest area? How do you know?

10 cm

9 cm

11 cm

8 cm

12 cm

## Discover

Lessons start with **Discover**.

Here, we explore new maths problems.

Can you work out how to find the answer?

Don't be afraid to make mistakes. Learn from them and try again!

Unit 10: Perimeter – perimeter, area and volume, Lesson 4

### Problem solving – area

Discover

Holly

- 1 The garden has two paths that are perpendicular to each other. Each path is 2 m wide.
  - a) What is the total area of the paths?
  - b) What is the total area of the grass?

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# Share

Next, we share our ideas with the class.

Did we all solve the problems the same way?  
What ideas can you try?

**Share**

a) This path is the shape of a rectangle.  This path is the shape of a parallelogram. 

Area of the rectangle =  $8 \times 2 = 16 \text{ m}^2$   
Area of the parallelogram =  $10 \times 2 = 20 \text{ m}^2$

The paths overlap! I need to find the total area without including the area of the overlapping square twice. 

To find the total area of the paths, add up the area of each path and subtract the area of the square.

Area of the square =  $2 \times 2 = 4 \text{ m}^2$   
 $16 + 20 = 36 \text{ m}^2$   
 $36 - 4 = 32 \text{ m}^2$   
The total area of the paths is  $32 \text{ m}^2$ .

b) To find the area of the grass, find the area of the garden then subtract the area of the paths.

Area of the garden =  $10 \times 8 = 80 \text{ m}^2$   
Area of the paths =  $32 \text{ m}^2$

Area of the grass =  $80 - 32 = 48 \text{ m}^2$   
The total area of the grass is  $48 \text{ m}^2$ .

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# Think together

Then we have a go at some more problems together. Use what you have just learnt to help you.

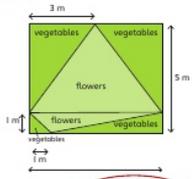
We'll try a challenge too!



This tells you which page to go to in your Practice Book.

**Think together**

1. The school garden is a rectangular shape. Use both Isla's and Richard's methods to find the total area of the garden that is made up of flowers.



I will find the area of the whole garden, then subtract the area with vegetables.  Isla

I will find the area of each flowerbed and add them together.  Richard

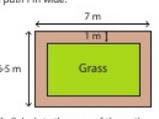
2. Sofia is calculating the number of triangular tiles needed to cover her bathroom floor.



a) What is the area of the floor?  
b) What is the area of one tile?  
c) How many triangular tiles are needed to cover the whole floor?

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3. Toshi's garden is a rectangle of grass surrounded by a path 1 m wide.



a) Calculate the area of the path.  
b) Toshi wants to test out his new tent by putting it up on the grass. The tent will take up 4.5 m<sup>2</sup>. Is there enough room on the grass for the tent?

I think I can find the solution in two ways. 

First, I will find the area of the whole garden. Then I will calculate the area of the grass. 

CHALLENGE

Practice Book 68 p167

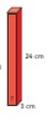
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**End of unit check**

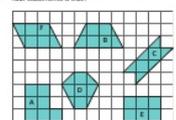
1. The area of the parallelogram and the area of the triangle are equal. What is the length of the base of the triangle?   (Not to scale)

a) 24 cm   b) 12 cm   c) 48 cm   d) 36 cm

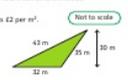
2. Which of these four statements is true?  
 a) To find the area of a rectangle, multiply the length by the width, then double the answer.  
 b) To find the area of a triangle, measure the length of a side, then multiply it by 2.  
 c) To find the area of a parallelogram, multiply the width by the length.  
 d) To find the volume of a cuboid, multiply length by width by height.

3. The volumes of cube A and cuboid B are equal. What is the missing width?  
 

a) 18 cm   b) 9 cm  
c) 3 cm   d) 8 cm

4. Here are some shapes on a centimetre grid. Which of these four statements is true?  


a) Shapes A and B have the same area but different perimeters.  
 b) Shapes B and D have the same perimeter and area.  
 c) Shapes C and D have the same perimeter.  
 d) Shapes A and E have equal perimeters but different areas.

5. This triangle shows a lawn. Turf costs £2 per m<sup>2</sup>.  
 a) What is the area of the lawn?  
 b) How much would it cost to turf the lawn?  
 (Not to scale)

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Practice Book 68 p167

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At the end of each unit there's an **End of unit check**. This is our chance to show how much we have learnt.

# Unit 7

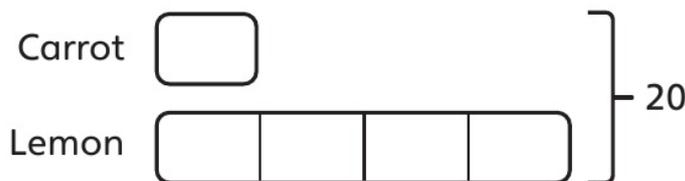
## Ratio and proportion



In this unit we will ...

- ⚡ Calculate ratios
- ⚡ Use ratios to work out amounts
- ⚡ Enlarge shapes by a scale factor
- ⚡ Identify similar shapes
- ⚡ Solve problems involving ratio

We will use bar models to represent ratio problems. For every 1 slice of carrot cake there are 4 slices of lemon cake. If there are 20 slices in total, how many slices are carrot?





We will need some maths words. We will use the phrase, 'For every ... there are ...'. What do you think it might mean?

ratio

proportion

part

whole

scale

scale factor

similar

notation

We will need to know our multiplication and division facts. Write three multiplication or division facts that match this one.

$$8 \times 9 = \square$$



# Use ratio language

## Discover



- 1 a) Sort the children and adults into equal groups.

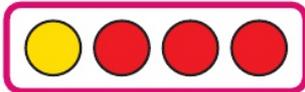
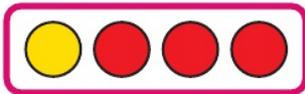
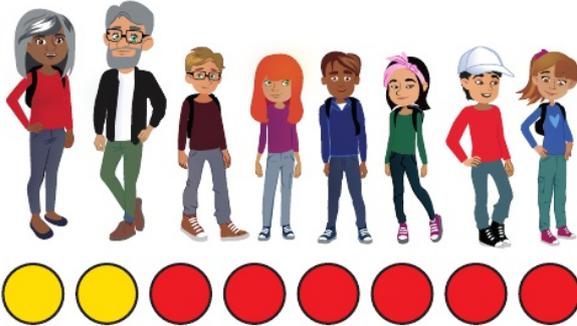
Use the groups you have made to complete the sentence.

For every  adult there are  children.

- b) Write a sentence to compare how many bananas and how many apples there are.

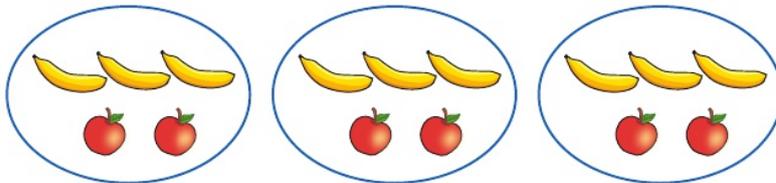
# Share

a) There are 2 adults and 6 children.



For every 1 adult there are 3 children.

b) In each group there are 3 bananas and 2 apples.



So, for every 3 bananas there are 2 apples.

Or for every 2 apples there are 3 bananas.

I sorted the people into equal groups. Each group has 1 adult and 3 children.



This statement is an example of a **ratio**. A ratio compares two or more parts of the whole.

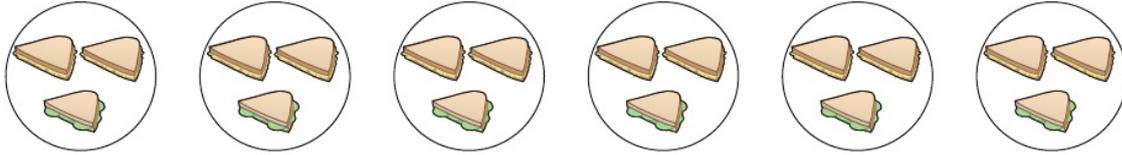


I tried to sort the fruit so there was 1 apple in each group, but I did not have enough bananas.



# Think together

1 A camping group take some sandwiches on a walk. Some sandwiches are cheese and some are cucumber.



Complete the ratio sentences to compare the number of sandwiches.

For every  cheese sandwiches there is  cucumber sandwich.

For every  cucumber sandwich there are  cheese sandwiches.

2 Danny has these coins.



Danny



Lexi has these coins.

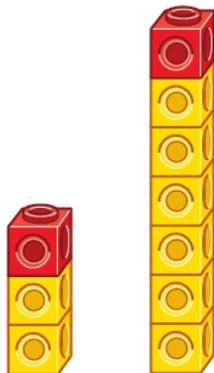


For every 4 coins I have, Lexi has 3 coins.

Is Danny correct?


**CHALLENGE**

- 3** a) Josh is making towers of cubes.



What is the same about the two towers?

What is different?

- b) Josh makes another tower.

For every 3 red cubes there are 2 yellow cubes.

What fraction of the tower is red?

What fraction of the tower is yellow?



I think if I work out what fraction of each tower is red, I will notice something about the answers.

I wrote some ratio sentences. I wonder if there is a link between these and the fraction answers.



# Introduce the ratio symbol

## Discover



1 a) Complete the ratio sentence.

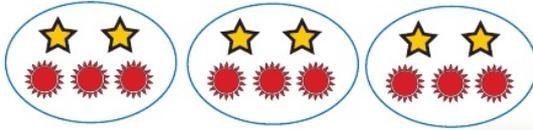
On the t-shirt, for every  stars there are  suns.

b) Emma makes her next t-shirt.

What could the t-shirt look like?

# Share

a) There are 6 stars and 9 suns.



$$\begin{array}{c} \div 3 \quad \left\langle \begin{array}{l} 6 \text{ stars} : 9 \text{ suns} \\ 2 \text{ stars} : 3 \text{ suns} \end{array} \right\rangle \div 3 \end{array}$$

I wrote my answer in its simplest form. I noticed that 6 and 9 both divide by 3.



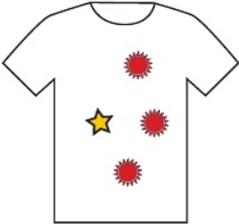
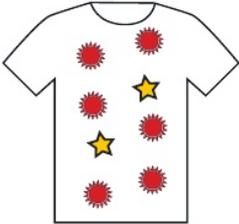
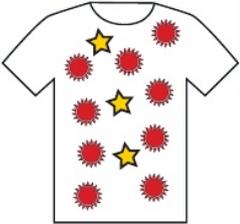
On the t-shirt, for every 2 stars there are 3 suns.



We can say and write this differently. The ratio of stars to suns is 2 to 3. We write this as 2 : 3.

b) On Emma's next t-shirt, for every 1 star there are 3 suns.

Emma's t-shirt could look like this:

Stars	1	2	3
Suns	3	6	9
			

We can say the ratio of stars to suns is 1 : 3.

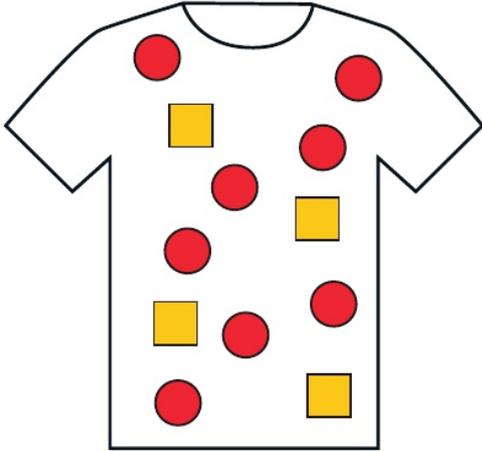
For every 1 star I drew, I had to draw 3 suns. The t-shirt has three times as many suns as stars on it.



# Think together

I What is the ratio of squares to circles on each of these t-shirts?

a)



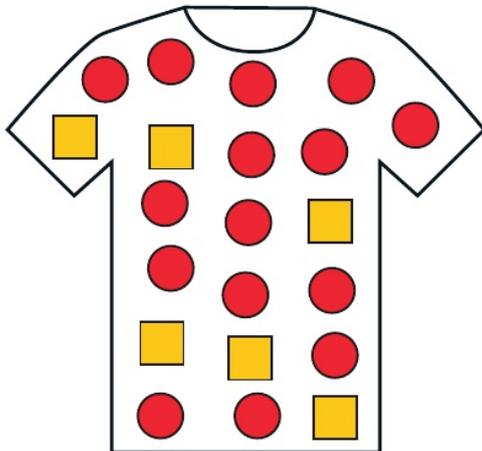
I remember I read the ':' as 'to'.



For every  square there are  circles.

Or, the ratio of squares to circles is  : .

b)



Try to write your answers in their simplest form.



For every  squares there are  circles.

Or, the ratio of squares to circles is  : .

- 2 The ratio of trucks to cars in a car park is 2 : 1.

That means there are more trucks than cars.



Zac

This means there are three times as many trucks as cars.



Lexi

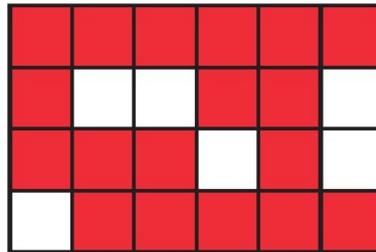
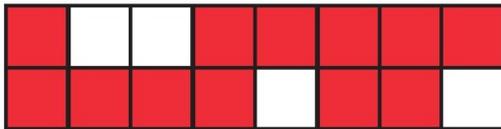
There could be 24 trucks and 12 cars.



Jamilla

Who is correct? Explain your answer.

- 3 What is the same about the rectangles? What is different about them?



CHALLENGE

I will use fractions and ratio to help me compare the two rectangles.



# Use ratio

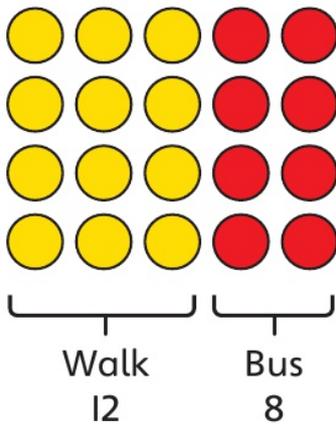
## Discover



- 1** a) There are 12 children who walk to school in class today. Use counters to show how many children catch the school bus.
- b) Find another method to work out the number of children who catch the school bus.

# Share

- a) There are 3 children who walk to school for every 2 children who catch the school bus.



I used counters to represent the children. I placed the counters in rows until I had 12 children who walk to school.



- b) **Method 1**

Add 3 children who walk each time.

Stop when you get to 12 children.

Walk	Bus
3	2
6	4
9	6
12	8

I tried two ways. I drew a table and added on 3 children who walk to school and 2 children who catch the school bus each time. I stopped when I got to 12 children who walk and then saw there were 8 children who catch the bus.

Add 2 children who catch the school bus each time.



## Method 2

$$3 \times 4 = 12$$

To calculate the number of children who catch the bus, work out

$$2 \times 4 = 8$$

There are 8 children who catch the school bus.

I also tried it this way: I worked out what I needed to multiply 3 (number of children who walk) by to make 12. I then multiplied this by 2 to tell me how many children catch the school bus.

## Think together

1 For every 2 children wearing a bib, 1 child is not wearing a bib.

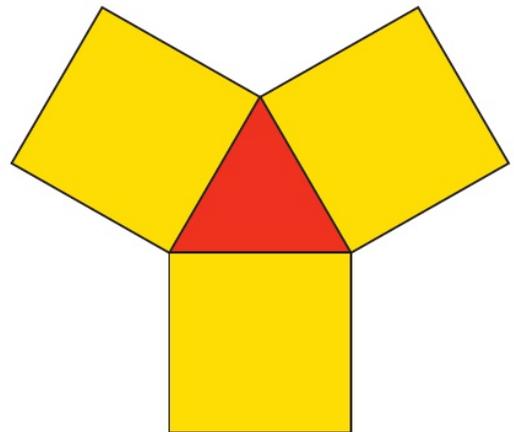


If 10 children are wearing a bib, how many children are not wearing one?

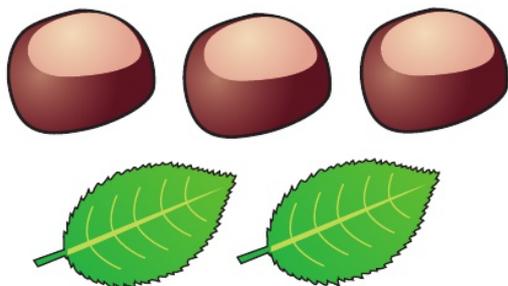
Explain your method to a partner.

2 For every 1 triangle there are 3 squares.

- a) If there are 5 triangles, how many squares are there?
- b) If there are 18 squares, how many triangles are there?



- 3** At the park, some children are making patterns.  
They make a pattern with conkers and leaves.



They want to continue the pattern.

- a)** If they have 15 conkers, how many leaves do they need?  
Explain your method to your partner.
- b)** If they have 20 conkers, how many leaves do they need?

I do not think they can use all 20 conkers. I wonder how many of the conkers they can use.



# Scale drawing

## Discover

The plan uses a scale of 1 cm to 2 m.

The plan shows everything smaller than it is in real life.

Playground plan

Fence

Row of trees

Jungle gym

Sandpit

Scale 1 cm : 2 m

Holly

Sofia

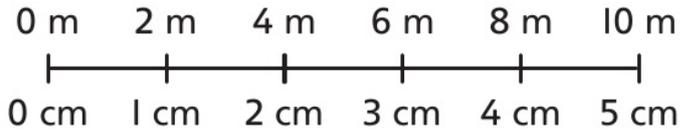
- 1 A new playground is built.
  - a) What length is the row of trees in real life?
  - b) What is the perimeter of the sandpit in real life?

# Share



- a) On the plan, the row of trees is 4 cm long.

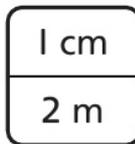
The plan uses the scale 1 cm : 2 m.



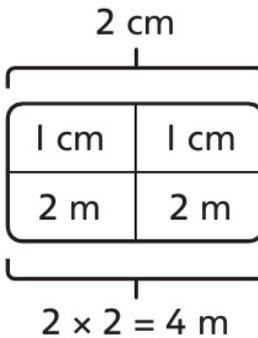
The row of trees is 8 m long in real life.

- b) We need to work out length and width.

We know that every 1 cm on the plan is 2 m in real life.



The width is 2 cm, which is  $2 \times 2 = 4$  m in real life.



The length is 5 cm, which is  $5 \times 2 = 10$  m in real life.

To find the perimeter of the shape we add up all four sides.

$$\text{Perimeter} = 4 + 10 + 4 + 10 = 28 \text{ m}$$

The perimeter of the sandpit is 28 m in real life.

Remember, the ratio **notation** tells you that 1 cm on the plan represents 2 m in real life.

I can use a map scale like this to show how many metres each centimetre is in real life.

