Unit 7 – Multiplication and division (2)

I Multiply a number up to 4-digits by a 1-digit number

→ pages 6–8

1. 6 × 20 = **120**
6 × 7 = **42**
120 + 42 = **162**
So, 6 × 27 = **162**

2. 5 × 100 = **500** 5 × 30 = **150** 5 × 5 = **25**
500 + 150 + 25 = **675**
So, 5 × 135 = **675**

3. a) 32 × 7 = 224

	30	2
7	7 × 30 = 210	7 × 2 = 14

b) 3 × 314 = 942

	300	10	4
3	900	30	12

4. a) 19 × 6 = **114**
b) 48 × 6 = **288**
c) 235 × 3 = **705**
d) 8 × 711 = **5,688**
e) 1,704 × 5 = **8,520**
f) 739 × 9 = **6,651**

5. There are **18,400** sweets in 8 jars.

6. Method 1: add then multiply:
(45 + 376 + 918) × 3 = **4,017**
Method 2: multiply then add:
(45 × 3) + (376 × 3) + (918 × 3) = **4,017**

Reflect

Children should explain placing digits in the correct columns and the order of multiplications.

2 Multiply 2-digit numbers (area model)

→ pages 9–11

1. a)

	20	6
10	10 × 20 = 200	10 × 6 = 60
4	4 × 20 = 80	4 × 6 = 24

26 × 14 = 364

b)

	10	7
40	400	280
2	20	14

17 × 42 = 714

c) Zac will get the same answer as multiplication can be completed in any order.

2. a) 27 × 34 = **918** b) 53 × 38 = **2,014**

3. Mike runs **779** km in 19 weeks.

4.

	50	3
20	50 × 20 = 100	3 × 20 = 60
7	50 × 7 = 350	3 × 7 = 10

53 × 27 = 1,431

	Th	H	T	O
		3	5	0
		1	0	0
		6	0	
+		1	0	
	1	1	5	0

Errors: 50 × 20 = 1,000
3 × 7 = 21
100, 60 and 10 are not lined up correctly.

5. Gina has forgotten two of the parts: 20 × 7 and 3 × 40. Her method does not work because not all of the digits have been multiplied.

6. Gina is multiplying 38 and 36.

	30	8
30	900	240
6	180	48

38 × 36 = 1,368

Reflect

Children should explain the method they would use to work out 56 × 21 = 1,176 – for example, the area model or column method.

3 Multiply 2-digit numbers

→ pages 12–14

1. a) Children complete the grids to show the following.

Olivia's method:

	34
10	340
2	68

	H	T	O
	3	4	0
+		6	8
	4	0	8

Jamilla's method:

	H	T	O
		3	4
×		1	2
		6	8
	3	4	0
	4	0	8

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b) Children should choose their preferred method, explaining why they find that method easier or more accurate.

2. a) 29 × 3 = 87
29 × 20 = 580
29 × 23 = **667**
b) 37 × 6 = 222
37 × 10 = 370
37 × 16 = **592**

3. a) 45 × 7 = 315
45 × 20 = 900
45 × 27 = **1,215**
b) 52 × 7 = 364
52 × 10 = 520
52 × 17 = **884**
c) 49 × 4 = 196
49 × 30 = 1,470
49 × 34 = **1,666**
d) 28 × 6 = 168
28 × 70 = 1,960
28 × 76 = **2,128**
Or 76 × 8 = 608
76 × 20 = 1,520
76 × 28 = **2,128**

4. 24 snack bars weigh **2,040 g** or **2.04 kg**.

5. 89 × 14 = 1,246

6 a)

		H	T	O	
			3	6	
	×		1	**3**	
		1	**0**	8	
		3	**6**	0	
		4	**6**	**8**	

		H	T	O	
			3	6	
	×		1	**8**	
		2	**8**	8	
		3	**6**	0	
		6	**4**	**8**	

b)

		Th	H	T	O	
				7	**4**	
	×			**4**	3	
			2	2	2	
		2	9	6	0	
		3	**1**	**8**	**2**	

Reflect

Children should explain using long multiplication to work out 99 × 47 = 4,653.

4 Multiply a 3-digit number by a 2-digit number

→ pages 15–17

1. a) 172 × 24 = 4,128

	100	70	2
20	100 × 20 = 2,000	70 × 20 = 1,400	2 × 20 = 40
4	100 × 4 = 400	70 × 4 = 280	2 × 4 = 8

b) 325 × 18 = 5,850

	300	20	5
10	3,000	200	50
8	2,400	160	40

2. Children complete each line to show:
a) 172 × 4 = **6**88
172 × 20 = **3,440**
172 × 24 = **4,128**
b) 325 × 8 = **2,600**
325 × 10 = **3250**
325 × 18 = **5,850**

3. Children complete the long multiplication grids to show:
a) 145 × 39 = **1,305** + **4,350** = **5,655**
b) 408 × 25 = **2,040** + **8,160** = **10,200**
c) 418 × 72 = **836** + **29,260** = **30,096**
d) 529 × 44 = **2,116** + **21,160** = **23,276**

4. 72 × 314 = 22,608
The long multiplication method is more efficient because it has fewer steps.

5. 288 × 12 = 3,456
3,456 – 2,390 = 1,066
1,066 bottles of water are left.

6.

		Th	H	T	O	
			5	6	7	
	×			**1**	**5**	
		2	**8^{3}**	**3^{3}**	**5**	
		5	**6**	**7**	**0**	
		8	**5**	**0**	**5**	

Children should explain how they knew which digits to put where. For example:

The ones digit in the multiplier must be 5 because the ones digit in the final answer is 5 and the only multiple of 7 to have a ones digit of 5 is **5** × 7 = 35. 5 × 567 = 2,835 in the first answer line. In the tens column of the second answer line, 3 + **7** = 0 so the tens digit must be 7. The tens digit in the multiplier must be 1 because only 1 × 7 = 7. The multiplier must therefore be 15.

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Reflect

354 × 30 = 10,620 and 300 × 52 = 15,600

Children should discuss the efficiency of using long multiplication to work out these calculations. A partitioning method would be more efficient.

5 Multiply a 4-digit number by a 2-digit number

➜ pages 18–20

1. a) 1,203 × 6 = 7,218
1,203 × 20 = 24,060
1,203 × 26 = **31,278**
b) 1,612 × 4 = 6,448
1,612 × 20 = 32,240
1,612 × 24 = **38,688**
c) 2,459 × 5 = 12,295
2,459 × 20 = 49,180
2,459 × 25 = **61,475**
d) 3,006 × 7 = 21,042
3,006 × 30 = 90,180
3,006 × 37 = **111,222**

2. 23 bags of marbles weigh **38,042 g**.

3. a) 3,612 × 38 = **137,256** b) 6,005 × 33 = **198,165**

4. 72 × 17 = **1,224**
720 × 17 = **12,240**
7,200 × 17 = **122,400**
1,700 × 72 = **122,400**
Children should spot that these are related facts and that they do not have to work out each multiplication separately.

5. The car and the motorbike cost **£47,000** in total.

6. **47,138** It does not matter what order you multiply the numbers in. Multiplication can be completed in any order.

7. One possible solution is 5,703 × 82.

Reflect

Children should explain that this calculation is incorrect because in the multiplication 1,39**5** × 3**7** the ones digit in the answer will be **5** because 5 × 7 = 3**5**. Or they might explain that odd number × odd number = odd number, but 53,010 is an even number.

1,395 × 37 = **51,615**

6 Divide a number up to 4 digits by a 1-digit number

➜ pages 21–23

1. a) 86 ÷ 2 = **43** c) 88 ÷ 4 = **22** e) 63 ÷ 3 = **21**
b) 848 ÷ 4 = **212** d) 696 ÷ **3 = 232** f) **642 ÷ 2 = 321**

2. a) 46 ÷ 2 = **23**
b) 966 ÷ 3 = **322**
c) 4,884 ÷ 4 = **1,221**

3. Each contestant gets **£1,333**.

4. a) 9,690 ÷ 3 = **3,201**
b) 7,070 ÷ 7 = **1,010**

5. a) **484** ÷ 4 = 121 c) 8,44**0** ÷ **4** = **2**,110
b) **9,603** ÷ 3 = 3,201

6.

£6,600					
£3,300		£3,300			
£2,200		£2,200		£2,200	
£1,100	£1,100	£1,100	£1,100	£1,100	£1,100

£6,600 ÷ 3 = £2,200 6,600 ÷ 6 = £1,100

Children should explain that dividing the same amount by a larger number means there are more groups to share the amount between, so each group will get less of a share.

Reflect

Children should explain how to use short division to work out 4,804 ÷ 2 = 2,402.

7 Divide a number up to 4 digits by a 1-digit number

➜ pages 24–26

1. 78 ÷ 3 = **26**

2. Olivia can make **16** hexagons.

3. a) 642 ÷ 6 = **107** c) 5,016 ÷ 3 = **1,672**
b) 725 ÷ 5 = **145**

4. a) 7,924 ÷ 7 = **1,132** c) 916 ÷ 4 = **229**
b) 711 ÷ 3 = **237**

5. 2,454 ÷ 6 = **409**

6. Isla did not carry the correct number over from the thousands column to the hundreds column. The small number against the 5 should be 1 not 3.

7. a)

		2	4	3		
	4	9	1 7	1 2		

b)

		2	2	9	1	
	3	6	8	2 7	3	

c)

		1	2	6		
	5	6	3	3 0		

Alternative for c)

		1	3	6		
	5	6	8	3 0		

8. Bella: 4,755 ÷ 3 = 1,585 1,585 ÷ 5 = **317**
Ebo: 4,755 ÷ 5 = 951 951 ÷ 3 = **317**

The bar model shows 5 parts each divided into 3 parts, which is 15 parts altogether.

Children should use 5 × 3 = 15, 15 ÷ 3 = 5 and 15 ÷ 5 = 3 to explain that dividing by 15 is the same as dividing by 5 and then by 3.

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Reflect

This answer is wrong because the remainders have not been carried over to the next columns.

308 ÷ 7 = 44

8 Divide with remainders

➜ pages 27–29

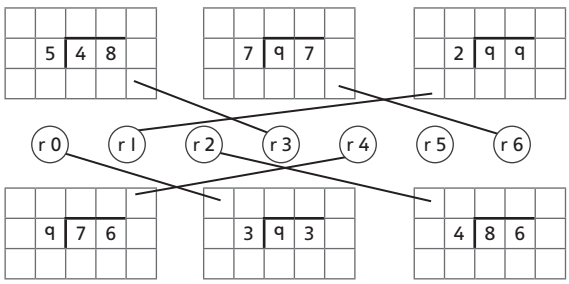
1. 74 ÷ 3 = **24 r 2**

2. a) 76 ÷ 6 = 12 r 4
Each friend gets **12** sweets.
b) There are **4** sweets left over.
c) If there were 5 left over, each jar could have another sweet put in it.
A remainder must be less than the divisor.
When dividing by 3 the only possible remainders are 1 or 2.

3. a) 56 ÷ 5 = **11 r 1**
b) 329 ÷ 2 = **164 r 1**
c) 418 ÷ 9 = **46 r 4**
d) 4,175 ÷ 4 = **1,043 r 3**
e) 973 ÷ 6 = **162 r 1**
f) 1,111 ÷ 8 = **138 r 7**

4. No, Toshi cannot pack all the jars without a remainder, 712 ÷ 6 = 118 r 4. There will be 4 jars left over.

5. Children will indicate which ones they could spot without completing the division:
- When dividing by 2, any odd number will have remainder 1 (99 ÷ 2).
- When dividing by 5, only numbers with a ones digit of 0 or 5 will not have a remainder; count on from either 0 or 5 to get a remainder of 1, 2, 3 or 4 (48 ÷ 5).
- If all the digits are multiples of the divisor, there will be no remainder (93 ÷ 3).
- Some children will be able to use multiplication tables to count on or back from a multiple to work out the remainder – for example, 76 ÷ 9 = 72 remainder 4.



6. The mints will last for **66** days.

7. a) 235 ÷ **7** = 33 r 4
b) 51**1** ÷ 3 = **170** r 1
51**4** ÷ 3 = **171** r 1
51**7** ÷ 3 = **172** r 1
9,718 ÷ **4** = 2,**429 r 2**

Reflect

Alex is not correct. The largest remainder is one less than the divisor, otherwise the remainder could be shared out again.

9 Efficient division

➜ pages 30–32

1. a) Children should circle: 300, 95 and 6,045.
Children should explain that they are all multiples of 5 because the ones digit is 0 or 5.
b) Children should circle: 1,252, 390 and 788.
Children should explain that they are all even numbers so they are all multiples of 2.
c) Children should circle: 156, 384 and 72.
They are all multiples of 3 because their digit sum is a multiple of 3.

2. Children could use a written method to show that 756 ÷ 4 = 189, or that 56 is a multiple of 4, so 756 is also a multiple of 4.

3. a) Children should circle: 78, 342 and 2,412.
b) **2**46, **5**46 or **8**46
3,1**3**2, 3,1**6**2 or 3,1**9**2
28**2**, 28**5** or 28**8**

4. a) remainder = 1
b) remainder = 2
c) remainder = 5
d) remainder = 0
Children should explain counting on from 712 to work out the remainder and knowing that when they count to 8 it means there is no remainder.

5. Children should circle: 516 ÷ 4, 1,748 ÷ 4 and ✱04 ÷ 4.

6. a) 71**3** or 71**8**
b) 1,73**1**, 1,73**4** or 1,73**7**
c) 59**3** or 59**9**

Reflect

Children should explain that the largest 1-digit number is 9. When dividing by 9 the largest remainder is 8, one less than 9, so you can never have a remainder higher than 8 when dividing by a 1-digit number.

10 Solve problems with multiplication and division

➜ pages 33–35

1. a) **602** ÷ **3** = **200** r **2**
b) **3,862** ÷ **8** = **482** r **6**

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2. 365 ÷ 7 = 52 r 1
Max is not correct. There are 52 weeks and 1 day in 365 days.

3. a) 32 × 5 + 3 = 163
163 stickers were shared out altogether.
b) 163 ÷ 6 = 27 r 1
Each child gets **27** stickers. There is **1** sticker left over.

4. (2,050 – 187) ÷ 9 = 207
One box is **207** mm wide.

5. 5,000 – (6 × 416) = 2,504
2,504 ÷ 8 = **313**
There is **313** ml of water in each short glass.

Reflect

Children should explain how to use related facts to check 1,143 × 5 = 5,715. For example, 5,715 ÷ 5, 5 × 1, 5 × 3 or 1,143 × 10 ÷ 2.

My journal

➜ pages 36–37

1. Mo: He forgot to carry the 3 from 9 × 30 into the hundreds column and so it was not added to 9 × 200. Instead, he wrote 3 in the hundreds column answer space. In the second multiplication, he forgot he was multiplying by 30 and not just 3, and so forgot to put a zero in the ones column. Finally, he worked out 3 × 5 as 25 when it is 15. His answer is wrong, he has one more digit than he should and his digits are in the wrong place.

First answer line: 2,115
Second answer line: 7,050
The correct answer is **9,165**.

Reena: She incorrectly worked out 28 ÷ 3 as 8 r 4 instead of 9 r 1. This caused the next column to be 45 ÷ 3 instead of 15 ÷ 3.
The correct answer is **295**.

Danny: He has calculated the wrong remainder. It should be r 3 not r 1.
The correct answer is **1,762 r 3**.

2. Children's explanations might vary, but could include:

99 × 764
100 × 764 = 76,400 – 764 = 75,636

5,917 × 1 = 5,917
Any number multiplied by 1 is the number itself.

723 ÷ 1 = 723
Any number divided by 1 is the number itself.

7,000 × 30
Use 7 × 3 = 21 and then multiply by 10 and then by 1,000 = 210.000.

Power play

➜ page 38

Lexi: 27 × 37 × 47 = 46,953
Mo: 28 × 38 × 48 = 51,072
Zac: 27 × 28 × 29 = 21,924

It is true that when you multiply three consecutive numbers together the ones digit is always 0, 4 or 6.

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Unit 8 – Fractions (3)

I Multiply unit fractions by an integer

➜ pages 39–41

1. a) $5 \times \frac{1}{7} = \frac{5}{7}$

b) $5 \times \frac{1}{3} = \frac{5}{3} = 1\frac{2}{3}$

c) Mike needs $\mathbf{2\frac{1}{4}}$ bananas.

2. a) $7 \times \frac{1}{8} = \mathbf{\frac{7}{8}}$ $\quad \frac{1}{8} \times 7 = \mathbf{\frac{7}{8}}$

b) $\frac{1}{10} \times \mathbf{7} = \frac{7}{10}$ $\quad \mathbf{7} \times \frac{1}{10} = \frac{7}{10}$

c) $\mathbf{\frac{1}{9}} \times 4 = \frac{4}{9}$ $\quad 4 \times \mathbf{\frac{1}{9}} = \frac{4}{9}$

3. a) $\frac{1}{5} \times 2 = \mathbf{\frac{2}{5}}$ $\quad$ b) $\frac{1}{7} \times 6 = \mathbf{\frac{6}{7}}$

4. a) $5 \times \frac{1}{2} = \mathbf{\frac{5}{2}} = \mathbf{2\frac{1}{2}}$ $\quad$ c) $\frac{1}{5} \times \mathbf{5} = 1$

b) $\frac{1}{4} \times 7 = \mathbf{\frac{7}{4}} = \mathbf{1\frac{3}{4}}$ $\quad$ d) $12 \times \frac{1}{3} = \mathbf{\frac{12}{3}} = \mathbf{4}$

5. a) $\frac{1}{5} \times \mathbf{7} = 1\frac{2}{5}$ $\quad$ b) $\frac{1}{\mathbf{8}} \times \mathbf{9} = 1\frac{1}{8}$

6. a) This is **false** because **any number multiplied by 0 is 0, so $\frac{1}{8} \times 0 = 0$**.

b) This is **true** because **$8 \times \frac{1}{8} = \frac{8}{8} = 1$**.

c) This is **true** because **$\frac{1}{8} \times 6 = \frac{6}{8}$ which is equivalent to $\frac{3}{4}$**.

7. a) $\frac{1}{10} \times \mathbf{6} = \frac{3}{5}$ $\quad$ b) $\frac{1}{6} \times 8 = \mathbf{1\frac{1}{3}}$

Reflect

The simplest answer is $\frac{1}{5} \times 4$ or $4 \times \frac{1}{5}$. Other answers are possible. For example, $\frac{4}{5} \times 1$ or $1 \times \frac{4}{5}$ and $\frac{1}{10} \times 8$ or $8 \times \frac{1}{10}$.

2 Multiply non-unit fractions by an integer

➜ pages 42–44

1. $\frac{3}{10} \times 3 = \mathbf{\frac{9}{10}}$

2. $\frac{3}{8} \times 5 = \mathbf{\frac{15}{8}} = \mathbf{1\frac{7}{8}}$

There are $\mathbf{1\frac{7}{8}}$ litres of milk in total.

3. a) $\frac{3}{5} \times 4 = \mathbf{\frac{12}{5}} = \mathbf{2\frac{2}{5}}$

b) $2 \times \frac{7}{9} = \mathbf{\frac{14}{9}} = \mathbf{1\frac{5}{9}}$

4. a) $\frac{6}{11} \times 5 = \frac{30}{11} = \mathbf{2\frac{8}{11}}$ $\quad$ c) $\frac{3}{4} \times 7 = \frac{21}{4} = \mathbf{5\frac{1}{4}}$

b) $\frac{5}{6} \times 6 = \frac{30}{6} = \mathbf{5}$ $\quad$ d) $11 \times \frac{3}{5} = \frac{33}{5} = \mathbf{6\frac{3}{5}}$

5. a) $\frac{7}{20} \times 18 = \mathbf{6\frac{3}{10}}$ $\quad$ b) $\frac{17}{20} \times 7 = \mathbf{5\frac{19}{20}}$

6. a) $\frac{3}{10} \times \mathbf{8} = \frac{12}{5}$ $\quad$ b) $\frac{4}{9} \times \mathbf{10} = 4\frac{4}{9}$

Reflect

Children should explain that $\frac{3}{7} \times 5$ means 5 lots of 3 sevenths = 15 sevenths. Only the numerator needs to be multiplied by the whole number.

3 Multiply mixed numbers by integers (I)

➜ pages 45–47

1. a) $1\frac{3}{5} = \mathbf{\frac{8}{5}}$

$\mathbf{\frac{8}{5}} \times 2 = \mathbf{\frac{16}{5}} = \mathbf{3\frac{1}{5}}$ kg

b) $\mathbf{\frac{8}{5}} \times 3 = \mathbf{\frac{24}{5}} = \mathbf{4\frac{4}{5}}$ kg

c) $\mathbf{\frac{8}{5}} \times 4 = \mathbf{\frac{32}{5}} = \mathbf{6\frac{2}{5}}$ kg

2. $\mathbf{11\frac{1}{4}}$ of sticky tape is needed to seal 5 boxes.

3. a) $1\frac{2}{3} \times 3 = \frac{15}{3} = \mathbf{5}$ $\quad$ c) $1\frac{2}{3} \times 7 = \frac{35}{3} = \mathbf{11\frac{2}{3}}$

b) $1\frac{2}{3} \times 5 = \frac{25}{3} = \mathbf{8\frac{1}{3}}$ $\quad$ d) $10 \times 1\frac{2}{3} = \frac{50}{3} = \mathbf{16\frac{2}{3}}$

4. a) **Yes**, Louise rows $13\frac{1}{2}$ km in 5 days.

$5 \times \frac{27}{10} = \frac{135}{10} = 13\frac{5}{10} = 13\frac{1}{2}$

b) It will take Louise **8** days to cycle more than 12 km.

$1\frac{2}{3} = \frac{5}{3}$

$8 \times \frac{5}{3} = \frac{40}{3} = 13\frac{1}{3}$

$7 \times \frac{5}{3} = \frac{35}{3} = 11\frac{2}{3}$ – not enough

5. a) **$\mathbf{1\frac{2}{3} \times 10}$** gives the largest answer.

b) **$\mathbf{2\frac{2}{7} \times 13}$** gives the smallest answer.

$2\frac{2}{7} \times 13 = \frac{16}{7} \times 13 = \frac{208}{7}$

$5\frac{1}{5} \times 8 = \frac{26}{5} \times 8 = \frac{208}{5}$

Fifths are larger than sevenths.

Or $\frac{208}{7} = 29\frac{5}{7}$

$\frac{208}{5} = 41\frac{3}{5}$

6. $2\frac{3}{8} \times 15 = \frac{19}{8} \times 15 = \frac{285}{8} = \mathbf{35\frac{1}{2}}$

$11\frac{7}{8} \times \mathbf{3} = \frac{95}{8} \times \mathbf{3} = \frac{285}{8} = 35\frac{1}{2}$

Reflect

Children should explain their method to show that $2\frac{4}{5} \times 6 = 16\frac{4}{5}$.

Partitioning: $2 \times 6 + \frac{4}{5} \times 6 = 12 + \frac{24}{5} = 12 + 4\frac{4}{5} = 16\frac{4}{5}$

Improper fraction: $2\frac{4}{5} \times 6 = \frac{14}{5} \times 6 = \frac{84}{5} = 16\frac{4}{5}$

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4 Multiply mixed numbers by integers (2)

→ pages 48–50

1. The horse eats $\mathbf{8\frac{1}{4}}$ carrots over 3 days.

2. $1\frac{3}{8} \times 5 = \mathbf{6\frac{7}{8}}$

3. $3\frac{1}{2} \times 5 = \mathbf{17\frac{1}{2}}$

4. Children should disagree.

$3\frac{1}{3} \times 4 = (3 \times 4) + (\frac{1}{3} \times \mathbf{4}) = 13\frac{1}{3}$

$4\frac{1}{3} \times 3 = (4 \times 3) + (\frac{1}{3} \times \mathbf{3}) = 13$

5. a) $7\frac{2}{5} \times 6 = \mathbf{44\frac{2}{5}}$

b) $8\frac{1}{3} \times 6 = \mathbf{50}$

6. **32** full glasses of lemonade can be poured.

Reflect

Aki is correct, they are the same.

$2\frac{3}{4} \times 5 = \frac{55}{4} = 13\frac{3}{4}$

$10\frac{15}{4}$ can be simplified to $13\frac{3}{4}$.

5 Fraction of an amount

→ pages 51–53

1. **15** balloons are red.

2. There are **25** yellow counters in the box.

3. a) $\frac{1}{7}$ of £140 = **£20**

b) $\frac{7}{12}$ of 48 = **28 kg**

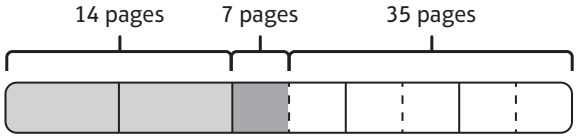
c) $\frac{11}{20}$ of £800 = **£440**

d) $\frac{13}{20}$ of £800 = **£520**

4. There are **11** purple counters.

5. The string is **6 cm** longer than the pencil.

6. There are **70** pages in the book.



Reflect

Children should explain the method they used, either using a bar model divided into quarters or dividing by 4 to find $\frac{1}{4}$, then multiplying by 3 to find $\frac{3}{4}$.

$\frac{3}{4}$ of 32 kg = 24 kg

6 Finding the whole

→ pages 54–56

1. Bella's number is **54**.
Ebo's number is **27**.

2. Amelia has to learn **30** spellings.

3. a) The number is **25**.
b) The number is **108**.

4. There were **30** buttons at the start.

5. Ethan gives **£30** to his friend.

6. a) $\frac{3}{5}$ of **15** = 9

b) $\frac{4}{9}$ of 27 = 12

7. The total distance Jen and Toshi have to drive is **72 km**.

Reflect

Children should draw a bar model with 5 equal sections, indicating that £60 covers 3 of the sections. The whole is therefore £100.

7 Using fractions as operators

→ pages 57–59

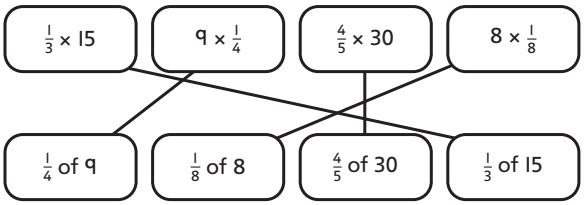
1. a) $10 \div 5 = \mathbf{2}$

$\frac{1}{5}$ of $10 = \mathbf{2}$

b) $\frac{1}{5} \times 10 = \frac{\mathbf{10}}{5} = \mathbf{2}$

c) The fraction, the whole number and the answer are the same.

2.



3. a) $72 \div 6 = 12$; $12 \times 5 = \mathbf{60}$

b) $\frac{5}{6} \times 72 = \frac{360}{6} = \mathbf{60}$

c) Children should discuss their preferred method with a partner, explaining efficiency and accuracy.

4. a) $\frac{1}{7}$ of $13 = \frac{13}{7} = \mathbf{1\frac{6}{7}}$

b) $\frac{2}{7}$ of $16 = \frac{32}{7} = \mathbf{4\frac{4}{7}}$

5. There is $\mathbf{3\frac{1}{3}}$ **kg** of flour left in the bag.

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Reflect

$\frac{1}{3}$ of 17:

It is easier to work out $\frac{1}{3} \times 17$ because 3 is not a factor of 17.

$\frac{1}{3} \times 17 = \frac{17}{3} = \mathbf{5\frac{2}{3}}$

$\frac{4}{5} \times 45$:

It is easier to work out $\frac{4}{5}$ of 45 because 5 is a factor of 45.

$\frac{4}{5}$ of 45 = 45 ÷ 5 × 4 = **36**

My journal

➜ page 60

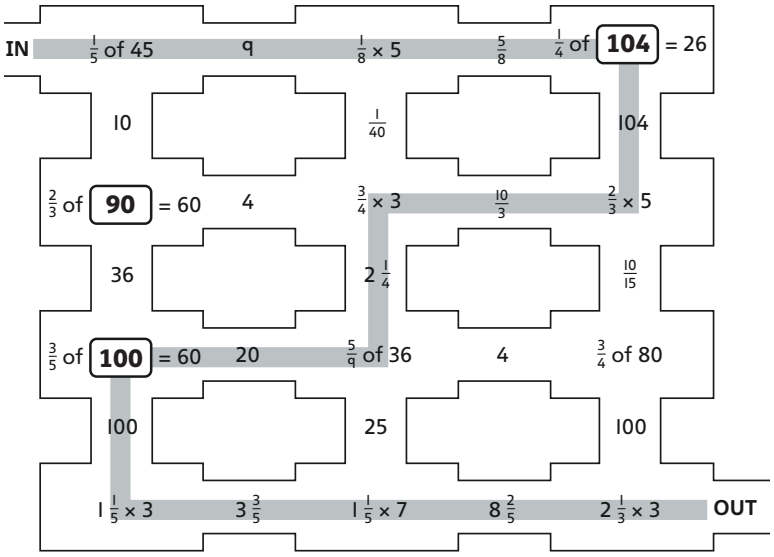
Children should draw bar models to represent the calculations.

$\frac{1}{4} \times 60$ kg = $\frac{1}{4}$ of 60 kg = 60 ÷ 4 = **15 kg**

$\frac{1}{3}$ of 5 litres = $\frac{1}{3} \times 5 = \frac{5}{3} = \mathbf{1\frac{2}{3}}$ **litres**

Power puzzle

➜ page 61



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Unit 9 – Decimals and percentages

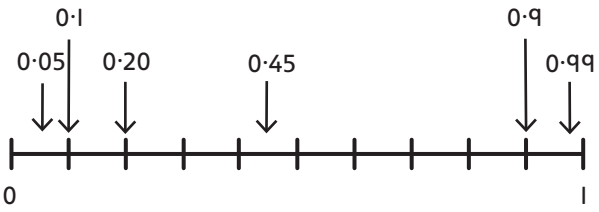
1 Write decimals up to 2 decimal places – less than 1

→ pages 62–64

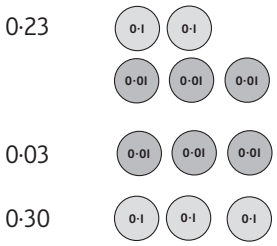
1. a) 0·3, 0·5, 0·8
b) 0·35, 0·39

2. a) 0·4
b) 0·47
c) 0·43

3.



4.



5. a) The value of the 3 digit is **3 tenths** or **0·3**.
b) The value of the 3 digit is **3 tenths** or **0·3**.
c) The value of the 4 digit is **4 hundredths** or **0·04**.
d) The value of the 4 digit is **4 hundredths** or **0·04**.

6. a) I am **0·28**.
b) I am **0·01**.

7. Children should find: 0·01, 0·12, 0·21, 0·23, 0·32, 0·34, 0·43, 0·45, 0·54, 0·56, 0·65, 0·67, 0·76, 0·78, 0·87, 0·89 and 0·98.

Reflect

Both numbers have a 7 digit.

The value of the 7 digit is different in the two numbers:

0·7 and 0·07.

2 Write decimals up to 2 decimal places – greater than 1

→ pages 65–67

1. a) 1·3, 1·4, 1·5, 1·6, 1·7, 1·8, 1·9, 2
b) 1·11, 1,13, 1·15, 1·16, 1·17, 1·18, 1·19, 2
c) 9·8, 9·9, 10, 10·1, 10·2, 10·3, 10·4, 10·5
d) 5·66, 5·67, 5·68, 5·69, 5·70, 5·71, 5·72, 5·73, 5·74

2. a) 1·6 b) 1·65

3. a) 1·4 b) 4·01

4. a) Children should draw 1 × 1 counter, 4 × 0·1 counters and 7 × 0·01 counters.
b) Now Filip has the number 1·77.
c) To get 2·89, Filip added 1 × 1 counter, 1 × 0·1 counter and 2 × 0·01 counters.

5. a) 1·0, 0·9, 0·8
b) 1·31, 1·33, 1·34
c) 3·02, 3·01, 2·98, 2·97, 2·96

6. a) The value of the 7 digit is 7 hundredths or 0·07.
b) The value of the 7 digit is 7 tenths or 0·7.
c) The value of the 3 digit is 3 ones or 3.
d) The value of the 7 digit is 7 tens or 70.

7. a) 10·9
b) 9·1
c) 9·01
d) 0·1, 0·9, 0·19, 0·91, 0·109, 0·901

Reflect

True. The 5 digit represents a different value in each number.

In 5·17 the 5 represents 5 ones.
In 7·15 the 5 represents 5 hundredths.
In 1·57 the 5 represents 5 tenths.

3 Equivalent fractions and decimals – tenths

→ pages 68–70

1. a) 0·7
b) 0·7 = $\frac{7}{10}$

2. a) Children should draw 8 counters in the tenths column.
b) 0·8 = $\frac{8}{10}$ or $\frac{4}{5}$

3. A = $\frac{1}{10}$ C = $\frac{5}{10}$ or $\frac{1}{2}$
B = $\frac{3}{10}$ D = $\frac{9}{10}$

4. Children should draw:
a) 4 × 0·1 counters in the tenths column.
b) 1 × 1 counter in the ones column, 4 × 0·1 counters in the tenths column.
c) 2 × 1 counter in the ones column, 4 × 0·1 counters in the tenths column.
d) All of the decimals have 4 tenths but they each have a different number of ones.

5.

Fraction	Decimal
$\frac{9}{10}$	**0·9**
$\frac{2}{10}$	0·2
$1\frac{3}{10}$	**1·3**
$2\frac{9}{10}$	**2·9**
4 $\frac{3}{10}$	4·3

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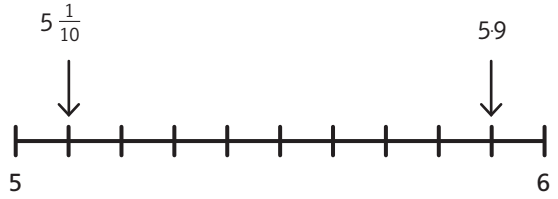
6. a) The arrow is pointing to **5·4** or **5 $\frac{4}{10}$**.
b) and c)



d) The difference between 5 $\frac{1}{10}$ and 5·9 is **0·8** or $\frac{8}{10}$.

Reflect

Children should draw place value grids and number lines to show $\frac{1}{10}$ = **0·1**, **1 $\frac{3}{10}$ = 1·3** and $\frac{7}{10}$ = **0·7**.

4 Equivalent fractions and decimals – hundredths

→ pages 71–73

1. a) 0·**09** = $\frac{9}{100}$
b) 0·**03** = $\frac{3}{100}$
c) 0·**23** = $\frac{23}{100}$
d) 0·**70** = $\frac{70}{100}$
e) 0·**7** = $\frac{7}{10}$
f) 0·**35** = $\frac{35}{100}$

2. a) **0·16** and $\frac{16}{100}$
b) 0·**42** and $\frac{42}{100}$

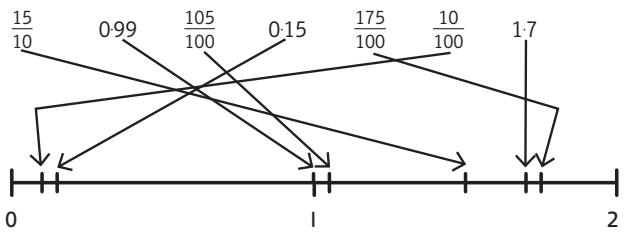
3. a) 0·06 = $\frac{6}{100}$
b) 0·13 = $\frac{13}{100}$
c) 0·49 = $\frac{49}{100}$
d) $\frac{38}{100}$ = 0·**38**
e) $\frac{79}{100}$ = 0·**79**
f) $\frac{95}{100}$ = **0·95**

4. Children should draw:
a) 2 × 0·1 and 1 × 0·01 counters
b) 1 × 1, 2 × 0·1 and 1 × 0·01 counters
c) 2 × 1, 2 × 0·1 and 1 × 0·01 counters.

5.

Decimal number	Mixed number	Improper fraction
1·61	1 $\frac{61}{100}$	$\frac{161}{100}$
1·6	1 $\frac{6}{10}$	$\frac{160}{100}$
2·26	2 $\frac{26}{100}$	$\frac{226}{100}$
2·06	2 $\frac{26}{100}$	$\frac{206}{100}$
4·6	4 $\frac{60}{100}$	$\frac{460}{100}$

6.



Reflect

Reena is not correct.
$\frac{35}{10}$ = 3·5
3·05 is $\frac{30}{10}$ + $\frac{5}{100}$ or $\frac{305}{100}$

5 Equivalent fractions and decimals

→ pages 74–76

1. a) **$\frac{1}{5}$ = 0·2**
b) **0·4 = $\frac{2}{5}$**
c) **0·8 = $\frac{4}{5}$**

2. a) Children should shade **75 squares**.
b) **$\frac{3}{4}$ = 0·75**
c) **$\frac{3}{4}$ = $\frac{75}{100}$**

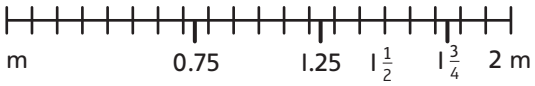
3.

Fraction	**$\frac{1}{4}$**	**$\frac{2}{4}$**	**$\frac{3}{4}$**	**$\frac{4}{4}$**	**$\frac{5}{4}$**	**$\frac{6}{4}$**
Decimal	0·25	0·5	0·75	1	1·25	1·5

4. a) 1 $\frac{1}{4}$ = **1·25**
2$\frac{1}{4}$ = **2·25**
3$\frac{1}{4}$ = **3·25**
7$\frac{1}{4}$ = **7·25**
b) $\frac{3}{5}$ = **0·6**
1 $\frac{3}{5}$ = **1·6**
$\frac{8}{5}$ = **1·6**
$\frac{9}{5}$ = **1·8**

5. A is 1 $\frac{1}{5}$ or 0·4
B is 1 $\frac{5}{10}$ or 1·5
C is 1 $\frac{4}{5}$ or 1·8

6.



Children should explain converting the fractions to decimals to place them on the number line.

Reflect

Children should write the fraction and decimal equivalents to $\frac{1}{5}$ and $\frac{1}{4}$ they can remember:

$\frac{1}{5}$ = $\frac{2}{10}$, $\frac{4}{20}$, $\frac{10}{50}$, $\frac{20}{100}$ and 0.2

$\frac{1}{4}$ = $\frac{2}{8}$, $\frac{3}{12}$, $\frac{4}{16}$, $\frac{5}{10}$, $\frac{8}{32}$, $\frac{15}{60}$, $\frac{16}{64}$, $\frac{20}{80}$, $\frac{25}{100}$ and 0·25.

6 Thousandths as fractions

→ pages 77–79

1. a) **$\frac{4}{1,000}$**
b) **$\frac{24}{1,000}$**
c) **$\frac{125}{1,000}$**
d) **$\frac{568}{1,000}$**

2. a) **$\frac{9}{1,000}$**
b) **$\frac{17}{1,000}$**
c) **$\frac{26}{1,000}$**
d) **$\frac{123}{1,000}$**

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3. a) Each row is $\frac{1}{10}$ of the whole grid.

b) $\frac{2}{10} = \frac{\mathbf{200}}{1{,}000}$ $\quad \frac{1}{4} = \frac{\mathbf{750}}{1{,}000}$

$\frac{7}{10} = \frac{\mathbf{700}}{\mathbf{1{,}000}}$ $\quad 1\frac{3}{10} = \frac{\mathbf{1{,}300}}{1{,}000}$

4. a) Various answers are possible, with numerators adding to 100. For example:

$\frac{20}{1{,}000} + \frac{30}{1{,}000} + \frac{50}{1{,}000}$

$\frac{35}{1{,}000} + \frac{45}{1{,}000} + \frac{20}{1{,}000}$

b) Parts: 1 and $\frac{600}{1{,}000}$

Reflect

Children should explain that $\frac{1}{1{,}000}$ means 1 part out of 1,000.

7 Thousandths as decimals

➜ pages 80–82

1. a) 0·009
b) 0·015
c) 0·075
d) 0·158

2. a) 0·006
b) 0·016
c) 0·053

3. a) $\frac{3}{1{,}000} = \mathbf{0{\cdot}003}$
b) $\frac{19}{1{,}000} = \mathbf{0{\cdot}019}$
c) $\frac{29}{1{,}000} = \mathbf{0{\cdot}029}$
d) $\frac{216}{1{,}000} = \mathbf{0{\cdot}216}$
e) $0{\cdot}006 = \frac{\mathbf{6}}{1{,}000}$
f) $0{\cdot}031 = \frac{\mathbf{31}}{1{,}000}$
g) $0{\cdot}171 = \frac{\mathbf{171}}{1{,}000}$
h) $0{\cdot}999 = \frac{\mathbf{999}}{1{,}000}$

4.

Decimal	0·002	**0.02**	0·251	**0.25**	0·2
Fraction	$\frac{2}{1{,}000}$	$\frac{20}{1{,}000}$	$\frac{251}{1{,}000}$	$\frac{250}{1{,}000}$	$\frac{200}{1{,}000}$

Decimal	1	**1.001**	1·251	1·25	0·000
Fraction	$\frac{1{,}000}{1{,}000}$	$\frac{1{,}001}{1{,}000}$	$\frac{1{,}251}{1{,}000}$	$1\frac{1{,}250}{1{,}000}$	$\frac{0}{1{,}000}$

5. Children should explain:

$\frac{7}{10} = 0{\cdot}7$ and $\frac{9}{1{,}000} = 0{\cdot}009$ so, $0{\cdot}7 + 0{\cdot}03 + 0{\cdot}009 = 0{\cdot}739$.

$\frac{7}{10} = \frac{700}{1{,}000}$ and $0{\cdot}03 = \frac{30}{1{,}000}$ so, $\frac{(700 + 30 + 9)}{1{,}000} = \frac{739}{1{,}000} = 0{\cdot}739$.

Reflect

Children should explain:

$0.035 = \frac{30}{1{,}000} + \frac{5}{1{,}000} = \frac{35}{1{,}000}$

$\frac{35}{1{,}000} = 0{\cdot}03 + 0{\cdot}05 = 0{\cdot}035$

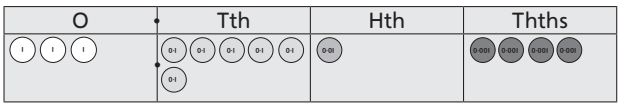
8 Thousandths on a place value grid

➜ pages 83–85

1. a) 0·16
b) 0·165
c) 0·105

2. Matt has put the counters in the wrong place value columns. There should be 2 counters in the ones column, 6 counters in the tenths column and 5 counters in the hundredths column.

3.



4. a) 1·425
b) 15·23
c) 34·05

5. The value of the 4 digit is:
a) 0·3 or 3 tenths
b) 0·3 or 3 tenths
c) 0·03 or 3 hundredths
d) 0·003 or 3 thousandths.

6. a) 2·071
b) 4·071
c) 2·371
d) 2·141
e) Emma added **3** hundredths.

Reflect

Children should explain that the counters in a place value grid shows which digit has which value. For example, if there are 7 counters in the tenths column, then the value of the 7 digit is 0·7 or 7 tenths.

9 Compare and order decimals – same number of decimal places

➜ pages 86–88

1. a) 0·7 is **greater** than **0·5**.
b) 1·7 is **less** than **2·5**.
c) 0·85 is **greater** than **0·75**.

2. Children should tick:
a) 0·67
b) 0·319
c) 1·49
d) 0·30
e) 126·5
f) 1·603

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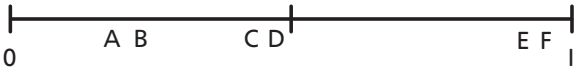
3.

Order	Dinosaur
1st (least fierce)	Brachiosaurus
2nd	Stegosaurus
3rd	Triceratops
4th (most fierce)	T-Rex

4. a) 0·255 > $\frac{251}{1{,}000}$ c) $\frac{980}{1{,}000}$ > $\frac{97}{100}$
b) 0·089 < 1.001 d) 0.316 = $\frac{316}{1{,}000}$

5. a) Greatest to least: 6·701, 1·760, 1·607, 0·176
b) Greatest to least: $\frac{15}{100}$, $\frac{126}{1{,}000}$, $\frac{1}{10}$
Children may suggest changing $\frac{15}{100}$ and $\frac{1}{10}$ into thousandths

6. Children should make six different decimals. A 0·249, B 0·294, C 0·429, D 0·492, E 0·924 and F 0·942.



Reflect

Children should describe looking at the tenths, hundredths and then thousandths digits. They could also describe placing the numbers on a number line.

I0 Compare and order any decimals with up to 3 decimal places

➜ pages 89–91

1. Children should circle:
a) 1·3 c) 1·09
b) 2·86 d) 2·59

2. a) Least to greatest: 2·21, 2·25, 2·3, 3·1
b) Greatest to least: 1·42, 0·43, 0·4, 0·33, 0·322

3. Lee has not compared the digits with the same place values.
The 1 in 1·627 should be compared with the 5 in 15·6.
15·6 > 1·627

4. a) 0·5 < 0·51 e) $\frac{11}{1{,}000}$ < 0·11
b) 10·51 < 10·6 f) $\frac{101}{100}$ = 0·101
c) 1·6 > 0·511 g) 0.11 = $\frac{110}{1{,}000}$
d) 1·056 > 1·05 h) $\frac{1{,}001}{1{,}000}$ < 1·01

5. Children should draw:
a) 3 × 0·1 plus any number of 0·01 or 0·001 counters
b) 1 × 0·1, 1 × 0·01 and more than 1 × 0·001 counters

6. a) Children should circle: 2 $\frac{51}{100}$, 2 $\frac{52}{100}$, 2·501
b) Children's answers will vary. For example, 2 $\frac{515}{1{,}000}$ and 2·515.

7. Less than 2·12: 0·05, 0·14, 0·23, 0·32, 0·41, 0·5, 1·22, 1·31, 1·13, 1·04, 1·4
Greater than 2·12: 2·21, 3·11, 3·02, 3·2, 4·01, 4·1, 5
Children should explain that they know they have found all of the possibilities because they worked systematically. Before 0·05 and after 5, you would need more than 5 counters to make a number that fits in the place value grid.

Reflect

Children should explain that 3·31 > 3·309 because it has 1 hundredth, whereas 3·309 has no hundredths.
0·31 = $\frac{31}{100}$ = $\frac{310}{1{,}000}$
0·309 = $\frac{309}{1{,}000}$
$\frac{310}{1{,}000}$ > $\frac{309}{1{,}000}$
3·31 > 3·309

I1 Round to the nearest whole number

➜ pages 92–94

1. a) 1·3 rounded to the nearest whole number is **1**.
b) 4·8 rounded to the nearest whole number is **5**.
c) 4·87 rounded to the nearest whole number is **5**.
d) 9·5 rounded to the nearest whole number is **10**.

2. a) Children should tick: 3·1, 3·2, 3·4, 3·42
b) Children should tick: 6·5, 6·8, 6·91
c) Children should write any 5 numbers between 4·5 and 5·499.

3. 2.3 cm rounds to 2 cm.
3.4 cm rounds to **3 cm**.
4.5 cm rounds to **5 cm**.

4. a) 4 f) 4
b) 3 g) 0
c) 3 h) 1
d) 11 i) 213
e) 30 j) 399

5. The missing digits could be:
4·**0**5, 4·**1**5, 4·**2**5, 4·**3**5, 4·**4**5
3·**5**, 3·**6**, 3·**7**, 3·**8**, 3·**9**

Reflect

Children should explain looking at the value of the tenths digit. They might explain using a place value grid to help them.

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I2 Round to one decimal place

➜ pages 95–97

1. a) 1·47 rounded to the nearest tenth is **1·5**.
b) 7·72 rounded to the nearest tenth is **7·7**.
c) 12·83 rounded to the nearest tenth is **12·8**.
d) 4·95 rounded to the nearest tenth is **5·0**.

2. Rounds to 3·8: 3·81, 3·82, 3·84
Rounds to 3·9: 3·87, 3·872, 3·85
Children should explain looking at the value of the hundredths digit to round the numbers.

3. 4·2**0**, 4·2**1**, 4·2**2**, 4·2**3** or 4·2**4**.
4·1**5**, 4·1**6**, 4·1**7**, 4·1**8** or 4·1**9**.

4. a) 1.6
b) 1.7
c) 7.1
d 7.4
e) 8.4
f) 8.5
g) 0.4
h) 0.4

5.

Number	Rounded to the nearest whole number	Rounded to the nearest tenth
1·19	1	1·2
0·75	1	0·8
100·75	101	100·8
100·03	100	100·0
100·037	100	100·0

6. Children should show 8·45, 8·46, 8·47, 8·48, 8·49 or any of these numbers with an additional decimal place. For example, 8·451, 8·469.

Reflect

Children explain that to round 5·23 to the nearest tenth they need to look at the hundredths digit. As the hundredths digit is less than 5, the number rounds down.

5·23 rounds to 5·2 to the nearest tenth.

I3 Understand percentages

➜ pages 98–100

1. a) **33** out of 100 are shaded. That is **33%**.
b) **24** out of 100 are shaded. That is **24%**.

2. Children should shade:
a) **4** squares
b) **24** squares
c) **96** squares

3. Children should circle the bead strings and the pie diagrams.

4. a) **52%** of children walk to school.
b) **12%** of children travelled by bike.
c) **13%** of children came by another mode of transport.

5. a) Children should shade 3 sections.
70% is not shaded.
b) Children should shade $2\frac{1}{2}$ sections in each colour.
50% is not shaded.
50% is shaded.
c) Children should shade:
11% (just over 1 section) in one colour
22% (just over 2 sections) in a second colour
33% ($3\frac{1}{3}$ sections) in a third colour.
34% is not shaded.
d) 5 × **20**% = 100%

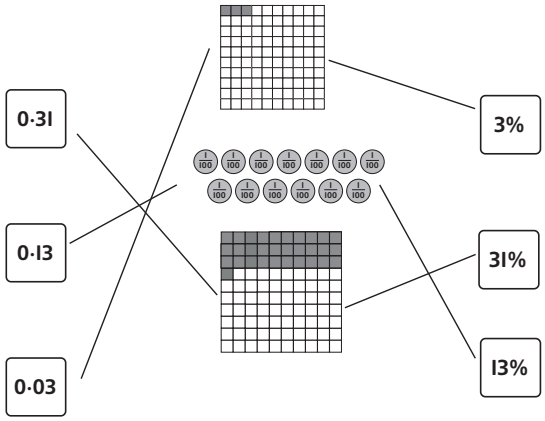
Reflect

Children should describe or show with a diagram that 42% is under a half or a little more than 40%.

I4 Percentages as fractions and decimals

➜ pages 101–103

1.



2.

O	•	Tth	Hth
	•	3	2

$\frac{32}{100}$ as a decimal is **0·32**.
$\frac{32}{100}$ as a percentage is **32%**.

3.

Fraction	Decimal	Percentage
$\frac{48}{100}$	0.48	48%
$\frac{99}{100}$	0.99	99%
$\frac{1}{100}$	0·01	1%

4. a) $\frac{53}{100} = 0.53 = 53\%$
b) $0.3\mathbf{5} = \frac{35}{100} = \mathbf{35}\%$
c) $\mathbf{9}2\% = \frac{92}{100} = 0.9\mathbf{2}$
d) $0.7\mathbf{8} = \frac{78}{100} = \mathbf{78}\%$

5. Least to greatest: 8%, 0.18, 0.8, $\frac{81}{100}$, 88%

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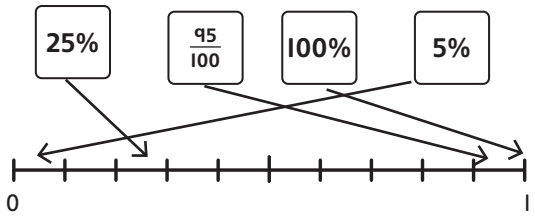
6.



7. The top number line is the longest, as its intervals are in hundredths and the bar model and lower number line are in tenths.
The bottom number line is the shortest, as its sections are each shorter than the section in the bar model.

Reflect

Children should explain how to write the percentage as a fraction out of 100, which can then be converted into a decimal.

4% = $\frac{4}{100}$ = 0.04. 14% = $\frac{14}{100}$ = 0.14

15 Equivalent fractions, decimals and percentages

→ pages 104–106

1. a) Children should shade 40 squares.
40% = $\frac{\mathbf{40}}{100}$

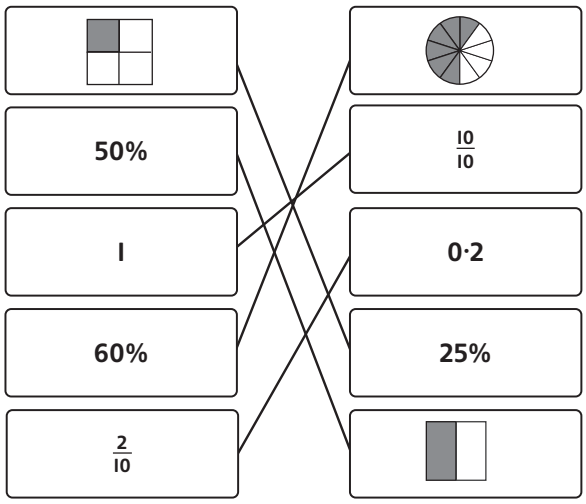
b) Children should shade 25 squares.
$\frac{25}{100}$ = **25**% = 0·2**5**

c) Children should shade 7 squares.
0·07 = **7**%

d) Children should shade 5 sections.
$\frac{5}{10}$ = **50**%

e) Children should shade 90 squares.
0·9 = **90**% = $\frac{\mathbf{9}}{10}$ = $\frac{\mathbf{90}}{100}$

2.



3.

Fraction	Decimal	Percentage
$\frac{4}{5}$ or $\frac{8}{10}$	0·8	80%
$\frac{1}{10}$	0·1	10%
$\frac{1}{2}$	0·5	50%
$\frac{3}{4}$	0·75	75%
$\frac{90}{100}$	0·9	90%

4. a) **50%** is shaded.
b) **80%** is shaded.
c) **10%** is shaded.

5. a) Children should shade all of the odd numbers.
b) 50% are odd and 50% are even.
c) This because 1 out of every 2 numbers ($\frac{1}{2}$) are odd and 1 out of every 2 numbers ($\frac{1}{2}$) are even.

Reflect

Andy is not correct.

0.8 = $\frac{8}{10}$ = $\frac{80}{100}$ = 80%

8% = $\frac{8}{100}$ = 0·**0**8

My journal

→ page 107–108

1. Aki is not correct.
20% is double 10% but $\frac{1}{20}$ is half of $\frac{1}{10}$.
20% = $\frac{20}{100}$ = $\frac{2}{10}$ = $\frac{1}{5}$ (not $\frac{1}{20}$)

2. a) Richard scored 40 points.
b) Richard's score as a fraction is $\frac{40}{50}$ or $\frac{4}{5}$.
c) 80% as a decimal is 0·8 not 0·08.

Power play

→ page 109

Children might need support finding equivalent fractions, decimals and percentages.

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Unit 10 – Measure – perimeter and area

1 Perimeter of rectangles

➜ pages 110–112

1. a) (**220** × 2) + (**90** × 2)
= **440** + **180**
= **620**
The perimeter of the playing field is **620 m**.
b) The perimeter of the playing field is **470 m**.

2. A = **70 cm** B = **70 cm** C = **80 cm**

3.

Shape	Number of tiles used	Perimeter (cm)
A	1	4
B	2	6
C	3	8
D	3	8

4. The length of the rectangle is **17 cm**.

5. One side is **32 cm** long.

6. The dimensions of the sports field must add to 90.
Sensible suggestions include: 45 × 45; 40 × 50; 30 × 60; 35 × 55; 42 × 48.

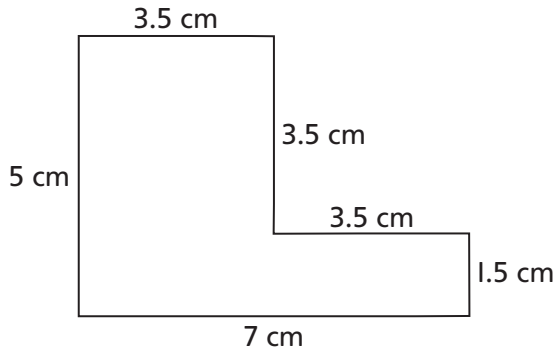
Reflect

Children should tick **Bella's** and **Max's** methods.

2 Perimeter of rectilinear shapes (I)

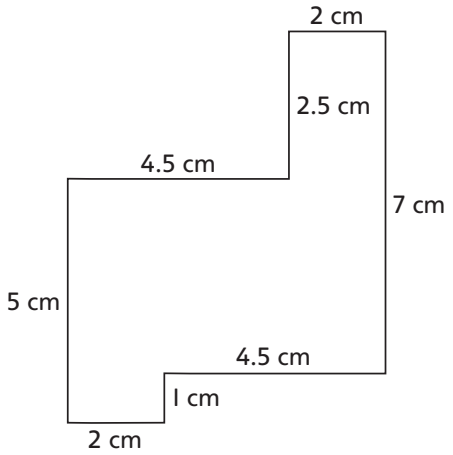
➜ pages 113–115

1. a)



The perimeter of the shape is 24 cm.

b)



The perimeter of the shape is 28.5 cm.

2. a) 6 + 1 + 6 + 1 cm. Perimeter = **14** cm
b) 3·5 + 5 + 6 + 2·5 + 2·5 + 2·5 cm. Perimeter = **22** cm
c) 2 + 2 + 2 + 2 cm. Perimeter = **8** cm
d) 1 + 1·5 + 2 + 1·5 + 2 + 2·5 + 5 + 2·5.
Perimeter = 18 cm

3. Lee is **incorrect**.
The perimeter of the rectilinear shape is **shorter** than Perimeter A + Perimeter B.

4. Amelia has counted one of the sides twice.
The actual perimeter is **52 cm**.

5.
- You can find the perimeter of a rectangle by measuring its width and doubling it.
False because **you need to measure its length as well.**
- You can find the perimeter of a square by measuring any one of its sides.
True because **each side is the same length, so you can multiply that side by 4.**
- The perimeter of a rectangle made by placing two identical squares next to each other is double the perimeter of one of the squares.
False because **the adjoining sides are inside the rectangle so are not part of the new perimeter and should not be counted**.

Reflect

Children's answers will vary but should include one of the following:
A + B + C + D + E + F
(E + F) × 2
(E × 2) + (F × 2)

3 Perimeter of rectilinear shapes (2)

➜ pages 116–118

1. a) 640 m
b) 840 m
c) 1,060 m

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2. Perimeter = **96 cm**

3. B: **10 cm**

4. The dimensions are **5 m** wide and **15 m** long.

5. Answers will vary depending on the children's diagrams, but the width of each tile is always 10 cm. For example:
1 × 6 rectangle: Perimeter = 140 cm
3 × 2 rectangle: Perimeter = 100 cm
Compound shape: 2 × 1 rectangle + 2 × 2 rectangle joining at one side: Perimeter = 130 cm.

Reflect

Children should explain calculating the width and length:
Width = 23 cm + 10 cm = 33 cm
Length = 9 cm + 31 cm = 40 cm

Children may explain adding all of the values together or multiplying the width and length by 2 and adding them together.
Perimeter = 146 cm

4 Perimeter of polygons

→ pages 119–121

1. a) Perimeter = **75 cm**
b) Perimeter = **36 cm**
c) Perimeter = **400 cm**
d) Perimeter = **60 cm**
e) Perimeter = **4,200 mm**
f) Perimeter = **4,050 mm**

2. a) Side length = **45 m**
b) Side length = **60 m**
c) Side length = **18 m**
d) Side length = **36 m**
e) Side length = **30 m**
f) Side length = **20 m**

3. a) **154 mm**
b) **13 mm**

4. a) and b) Various polygons are possible. Ensure that no sides are on the diagonal, as a diagonal measures slightly more than 1 unit. All vertices should be right angles to ensure the perimeter can be calculated accurately.

Reflect

Children should draw regular polygons with a perimeter of: 4 × 25, 5 × 20 or 10 × 10.

The number of sides must be a factor of 100 and total value of the sides must equal 100 cm.

5 Area of rectangles (I)

→ pages 122–124

1. a) **5** × **6** = **30**
Area = **30 cm²**
b) **7** × **6** = **42**
Area = **42 cm²**
c) **8** × **9** = **72**
Area = **72 cm²**

2. a) Children should arrange counters in a 4 × 4, 2 × 8 or 1 × 16 array.
b) Children should draw 4 × 4, 2 × 8 or 1 × 16 rectangles.

3.

Shape	Length	Width	Area (cm^2)
A	7	9	63
B	7	7	49
C	11	3	33
D	4	7	28

4. The factor pairs of 40 are 1 × 40, 2 × 20, 4 × 10 and 5 × 8.
Children should show that these factor pairs will make up the length and width of a rectangle with an area of 40 cm^2.

5. Area of the card = 500 cm^2
Largest square = 20 cm × 20 cm = 400 cm^2
Card left over = **100 cm²**

Reflect

Children should explain multiplying number of squares on the length side by the number of squares on the width side area.
8 × 8 = 64 squares
Area = 64 = **64 m²**

6 Area of rectangles (2)

→ pages 125–127

1. a) A: 2 row of 6
= 2 × 6
= **12 cm²**
B: 9 × 8 = **72 cm²**
C: 5 rows of 3
5 × 3 = 15
= **15 cm²**
D: 8 × 8 = **64 cm²**
b) Largest to smallest: C, D, B, A

2. a) **42 cm²**
b) **49 cm²**
c) **55 cm²**
d) **42 cm²**

3. a) The dimensions may be in a different order

Shape	Length	Width	Area (cm^2)
A	9 cm	9 cm	81 cm^2
B	10 cm	10 cm	100 cm^2
C	12 cm	12 cm	144 cm^2
D	9 cm	10 cm	90 cm^2
E	9 cm	12 cm	108 cm^2
F	12 cm	10 cm	120 cm^2

b) Answer depends on the order children have listed the shapes.

The 12 × 12 square has the largest area. It is shape C in this table.

c) The shape with the greatest area has a length of **12** cm and a width of **12** cm.

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4. Aki is not correct. The area also depends on the length.

If the lengths are the **same**, then the rectangle with the shorter width **will** have the smaller area.

If the lengths are different, the rectangle with a shorter width may have a smaller, greater or equal area.

Children may give a counter example, such as: a 6 × 4 rectangle has an area of 24 but a 9 × 3 rectangle has a greater area of 27 despite the shorter width.

5. The area left is **210 cm²**.

Reflect

I know that out of two squares, the square with the longer side length will always have the greater area because all four sides of a square have the same length which is multiplied by itself to calculate the total area.

7 Area of compound shapes

→ pages 128–130

1. a) Area = **15 cm²**
b) Area = **4 cm²**
c) Area = **21 cm²**
d) Area = **19 cm²**
e) Area = **34 cm²**

2. a) Area = **23 cm²**
b) Area = **19 cm²**
c) Area = **67 cm²**

3. Children should draw a compound shape with an area of 51 cm².

4. 31 cm²

5. a) Area = **268 m²**
b) Area = **342 m²**

Reflect

Children should suggest the following ways to work out the area of the compound shape:

Multiplying the longest length by the longest width and subtracting the cut unshaded segment:
13 × 5 – 5 = 65 – 5 = 60.

Splitting the compound shape into two rectangles and adding the areas together: 8 × 5 + 5 × 4 = 40 + 20 = 60.

The least efficient method is to count the squares: 60.

8 Estimate area

→ pages 131–133

1. There may be slight variations in these answers but the estimate made by adding the whole, almost-whole and halves (2 halves = 1 whole) should be close to the values in the table.

Foot-print	Whole squares	Almost-whole squares	Half squares	Less-than-half squares	Esti-mated area
A	12	4	6	4	19
B	18	6	4	6	26
C	30	8	0	15	38
D	23	10	2	15	34

2. Children should shade the squares to show half:

3. The area of the paint spillage is about **30 cm²**.

4. Children should draw irregular shapes made up of approximately 15 squares with a mix of whole, almost-whole, half and less-than-half squares.

5. Children should draw around their hand, then estimate the area by counting the whole, almost-whole and half squares.

Reflect

Children should explain that to estimate the area of an irregular shape you should count the whole, almost-whole and half squares, and ignore the less-than-half squares.

My journal

→ page 134

1. a) I know that the perimeter of this shape is **58 cm** because **I doubled the width and the length, then added them together, 20 × 2 + 9 × 2 = 58**.
b) I know that the area of this shape is **63 cm²** because **I multiplied the width by the length, 7 × 9 = 63**.

Power play

→ page 135

Children should show a systematic approach in their working.

1. The largest perimeter is 50 cm if the rectangle is a 1 × 24 rectangle.

2. The largest area is 36 cm² if the rectangle is a 6 × 6 square.

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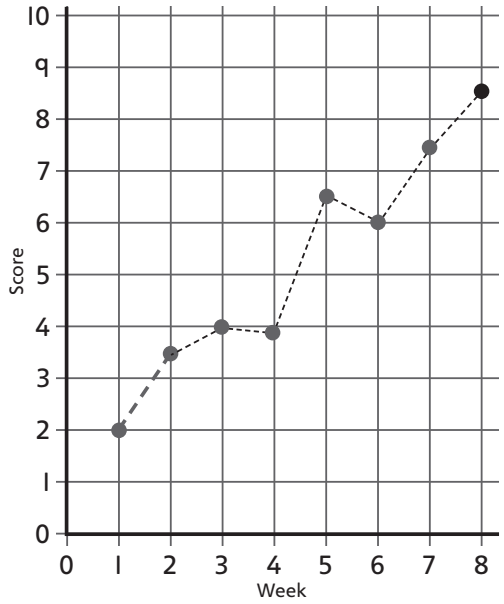
Unit II – Graphs and tables

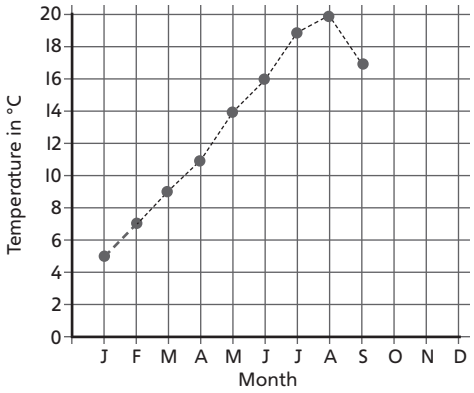
I Draw line graphs

➜ pages 136–138

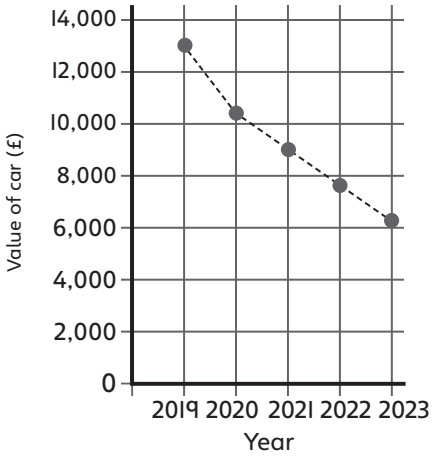
1. a) and b) The grey dots show the scores for weeks 1 to 7, in answer to a), and the black dot shows the score of week 8, in answer to b).



2.



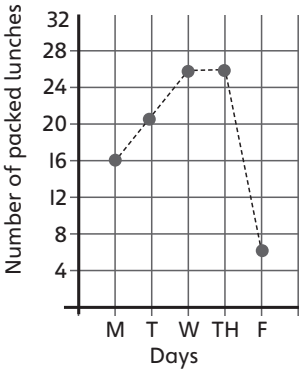
3.



4. a)

Day	Mon	Tue	Wed	Thur	Fri
Number of packed lunches	16	21	26	26	7

b)



Reflect

Children may mention three of the following: labelling the graph and its axes; using the right scale on the vertical axis, writing the scale number against the lines, not in the spaces; making sure the scale is equally spaced out and no numbers are missed; accurate plotting, especially when the values are in between the labelled scale; and joining the plotted points together at the end.

2 Read and interpret line graphs (I)

➜ pages 139–141

1. a) **2 pm**
b) **20** swimmers
c)

6 am	10 am	2 pm	6 pm	10 pm
20	**7**	**10**	**25**	**0**

d) There were **18** more swimmers at 6 pm.
e) There might have been 0 swimmers at 10 pm because the swimming pool was closed or it was too late to swim.

2. a) Day **7**
b) **390 km**
c) Mr Potter travelled approximately **210 km** more on day 5 than day 7.
d) Mr Potter travelled approximately **1,030 km** in the first 3 days.
e) The graph does not need to start at 0 because the minimum distance he travelled is between 180 km and 200 km, so the scale can start at 180 km.

3. Approximately **72** children finished the puzzle between 1 and 3 minutes.

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Reflect

Children may mention finding the time on the horizontal axis, following that up to the plotted point, then reading back across to find the temperature on the vertical axis. The temperature scale interval is in 2s so in between the intervals is worth 1. For example, the temperature at 10 am is 15 degrees.

3 Read and interpret line graphs (2)

→ pages 142–144

1. a) **22 m**
b) **5 m**
c) **3** seconds
d) The balloon bursts after **10** seconds because the graph line starts to go sharply down at that point.
e) **10 m**

2. a) **7** °C The balloon bursts after 10 seconds because the graph line starts to go sharply down at that point.
b) **7** °C The balloon bursts after 10 seconds because the graph line starts to go sharply down at that point.
c) **2 pm**
d) The difference in temperature was **6 °C**.
e) Both cities were equal to, or warmer than, 7 °C for **3** hours.

3. Approximately 19,000 (37,000 – 18,000)

Reflect

Tasnim's statement is sometimes true. If all the values are much more than zero, graphs can start just below the lowest value. Graphs can also show negative numbers.

4 Read and interpret tables

→ pages 145–147

1. a) In total, **£799** was made on Tuesday and Friday.
b) The shop made the most money on **Friday**.
c) **£103** more was made on Monday than on Wednesday.
d) The shop made less than £200 on **Monday** and **Wednesday**.
e) Rani is not correct. Double £192 = £**3**84, but the shop only made £**2**84 on Thursday.

2. a) The **thread snake** is the shortest snake.
b) The python is **6·5 m** long.
c) The python is **4 m** longer than the grass snake.
d) The **grass snake** is half the length of the **cobra**.

3. The number of children who take the bus is 71 (742 – 671).
154 – 71 = 83
The difference between the number of children who travel by bus and the number of children who walk to school is **83**.

4. In total, Toshi gets paid **£450**.

Reflect

Children's answers will vary. For example:

- There are 50 cars in total.
- Half of the cars are black.
- There are fewer red cars than black cars.
- There are more red cars than white cars.
- Less than a quarter of the cars are white.

5 Two-way tables

→ pages 148–150

1. a)

	Spots	Stripes	Solid black
Square	𝍸	𝍸	𝍸
Triangle	𝍸	𝍸	𝍸
Star	𝍸	𝍸	𝍸

b)

	Spots	Stripes	Solid black	Total
Square	3	2	1	6
Triangle	2	6	1	9
Star	3	2	2	7
Total	8	10	4	22

c) **8** shapes have spots. I worked this out by **looking in the Total row of the Spots column**.

2. a)

		Hair colour		
		Blonde	Brown	Total
Eye colour	Brown	3	10	13
	Blue	7	5	12
	Total	10	15	25

b) **15** children have brown eyes.
c) **4** fewer blonde-haired children have brown eyes than blue eyes.
d) $\frac{10}{25} = \frac{2}{5}$ of the class have blonde hair.

3. a)

	Rabbits	Guinea Pigs	Hamsters	Total
Petz R Us	24	15	49	88
Animals	52	17	26	95
We Love Pets	28	51	13	92

b) **We Love Pets** has the most guinea pigs.
c) **Animals** has twice as many rabbits as hamsters.
d) In total, all three shops have **275** pets.

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4. a)

	Walk	Cycle	Car	Other	Total
Children	7	3	4	1	15
Teachers	8	1	3	0	12
Total	15	4	7	1	27

b) **11** more people walk to school than cycle.

c) Mrs Dean is correct. Half of 27 is 13·5. 15 > 13·5, so more than half of the people walk to school.

Reflect

Children may mention that the tables in the previous lesson show data from one category, whereas two-way tables show data from more than one category which makes it easier to compare the different categories.

6 Timetables

→ pages 151–153

1. a) There are **8** rows in the timetable.
Each row shows a different **coach stop and the times it stops there**.
There are **6** columns. Each column shows a different **coach**.
The times in the timetable are **24** hour times.

b) It arrives at **8:45**.

c) It left at **11:15**.

d) At **14:15** Coach D arrives at Luton Airport.
Its next stop is **Hertford North Station**.
It takes **45** minutes to get there and it arrives at **15:00**.

2. a) Lexi is on the train for **40** minutes.

b) Mo will wait for **1** hour and **54** minutes.

c)

Grantham	13:15
Rauceby	–
Sleaford	13:41
Boston	14:09
Thorpe Culvert	14:31
Wainfleet	14:35
Havenhouse	14:39
Skegness	14:49

3.

	Bus 1	Bus 2
Hall Lane	07:40	14:48
Chapman Avenue	07:53	15:01
Wildshed Road	08:01	15:09
Station Road	08:10	15:18
Moorfield Academy	08:27	15:35

Reflect

Children should mention that 24-hour clock times ensure people know whether the time is before or after midday.

My journal

→ pages 154–155

1. a) 14 people because **3:30 is half-way between 3 pm and 4 pm and 14 is half-way between 12 and 16**.

b) I think the shop closes at 7 pm because **no one was in the shop after that time**.

c) Various answers are possible based on:
- The number of people in the store at any given time.
- The most and least popular times to shop.
- Comparisons: The difference in the number of people in the shop between two times.
- Specifics: At what times were there more or less than a certain number of people in the store.

2. a) Line graphs are used to track changes over periods of time. Line graphs can also be used to compare changes over the same period of time for more than one group. This table simply lists the number of items of each type sold on one particular day, there is no time scale.

b) Various statements are possible, for example:
- More shorts are sold than t-shirts.
- Less swimwear was sold than trainers.
- Half the number of swimwear was sold compared with t-shirts.

3. The journey is longest from **Littleworth** to **Brightown** by **4** minutes.

Power puzzle

→ page 156

	First	Second	Total
Red	**34**	**26**	**60**
Blue	**16**	**74**	**90**
Total	**50**	**100**	**150**

There are **58** more blue counters in the second box.

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