Unit 7 – Ratio and proportion

1 Use ratio language

→ pages 8–11

Discover

1. a) For every **1** adult there are **3** children.
b) For every **3** bananas there are **2** apples.
For every **2** apples there are **3** bananas.

Think together

1. For every **2** cheese sandwiches, there is **1** cucumber sandwich.
For every **1** cucumber sandwich, there are **2** cheese sandwiches.

2. Danny is correct. 8 : 6 simplifies to 4 : 3.

3. a) Both towers have 1 red cube with more than 1 yellow cubes.
The shorter tower has 1 red cube and 2 yellow cubes.
The taller tower has 1 red cube and 6 yellow cubes.
b) $\frac{3}{5}$ of the tower is red.
$\frac{2}{5}$ of the tower is yellow.

2 Introduce the ratio symbol

→ pages 12–15

Discover

1. a) There are 6 stars and 9 suns.
On the t-shirt, for every 2 stars there are 3 suns.
b) On Emma's next t-shirt, for every 1 star there are 3 suns.
The ratio of stars to suns is 1 : 3. There could be 1 star and 3 suns, 2 stars and 6 suns, 3 stars and 9 suns and so on.

Think together

1. a) For every **1** square there are **2** circles.
Or the ratio of squares to circles is **1** : **2**.
b) For every **2** squares there are **5** circles.
Or the ratio of squares to circles is **2** : **5**.

2. Zac and Jamilla are correct, as the number of trucks is double the number of cars, so if there are 12 cars there will be 24 trucks.
Lexi is incorrect. She has mistakenly added the two parts of the ratio together, confusing it with the fraction of the trucks ($\frac{2}{3}$) and of the cars ($\frac{1}{3}$).

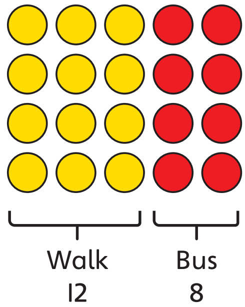
3. Both rectangles have the same ratio. For every 1 white square there are 3 red squares.
The ratio of white to red squares is 1 : 3.
In both rectangles the fraction of white squares is $\frac{1}{4}$ ($\frac{4}{16}$ and $\frac{6}{24}$ both simplify to $\frac{1}{4}$).
In both rectangles the fraction of red squares is $\frac{3}{4}$ ($\frac{12}{16}$ and $\frac{18}{24}$ both simplify to $\frac{3}{4}$).
The rectangles are different sizes.

3 Use ratio

→ pages 16–19

Discover

1. a)



b) Children could draw a table or divide 12 by 3 and multiply the answer by 2.
8 children catch the bus.

Think together

1. There are **5** children not wearing a bib.
The ratio of bib to no bib is 2 : 1.
If the 2 parts = 10, then 1 part will equal 5.
0 ÷ 2 = 5

2. a) There are 15 squares.
1 : 3 = 5 : 15
The number of triangles has increased 5 times, so the number of squares must also increase 5 times.
5 × 3 = 15
b) There are 6 triangles.
1 : 3 = 6 : 18
The number of squares has increased 6 times (18 ÷ 3 = 6), so the number of triangles must also increase 6 times.
6 × 1 = 6

3. a) They need **10** leaves.
The ratio of conkers to leaves is 3 : 2.
15 conkers ÷ 3 = 5 groups of 3 conkers
5 groups of 2 leaves = 5 × 2 = **10** leaves
b) 20 is not divisible by 3 so only 18 conkers can be used to make complete groups.
18 ÷ 3 = 6 groups of 3 conkers
6 groups of 2 leaves = 6 × 2 = 12 leaves
They need **12** leaves with 18 conkers.

4 Scale drawing

→ pages 20–23

Discover

1. a) The row of trees is 8 m long in real life.
b) The perimeter of the sandpit is 28 m in real life.

Think together

1. a) The length of the flower bed is 30 m in real life.
The width of the flower bed is 15 m in real life.
b) The length of the path is 27·5 m in real life.

2. The distance is 90 m in real life.

3. a) Kate is correct. The second plan is 1 cm to 200 cm. 200 cm = 2 m, so 1cm : 2m is the same as 1 cm : 200 cm.
When a scale does not state the units, they are the same units.
b) The height of the roof is 10 m in real life.

5 Scale factors

→ pages 24–27

Discover

1. a) The scale factor is 2.
b) The tree is 4 m tall.

Think together

1. a) The scale factor is 2.
b) The scale factor is 3.
c) The scale factor is 7.

2. a)

Scale factor	2	3	4	5	1
Number of cubes tall	16	24	32	40	12

b) The scale factor is 6.
c) The scale factor is $7\frac{1}{2}$.

3. a) To enlarge a shape by a scale factor of 2 means all the dimensions have been doubled (× 2).
b) To enlarge a shape by a scale factor of 3 means all the dimensions are trebled (× 3).
c) To enlarge a shape by a scale factor of $\frac{1}{2}$ means all the dimensions are halved (÷ 2).
Children should draw various pairs of shapes to show scale factors of 2, 3 and $\frac{1}{2}$.

6 Similar shapes

→ pages 28–31

Discover

1. a) If two shapes are similar, then matching sides are all in the same ratio.
Each side of Zac's larger rectangle is double the size of his smaller rectangle (the ratio is 1 : 2), so the rectangles are similar.
One side of Lexi's larger triangle is double the size of the smaller one, but the other (vertical) side is not doubled (2 × 4 = 8 not 7), so her triangles are not in the same ratio and are not similar.
b) Making the vertical side of the larger triangle 8 units would make the triangles similar.

Think together

1. a) The scale factor is 2.
b) The length is 20.
c) The dimensions increase 3 times (× 3).
The length will be 30 and the width 24.

2. The scale factor is 10.
1·5 × 10 = 15 or 15 ÷ 1·5 = 10.

3. a) a : b = 1 : 2
b) b : c = 1 : 1·5 = 2 : 3
c) Children should draw 2 shapes where the dimensions of the second shape are 5 times the dimensions of the first shape.
Children should draw 2 shapes where the dimensions of the second shape are half the dimensions of the first shape.

7 Ratio problems

→ pages 32–35

Discover

1. a) The ratio of long to round balloons is 2 : 3.
b) There are 12 long and 18 round balloons.

Think together

1. a) 7 children do karate.
21 ÷ 3 = 7
b) 14 children do tennis.
21 ÷ 3 = 7
7 × 2 = 14

2. 154 ÷ (2 + 5) = 154 ÷ 7 = 22
22 × 2 = 44
6A raises **£44**.
22 × 5 = 110
6B raises **£110**.

3. a) Explanations may vary but answers should focus on sharing balloons between parts.
b) For **Think together** question 1: Children need to show the ratio karate : tennis is 1 : 2. The bar model needs to show a total of 21 with parts of 7 for karate and 14 for tennis. Children should be able to show they reach the correct answers for this question.
For **Think together** question 2: Children need to show the ratio 6A : 6B is 2 : 5. The bar models need to show parts to make £44 for 6A and parts to show £110 for 6B. Children should be able to show they reach the correct answers for this question.

8 Problem solving – ratio and proportion (1)

→ pages 36–39

Discover

1. a) 48 ÷ 4 × 6 = 72. Toshi needs **72 g** of curry paste for 6 people.
b) 3 ÷ 4 × 6 = $4\frac{1}{2}$. Toshi needs $4\frac{1}{2}$ peppers for 6 people, so he does not have enough.

Think together

1. a) 240 ÷ 12 × 15 = 300. Andy needs **300** g of flour.
   b) 300 ÷ 12 × 10 = 250. Andy needs **250** g of butter.
   c) 120 ÷ 12 = 10. 200 ÷ 10 = 20. Andy could make **20** cupcakes.

2.

Number of people	3	6	15	30	40
Total cost	£7·50	£15	£37·50	£75	£100

3. a) 6 × 20 minutes = 120 minutes
   120 minutes ÷ 3 pairs = 40 minutes
   Each pair would get 40 minutes.
   b) 120 minutes ÷ 8 pairs = 15
   Each pair would get 15 minutes.

9 Problem solving – ratio and proportion (2)

→ pages 40–43

Discover

1. a) 200 ml feed = 800 ml water
   50 ml feed = 800 ÷ 4 = 200 ml of water
   350 ml feed = 7 × 200 = 1,400 ml of water
   Sofia needs to add **1,400 ml** of water to 350 ml of tomato feed
   b) 1,200 ÷ 3 = 400 ml
   The small plant gets **400 ml** of feed.
   400 × 2 = 800 ml
   The big plant gets **800 ml** of feed.

Think together

1. 27 ÷ 3 = 9
   9 × 2 = 18
   There are **18** children with winter birthdays at the club.

2. 3 × 110 = 330 g
   110 + 330 = 440 g
   The total mass of the parcels is **440** g.

3. 784 ÷ 7 = 112 km
   First day = 1 × 112 = 112 km
   Second day = 2 × 112 = 224 km
   Third day = 4 × 112 = 448 km
   She travels **224 km** on the second day.

End of unit check

→ pages 44–45

1. D
2. A
3. C
4. D
5. C
6. **156 g**
   1 cube = 80 g ÷ 4 = 20 g
   8 cubes = 160 g
   5 spheres = 200 g – 160 g = 40 g
   1 sphere = 40 g ÷ 5 = 8 g
   7 cubes + 2 spheres = 7 × 20 g + 2 × 8 g = 140 g + 16 g = 156 g
7. There are **108** shapes altogether.
   63 ÷ 7 = 9.
   There are 9 groups of 7 circles, 3 squares and 2 diamonds.
   63 + 9 × 3 + 9 × 2 = 63 + 27 + 18 = 108
   Or there are 12 shapes in the pattern.
   12 × 9 = 108

Unit 8 – Algebra

1 Find a rule – one step

→ pages 48–51

Discover

1. a) The number of legs is four times the number of frogs:
$4 \times a$ (where a is the number of frogs).
b) Where a is the number of frogs, the number of eyes is $2 \times a$ and the number of mouths is $1 \times a$.

Think together

1. a) Outputs: 3, 6, 9, 12, 15, 36, $3 \times n$ ($3n$)
b) Outputs: 11, 12, 13, 14, 26, 119, $n + 10$

2. Number of shells: 6, 12, 18, 24, $m \times 6$ ($6m$)

3. a) Jen's age: 34, 35, 36, 51, $n + 26$
b) Ebo's age: 0, 10, 21, 33, $y - 47$
c) If p is Amal's age, $p + 10$ = Mrs Dean's age
When Amal is 75, Mrs Dean will be 75 + 10 = **85**.
p = Mrs Dean's age – 10
When Mrs Dean is 100, Amal will be 100 – 10 = **90**.

2 Find a rule – two steps

→ pages 52–55

Discover

1. a) There will be $7 + n \times 2$ geese in total (where n is the number of pairs of geese).
b) No, Richard is not correct because there will never be exactly 100 geese. The rule adds on a multiple of 2 to 7, so the answer will always be an odd number.

Think together

1. a) Outputs: 8, **11**, **14**, **20**, **26**, **35**
b) $n \times 3 + 5$ (or $3n + 5$)

2. Money left: 13, 11, 9, $15 - 2 \times a$ (or $15 - 2a$)

3. To make 3 squares, 4 + 3 × **2** sticks are used.
To make 4 squares, 4 + 3 × **3** sticks are used.
To make n squares, 4 + 3 × **(*n* – 1)** sticks are used.

3 Form expressions

→ pages 56–59

Discover

1. a) The number of Mo's badges is $d + 6$.
The number of Jamilla's badges is $(d + 6) \times 2$.
b) 4 + 6 = 10
Mo has 10 badges.
(4 + 6) × 2 = 20 badges
Jamilla has 20 badges.

Think together

1. a) 3 × 5 + 2 = 17
Bella has 17 snow globes.
b) The top bar of the model shows the number of Amelia's snow globes as the letter s.
The bottom bar shows the number of Bella's snow globes.
c) $3 \times s + 2$ (or $3s + 2$)

2. 7, **10**, **25**, **25·5**, **(*n* + 10) ÷ 2**

3. There are many possible solutions if the first function is a multiplication and the second is either an addition or subtraction. For example, × 2 + 2; × 3 + 1; × 5 – 1.
There is only one solution where an addition is followed by a multiplication: + 1 × 2.
There are several solutions with an addition followed by a division. For example, + 7 ÷ 2; + 11 ÷ 3.
There are many possible solutions using a combination of 2 additions or an addition and a subtraction. For example, + 4 – 1; + 1 + 2.

4 Substitution (I)

→ pages 60–63

Discover

1. a) 5, 10, 15, 20, $n \times 5$ (or $5n$)
The rule is $5n$ which means $n \times 5$.
If $n = 13$, $5n = 5 \times 13 = 65$ points
If the value of n is 13, you will have **65** points.
b) If $n = 23$, you will have **115** points.
Method 1: 5 × 23 = 115
Method 2: 5 × 13 + 5 × 10 = 65 + 50 = 115

Think together

1. a)

Number of lightning bolts collected	Points for Level 2
1	15 × 1 = 15
2	15 × 2 = 30
3	15 × 3 = 45
m	$15 \times m = 15m$

b) When $m = 9$, points = 135
When $m = 10$, points = 150
When $m = 11$, points = 165

2. a)

Spikes hit	Points remaining
1	100 – 3 × 1 = 97
2	100 – 3 × 2 = 94
3	100 – 3 × 3 = 91
k	$100 - 3 \times k$

b) When $k = 10$, $100 - 3 \times 10 = 100 - 30 = 70$
When $k = 20$: $100 - 3 \times 20 = 100 - 60 = 40$
When $k = 30$: $100 - 3 \times 30 = 100 - 90 = 10$

c) When $k = 33$: $100 - 3 \times 33 = 100 - 99 = 1$
When $k = 34$: $100 - 3 \times 34 = 100 - 102 = -2$
$k = 34$ means you lose all your 100 points.

3. a)

	$2p + 1$	$2p - 1$
Substitute $p = 1$	$2 \times 1 + 1 = 3$	$2 \times 1 - 1 = 1$
Substitute $p = 15$	$2 \times 15 + 1 = 31$	$2 \times 15 - 1 = 29$
Substitute $p = 101$	$2 \times 101 + 1 = 203$	$2 \times 101 - 1 = 201$
Substitute $p = 1{,}213$	$2 \times 1{,}213 + 1 = 2{,}423$	$2 \times 1{,}213 - 1 = 2{,}425$

Children should notice that the answer is always odd because $2p$ always gives an even number.

b) Various answers are possible, depending on the numbers substituted for p. Children should notice that the answer is always odd because $10p$ gives an even number.

5 Substitution (2)

→ pages 64–67

Discover

1. a) If t is the number of hours, the rule is $20 \times t$ (or $20t$).
b) If n is the number of hours, the rule is $50 + 20 \times n$ (or $50 + 20n$).

Think together

1. The expression is $150 -$ **2**w.

Number of days	Litres of water left in the barrel
1	$150 - 2 \times 1 = 148$
2	$150 - 2 \times 2 = 146$
3	$150 - 2 \times 3 = 144$
4	
7	$150 - 2 \times 7 = 136$
w	$150 - 2w$

2. a) $720 -$ **20**y

b)

Time taken	Your calculation	Sand left in the hourglass (grams)
10 minutes	$720 - 20 \times 10$	520 g
20 minutes	$720 - 20 \times 20$	320 g
30 minutes	$720 - 20 \times 30$	120 g

3. a) $m + 10$
$m - 30$
$\frac{1}{3}m, \frac{1}{3}m, \frac{1}{3}m$
$2m + 12$

b) When $m = 48$:
$m + 10 = 48 + 10 = \mathbf{58}$
$m - 30 = 48 - 30 = 18$
$\frac{1}{3}m + \frac{1}{3}m + \frac{1}{3}m = 16 + 16 + 16 = \mathbf{48}$
$2m + 12 = 2 \times 48 + 12 = 96 + 12 = \mathbf{108}$

When $m = 24$:
$m + 10 = 24 + 10 = \mathbf{34}$
$m - 30 + 30 = \mathbf{24}$
$\frac{1}{3}m + \frac{1}{3}m + \frac{1}{3}m = 8 + 8 + 8 = \mathbf{24}$
$2m + 12 = 2 \times 24 + 12 = \mathbf{60}$

6 Formulae

→ pages 68–71

Discover

1. a) Perimeter of a regular pentagon:
$a + a + a + a + a = a \times 5 = 5a$
Perimeter of a regular hexagon:
$a + a + a + a + a + a = a \times 6 = 6a$

b) When $a = 6$:
$5a = 5 \times 6 =$ **30 cm**
$6a = 6 \times 6 =$ **36 cm**
When $a = 12$:
$5a = 5 \times 12 =$ **60 cm**
$6a = 6 \times 12 =$ **72 cm**
Children should notice that when the value of a is doubled, the perimeter of each shape is also doubled.

Think together

1. a) Perimeter $= a + b + a + b = 2a + 2b$
Children might also find the answer as $(a + b) \times 2$.
b) Perimeter $= 2 \times 10 + 2 \times 8 = 20 + 16 = 36$ m

2. a) Area $= a \times b$
b) Area of the shape $= 7 \times 5 = 35\ \text{cm}^2$

3. a) Children should use a pair of letters, such as a and b, to write the equation $a + b = b + a$.
b) Children use a pair of letters to write the equations:
$(a + b) \times c = a \times c + a \times b$
$(a + b) \times c = a \times c + a \times b$
$a \times (b + c) = a \times b + a \times c$

7 Form and solve equations

→ pages 72–75

Discover

1. a) The c represents the cost of the kayak.
$80 + c$ represents the total cost of the surfboard and the kayak.
$80 + c = 230$ means that the total of the surfboard and the kayak is equal to £230.

b) Several answers are possible. For example:
example,
$230 - 80 = 150$.
The cost of the kayak is **£150**.

Think together

1.

1	26
2	27
5	30
6	31
7	32

Children should continue trying numbers to get to the correct result.

2. a) $y - 35 = 85$
$y = 85 + 35 = £120$
The usual cost of the dinghy is **£120**.
b) i) $s = 360 \div 3$
ii) $360 \div 3 = 120$
There are **120** wetsuits in 1 crate.

3. Kate $9 + i = 45$
Alex $j - 9 = 45$
Richard $45 = 9h$
Aki $45 = k \div 9$

8 Solve one-step equations

→ pages 76–79

Discover

1. a) The mystery weight is 6 kg.
Finding the mystery weight means you can replace the h in $h + 36 = 42$ with 6 to solve the equation.
b) $h + 36 = 42$
$h = 42 - 36$
$h = 6$

Think together

1. a) $y = 240 - 48 =$ **192**
b) $600 = 3a$

2. a) $t + 6 = 24$
$t = 24 - 6$
$t = 18$
b) $24 = 6m$
$m = 24 \div 6$
$m = 4$

3. a) The second bar model helps to solve the equation $n - 10 = 36$.
The first bar model shows $n + 10 = 36$.
$n - 10 = 36$
$n = 36 + 10$
$n = 46$
b) $y + 10 = 25$ $k - 10 = 25$
$\mathbf{y = 15}$ $\mathbf{k = 35}$
$10 + g = 25$ $25 - h = 10$
$\mathbf{g = 15}$ $\mathbf{h = 15}$
$5a = 30$ $4b = 600$
$\mathbf{a = 6}$ $\mathbf{b = 150}$

9 Solve two-step equations

→ pages 80–83

Discover

1. a) $2a + 5 = 19$
b) Lee's number was 7.

Think together

1. Lexi's number is **5**.

2. a) $5m + 3 = 58$
$5m = 58 - 3 = 55$
$m = 11$
b) $17 = 2q + 5$
$2q = 17 - 5 = 12$
$q = 6$

3. a) The bar model shows that $p = 11 + 3$.
This can be rearranged as $p - 3 = 11$ because they are part of the same fact family.
b) $p - 3 = 11$
$p = 14$
c) This bar model shows that $2p = 11 + 3$.
This can be rearranged as $2p - 3 = 11$ because they are part of the same fact family.
d) $2p - 3 = 11$
$2p = 14$
$p = 7$

10 Find pairs of values

→ pages 84–87

Discover

1. a) The perimeter is $2a + 2b$ or $(a + b) \times 2$.

Perimeter of rectangle	a = ?	b = ?
20	1	9
20	2	8
20	3	7
20	4	6
20	5	5
20	6	4

b) Area is $a \times b$.
The greatest area for the enclosure is $5 \times 5 = 25$ m^2.

Think together

1. Other values for m may be used, up to $m = 15$, $n = 0$.

m = ?	n = ?
0	15 – 0 = 15
1	15 – 1 = 14
2	15 – 2 = 13
3	15 – 3 = 12
4	15 – 4 = 11
5	15 – 5 = 10

2. $y \times z = 36$

y = ?	z = ?
1	36
2	18
3	12
4	9
6	6

3. a) $x = 0, y = 10$
$x = 1, y = 9$
$x = 2, y = 8$
$x = 3, y = 7$
$x = 4, y = 6$
$x = 5, y = 5$
$x = 6, y = 4$
$x = 7, y = 3$
$x = 8, y = 2$
$x = 9, y = 1$
$x = 10, y = 0$
Children should notice that if they plot the values on the grid, they form a straight line.

b) $x = 0, y = 1$
$x = 1, y = 2$
$x = 2, y = 3$
$x = 3, y = 4$
$x = 4, y = 5$
$x = 5, y = 6$
$x = 6, y = 7$
$x = 7, y = 8$
$x = 8, y = 9$
$x = 9, y = 10$
Children should notice that if they plot the values on the grid, they form a straight line.

11 Solve problems with two unknowns

→ pages 88–91

Discover

1. a) $2a + 4y = 10$
The possible solutions are 1 chicken and 2 rabbits or 3 chickens and 1 rabbit.

b) There cannot be 2 or 4 chickens in the shelter, because this would mean there would have to be half a rabbit. 2 chickens = 4 legs, leaving 6 rabbit legs, and 4 chickens = 8 legs, leaving 2 rabbit legs.

Think together

1. $\mathbf{6}m + \mathbf{4}n = 30$
Possible solutions with all tables filled are:
$m = 1, n = 6$ $(6 + 24 = 30)$
$m = 3, n = 3$ $(18 + 12 = 30)$
$m = 5, n = 0$ $(30 + 0 = 30)$
$m = 2$ leaves 18 which is not divisible by 4.
$m = 4$ leaves 6 which is not divisible by 4.
30 is not divisible by 4, so there cannot be only tables of 4.

2. There are **23** chickens and **12** rabbits in total.

3. a) $100 = 20a + 10b$

$a = 0$	$b = 10$
$a = 1$	$b = 8$
$a = 2$	$b = 6$
$a = 3$	$b = 4$
$a = 4$	$b = 2$
$a = 5$	$b = 0$

$100 = 10c - 20d$

$c = 10$	$d = 0$
$c = 11$	$d = 0{\cdot}5$
$c = 12$	$d = 1$
$c = 13$	$d = 1{\cdot}5$
$c = 14$	$d = 2$
$c = 15$	$d = 2{\cdot}5$

b) $d + 30 = y - 70$

$d = 1$	$y = 101$
$d = 2$	$y = 102$
$d = 3$	$y = 103$
$d = 4$	$y = 104$

y is always 100 more than d.

$20s = 100 - 2t$

$s = 0$	$t = 50$
$s = 1$	$t = 40$
$s = 2$	$t = 30$
$s = 3$	$t = 20$
$s = 4$	$t = 10$
$s = 5$	$t = 0$

As the value of s increases by 1, the value of t decreases by 10.

End of unit check

→ pages 92–93

1. C

2. D

3. A

4. D

5. A

6. $w = 8$

7. Various answers are possible. a should be a number between 0 and 30.

Unit 9 – Decimals

1 Place value to 3 decimal places

➜ pages 96–99

Discover

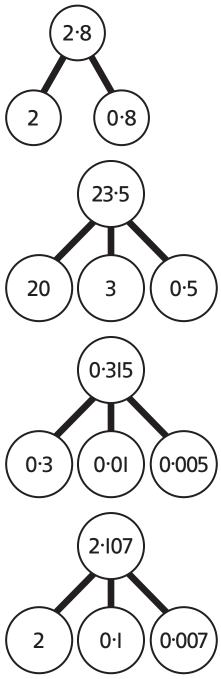
1. a) Reena has made the number 0·37.
Andy has made the number 61·7.
b) The value of the digit 7 is 7 hundredths in Reena's number.
The value of the digit 7 is 7 tenths in Andy's number.

Think together

1. a) 0·25
3·57
15·7
b) The value of the digit 5 in each number is:
5 hundredths
5 tenths
5 ones

2. Emma is incorrect. She has made the number 0·307.

3. a)



b) 0·3 + 0·08 = **0·38**
7 + 0·3 + 0·06 = **7·36**
6 + 0·02 + 0·004 = **6·024**

2 Round decimals

➜ pages 100–103

Discover

1. a) The athlete has jumped 2·8 m.
b) 2·8 m to the nearest whole metre is 3 m.

Think together

1. a) 6·2 rounds to **6**.
b) 6·75 rounds to **7**.
c) 6·5 rounds to **7**.
d) 6·415 rounds to **6**.

2. a) Jamie has rounded to the nearest whole number instead of to one decimal place.
b) 3·3

3. a) 4·37 rounds to **4·4**.
16·14 rounds to **16·1**.
5·349 rounds to **5·3**.
b) Children should explain looking at the thousandths digit to round to 2 decimal places.
8 > 5 so 8·158 rounds up to 8·16.

3 Add and subtract decimals

➜ pages 104–107

Discover

1. a) There are **9·38** litres in total.
b) **0·62** litres will be needed to fill the bottle.

Think together

1. a) 3·6 + 4·9 = **8·5**
b) 2·08 + 3·55 = **5·63**
c) 16·8 + 29·5 = **46·3**

2. a) 5·1 – 3·6 = **1·5**
b) 0·964 – 0·183 = **0·781**
c) 26·7 – 23·9 = 2·8

3. a) Emma has not written the digits for 6·5 in the correct columns.
6·5 is 6 ones and 5 tenths, not 6 tenths and 5 hundredths.
b) 6·5 + 3·84 = **10·34**
c) 2·34 + 0·172 = **2·512**
35·8 + 6·14 = **41·94**
7·5 – 3·16 = **4·34**
0·4 – 0·157 = **0·243**

4 Multiply by 10, 100 and 1,000

➜ pages 108–111

Discover

1. a) The mass of 10 plates is 3 kg.
b) The mass of 100 plates if 30 kg.

Think together

1. Ambika: 1·5 × 10 = **15**
1·5 × 100 = **150**
1·5 × 1,000 = **1,500**
Lee: 0·36 × 10 = **3·6**
0·36 × 100 = **36**
0·36 × 1,000 = **360**
Children should notice that the digits stay the same but their values increase.

2. a) 5·2 × 10 = **52**
5·2 × 100 = **520**
5·2 × 100 = **502**
b) 0·12 × 10 = **1·2**
1·02 × 100 = **102**
10·02 × 1,000 = **10,020**
c) 50·2 × 10 = **502**
5·02 × 1,000 = **5,200**
0·502 × 1,000 = **502**

3. Multiplying by 10 and then 10 again is the same as multiplying by 100 because 10 × 10 = 100. Both increase the value of each digit 100 times.

5 Divide by 10, 100 and 1,000

→ pages 112–115

Discover

1. a) Each child makes 1·2 m of paper chain.
b) 36 ÷ 100 = **0·36**

Think together

1. Reena is correct. Dividing by 10 moves each digit one place to the right.
Children should draw a diagram to show 12·3 ÷ 100 = **0·123**. They should draw a place value table showing how tens, ones and tenths move to tenths, hundredths and thousandths.

2. a) 63 ÷ 10 = **6·3**
63 ÷ 100= **0·63**
63 ÷ 1,000 = **0·063**
b) 717 ÷ 10 = **71·7**
717 ÷ 100 = **7·17**
717 ÷ 1,000 = **0·717**

3. a) Danny has divided 6·5 by 10 to find a whole when he needs to multiply 6·5 by 10 to find the missing part.
b) **65** ÷ 10 = 6·5
c) **40** ÷ 10 = 4
5·8 ÷ 10 = 0·58
350 ÷ 100 = 3·5
60 ÷ 100 = 0·6

6 Multiply decimals by integers

→ pages 116–119

Discover

1. a) The fence section is 1·8 m tall.
b) The whole fence will be 5·6 m long.

Think together

1. a) 0·2 × 4 = **0·8**
b) 0·4 × 3 = **1·2**
c) 0·7 × 4 = **2·8**

2. a) 0·4 × 2 = **0·8**
0·4 × 3 = **1·2**
0·4 × 4 = **1·6**
0·4 × 5 = **2·0**
b) 0·06 × 2 = **0·12**
0·06 × 3 = **0·18**
0·06 × 4 = **0·24**
0·06 × 5 = **0·3**
Children should mention using multiplication tables to find the answers.

3. a) 0·3 is ten times smaller than 3 so the answer to 32 × 0·3 is ten times smaller than 32 × 3.
32 × 0·3 = 96 ÷ 10 = 9·6
b) 12 × 0·07 = **0·84 m²**
30 × 0·5 = **15 m²**
4 × 0·9 = **3·6 m²**

7 Divide decimals by integers

→ pages 120–123

Discover

1. a) The mass of each block is 0·2 kg.
b) 40 blocks will balance an 8 kg crate.

Think together

1. a) 12 ÷ 3 = **4**
b) 1·2 ÷ 3 = **0·4**
c) 0·12 ÷ 3 = **0·04**

2. a) 35 ÷ 5 = **7**
350 ÷ 5 = **70**
3·5 ÷ 5 = **0·7**
0·35 ÷ 5 = **0·07**
b) 2·4 ÷ 8 = **0·3**
2·4 ÷ 3 = **0·8**
2·4 ÷ 4 = **0·6**
2·4 ÷ 6 = **0·4**

3. a) 4·24 ÷ 8 = **0·53 m**
b) 15·6 ÷ 2 = **7·8**
15·6 ÷ 3 = **5·2**

8 Fractions to decimals

→ pages 124–127

Discover

1. a) $\frac{6}{1,000}$ is equivalent to 0·006.
$\frac{6}{100}$ and $\frac{60}{1,000}$ are equivalent to 0·06.
$\frac{6}{10}$, $\frac{60}{100}$ and $\frac{600}{1,000}$ are equivalent to 0·6.
b) $\frac{6}{1,000}$ can be simplified to $\frac{3}{500}$.
$\frac{6}{100}$ and $\frac{60}{1,000}$ can be simplified to $\frac{3}{50}$.
$\frac{6}{10}$, $\frac{60}{100}$ and $\frac{600}{1,000}$ can be simplified to $\frac{3}{5}$.

Think together

1. a) $\frac{1}{4}$ = **0·25**
$\frac{2}{4}$ = **0·5**
$\frac{3}{4}$ = **0·75**
b) $\frac{1}{10}$ = **0·1**
$\frac{2}{10}$ = **0·2**
$\frac{3}{10}$ = **0·3**
$\frac{5}{10}$ = **0·5**
$\frac{7}{10}$ = **0·7**

2. a) $\frac{93}{100}$ = **0·93** $\frac{12}{100}$ = **0·12** $\frac{55}{100}$ = **0·55**
$\frac{347}{1,000}$ = **0·347** $\frac{250}{1,000}$ = **0·25** $\frac{73}{1,000}$ = **0·073**

b) 0·6 = $\frac{6}{10}$ = $\mathbf{\frac{3}{5}}$
0·06 = $\frac{6}{100}$ = $\mathbf{\frac{3}{50}}$
0·006 = $\frac{6}{1{,}000}$ = $\mathbf{\frac{3}{500}}$
0·23 = $\mathbf{\frac{23}{100}}$
0·023 = $\mathbf{\frac{23}{1{,}000}}$
0·123 = $\mathbf{\frac{123}{1{,}000}}$

3. a) 1·2 = $\frac{12}{10}$ = $\mathbf{1\frac{1}{5}}$
0·4 = $\frac{4}{10}$ = $\mathbf{\frac{2}{5}}$ 1·4 = $\mathbf{\frac{14}{10}}$ = $\mathbf{1\frac{2}{5}}$
0·6 = $\mathbf{\frac{16}{10}}$ = $\mathbf{\frac{3}{5}}$ 1·6 = $\mathbf{\frac{16}{10}}$ = $\mathbf{1\frac{3}{5}}$
0·8 = $\mathbf{\frac{8}{10}}$ = $\mathbf{\frac{4}{5}}$ 1·8 = $\mathbf{\frac{18}{10}}$ = $\mathbf{1\frac{4}{5}}$

b) 0·25 = $\frac{25}{100}$ = $\mathbf{\frac{1}{4}}$
0·125 = $\frac{125}{1{,}000}$ = $\mathbf{\frac{1}{8}}$
0·875 = $\frac{875}{1{,}000}$ = $\mathbf{\frac{7}{8}}$
0·35 = $\frac{35}{100}$ = $\mathbf{\frac{7}{20}}$
0·95 = $\frac{95}{100}$ = $\mathbf{\frac{19}{20}}$

9 Fraction as division

→ pages 128–131

Discover

1. a) The arrow is pointing to $\frac{3}{8}$.
b) The arrow is pointing to 0·375.

Think together

1.

```
     0  ·
3 |  1  · ¹0
```

Children should notice that:
- Converting a proper fraction results in a decimal < 1
- The denominator is the number to divide by
- The numerator is the number to divide into.

2. $\frac{5}{8}$ = 0·625
$\frac{1}{6}$ = 0·166
$\frac{1}{9}$ = 0·111
$\frac{2}{5}$ = 0·4

3. $\frac{6}{9}$ = $\frac{2}{3}$ = **0·667** simplify then divide
$\frac{3}{25}$ = $\frac{12}{100}$ = **0·12** convert to equivalent fraction in hundredths
$\frac{3}{50}$ = $\frac{6}{100}$ = **0·06** convert to equivalent fraction in hundredths
$\frac{5}{12}$ = **0·417** divide
$\frac{300}{450}$ = $\frac{2}{3}$ = **0·667** simplify then divide
$\frac{6}{90}$ = $\frac{1}{15}$ = **0·067** simplify then divide

End of unit check

→ pages 132–133

1. A
2. C
3. B
4. C
5. C
6. 0·875

Unit 10 – Percentages

1 Understand percentages

➜ pages 136–139

Discover

1. a) Mr Jones has painted $\frac{30}{100}$ or $\frac{3}{10}$ of the circles.

b) Mr Jones has painted 30% of the circles.

Think together

1. a) 45%
b) 97%
c) 6%
d) 90%

2. Children should shade empty 100 grids to show:
18%: 1 complete row (or column) and 8 cells in adjoining row (or column).
40%: 4 complete rows (or columns).
7%: first 7 cells of top row (or column).

3. 64% of the grid is shaded.
There are 50 sections in the whole grid, so each section is worth 2%.

2 Fractions to percentages

➜ pages 140–143

Discover

1. a) $\frac{10}{25}$ or $\frac{2}{5}$ of the wall is painted.

b) 40% of the wall is painted.

Think together

1. a) $\frac{2}{10}$ = **20%**
b) $\frac{1}{4}$ **= 25%**

2. a) $\frac{7}{10} = \frac{70}{100}$ = **70%**
b) $\frac{7}{20} = \frac{35}{100}$ = **35%**
c) $\frac{7}{25} = \frac{28}{100}$ = **28%**
d) $\frac{7}{50} = \frac{14}{100}$ = **14%**

3. a) $\frac{6}{20} = \frac{3}{10}$ = **30%**
b) $\frac{3}{30} = \frac{1}{10}$ = **10%**
c) $\frac{120}{200} = \frac{60}{100}$ = **60%**

3 Equivalent fractions, decimals and percentages

➜ pages 144–147

Discover

1. a)

0	0·1	**0·2**	0·3	**0·4**	0·5	0·6	**0·7**	0·8	0·9	1
	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{3}{10}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{7}{10}$	$\frac{4}{5}$	$\frac{9}{10}$	
	10%	**20%**	30%	**40%**	50%	60%	**70%**	80%	90%	

b) $\frac{19}{20} = \frac{95}{100}$ = 0·95 = 95%

Think together

1. a) 0·55 = **55%**

b) 0·55 = $\frac{55}{100} = \frac{11}{20}$

2. 0·01 is not equivalent to the others. It is equivalent to $\frac{1}{100}$ and 1%.
All the others are equivalent to $\frac{1}{10}$, 10% and 0·1.

3.

Decimal	Percentage	Fraction
0·25	25%	$\frac{1}{4}$
0·5	50%	$\frac{1}{2}$
0·65	65%	$\frac{13}{20}$
0·6	60%	$\frac{3}{5}$
0·3	30	$\frac{3}{10}$
0·07	7%	$\frac{7}{100}$

4 Order fractions, decimals and percentages

➜ pages 148–151

Discover

1. a) Lee: 6 out of 20 = $\frac{6}{20} = \frac{30}{100}$ = 30%.
Kate: 7 out of 25 = $\frac{7}{25} = \frac{28}{100}$ = 28%.
Lee was more accurate at the coconut shy.

b) A possible fraction between 28% and 30% is 29% = $\frac{29}{100}$.
A fraction made from a decimal between 0·28 and 0·3 also works, for example, 0·295 = $\frac{295}{1,000}$, 0·281 = $\frac{281}{1,000}$ or 0·299 = $\frac{299}{1,000}$.

Think together

1. a) **73%** is greater than 0·55 (55%).
b) $\mathbf{\frac{17}{50}}$ ($\frac{17}{50} = \frac{34}{100}$ = 34%) is greater than 29%.
c) $\mathbf{\frac{7}{20}}$ ($\frac{7}{20} = \frac{35}{100}$ = 0·35) is greater than 0·34.

2. a) Smallest to largest: $\frac{7}{25}$, 0·38, 45%.
b) $\frac{9}{25} = \frac{36}{100}$ = 36%. 40% > 36% so Aki has improved.

3. Lexi is not correct: 0·5 = $\frac{5}{10} = \frac{50}{100}$ = 50%.
0·45 = 45%
50% > 45%

Or 0·5 has 5 tenths but 0·45 only has 4 tenths.

Luis is not correct: $\frac{32}{80} = \frac{4}{10}$ = 40%.

5 Simple percentage of an amount

→ pages 152–155

Discover

1. a) There are **12** motorbikes on the ferry.
b) There are 15 vans on the ferry.
15 − 12 = 3
There are **3** more vans than motorbikes on the ferry.

Think together

1. a) 10% of 30 = 3 squares covered.
b) 20% of 30 = 6 squares covered.

2. a) 10% of 120 = 12
20% of 120 = 24
20% of a number is double 10% of that same number.
b) 10% of 150 = 15
20% of 75 = 15
75 is half of 150, so 20% of 75 is the same as 10% of 150.
c) 10% of 80 = 8
90% of 80 = 72
90% of 80 is 9 × 10% of 80 or 100% − 10%.

3. a) Various responses are possible. Children might explain:
10% = 1/10 so divide 60 by 10
5% is half of 10%
50% = 1/2 so half 60
25% is half of 50% or $\frac{1}{4}$ of 60.
b) There are several ways children could work these out, for example:
15% of £60 = 10% + 5% = 6 + 3 = **£9**
55% of £60 = 50% + 5% = 30 + 3 = **£33**
70% of £60 = 10% × 7 = 6 × 7 = **£42**
95% of £60 = 100% − 5% = 60 − 3 = **£57**

6 Percentage of an amount – 1%

→ pages 156–159

Discover

1. a) 1% of 500 = 5
In a box of 500 bars, there are 5 winning rainbow tickets.
b) In a box of 200 bars, there are 2 winning rainbow tickets.
In a box of 1,000 bars, there are 10 winning rainbow tickets.
In a box of 2,500 bars, there are 25 winning rainbow tickets.

Think together

1. 3% of 700 kg = 21 kg 7% of £800 = £56
8% of 1,200 km = 96 km 22% of £400 = £88

2. a) Yes, Reena is correct. $\frac{40}{100}$ means 40 ÷ 100 = 0·4.
1% of 40 = 0·4
b) 7% of 40 = 0·4 × 7 = 2·8
c) 17% of 40 = 10% of 40 + 7% of 40 = 4 + 2·8 = **6·8**
or 17% of 40 = 17 × 1% of 40 = 17 × 0·4 = **6·8**

3.

	Emma's method	Isla's method	Percentage of £40
50%	Divide the whole by 2.	Find 1% and then multiply by 50.	£20
25%	Divide the whole by 4.	Find 1% and then multiply by 25.	£10
20%	Divide the whole by 5.	Find 1% and then multiply by 20.	£8
10%	Divide the whole by 10.	Find 1% and then multiply by 10.	£4

7 Percentages of an amount

→ pages 160–163

Discover

1. a) 75% of 80 kg is 60 kg. Class 1 recycled 60 kg of paper.
b) Class 1 recycled 40 kg more paper than plastic.

Think together

1. 60% of 120 kg = 72 kg of paper
40% of 120 kg = 48 kg of plastic

2. a) 5% of £300 = £15
b) 55% of 300 kg = 165 kg
c) 15% of 300 cm = 45 cm
d) 95% of 300 km = 285 km

3. Children should discuss various methods to find percentages of 320 and their efficiency. They should draw bar models and grids to help them explain their methods.
Methods might include:
11% = 10% + 1% = 32 + 3·2 = 35·2
11% = 11 × 1% = 11 × 3·2 = 35·2
51% = 50% + 1% = 160 + 3·2 = 163·2
9% = 9 × 1% = 9 × 3·2 = 28·8
9% = 10% − 1% = 32 − 3·2 = 28·8
19% = 20% − 1% = 64 − 3·2 = 60·8
49% = 50% − 1% = 160 − 3·2 = 156·8

8 Percentages (missing values)

→ pages 164–167

Discover

1. a) The world record for women's long jump is 7·5 m.
b) The world record for men's high jump is 245 cm.

Think together

1. a) 10% of **30** = 3
b) 20% of **25** = 5
c) 25% of **120** = 30

2. There are 300 spectators in total.

3. Here are some possible methods. Parts a) and c) involve working out the whole (100%) from a given percentage. Part b) is simply finding a percentage of the whole.

a) If 75% = 30, 25% = 10, 100% = 40.
The number is **40.**

b) 30% of 120 = 3 × 10% = 3 × 12 = 36 miles
Jen has completed **36 miles** of the 120 mile journey.

c) 15% of the rectangle is 5 m × 12 m = 60 m^2.
1% of the rectangle = 60 m^2 ÷ 15 = 4 m^2.
100% of the rectangle = **400 m^2**.

End of unit check

→ pages 168–169

1. A

2. B

3. C

4. D

5. B

6. $\frac{1}{4}$ of 25,000 = 6,250; 30% of 25,000 = 7,500
25,000 – (6,250 + 7,500) = 11,250
11,250 fans watch the Saturday show.

Unit 11 – Measure – perimeter, area and volume

1 Shapes – same area

→ pages 172–175

Discover

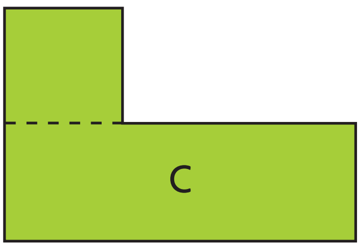
1. a) Jen is correct.
Area of Room A = 4 m × 6 m = **24 m^2**
Area of Room B = 3 m × 8 m = **24 m^2**
b) Various arrangements are possible. The dimensions will change (for example, 2 m × 12 m) but the area will still be 24 m^2.

Think together

1. A and D are both 8 m^2.
B and C are both 12 m^2.

2. a) Luis is correct. Both shapes have an area of 30 m^2.
b) Children should draw rectangles that are 15 cm by 2 cm or 30 cm by 1 cm.

3. a) A: 4 cm by 4 cm
B: 2 cm by 8 cm
C: Various options are possible.
Children should split the composite shape into two rectangles with a combined area of 16 cm^2.



For example, Rectangle 1: 12 cm^2 (2 cm × 6 cm) and Rectangle 2: 4 cm^2 (2 cm × 2 cm).
The dimensions could then be (clockwise from top): 2 cm, 2 cm, 4 cm, 2 cm, 6 cm, 4 cm.
b) Children should draw the shapes accurately on cm squared paper using the dimensions they worked out in part a).

2 Area and perimeter

→ pages 176–179

Discover

1. a) Both shapes have the same area (36 cm^2) but different perimeters (Lexi 24 cm, Max 26 cm).
b) There are two possible rectangles: 12 cm × 3 cm (perimeter of 30 cm or 18 cm × 2 cm (perimeter of 40 cm).

Think together

1. a)

	Area	Perimeter
A	3 × 8 = 24 cm^2	3 × 2 + 8 × 2 = 22 cm
B	6 × 4 = 24 cm^2	6 × 2 + 4 × 2 = 20 cm
C	3 × 2 + 6 × 3 = 24 cm^2	5 + 6 + 3 + 3 + 2 + 3 = 22 cm

b) Various answers are possible. For example, children could draw a rectangle with dimensions 2 cm × 12 cm and perimeter 26 cm, or a range of different composite shapes.

2. The areas are all the same: 28 squares in total, 14 red and 14 yellow.
The perimeters are all different: A 22 cm, B 26 cm, C 32 cm.

3. Max is not correct. Children should show a counter example. For example, a 6 × 4 rectangle has an area of 24 cm^2 and perimeter of 20 cm. An 11 × 2 rectangle has a smaller area of 22 cm^2 but a greater perimeter of 26 cm.

3 Area and perimeter – missing lengths

→ pages 180–183

Discover

1. a) The area of Lee's card is **64 cm^2**.
The area of Jamilla's card is **60 cm^2**.
b) Perimeter = 32 cm so, length + width = 16 cm.
Some possible areas of Mrs Dean's card are:
Area = 13 × 3 = 39 cm^2 Area = 12 × 4 = 48 cm^2
Area = 11 × 5 = 55 cm^2 Area = 7 × 9 = 63 cm^2

Think together

1. a) A: 9 m B: 5 m C: 6 m
b) A: 9 m^2 B: 25 m^2 C: 24 m^2
c) The gardens have the same perimeter but different areas.

2. a) A: Area = 15 cm^2, Perimeter = 16 cm; B: Area = 13 cm^2, Perimeter = 16 cm
They have the same perimeter but a different area.
b) C: Area = 12 cm^2, Perimeter = 14 cm; D: Area = 10 cm^2, Perimeter = 14 cm
They have the same perimeter but a different area.

3. a)

Width	Length	Area
2 m	13 m	26 m^2
3 m	12 m	36 m^2
5 m	10 m	50 m^2
7 m	8 m	56 m^2
11 m	4 m	44 m^2
13 m	2 m	26 m^2

b) Smallest area = 26 m^2
Largest area = 56 m^2
c) Yes, Isla is correct. The length + width = 20 cm (half of 40 cm). A dimension cannot be zero, so both dimensions have to be 0 > and < 20.

4 Area of a triangle – counting squares

→ pages 184–187

Discover

1. a) The area of Jamie's triangle is approximately **9 cm²**.
b) The area of Andy's triangle is approximately **6 cm²**.

Think together

1. a) Approximately 13 cm²
b) Approximately 13 cm²

2. a) Approximately 3 cm²
b) Approximately 3 cm²

3. Answers may vary for half/quarter/less than a quarter depending on children's estimations but the total number of part and whole squares should total to 12.

Whole squares	I
Almost-whole squares	I
Half squares	4
Quarter squares	3
Less than a quarter squares	3

Area: 5

5 Area of a right-angled triangle

→ pages 188–191

Discover

1. a) The area of the rectangle is twice the area of each triangle.
b) The area of Reena's triangle is 20 cm².

Think together

1. a) Area of rectangle = **3** cm × **6** cm = **18** cm²
Area of triangle = **18** cm² ÷ 2 = **9** cm²
b) Area of rectangle = **2** × **2** = **4** cm²
Area of triangle = **4** ÷ 2 = **2** cm²
c) Area of rectangle = **4** × **11** = **44** cm²
Area of triangle = **44** ÷ 2 = **22** cm²

2. a) 8 cm² c) 7 cm²
b) 5 cm² d) 22 cm²

3. a) Amelia is correct.
b)

Base	Height
5 cm	4 cm
4 cm	5 cm
2 cm	10cm
10 cm	2 cm
1 cm	20 cm
20 cm	1 cm

6 Area of any triangle

→ pages 192–195

Discover

1. a) The area of the triangle on Lexi's sign is 42 cm².
b) The area of Mo's sign is 600 cm².

Think together

1. a) Area = (**8** × **2**) ÷ 2
Area = **8** cm²
b) Area = (**6** × **3**) ÷ 2
Area = **9** cm²
c) Area = (**11** × **4**) ÷ 2
Area = **22** cm²

2. a) Max used the slanting height to calculate the area. He should have used the vertical height.
Area = (6 × 5) ÷ 2 = 15 cm²
b) Base = **7** cm
Height = **4** cm
Area = (7 × 4) ÷ 2 = **14** cm²

3. a) Both triangles have the same area because they have the same base and the same vertical height.
b) Children should draw a triangle with the same height as triangle A and B but a wider base.

7 Area of a parallelogram

→ pages 196–199

Discover

1. a) The area of the parallelogram is 30 cm × 20 cm = 600 cm².
So, the area of one tile is 600 cm².
b) Zac's method is 25 cm × 30 cm = 750 cm².
Zac is incorrect.
Emma's method is 30 cm × 20 cm = 600 cm².
Emma is correct.

Think together

1. a) A: 5 × 6 = 30 cm²
B: 2 × 4 = 8 cm²
C: 2 × 3 = 6 cm²
b) A: 5 × 6 = 30 cm²
B: 2 × 4 = 8 cm²
C: 2 × 3 = 6 cm²
Children should notice that the area is the same for both methods.

2. a) 20 cm² c) 42 mm²
b) 40 cm² d) 12.6 m²

3. a = 3 cm b = 6 cm

8 Problem solving – area

→ pages 200–203

Discover

1. a) $16 + 20 = 36$ m²
$36 - 4 = 32$ m²
The total area of the paths is 32 m².
b) Area of the grass = $80 - 32 = 48$ m²
The total area of the grass is 48 m².

Think together

1. Isla: Whole garden = $6 \times 5 = 30$ m²
2 larger vegetable triangles = $(3 \times 4) \div 2 = 6$ m²
Medium vegetable triangle = $(1 \times 5) \div 2 = 2{\cdot}5$ m²
Small vegetable triangle = $(1 \times 1) \div 2 = 0{\cdot}5$ m²
Total = $6 + 6 + 2{\cdot}5 + 0{\cdot}5 = 15$ m²
Flowers = 30 m² – 15 m² = **15 m²**

Richard: $(4 \times 6) \div 2 = 12$ m²
$(1 \times 6) \div 2 = 3$ m²
Total of flowers: 12 + 3 = **15 m²**

2. a) Area of the floor = 60×120 = **7,200 cm²** or **72 m²**
b) Area of each tile = $(30 \times 30) \div 2$ = **450 cm²** or **4·5 m²**
c) $72 \div 4{\cdot}5 = 16$
16 tiles are needed to cover the whole floor.

3. a) Area of the path = Area of the garden – Area of the grass
Area of the path = 45 m² – 22·5 m²
Area of the path = **23 m²**
b) Area of the grass = **22·5 m²**
There is plenty of room for the tent.

9 Problem solving – perimeter

→ pages 204–207

Discover

1. a) Danny ran 150 m + 150 m = 300 m.
Ambika ran 55 m + 71 m + 150 m = 276 m.
Danny ran **24 m** more than Ambika.
b) The perimeter of the park = $150 \times 4 = 600$ m.
The perimeter of the field = $150 \times 3 + 71 + 55 + 24 = 600$ m.
The amount of bunting needed would be the same.

Think together

1. Perimeter of each rectangle is 10 + 10 + 5 + 5 = **30 cm**.

2. Perimeter of the octagon = $9 \times 8 = 72$.
Length of one side of the hexagon = $72 \div 6 = 12$.
The length of one side of the hexagon is **12 cm**.

3. The perimeter of shape A = 9 + 9 + 5 + 5 = **28 cm**.

4. The greatest possible area is a square
12 m × 12 m = 144 m².

10 Volume – count cubes

→ pages 208–211

Discover

1. a) Jamilla and Max's solids each have a volume of **8 cm³**.
Jamilla is not correct.
b) The volume of the new cuboid is **16 cm³**.
Children could make the following cuboids:
$2 \times 2 \times 4$, $1 \times 2 \times 8$ or $1 \times 1 \times 16$.

Think together

1. a) **8** cm³ b) **11** cm³ c) **28** cm³

2. a) 20 cm³ b) 36 cm³

3. a) Max: $2 \times (3 \times 4) = 24$ cm³
Jamilla: 4 × (3 × 2 = 24 cm³
b) A: 18 cm³ B: 24 cm³ C: 22 cm³
B has the greatest volume.
The total number of cubes is 64. This would make a $4 \times 4 \times 4$ cube.

11 Volume of a cuboid

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Discover

1. a) 64 cubes fit in Aki's box.
60 cubes fit in Kate's box.
b) Volume = $l \times w \times h$
$4 \times 4 \times 4 = 16 \times 4 = 64$
The volume of Aki's box is 64 cm³.
$5 \times 4 \times 3 = 20 \times 3 = 60$
The volume of Kate's box is 60 cm³.

Think together

1. a) $4 \times 3 \times 3 = 36$ cm³
b) $5 \times 5 \times 2 = 50$ cm³
c) $10 \times 3 \times 4 = 120$ cm³

2. The volume of A is $4 \times 5 \times 6 = 120$ cm³.
The volume of B is $10 \times 2 \times 6 = 120$ cm³.
The volume of C is $4 \times 1{\cdot}5 \times 20 = 120$ cm³.
Olivia is correct, they all have the same volume.

3. a) height = **2** cm
b) length = **10** cm

End of unit check

→ pages 216–217

1. C

2. D

3. B

4. B

5. a) Area = **480 m²**
b) Turf = 480 × £2 = **£960**