Unit 1: Place value – 4-digit numbers (1)

Lesson 1: Numbers to 1,000

→ pages 6–8

1. four hundred and twenty-nine 429
   five hundred and seventy-one 571
   six hundred and sixty 660
   one hundred and eight 108
2. a) 892 = 8 hundreds, 9 tens and 2 ones
   b) 705 = 7 hundreds, 0 tens and 5 ones
3. a) Child draws one circle in O column
   b) Child draws four circles in O column
   c) Child draws three squares in H column and one extra rectangle in T column
4. Answers may vary. Explanation should say: Richard is correct as he can exchange 10 tens for 1 hundred, making 5 hundreds altogether.
5. Answers may vary: Children should say that counters dropped should total 111. This can be in a variety of ways, e.g. 1 hundred, 1 ten and 1 one, or 11 tens and 1 one.

Reflect

Children represent 707 in a variety of ways, e.g. using arrow cards, place value grids, pound coins and pennies.

Lesson 2: Rounding to the nearest 10

→ pages 9–11

1. a) Round down to the nearest 10: 41, 102, 981, 902, 333
   Round up to the nearest 10: 15, 78, 765, 209, 457
   b) Children add two extra numbers to each box. Left-hand numbers have 1s digit less than 5. Right-hand numbers have 1s digit 5 or greater.
2. a) 50 60
   60
   b) 120 130
   120
3. 24.
4. a) 20 e) 100
   b) 30 f) 130
   c) 50 g) 370
   d) 80
5. a) 80 180 380
   b) 230 370 50
   c) 450 710 100
6. 45 and 54; 46 and 53; 47 and 52; 48 and 51; 49 and 50.

Reflect

Answers may vary but should say that Hannah needs to look at the digit in the 1s column to decide whether to round the number up or down. The number in the 1s column is obscured, so Hannah cannot decide.

Lesson 3: Rounding to the nearest 100

→ pages 12–14

1. a) 600
   b) 900
   c) 309 – marked just before the first mark on the number line
   300
2. Children mark three 3-digit numbers correctly on the number line. Choice must be between 350 and 449 inclusive.
3. 698, 652, 378 are circled.
4. 490 linked with 5 hundreds (in base 10 equipment)
   449 linked with 4 hundreds counters
   550 linked with 600
   620 (in base 10 equipment) linked with 600
5. a) 700 e) 1,000
   b) 400 f) 0
   c) 200 g) 400
   d) 100
6. Explanations may vary but should say both children are wrong. 250 is in the middle but the rule is that if it is in the exact middle it always rounds up.

Reflect

Explanations may vary. Children may explain that the 10s digit is greater than 5 so it rounds up to 500.

They may think of the 100s before and after 462 (400 and 500). 462 is greater than 450, which is the half-way number between 400 and 500, so 462 is rounded up to 500.

Lesson 4: Counting in 1,000s

→ pages 15–17

1. a) 4,000
   four thousand
   b) 7,000
   seven thousand
   c) 9,000
   nine thousand

2. a) 4,000 5,000 7,000
b) 1,000 3,000 5,000 6,000
c) 8,000 7,000 5,000

3. a) 8,000 eight thousand
b) 2,000 two thousand

4. Children draw three cubes to represent 3,000 (3 thousands)

5. 1,000. Explanations may vary: Children should explain that 10 hundreds have the same value as 1 thousand.

6. Andy says 2,000, 3,000, **4,000**, 5,000, 6,000, 7,000.
Bella says 6,000, 5,000, **4,000**, 3,000.
They say 4,000 at the same time.

Reflect

Explanations may vary: There are 10 boxes of 1,000, containing 10,000 pencils. If 2,000 are red and 5,000 are blue this is 7,000. So using 10 – 7 = 3 then 10,000 – 7,000 = 3,000. The 3,000 are green.

Lesson 5: Representing 4-digit numbers

➜ pages 18–20

1. 3,293 three
two
ninety-three
4,066 four thousand and sixty-six
1,308 one thousand three hundred and eight

2. a) Part–whole models completed.
6,000 500 1
b) 3,789
c) Part–whole model drawn and completed with 8,000, 30, 4 (100s circle may be completed with a 0)

3. Top part–whole model completed with 6,542 and linked with bottom base 10 equipment
Bottom part–whole model completed with 5,624 linked with top base 10 equipment

4. Odd one out is C as its value is 3,003. A and B are both 3,030.

5. No. Reena has made a 4-digit number. She should exchange 10 hundreds for 1 thousand and 10 ones for 1 ten. The number she has made is 1,262, which has 4 digits.

Reflect

Answers may vary. Teachers should check that the number chosen is drawn correctly using base 10 equipment and the same number is represented in the part-whole model.

Lesson 6: 1,000s, 100s, 10s and 1s

➜ pages 21–23

1. a) 3,712
b) 4,125

2. a) 2 thousand counters, 3 hundred counters, 5 ten counters and 6 one counters
b) 4 thousand counters, 8 hundred counters, 4 one counters (T column should be empty)
c) 2 thousand counters, 2 hundred counters, 5 ten counters and 6 one counters

3. a) 3,000 + 400 + 50 + 8 (answers may vary as long as total is 3,458)
8
58
b) 3,772
3,057
3,570

4. The others all represent 4,749 whereas c) represents 3,749.

5. 2,124 or 4,246 or 6,368. Children draw counters to represent the answers.

Reflect

Mr Harris has thought about the total number of people. Mrs Mackintosh is thinking about the 100s. 23 hundreds make 2,300.

Lesson 7: The number line to 10,000 (1)

➜ pages 24–26

1. a) 6,000
b) 4,700
c) 3,250

2. a) 5,100, 5,200, 5,300, 5,400, 5,500, 5,600, 5,700, 5,800, 5,900
b) 1,102, 1,104, 1,106, 1,108, 1,110, 1,112, 1,114, 1,116, 1,118
c) 7,200, 7,400, 7,600, 7,800, 8,000, 8,200, 8,400, 8,600, 8,800

3. a) Arrow drawn to sixth mark on the line
b) Arrow drawn to third mark on the line
c) Arrow drawn half-way between fourth and fifth marks

4. a) Answers may vary: There are 20 intervals on the line between 1,000 and 2,000 so each interval represents a jump of 50.
So arrow A is 1,000 + 50 + 50 = 1,100
b) 1,800

Reflect

Luis is not correct. Answers may vary. Half-way between 1,000 and 2,000 is 1,500. The arrow is showing a number greater than 1,500 as it is more than half-way along. 1,200 would be less than one-quarter of the way along.

Lesson 8: The number line to 10,000 (2)

→ pages 27–29

1. a) 7,800 positioned between 7,000 and 8,000, more than three-quarters of the way along the interval
b) 2,500 positioned on the fifth mark
c) 4,400 positioned on the second mark after 4,000

2. a) First mark after 4,500
b) Positioned slightly more than half-way between 4,000 and 5,000

3. a) Children write three numbers in the range 0–10,000
b) Children write three numbers in the range 1,100–1,200
c) Children write three numbers in the range 9,990–10,000

4. A is close to 1,000, so allow estimates around 1,200.
B is just under half-way so allow estimates around 1,950.
C is just over three-quarters of the way so allow estimates around 2,600.

Reflect

Answers may vary but the left-hand number could be 3,425 or less; the right-hand number could be 6,790 or greater, with appropriate reasoning.

Lesson 9: Roman numerals to 100

→ pages 30–32

1. a) 27 c) 45
b) 72 d) 93

2. 4 o'clock half past 10

3. Answers left to right by Roman numerals.

XXII = 22	XLII (added) = 42	LXXIV = 74 (added)
XXXVI = 36	LXIX = 69	LXXXIV = 84
XCIX = 99		

4. a) 26 or XXVI
b) Amelia has more marbles. She has 37 (XXXVII) more than Emma.

5. a) XL
b) LXVIII
c) C
d) LXXXVI
e) LXV

Reflect

Look for the Roman numerals that start with L and have numerals after the L.

LI, LXXI are circled.

End of unit check

→ pages 33–34

My journal

1. Children should record the number 4,563 in words, partitioning into its parts, representing it in a variety of ways, e.g. with part–whole models or place value tables.

Power play

There are ten possible numbers:

3,111	1,311	1,131	1,113	2,211
2,121	2,112	1,221	1,212	1,122

Three of the numbers round to 1,000 (the last three in the list).

Children can make many more numbers where digits add to 7.

Unit 2: Place value – 4-digit numbers (2)

Lesson 1: Finding 1,000 more or less

→ pages 35–37

1. a) 3,767 4,767
b) 5,870 5,880
c) 2,950 3,050
d) 10,000 9,900

2.

4,407	5,407	4,307	4,417
3,241	4,241	3,141	3,251
2,250	3,250	2,150	2,260
758	1,758	658	768

3. a) 5,879
b) 4,779
c) 4,869
d) 4,880
e) 2,921
f) 752

4. a) 1
b) 1,000
c) 100
d) 4,000
e) 6,989
f) 7,950
g) 1,000

5. 7,775

Reflect

The 1,000s digit changes

Lesson 2: Comparing 4-digit numbers (1)

→ pages 38–40

1. a) more than
b) less than

2. a) >
b) <
c) <
d) >

3. 4,076 < 4,209.
Children can add counters to one or both grids but the left-hand side must be less than the right-hand side

Reflect

5,204 < 5,209 or 5,209 > 5,204

Explanations may vary. For example: Both numbers have the same number of 1,000s and 100s but a different number of 1s.

The top number has 5 fewer counters in the 1s.

Lesson 3: Comparing 4-digit numbers (2)

→ pages 41–43

1. a) 4,301 5,015
b) 6,723 6,751
c) 4,781 945

2. a) <
b) >
c) <
d) >
e) =

3. a) Allow digits 0–4.
b) Allow any digits: left-hand side must be greater than, or equal to, the right-hand side.
c) If right-hand box is greater than 5, allow any digit in left-hand box.
If right-hand box is 5, then left-hand box must be 0 or 1.

4. 2,305; part-whole model ticked

5. Children write any six numbers in the range 1,301–1,499.

6. Teacher should check that comparisons are correct and digits are used only once.
Row 1: right-hand digit must be 1–4; left-hand digit can be any other digit 1–6.
Row 2: right-hand digit must be 3–6; left-hand digit can be any other digit 1–6.
Row 3: if left-hand digit is 6, right-hand digit must be 4 or 5; otherwise, left-hand digit should be 1–5 and right-hand digit any other digit 1–6.

Reflect

highest
same
right
different

Lesson 4: Ordering numbers to 10,000

→ pages 44–46

1. 6,541 6,537 6,536 6,421

2. a) 3,256 3,270 3,258 3,300
b) 3,256 3,258 3,270 3,300

3. a) 4,502 kg 4,314 kg 4,099 kg 3,821 kg
b) 8,120 m 8,032 m 7,909 m 7,830 m 812 m

4. a) Max
b) Richard
c) 7,850 m 7,855 m 7,995 m

5. a) 2; 2 or above
b) Allow 6 or above if second missing digit is completed with 7, allow 7 or above if second missing digit is completed with 8 or 9
Allow 7, 8 or 9
Allow 4 or above
c) Answers vary but must be within the range 2,711–2,899; three numbers in ascending order left to right.

6. 4,326 4,335 4,344

Reflect

Children make numbers from these possibilities:

9,865	9,856	9,685	9,658	9,586	9,568
8,965	8,956	8,695	8,659	8,596	8,569
6,985	6,958	6,895	6,859	6,598	6,589
5,986	5,968	5,896	5,869	5,698	5,689

which are arranged in descending order

Lesson 5: Rounding to the nearest 1,000

➜ pages 47–49

1. a) 2,000
b) 7,000
c) 2,800 3,000

2. Children select five numbers from the range 4,500–5,499 (inclusive)

3. a) 5,762 6,000
b) 2,380 2,000

4. a) 3,000
b) 3,200
c) 5,100

5. a) 5,000
b) 5,000
c) 5,000

6. 8,905–8,914 inclusive – 10 possibilities

Reflect

Children should make 4-digit numbers using digits 5 2 7 0.

Numbers that round to 5,000 are 5,027, 5,072, 5,207 or 5,270

Numbers that round to 2,000 are 2,057 or 2,075

Lesson 6: Solving problems using rounding

➜ pages 50–52

1. 8,500
7,800
8,800

2. Luis = 5,000 m Emma = 5,000 m
To the nearest 1,000 m, they have cycled the same.

3. 9,000
9,000
6,000
4,000

4. Andy is correct, as 8,001 rounds to 8,000, whether rounding to the nearest 10, 100 or 1,000

5. 8,341 8,000 8,300 8,340
6,892 7,000 6,900 6,890
8*7* (allow digit of 5 or more in 100s and any digit in 1s)
9,000 various various
Allow answers
5,450–5,459 5,000 5,500 5,450 or 5,460
(depending on first answer)
6,097 6,000 6,100 6,100

6. 4,112, 4,121, 4,211.
Greatest is 4,211
Smallest is 4,112

Reflect

Allow answers in range 1,995–2,004

Lesson 7: Counting in 25s

➜ pages 53–55

1. 25 75 125 150 50

2. a) 200 250 275 325 350
b) 1,175 1,200 1,250 1,275 1,300

3. a) 850 875 925 975
b) 5,025 5,075 5,100 5,150

4. 250 900 325 200 975 475 1,000
Answers vary: The last two digits will be 25, 50, 75 or 00

5. 13 Children may complete number line; teachers check it is correctly going up in jumps of 25:
150 175 200 225 250 275 300 325

6. 13
40

Reflect

5,000 4,075 0 100 1,000 50
When counting in 25s the T and O digits will be 00, 25, 50 or 75

Lesson 8: Negative numbers (1)

➜ pages 56–58

1. a) $^{-}3$
b) $^{+}3$

2. a) 1
b) $^{-}4$

3. a) 5
b) 7
c) 3

4. $^{-}5$

5. a) $^{-}1$ $^{-}2$ $^{-}3$
b) $^{-}4$ $^{-}3$ $^{-}2$
c) 0 $^{-}2$ $^{-}4$
d) $^{-}3$ 0 3

6. a) No, she isn't correct. Children should have marked jumps of 4 backwards on number line from 8, landing on 4, 0, $^{-}4$, $^{-}8$
b) $^{-}25$ (assuming Luis does not say the number 30) or $^{-}20$ (assuming Luis does say the number 30)

Reflect

Game

Lesson 9: Negative numbers (2)

➜ pages 59–61

1. a) $^{-}4$ $^{-}2$ 3
b) 15
$^{-}5$
$^{-}20$
$^{-}30$

2. a) $^{-}3$
Missing numbers on thermometer
7
2
$^{-}3$
$^{-}4$
$^{-}5$
$^{-}8$

b) $^{-}20$
Missing numbers on thermometer
30
10
0
$^{-}20$
$^{-}30$
$^{-}40$

3. a) 6
b) 7
c) $^{-}20$

4. a) $^{-}2$
b) 5

5. a) Negative numbers are reversed. $^{-}1$ should be next to 0
b) The whole number line has been reversed

6. A = 0 B = allow 12 or 13 C = $^{-}5$ D = $^{-}117$.

7. Various answers but jumps should be equal,
e.g. $^{-}9$ $^{-}6$ $^{-}3$ 0 3 6 9
or $^{-}5$ $^{-}4$ $^{-}3$ $^{-}2$ $^{-}1$ 0 1

Reflect

Max is wrong. Numbers are greater on a number line from left to right. So as $^{-}1$ is on the right of $^{-}4$, it must be greater not smaller.

End of unit check

➜ pages 62–63

My journal

When finding 1,000 less than a number, the T and O columns will never change.

When rounding a number to the nearest 1,000 every place value column can change, for example 8,999 rounds to 9,000.

Unit 3: Addition and subtraction

Lesson 1: Adding and subtracting 1s, 10s, 100s, 1,000s

➜ pages 64–66

1. a) 4,139
b) 20 4,139

2. a) 6,668
b) 6,686
c) 8,666
d) 6,466
e) 6,866

3. a) 3,654
b) 4,851
c) 5,786
d) 7,568
e) 1,134
f) 521
g) 4,004
h) 5,000

4. a) 7,999 – 1,000 = 6,999
6,999
b) 8,749 – 500 = 8,249
500

5. 7,333 – 3,333 = 4,000
Explanations will vary, e.g. you can use the fact 3,333 + 4,000 = 7,333 and the related fact family.
8,181 – 8,111 = 70

6. a) and b) Answers will vary. Numbers used once.
3,334 + ______ – _______ = 3,434
Cards selected have a difference of 100, with the left one greater.
3,934 – ______– ________= 3,434
Both cards have a total of 500.
3,434 – ______ – _______ + ________ = 3,434
The left and middle card will total the right-hand card.
3,334 – ______ + _______= 3,434
Cards have a difference of 100, with the right-hand side greater.

Reflect

5,167 + 4,000 = 9,167
Answers will vary, e.g. 5,000 + 4,000 = 9,000
so 5,167 + 4,000 = 9,167

Lesson 2: Adding two 4-digit numbers (1)

➜ pages 67–69

1. 2,846

2. a) 6,616
b) 8,182

3. a) 1,143
b) 3,071 + 4,816 = 7,887

4. a) Correctly set out 3,452 + 42 = 3,494
b) Correctly set out 1,025 + 1,500 = 2,525

5. Children work out 4,153 + 2,345 = 6,498

6. a) 1,045 + 2,331 = 3,376
b) 4,521 + 432 = 4,953

7. These are all the possible places for 8 or 1:
1,111 + 8,888
8,111 + 1,888 1,811 + 8,188 1,181 + 8,818
1,118 + 8,881
1,188 + 8,811 1,818 + 8,181 8,118 + 1,881

There are 8 different solutions (or 16 if you allow for numbers in calculation to be given in different order, i.e. if you count 1,111 + 8,888 and 8,888 + 1,111 as different solutions).

Reflect

2,512 + 5,105 = 7,617

Children show how they complete calculation.

Lesson 3: Adding two 4-digit numbers (2)

➜ pages 70–72

1. a) 1,175 + 1,750 = 2,925 (or 1,750 + 1,175 = 2,925)
They ran 2,925 m in total.
b) 975 + 2,400 = 3,375 (or 2,400 + 975 = 3,375)
Bella ran 3,375 m.
c) Children complete 1,245 + 1,245 = 1,490
2,490
They ran 2,490 m in total.

2. Check correct column method used.
a) 5,186
b) 5,992
c) 6,148
d) 2,787

3. a) How many tickets were sold altogether?
Children select any number that has 7 or less in the 100s column, 5 or more in the 10s column and 0 in the 1s column.
Check the calculation is correct.
b) Children select two numbers where the 10s column only has an exchange.
How many seats are there altogether?
Check the calculation is correct.

4. a) 1,139 b) 1,633

5. a) 7,095 = 1,575 + 5,520
b) 6,095 7,095
7,075 1,095

Reflect

Teachers should check that selection obeys the rules.

Lesson 4: Adding two 4-digit numbers (3)

→ pages 73–75

1. 1,635 + 2,186 = 3,821
2,465 + 1,662 = 4,127

2. a) 3,405 + 1,726 = 5,131 or 1,726 + 1,283 = 3,009 or 1,726 + 199 = 1,925 or 1,283 + 199 = 1,482 or 3,405 + 199 = 3,604
b) Children select their own numbers to make additions with two exchanges.

3. 5,001 = 1,218 + 3,783. The addition is completed. Astrid is wrong as there are three exchanges.

4. a) 1,446 b) 2,000

5. a) 654 + 2,999 = 3,653
mental method is + 3,000 then – 1 because you added one more than was needed.
b) 4,999 + 2,999 = 7,998
Rounding 5,000 + 3,000 = 8,000. Then adjust by 2 so 7,998

6. a) 1,234 + 766 = 2,000 4,371 + 4,629 = 9,000
7,001 + 1,999= 9,000
b) 1,766
8,001
5,679

Reflect

Answers will vary but may include: set out my columns neatly; exchange when my digits come to more than 9; add on my exchanged digit.

Lesson 5: Subtracting two 4-digit numbers (I)

→ pages 76–78

1. 4,325 – 2,114 = 2,211
She had to deliver 2,211 letters in the afternoon.

2. Top grid linked with 4,252 – 2,011 = 2,241
Base 10 equipment linked to 4,250 – 1,140 = 3,110
Bottom grid linked to 4,525 – 2,114 = 2,411

3. a) 4,310 8,855 – 4,545 = 4,310
b) 2,449 4,999 – 2,550 = 2,449
c) 7,033 9,099 – 2,066 = 7,033

4. The mistake is that 411 is not in the correct columns.

5. Children make two numbers and subtract their numbers from 9,999. Check answers and that layout is correct.
Comments will vary, e.g. I noticed that
odd – odd = even answer
odd – even = odd answer

Reflect

Children write a story problem for 5,455 – 2,123 = 3,332 and solve it correctly.

Lesson 6: Subtracting two 4-digit numbers (2)

→ pages 79-81

1. a) 4,362 – 247 = 4,115
b) 1,454 – 1,270 = 184 Grid may be annotated to show exchange
c) 2,350 – 1,530 = 820. Grid may be annotated to show exchange.

2. 1,356 – 349 = 1,007
Bella lives 1,007 miles further away.

3. a) 9,375 – 8,293 = 1,082 c) 9,375 – 8,239 = 1,136
b) 82 = 8,375 – 8,293 d) 7,375 – 239 = 7,136

4. a) 2,139 Base 10 equipment shows annotation
b) 1,620 Base 10 equipment shows annotation

5. Methods may vary but these are the most likely:
a) 3,245 Number line shows jump back of 1 to 3,250 and jump back of 5 to 3,245
b) 5,047 Number line shows jump back of 1 from 5,051 to 5,050 and then a jump back of 3 to 5,047.
c) 5 Number line shows jump of 4 between 3,246 and 3,250 and jump of 1 between 3,250 and 3,251.
d) 9 Number line shows jump of 1 between 4,991 and 4,990 and jump of 8 between 4,990 and 4,982.

Reflect

Check subtraction involves an exchange of 1 hundred for 10 tens.

Lesson 7: Subtracting two 4-digit numbers (3)

→ pages 82–84

1. PV grid has annotation.
1,917
1,917

2. a) 1,069 c) 1,093
b) 2,925 d) 1,990

3. a) 8,672
b) 7,672 because 8,449 is 1,000 less than 9,449, so answer will be 1,000 less: 7,672

4. 1,258 – 163 1 1,258 – 163 = 1,095
3,258 – 329 2 3,258 – 329 = 2,929
1,158 – 249 or 1,058 – 249 2 1,158 – 249 = 909 or
1,058 – 249 = 809

5. 3,412 – 1,651 = 1,661
The mistake was that the person didn't take the bottom number from the top number. They just took away the smaller number wherever it was.

6. 2,455 – 1,689 = 766 1,689 – 949 = 740
Richard is wrong. It is closer to the guinea pig: 740 g, compared with 766 g to the cat.

Reflect

Children explain how they know how many exchanges there need to be in subtraction questions.

Lesson 8: Subtracting two 4-digit numbers (4)

➜ pages 85–87

1. 1,401 – 225 = 1,176
1,176

2. Place value grid completed to show exchange of:
1 hundred to 10 tens and 1 ten to 10 ones. 1 hundred, 5 tens and 7 ones are crossed off.
2,202 – 157 = 2,045

3. a) 3,507 – 419 = 3,198 linked with middle statement
3,008 – 1,419 = 1,599 linked with bottom statement
3,023 – 419 = 2,604 linked with top statement
b) 3,507 – 419 = 3,088 3,008 – 1,419 = 1,589
(in either order)

4. a) 3,061 – 174 = 2,887
3,061 – 174 = 2,887
b) 3,501 (2,000 and 1,400 and 90 and 11)
3,501 – 2,552 = 949

Reflect

Children explain how to subtract when there is a 0 in the 10s column: having to exchange 1 hundred for 10 tens first, then exchange between the 10s and 1s.

Lesson 9: Equivalent difference

➜ pages 88–90

1. 95 – 7 = 88 96 – 8 = 88
97 – 9 = 88
98 – 10 = 88 (circled)

2. 298 – 139 = 159
299 – 140 = 159

3. 235 – 98
236 – 99
237 – 100 = 137 (circled)
238 – 101 = 137
239 – 102 = 137

Jan's tower is 137 cm taller.

4. a) 1,434
1,434
b) Children select 1,000 – 518
Explanations will vary but should identify that an equivalent subtraction is 999 – 517. This can be solved without any exchange to give the answer 482.

5. Methods chosen may vary. One possible method is suggested for each.
2,950 – 850 = 2,100 (mental: subtract 100s and 10s)
2,875 – 1,989 = 886 (change to equivalent subtraction 2,886 – 2,000 and subtract 1,000s)
3,011 – 2,997 = 14 (mental count up)
8,001 – 4,567 = 3,434 (change to equivalent subtraction 7,999 – 4,565 and use column method)
6,626 – 6,618 = 8 (mental: count up)
9,009 – 10 = 8,999 (mental: count back to 9,000, then 1 more)

Reflect

Answers will vary. Children may suggest that they will work out the equivalent subtraction 999 – 954 to get the answer 45 or they may use number bonds to 100.

Lesson 10: Estimating answers to additions and subtractions

➜ pages 91–93

1. a) 4,000 5,000
4,000 + 5,000 = 9,000
Lexi's score is roughly 9,000 points.
b) 4,000 – 3,000 = 1,000 Max has roughly 1,000 points now.
c) Lexi 3,987 + 5,123 = 9,110
Max 3,987 – 3,104 = 883
The estimates are close to the exact answers.

2. 2,101 – 998 linked with 2,100 – 1,000
2,891 – 1,100 linked with 2,900 – 1,000
1,975 + 2,010 linked with 2,000 + 2,000
1,998 + 2,101 linked with 2,000 + 2,000
2,925 – 975 = linked with 2,900 – 1,000
2,998 – 1,998 linked with 3,000 – 2,000

3. a) 6,152 + 3,025 = 9,177 6,452 – 2,005 = 4,447
Estimates may vary
6,000 + 3,000 = 9,000 6,500 – 2,000 = 4,500
b) Explanations will vary but children should mention rounding the numbers.

4. 6,491 – 2,725 = 3,766
6,000 – 3,000 = 3,000
6,500 – 2,700 = 3,800
6,490 – 2,730 = 3,760
Children may comment that rounding to 10 gives you the closest answer although rounding to 1,000 is easier to do.

Reflect

Explanations will vary, for example children may round to the nearest 1,000 (2,000 – 1,000 = 1,000) or to the nearest 100 (1,900 – 1,000 = 900).

Lesson 11: Checking strategies

→ pages 94–96

1. a) 2,341 + 1,151 = 3,492 (wrong)
451 + 550 = 1,001 (correct)
2,189 + 6,789 = 8,978 (wrong)
b) 3,412 – 1,151 = 2,261
9,876 – 6,789 = 3,087

2. 2,894
1,899 995
1,899 + 995 = 2,894
Holly is correct because 2,894 – 1,899 = 995

3. a) 4,560 c) 4,560
b) 6,550 d) 6,550 5,555

4. Dexter has rounded to the nearest 1,000 but this has made both numbers significantly smaller so his estimate is too small. It would be better to round to the nearest 100. This would give 4,500 + 3,500 = 8,000.

5. Estimate: 2,600 + 2,600 = 5,200
Exact answer: 2,599 + 2,599 = 5,198

Reflect

Estimation: 600 +1,600 = 2,200

Inverse operation 2,098 – 1,599 = 499

Both checks show that the answer 2,098 is incorrect.
It should be 2,198.

Lesson 12: Problem solving – addition and subtraction (1)

→ pages 97–99

1. a) 5,600 2,500 + 3,100 = 5,600
They poured 5,600 ml of water altogether.
b) 5,000
2,500 2,500 5,000 – 2,500 = 2,500
Ambika has 2,500 ml of water left now.

2. a) 5,000 – 3,900 = 1,100
She has 1,100 m left to cycle.
b) Box may have column addition and bar model to show 1,250 + 2,800 = 4,050
He travels 4,050 m altogether.

3. a) Bar models drawn to show :
Top bracket: 7,750
Bar split into two: 3,750 and 4,000
b) Top bracket: 4,000
Bar split into two: 3,750 and 250

4. 2,500 2,000 1,500 500

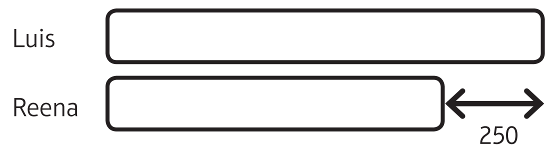
Reflect

Children complete bar model and write a story problem for 1,050 + 950 = 2,000 or 2,000 – 950 = 1,050.

Lesson 13: Problem solving – addition and subtraction (2)

→ pages 100–102

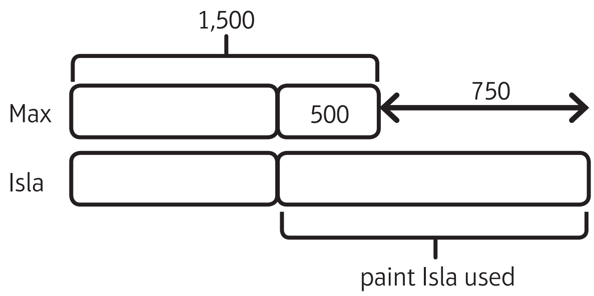
1. a) 1,020 – 820 = 200
Ebo has 200 more stickers.
b) Lower bar drawn to show 1,020 with arrow to the end.
1,500 – 1,020 = 480
Ebo has 480 fewer stickers than Reena.
c)



Column addition: 1,500 + 250 = 1,750
Luis has 1,750 stickers in total.

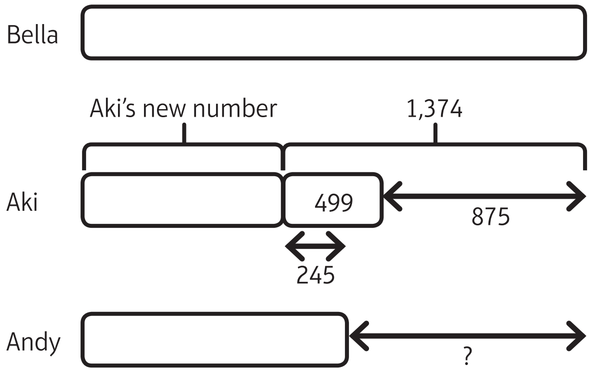
2. B suits this problem as it involves comparing two amounts, not combining them.
576 – 425 = 151

3.



500 + 750 = 1,250 Isla used 1,250 ml of paint.

4. Bar models may vary.



499 + 875 = 1,374
1,374 – 245 = 1,129
The difference between Bella's number and Andy's number is 1,129.

Reflect

Explanations will vary. Children may say that they draw a comparison bar model when the problem involves comparing amounts. They draw a single bar model when finding a part or the whole of an amount.

Lesson 14: Problem solving – addition and subtraction (3)

➜ pages 103–105

1. a) 2,250 + 500 = 1,750
1,750 + 1,250 = 3,000
The total distance was 3,000 m.
b) Bar model has parts 2,500 and 4,750 and 750
2,500 + 4,750 = 7,250 and
8,000 – 7,250 = 750
Alternatively 8,000 – 2,500 = 5,500 and 5,500 – 4,750 = 750
c) Children explain the order in which they did the calculations. Likely answer is: first they added 2,500 + 4,750. Then they subtracted this sum from 8,000. The swimming was the remaining distance that was not running or cycling.

2. Either 325 + 450 = 775 and 1,200 – 775 = 425 or
1,200 – 450 = 750 and 750 – 325 = 425
The height of the middle section of the tower is 425 cm.

3. Bar model drawn to show 650 + 1,100 = 1,750

4. Bar models drawn to support working:
a) Amy has more money now. The difference is £25.
b) Evelyn has £1,800. Noah has £1,000.

Reflect

Teacher checks three-part bar model totalling 2,050, e.g. 1,000, 1,000 and 50

Lesson 15: Problem solving – addition and subtraction (4)

➜ pages 106–108

1. a) Write in parts of 1,228, 1,517 and 483 into both diagrams
b) 1,228 + 1,517 = 2,745
2,745 + 483 = 3,228
5,000 – 3,228 = 1,772
Class 2 collected1,772 bottles.
483 < 1,228 < 1,517 <1,772
Class 2 collected the most bottles.

2. Box over arrow = 1,700
3,985 – 1,700 = 2,285 Rover bar = 2,285
3,985 + 2,285 = 6,270
There are 6,270 fans in total.

3. 1,502 + 3,116 = 4,618 so the dog weighs 4,618 g.
4,618 – 4,586 = 32 so the hamster weighs 32 g.
The hamster weighs 32 g.

4. Answers will vary
e.g. A school is comparing house points earned by the houses this year. The total points earned is 4,000. Class 1 earned 950 fewer points than Class 3. Class 3 earned 1,900 points. How many did Class 2 earn?

Reflect

Children explain how they use bar models to solve problems.

End of unit check

➜ pages 109–111

My journal

1. Children estimate 2,000 + 6,500 = 8,500 or
1,900 + 6,700 = 8,600, and 2,000 = 9,000 – 7,000.
Would expect that the second one has a missing number greater than 6,800.
8,634 – 1,889 = 6,745 so 1,849 + 6,745 = 8,634
9,000 – 2,026 = 6,974 (which is greater than 6,800) so
2,026 = 9,000 – 6,974

2. 8,699 – 4,875 = 3,824. The difference between Aki's and Lee's score is 3,824.
The difference between Aki's score and Jamilla's score is 3,823.
So Aki is wrong. His score is 1 closer to Jamilla's score than it is to Lee's score.

Power puzzle

Puzzle A
Cloud = 1,750 Star = 1,250

Puzzle B
Heart = 1,050 Star = 150 Cloud = 1,800 Triangle = 600

Unit 4: Measures – perimeter

Lesson 1: Kilometres

→ pages 112–114

1. a) 1,000 1,000 1,000 3,000
Barwich is 3,000 metres away.
b) Bars completed
1,000 1,000 1,000 1,000
1,000 1,000 6,000
Littleton is 6,000 metres away.
c) Top bar completed with 1 km (9 times)
Newville is 9 kilometres away.

2. a) 5,000 c) 3,500
b) $1\frac{1}{2}$ d) $1\frac{1}{4}$

3. a) 11,000 c) 8
b) 4,500 d) $10\frac{1}{2}$

4. The flowers will cost £9,500.

5. Children draw route from A to B and correctly complete number of kilometres.

6. a) 500 d) 250
b) 750 e) 200
c) 400 f) 100

Reflect

$3\frac{1}{2}$ km. Children explain their working and knowledge, to include 1,000 m = 1 km so 2,000 m = 2 km   500 m = $\frac{1}{2}$ km

Lesson 2: Perimeter of a rectangle (1)

→ pages 115–117

1. 13 + 13 + 6 + 6 = 38. Addition in any order.

2. A = 18
B = 30
C = 18
D = 28

3. Left-hand drawing and right-hand drawing are ticked.

4. a) width = 10 m   length = 15 m
b) 50 (m)

5. Jack has run further.
Jack runs 3 × 50 m = 150 m
Sam runs 50 m + 50 m + 23 m + 23 m = 146 m

6. a) 5 6 7 8 10
20 24 28 32 40
b) Answers may vary. Children should notice that the perimeter is equal to four times the side length.

Reflect

Answers may vary. Children may say they would add the lengths of the sides, and there are two each of length 6 m and 5 m so they would work out 6 + 5 + 6 + 5 = 22 m.

Lesson 3: Perimeter of a rectangle (2)

→ pages 118–120

1. Bar model may be completed in different ways. Children may split the remaining section in half and label each part 2 m. Alternatively, they may simply label the remaining part as 4 m.
4 ÷ 2 = 2
The length of the noticeboard is 2 m.

2. Perimeter = 40 sticks
Length = 12 sticks
Width = 8 sticks

3. Top left linked with 6 m
Top right linked with 5 m
Bottom left linked with 3 m
Bottom right linked with 9 m

4. a) 1 cm 7 cm
2 cm 6 cm
3 cm 5 cm
4 cm 4 cm
b) It is a square because its length and width are the same.

5. a) 280 cm
b) 420 cm
The diagram should show a rectangle with a length of 140 cm and a width of 70 cm.

Reflect

Children find the length is 5 cm and explain their reasoning, e.g.
12 – 1 – 1 = 10   10 ÷ 2 = 5

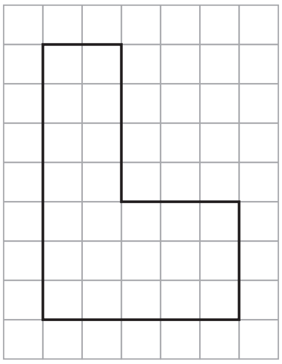
Lesson 4: Perimeter of rectilinear shapes (1)

→ pages 121–123

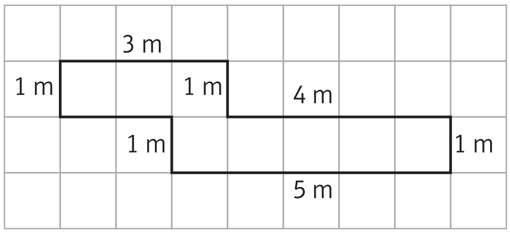
1. Clockwise from the top.
a) 2, 1, 2, 1, 4, 2
b) The perimeter of the flower bed is 12 m.m

2. a) 14 c) 20
b) 14 d) 26

3. a) 24
b)



4. 18 cm



5. a) Children draw a factory with side lengths labelled and correct perimeter calculated. All angles should be right angles (no sloping roofs).

Reflect

Not correct. Perimeter = 22

Amy has put a number in each corner where there is no length to measure, and she has not noticed that square 9 includes two 1 cm lengths of the perimeter instead of just one.

Lesson 5: Perimeter of rectilinear shapes (2)

→ pages 124–126

1. a) 3
b) 10

2. 6 cm and 2 cm (or 2 cm and 6 cm)
8
2
7
5
30

3.

Left-hand shape	Right-hand shape
9	$14\frac{1}{2}$
9	$14\frac{1}{2}$
perimeter = 42 cm	perimeter = 58 cm

4. a) The length is 5 cm + 4 cm + 9 cm = 18 cm.
The width is 12 m.
The other missing measurement is 7 cm.
b) 12 + 18 + 12 + 9 + 7 + 4 + 7 + 5 = 74
The perimeter is 74 m.

5. Teacher checks both shapes have a perimeter of 8 units. They will be 3 connected blocks, grouped as either a rectangle or an L (or reverse L), or a square of 2 blocks by 2 blocks

End of unit check

→ pages 127–128

My journal

Using only using horizontal and vertical lines, children draw two shapes each with a perimeter of 18 units.

Power play

Keeping to rectilinear shapes (all right angles), you can make shapes for these perimeters: 10, 8, 6, 4.

Impossible perimeters are: 11, 9, 7, 5, 3, 2, 1, 0.

You can only make a new shape each time you have taken away an even number of sticks. This is because, in a closed rectilinear shape, whatever distance you travel in each dimension (horizontal or vertical), you need to travel the same distance back again: so the total lengths in the horizontal direction will be an even number, and likewise in the vertical direction. Secondly, to make the smallest rectilinear shape (a unit square), you need 4 sticks, so 4 is the minimum.

Unit 5: Multiplication and division (I)

Lesson I: Multiplying by multiples of I0 and I00

→ pages 129–131

1. a) 7 × 5 = 35
There are 35 boxes of pencils.
b) 35 × 10 = 350 (or 7 × 50 = 350)
There are 350 pencils in total.

2. a) 6 × 2 = 12
There are 12 jars of sweets.
b) 12 × 100 = 1,200 (or 6 × 200 = 1,200)
There are 1,200 sweets in total.

3. 30 + 30 + 30 + 30 + 30 + 30 + 30 = 210
7 × 3 ones = 21 ones = 21; 7 × 3 tens = 21 tens = 210
7 × 3 = 21; 21 × 10 = 210

4. a) 8 × 200 = 1,600
b) 8 × 20 = 160

5. a) 28
280
2,800
b) 240
2,400
24
c) 18
180
1,800
d) 450
720
2,400

6. 300
Explanations may vary, e.g. I worked out how many 8s there were altogether by finding 200 + 50 + 30 + 20 = 300.

Reflect

Children use 7 × 4 = 28 to explain a linked multiplication, e.g. 700 × 4 = 7 hundreds × 4 = 28 hundreds = 2,800

Lesson 2 Dividing multiples of I0 and I00

→ pages 132–134

1. a) 2
b) 20
c) 200

2. a) 250 ÷ 50 = 5
b) 2,800 ÷ 700 = 4

3. 400 ÷ 5 linked with 80
480 ÷ 6 linked with 80
40 ÷ 5 linked with 8
32 ÷ 4 linked with 8
32 tens ÷ 4 linked with 80
1,600 ÷ 2 linked with 800
4,000 ÷ 5 linked with 800
720 ÷ 9 linked with 80
800 ÷ 10 linked with 80

4. a) 6
60
600
b) 6
60
600
c) 11
110
1,100
d) 70
160
20
400

5.

6	60	600	20	300	$12\frac{1}{2}$	30
24	240	2,400	80	1,200	50	120

× 8 then ÷ 2 is the same as × 4

Reflect

1,200 ÷ 4 = 300

Methods will vary, e.g. 12 ÷ 4 = 3 so 12 hundreds ÷ 4 = 3 hundreds = 300

Lesson 3: Multiplying by 0 and I

→ pages 135–137

1. Lines are drawn to match the picture with the following multiplication
a) 4 × 0 = 0
b) 2 × 3 = 6
c) 1 × 4 = 4
d) 5 × 1 = 5
e) 2 × 0 = 0

2. a) 4 × 1 = 4 4
b) 4 × 3 = 12 12
c) 4 × 0 = 0 0

3. Circled calculations: a) c) e) f) h)
They all have 0 as one part of the multiplication.

4. a) 0
b) 9
c) 15
d) 0

5. 0

Reflect

With × 0, any number can be put in the first box but the answer will always be 0.

With × 1, whatever goes into the first box is also the answer. When you multiply a number by 1, the number doesn't change.

Unit 4: Dividing by I

→ pages 138–140

1. a) 6 ÷ 1 = 6
b) 6 ÷ 6 = 1

2. Amelia has confused division with subtraction (4 – 4 = 0). However, 4 ÷ 4 = 1 because 4 things shared among 4 people means one each.

3. Circled calculations:
8 ÷ 8   5 ÷ 5   16 ÷ 16   7 ÷ 7   150 ÷ 150

4. a) 3   4   5
10   14   20
When you divide a number by 1 the number stays the same.
b) All answers 1
When you divide a number by itself, the answer is always 1.

5. a) 11   d) 1   g) 0
b) 1   e) 12   h) 8
c) 1   f) 70

6. The square is greater than the pentagon. Explanations will vary, e.g. Both numbers have been divided by 1, which leaves them unchanged. This means that square > pentagon.

Reflect

In each calculation both numbers are the same.

Lesson 5: Multiplying and dividing by 6

➜ pages 141-143

1. a) 3 × 6 = 18
18
b) 7 × 6 = 42
42

2. 48 ÷ 6 = 8
8

3. 24 ÷ 6 = 4
£4

4. a) 6 × 90 = 540
540
b) 1,800 ÷ 6 = 300
300
c) 90 + 300 = 390
390

5. Methods may vary. One possible method is:
6 × 12 = 72   72 × 2 = 144
144 + 6 + 6 = 156
The perimeter of the new shape is 156 cm.

Reflect

Children write and solve a story problem using × or ÷ by 6.

Lesson 6: 6 times-table

➜ pages 144–146

1. a) 3 × 6 = 18
b) 5 × 6 = 30

2. a) 18   f) 0   k) 7
b) 6   g) 4   l) 11
c) 36   h) 54   m) 0
d) 72   i) 1   n) 6
e) 60   j) 4   o) 60

3. a) 24   30   36   48
b) 54   48   42   30   24
c) 180   240   300   360

4. The following numbers are circled: 60   6   120
(children may also circle 0 because 0 × 6 = 0)

5. 78

6. a) >   d) <
b) <   e) =
c) <   f) >

7. a) 24   b) 5,400
240   420
2,400   300
240   200

8. a) You can double 8 × 3 to work out 8 × 6
b) You can add another 8 to 8 × 5 to work out 8 × 6

Reflect

0	6	12	18
24	30	36	42
48	54	60	66
72			

Lesson 7: Multiplying and dividing by 9

➜ pages 147–149

1. a) 5 × 9 = 45
b) 7 × 9 = 63

2. Children circle 2 groups of 9

3. 72 ÷ 9 = 8

4. a) 4 × 9 = 36
b) 12 × 9 = 108
Explanations will vary, e.g. There are 12 sides to the perimeter so 12 × 9 = 108 cm

5. 209

6. 4

Reflect

Children write a problem to match £45 ÷ 9 = £5.

Lesson 8: 9 times-table

→ pages 150–152

1. a) 4 x 9 = 36
b) 9 × 4 = 36

2. 72

3. 36 45 63 72 81 99 108

4. Children add two more columns of 6 to the array.
54

5. a) 63 g) 3
b) 0 h) 1
c) 81 i) 6
d) 45 j) 4
e) 108 k) 99
f) 9 l) 90

6. a) 27 b) 6,300
270 540
2,700 540
270 40
270 (27 tens) 1,000

7. Answers will vary, e.g.
5 × 9 > 4 × 9
0 ÷ 9 < 36 ÷ 9
8 × 9 = 72

Reflect

Calculations will all be in the 9 times-table, from 1 × 9 = 9 up to 12 × 9 = 108.

Lesson 9: Multiplying and dividing by 7

→ pages 153–155

1. a) 4 × 7 = 28
28
b) 2 × 7= 14
14
c) Seven packets are circled.

2. 14 21 35 42 49 56 63 70

3. 4 weeks = 28 days
9 weeks = 63 days
70 weeks = 490 days
11 weeks = 77 days

4. a) 7 × 8 = 56
56
b) 11 rows
2

5. First 3 × 7= 21
Then 35 – 21 = 14
Finally 14 ÷ 7 = 2
2

Reflect

Explanations will vary, e.g. I would draw a 5 by 7 array.

Lesson 10: 7 times-table

→ pages 156–158

1. a) 4 × = 28
b) 3 × 7= 21

2. 21 28 35 42 49 56 63 77

3. a) 40
16
40 + 16 = 56
56
b) You can add another 7 on to 56

4. a) 28 h) 8
b) 14 i) 11
c) 35 j) 1
d) 70 k) 4
e) 0 l) 9
f) 77 m) 21
g) 6 n) 84

5. From top working clockwise:
Outer: 210 2,100 420 5,600
Inner: 5 50 500 90 100

6. 5 × 10 × 4 × 2 = 400

Reflect

Explanations will vary, e.g. To work out 7 times a number, you can work out 5 times the number and 2 times the number and add the two answers together.

Lesson 11: 11 and 12 times-tables

→ pages 159–161

1. a) 6 × 12= 72
b) 11 × 1 = 11

2. 10 × 12 = 120
120

3. a) 44 55 66 88 99 110
b) 24 48 72 96 108
c) 120 108 96 84 72
d) 121 110 99 88 77

4. Left wheel (clockwise):
Outer:
55 77 99 121 132
Inner:
8 0 1 10

Right wheel (clockwise):
Outer:
108 36 60 144 132 0
Inner:
1 7 2

5. a) 72
720
7,200

b) 80
200
12
11

c) 30
66
9

Reflect

Children complete tables grid.

Numbers across top: 7 3 2 5 10 11 9 6 8 1 12 4

Numbers down left: 10 11 1 4 5 6 2 12 7 3 9 8

End of unit check

→ pages 162–164

My journal

1. There are 27 possible combinations:

Large	Med	Small
5	0	0
4	1	1
4	0	3
3	3	0
3	2	2
3	1	4
3	0	6
2	4	1
2	3	3

Large	Med	Small
2	2	5
2	1	7
2	0	9
1	6	0
1	5	2
1	4	4
1	3	6
1	2	8
1	1	10

Large	Med	Small
1	0	12
0	7	1
0	6	3
0	5	5
0	4	7
0	3	9
0	2	11
0	1	13
0	0	15

2. Children may sort the problems in different ways, e.g.
Problems that involve multiplication: A, D
Problems that involve division: B, C.
A: $6 \times 7 = 42$
7 books cost £42.
B: $48 \div 6 = 8$
Each child receives 8 sweets.
C: $90 \div 9 = 10$
I can buy 10 board games.
D: $2 \times 9 \times 9 = 162$
9 bags weigh 162 kg.

Power puzzle

1. Children note how long it took them. Teacher to check answers.

2. Order of numbers along top of grid: 2, 7, 9, 4, 8, 1, 11, 6, 5, 10, 12, 3

Order of numbers down left side of grid: 4, 10, 2, 1, 8, 6, 12, 3, 7, 11, 9, 5

Teacher to supervise checking of answers in grids designed by children.

Unit 6: Multiplication and division (2)

Lesson I: Problem solving – addition and multiplication

→ pages 6–8

1. Method 1: 5 × 4 = 20, 5 × 3 = 15, 20 + 15 = 35
   Method 2: 4 + 3 = 7, 7 × 5 = 35
   There are 35 counters in total.
2. 4 + 2 = 6
   6 × 3 = 18
   There are 18 pens in total.
3. a) 9 × 2 = 18 There are 18 balls in total.
   b) 7 × 3 = 18 There are 21 balls in total.
4. Explanations may vary; for example:
   4 × 3 + 5 × 3 = 12 + 15 = 27; 4 + 5 = 9, 9 × 3 = 27
   Diagrams could include 4 rows of 3 counters in one colour with 5 rows of 3 counters in a different colour, showing a total 9 rows of 3 counters altogether.
5. a) 7 d) 6
   b) 10 e) 9
   c) 2 f) 4
6. First I added together the number of columns of counters (3 + 2 + 5 =10).
   Then I multiplied the number of columns by the number of rows (10 × 4 = 40).
   There are 40 counters in total.
   (Note: this is the most efficient method.)
   OR
   First I found how many black counters (4 × 3 = 12) and the white counters (4 × 2 = 8) and the grey counters (4 × 5 = 20).
   Then I added these totals together (12 + 8 + 20 = 20).
   There are 40 counters in total.

Reflect

Explanations may vary; for example:
If you have 5 threes and 2 threes, you have 7 threes altogether so 5 × 3 + 2 × 3 = 7 × 3.

Alternatively, children may draw diagrams or write calculations: 5 × 3 = 15, 2 × 3 = 6; 15 + 6 = 21; also 7 × 3 = 21 so 5 × 3 + 2 × 3 = 7 × 3.

Lesson 2: Problem solving – mixed problems

→ pages 9–11

1. a) 6 × 3 = 18 Jamie has 18 cards in total.
   b) 18 ÷ 2 = 9 Jamie and Richard each get 9 cards.
2. 8 × 3 = 24, 24 ÷ 4 = 6. Each horse gets 6 apples.
3. 12 towers of 3 cubes can be made.
4. a) Total value = 18, missing number in bottom row = 6
   b) Total value = 48, missing number in bottom row = 8
5. 5 × 400 g = 2,000 g = 2 kg; 2 kg ÷ 2 = 1 kg
   1 teddy bear weighs 1 kg.
6. 8 × £3 = £24; £24 ÷ 6 = £4; 5 × £4 = £20
   5 large cones cost £20.

Reflect

Bar model should look similar to the model below; pineapple (p) represented in the top row, divided into two equal parts. Apples (a) represented in the bottom row, divided into 5 equal parts.

Explanations may vary, but should reference how the top and bottom rows in the bar model are of equal length despite each being made up of a different number of sections.

<table>
<tr><td colspan="5">p</td><td colspan="5">p</td></tr>
<tr><td colspan="2">a</td><td colspan="2">a</td><td colspan="2">a</td><td colspan="2">a</td><td colspan="2">a</td></tr>
</table>

Lesson 3: Using written methods to multiply

→ pages 12–14

1. a) 10 × 6 + 3 × 6 = 60 + 18 = 78
   There are 78 eggs in total.
   b) 13 × 6 = 78 There are 78 eggs in total.
   c) The answers are the same. Explanations may vary; for example:
   In both questions there are 13 boxes of eggs altogether.
2. 10 × 3 = 30 8 × 3 = 24
   30 + 24 = 54 So, 18 × 3 = 54
   There are 54 beads in total.
3. a) 10 × 5 = 50, 7 × 5 = 35, 17 × 5 = 85
   c) 3 × 6 = 18, 20 × 6 = 120, 23 × 6 = 138
   e) 20 × 8 = 160, 5 × 8 = 40, 25 × 8 = 200
   b) 4 × 10 = 40, 4 × 6 = 24, 4 × 16 = 64
   d) 3 × 40 = 120, 3 × 5 = 15, 3 × 45 = 135
   f) 11 × 7 = 77, 5 × 7 = 35, 16 × 7 = 112
4. a) Parts: 10 × 6 = 60; 6 × 6 = 36
   b) Whole: 9 × 5 = 45 Parts: 7 × 5 = 35; 2 × 5 = 10

5. a) 8
b) 12
c) 13
d) 17 × 6
e) 7
f) 19
g) 3 × 25

Reflect

Methods may vary; for example:
Method 1: Find the totals separately for the pencils on the left-hand side (5 × 10 = 50) and on the right-hand side (5 × 3 = 15) and then add these together (50 + 15 = 65).

Method 2: Add together the number of packs of pencils (10 + 3 =13) and multiply this by 5 (13 × 5 = 65).

Lesson 4: Multiplying a 2-digit number by a 1-digit number

➜ pages 15–17

1.

$$\begin{array}{cccc} & & 4 & 1 \\ \times & & & 5 \\ \hline & 2 & 0 & 5 \\ \hline \end{array}$$

41 × 5 = 205

2. a)

$$\begin{array}{cccc} & & 5 & 3 \\ \times & & & 6 \\ \hline & 3 & 1 & 8 \\ \hline & & {\scriptstyle 1} & \end{array}$$

c)

$$\begin{array}{cccc} & & 2 & 9 \\ \times & & & 4 \\ \hline & 1 & 1 & 6 \\ \hline & & {\scriptstyle 3} & \end{array}$$

b)

$$\begin{array}{cccc} & & 4 & 7 \\ \times & & & 3 \\ \hline & 1 & 4 & 1 \\ \hline & & {\scriptstyle 2} & \end{array}$$

d)

$$\begin{array}{cccc} & & 2 & 2 \\ \times & & & 8 \\ \hline & 1 & 7 & 6 \\ \hline & & {\scriptstyle 1} & \end{array}$$

3. a) 28 × 5 = 140
b) 37 × 4 = 148
c) 64 × 9 = 576
d) 7 × 32 = 224

4. 54 × 5 = 270
Amal travels 270 km in 5 days.
(Children may suggest an answer of 540 km if they assume he travels 54 km to work and 54 km back from work each day).

5. Explanations may vary; for example:
Lee has not correctly considered the value of each digit in his answer.
4 ones × 6 gives 24 ones = 2 tens and 4 ones.
5 tens × 6 gives 30 tens = 3 hundreds
So, the answer = 3 hundreds, 2 tens and 4 ones = 324.

$$\begin{array}{cccc} & & 5 & 4 \\ \times & & & 6 \\ \hline & & 2 & 4 \\ & 3 & 0 & 0 \\ \hline & 3 & 2 & 4 \\ \hline \end{array}$$

6. a)

$$\begin{array}{cccc} & & 5 & 7 \\ \times & & & 3 \\ \hline & 1 & 7 & 1 \\ \hline & & {\scriptstyle 2} & \end{array}$$

b)

$$\begin{array}{cccc} & & 2 & 3 \\ \times & & & 6 \\ \hline & 1 & 3 & 8 \\ \hline & & {\scriptstyle 1} & \end{array}$$

or

$$\begin{array}{cccc} & & 2 & 8 \\ \times & & & 6 \\ \hline & 1 & 6 & 8 \\ \hline & & {\scriptstyle 4} & \end{array}$$

c)

$$\begin{array}{cccc} & & 6 & 9 \\ \times & & & 7 \\ \hline & 4 & 8 & 3 \\ \hline & & {\scriptstyle 6} & \end{array}$$

Reflect

Explanations will vary; for example:
There are 4 rows of 26 on the left-hand side, with 2 sets of 10 one counters grouped to make 2 tens. In the middle these are exchanged for 2 ten counters and 10 ten counters are grouped together. On the right-hand side the group of 10 ten counters are exchanged for 1 hundred counter showing the answer of 104.

Lesson 5: Multiplying a 3-digit number by a 1-digit number

➜ pages 18–20

1.

$$\begin{array}{cccc} & 1 & 3 & 4 \\ \times & & & 2 \\ \hline & 2 & 6 & 8 \\ \hline \end{array}$$

134 × 2 = 268

2. a)

$$\begin{array}{cccc} & 2 & 1 & 3 \\ \times & & & 4 \\ \hline & 8 & 5 & 2 \\ \hline & & {\scriptstyle 1} & \end{array}$$

d)

$$\begin{array}{cccc} & 1 & 4 & 8 \\ \times & & & 3 \\ \hline & 4 & 4 & 4 \\ \hline & {\scriptstyle 1} & {\scriptstyle 2} & \end{array}$$

b)

$$\begin{array}{cccc} & 1 & 1 & 4 \\ \times & & & 5 \\ \hline & 5 & 7 & 0 \\ \hline & & {\scriptstyle 2} & \end{array}$$

e)

$$\begin{array}{ccccc} & & 2 & 5 & 2 \\ \times & & & & 7 \\ \hline & 1 & 7 & 6 & 4 \\ \hline & & {\scriptstyle 3} & {\scriptstyle 1} & \end{array}$$

c)

$$\begin{array}{cccc} & 1 & 1 & 5 \\ \times & & & 4 \\ \hline & 4 & 6 & 0 \\ \hline & & {\scriptstyle 2} & \end{array}$$

f)

$$\begin{array}{ccccc} & & 3 & 1 & 8 \\ \times & & & & 6 \\ \hline & 1 & 9 & 0 & 8 \\ \hline & & {\scriptstyle 1} & {\scriptstyle 4} & \end{array}$$

3. a) 122 × 6 = 732
b) 215 × 5 = 1,075
c) 270 × 3 = 810
d) 4 × 624 = 2,496

4. a)

$$\begin{array}{ccccc} & & 2 & 9 & 3 \\ \times & & & & 5 \\ \hline & 1 & 4 & 6 & 5 \\ \hline & & {\scriptstyle 4} & {\scriptstyle 1} & \end{array}$$

b)

$$\begin{array}{ccccc} & & 5 & 1 & 6 \\ \times & & & & 7 \\ \hline & 3 & 6 & 1 & 2 \\ \hline & & {\scriptstyle 1} & {\scriptstyle 4} & \end{array}$$

5. 8 bars of soap weigh 1,160 g.

6.

$$\begin{array}{rrrr} & 1 & 3 & 6 \\ \times & & & 7 \\ \hline & 9 & 5 & 2 \\ \hline & {\scriptstyle 2} & {\scriptstyle 4} & \end{array}$$

Explanations will vary; for example:
Alex has incorrectly multiplied 6 × 7 to get 43 (should be 42). She has put the 3 in the ones column and carried over the 4 tens. She has then multiplied 7 × 3 tens to get 21 tens but then added on the 4 tens carried over (to get 25 tens). She has written 25 in the tens column rather than exchanging 20 tens for 2 hundreds and carrying the 2 into the hundreds column.

7.

$$\begin{array}{rrrrr} & & 2 & 1 & 5 \\ \times & & & & 7 \\ \hline & 1 & 5 & 0 & 5 \\ \hline & & {\scriptstyle 1} & {\scriptstyle 3} & \end{array} \qquad \begin{array}{rrrrr} & & 5 & 1 & 2 \\ \times & & & & 7 \\ \hline & 3 & 5 & 8 & 4 \\ \hline & & & {\scriptstyle 1} & \end{array}$$

$$\begin{array}{rrrrr} & & 1 & 5 & 2 \\ \times & & & & 7 \\ \hline & 1 & 0 & 6 & 4 \\ \hline & & {\scriptstyle 3} & {\scriptstyle 1} & \end{array} \qquad \begin{array}{rrrrr} & & 2 & 5 & 1 \\ \times & & & & 7 \\ \hline & 1 & 7 & 5 & 7 \\ \hline & & {\scriptstyle 3} & & \end{array}$$

Reflect

$$\begin{array}{rrrr} & 1 & 9 & 5 \\ \times & & & 3 \\ \hline & 5 & 8 & 5 \\ \hline & {\scriptstyle 2} & {\scriptstyle 1} & \end{array}$$

Explanations will vary; for example:
Using column multiplication, multiply 5 ones × 3 to give 15 ones. Exchange 10 ones for 1 ten, write the 5 in the ones column and carry over the 1 ten. Multiply 9 tens × 3 to give 27 tens and then add on the 1 ten carried over. This gives 28 tens so 20 tens can be exchanged for 2 hundreds. Write 8 in the tens column and carry over 2 to the hundreds column. Multiply 1 hundred × 3 to give 3 hundreds and then add on the 2 hundreds carried over to give 5 and write this in the hundreds column.

Other methods could include the expanded column method:

$$\begin{array}{rrrr} & 1 & 9 & 5 \\ \times & & & 3 \\ \hline & & 1 & 5 \\ + & 2 & 7 & 0 \\ + & 3 & 0 & 0 \\ \hline & 5 & 8 & 5 \\ \hline \end{array}$$

Lesson 6: Problem solving – multiplication

→ pages 21–23

1. Emma uses 161 cm of ribbon.

2. a) Holly travels 672 km. (Children may give answer of 1,344 km if they include the return journey).
b) It costs 6,048p in total for the 3 journeys. (Children may give answer of 12,096p if they included the return journey).

3. 5 × 79 = 395; 3 × 119 = 357
395 + 357 = 752
Andy spends £7 and 52p in total.

4. The total weight of the cookies is 1,608 g.

5. Tower A: 7 × 86 cm = 602 cm
Tower B: 4 × 142 cm = 568 cm
Tower A is taller.

Reflect

Explanations will vary; for example:
The first bar model is split into 7 sections, one for each day of the week. Placing 83 in each section helps work out the total of 7 × 83 = 581.

The second bar model is split into 5 sections, one each for Monday to Friday. Placing 127 in each section helps work out the total of 5 × 127 = 635.

The difference is 635 km – 581 km = 54 km

Lesson 7: Multiplying more than two numbers (1)

→ pages 24–26

1. a) 4 × 2 × 4 = 32, 8 × 4 = 32
b) 3 × 5 × 3 = 45, 15 × 3 = 45 (numbers may be multiplied in a different order)

2. Diagram showing 2 boxes of chocolates with each box showing 12 chocolates in an array.

3. Explanations will vary. Look for children who identify in their answer that doubling or multiplying by 2 is a relatively easy multiplication, even for numbers with 2 or more digits. By multiplying 7 by 9 Aki did the harder multiplication first and then doubled it.

4. 5 × 2 × 11 = 110 (numbers may be multiplied in a different order). There are 110 candles in total.

5. a) 2 × 4 × 6 = 48
b) 80 = 8 × 5 × 2
c) 4 × 5 × 5 = 100
d) 5 × 7 × 3 = 105
e) 72 = 9 × 2 × 4
f) 9 × 2 × 8 = 144

6. a) 4 × 4 × 2 = 32
b) 2 × 7 × 5 = 70
c) 2 × 7 × 5 = 70
d) 54 = 3 × 9 × 2
e) 7 × 0 × any number = 0
f) 36 = 6 × 1 × 6

7. The answer is 0 regardless of the order.
Explanations may vary; for example:
0 × any number = 0, so there is no need to work out the product of the other numbers as multiplying by 0 will give a final product of 0 in any case.

8. There are 12 possible ways to complete the calculation using single-digit numbers:

3 × 8 × 9 = 216 | 4 × 6 × 9 = 216
3 × 9 × 8 = 216 | 4 × 9 × 6 = 216
8 × 3 × 9 = 216 | 6 × 4 × 9 = 216
8 × 9 × 3 = 216 | 6 × 9 × 4 = 216
9 × 3 × 8 = 216 | 9 × 4 × 6 = 216
9 × 8 × 3 = 216 | 9 × 6 × 4 = 216

Reflect

Different methods are possible; however the most efficient method is to work out 2 × 5 = 10 and 8 × 9 = 72 and then multiply these answers together.
2 × 8 × 5 × 9 = 10 × 72 = 720

Lesson 8: Multiplying more than two numbers (2)

➜ pages 27–29

1. 5 × 5 × 3; 5 × 5 = 25; 25 × 3 = 75 (numbers may be multiplied in a different order)
There are 75 beads in total.

2. 2 × 7 × 7 = 98 There are 98 counters in total.
First I found 7 × 7 = 49. Then I doubled 49 to get 98.

3. a) Explanations may vary, but should reference that there are 16 frames with 9 counters in each frame, organised into 2 rows of 8 frames with 9 counters in each frame. So, the total number of counters can be worked out using the calculation 16 × 9 or the calculation 2 × 8 × 9. Therefore 16 × 9 = 2 × 8 × 9.
b) There are 144 counters in total.

4. Explanations may vary, but should reference the following:
Andy is correct because the factors of 15 are 3 and 5, i.e. 15 = 5 × 3 and so 15 × 8 = 5 × 3 × 8.
Reena is correct because multiplication is commutative and so the order of the numbers does not matter, i.e. 5 × 3 × 8 = 5 × 8 × 3 = 40 × 3.

5. 35 is equal to 5 × 7
16 is equal to 2 × 8
So, I can work out 35 × 16 by 5 × 7 × 2 × 8 =
5 × 2 × 7 × 8 = 10 × 56 = 560

6. a) 3,600
b) 6 × 2 × 3 × 5 × 4 × 5 = 12 × 15 × 20 because
6 × 2 = 12, 3 × 5 = 15, 4 × 5 = 20

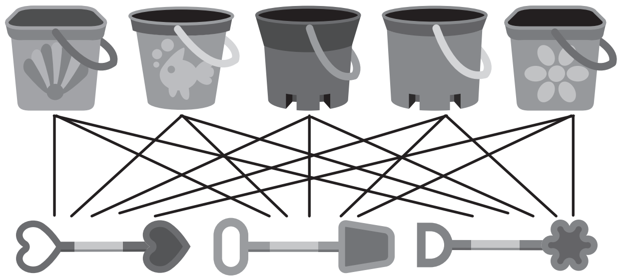
Reflect

Explanations may vary; for example:
Multiplication is commutative which means that the order in which you multiply the numbers does not matter, since 3 × 4 = 4 × 3, then 3 × 4 × 6 = 4 × 3 × 6.

Lesson 9: Problem solving – mixed correspondence problems

➜ pages 30–32

1. a)



Children should draw lines joining the buckets and spades.
There are 15 different ways to choose a bucket and a spade.
b) 5 × 3 = 15

2. 7 × 5 = 35 Andy has 5 T-shirts.

3. 5 × 2 = 10, so there are 10 possible choices. The ten possible totals are:
2p + £1 = £1 and 2 pence; 2p + £2 = £2 and 2 pence;
5p + £1 = £1 and 5 pence; 5p + £2 = £2 and 5 pence;
10p + £1 = £1 and 10 pence; 10p + £2 = £2 and 10 pence;
20p + £1 = £1 and 20 pence; 20p + £2 = £2 and 20 pence;
50p + £1 = £1 and 50 pence; 50p + £2 = £2 and 50 pence

4. a) Possible 2-digit numbers:
12, 13, 14, 15, 16,
21, 23, 24, 25, 26,
31, 32, 34, 35, 36,
41, 42, 43, 45, 46,
51, 52, 53, 54, 56,
61, 62, 63, 64, 65
b) 6 × 5 = 30
30 different 2-digit numbers can be made.

5. There are 15 different pairs of snack that Reena can buy (see shaded cells in table below, where letters A-F each represent a different snack in the vending machine).

	A	B	C	D	E	F
A						
B						
C						
D						
E						
F						

For her first choice, Reena has 6 different snacks to pick from. She then has 5 snacks to pick from for her second choice. This gives 6 × 5 = 30 possibilities. However this set of 30 possibilities includes each pair of snacks twice as it counts choosing snack A then snack B and choosing snack B then snack A. So, there are 30 ÷ 2 = 15 distinct pairs of snacks.

Reflect

Explanations may vary, but should reference the following:
Each shirt can be matched with 3 ties. There are 5 shirts, so 5 × 3 = 15, meaning there are 15 different ways of choosing one shirt and one tie.

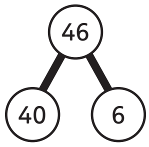
Lesson 10: Dividing a 2-digit number by a 1-digit number (1)

→ pages 33–35

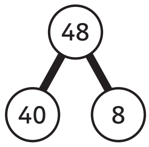
1. a) 22 There are 22 cakes on each plate.
b) 11; 60 ÷ 6 = 10, 6 ÷ 6 = 1

2. a) 64 ÷ 2 = 32; 60 ÷ 2 = 30; 4 ÷ 2 = 2
b) 69 ÷ 3 = 23; 60 ÷ 3 = 20; 9 ÷ 3 = 3

3. a) 46 ÷ 2 = 23;



b) 48 ÷ 4 = 12;



c) 77 ÷ 7 = 11
d) 93 ÷ 3 = 31

4. Explanations may vary; for example:
Lexi is correct in saying that 8 ÷ 4 = 2 and 4 ÷ 4 = 1, but she is working out 84 ÷ 4 and needs to remember that the 8 represents 8 tens and that dividing this by 4 gives 2 tens, i.e. 80 ÷ 4 = 20 and 4 ÷ 4 = 1, so 84 ÷ 4 = 20 + 1 = 21.

5. a) 10; 11; 12; 13
b) 21; 22; 23; 24

6. Explanations may vary, but should reference that both are correct. Jamilla is using halving and Olivia is using multiplication facts. 68 = 60 + 8 and so halving gives 30 (3 tens) + 4 = 34. 30 × 2 = 60 and 4 × 2 = 8 so 34 × 2 = 68.

7. Explanations may vary; for example:
Dividing the same number (48) into a larger number of groups will give a smaller answer.
48 ÷ 4 = 12, 48 ÷ 2 = 24

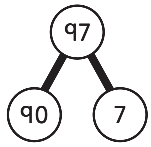
Reflect

Methods will vary; for example:
26 is 20 + 6. Half of 20 is 10 and half of 6 is 3. Adding these together gives 13. This could be shown with a part-whole model or counters in a diagram.

Lesson 11: Division with remainders

→ pages 36–38

1. a) 20 ÷ 2 = 10, 9 ÷ 2 = 4 remainder 1,
29 ÷ 2 = 14 remainder 1
b)



90 ÷ 3 = 30, 7 ÷ 3 = 2 remainder 1,
97 ÷ 3 = 32 remainder 1

2. The number in the picture has 4 tens and 5 ones. The picture shows 45 ÷ 2 = 22 remainder 1.

3. a) 10 r 1 c) 20 r 2
b) 11 r 4 d) 22 r 1

4. Explanations may vary, for example:
No, Luis is not correct. He has divided the 6 tens into 3, rather than 2. Also he has a remainder of 3, which can be divided by 2. 63 ÷ 2 = 31 r 1.

5. There are many possible answers; for example:
13 ÷ 2 = 6 r 1; 97 ÷ 2 = 48 r 1; 25 ÷ 3 = 8 r 1;
64 ÷ 7 = 9 r 1

Reflect

87 is an odd number and so is not divisible by 4, so there will be a remainder. Pictures could include a part-whole model showing 87 split into 80 and 7 (other combinations possible) or counters. 87 ÷ 4 = 21 r 3

Lesson 12: Dividing a 2-digit number by a 1-digit number (2)

→ pages 39–41

1. 20 ÷ 2 = 10; 18 ÷ 2 = 9; 10 + 9 = 19.
So, 38 ÷ 2 = 19
They each get 19 cakes.

2. a) 14 c) 24
b) 15 d) 38

3. a) 58 ÷ 2 = 29, different partitions possible, for example: 50 and 8 or 40 and 18
b) 65 ÷ 5 = 13, different partitions possible, for example: 60 and 5 or 50 and 15

4. a) 16 c) 13
b) 23 d) 17

5. Tilly needs 25 plant pots.

6. 95 ÷ 5 is greater.
54 = 30 + 24, so 54 ÷ 3 = 10 + 8 = 18.
95 = 50 + 45, so 95 ÷ 5 = 10 + 9 = 19.

7. 48 ÷ 6 = 8; 48 ÷ 3 = 16; 48 ÷ 2 = 24 (accept 48 ÷ 1 = 48)

Reflect

Explanations will vary; for example:
No, neither 40 nor 17 are divisible by 3. When partitioning it is useful to partition into numbers that are divisible by the divisor. Here it would be more helpful to partition 57 into 30 and 27 which are both divisible by 3.

Lesson 13: Dividing a 2-digit number by a 1-digit number (3)

→ pages 42–44

1. 30 ÷ 3 = 10; 16 ÷ 3 = 5 r 1; So, 46 ÷ 3 = 15 r 1
Each guinea pig gets 15 peas and there is 1 pea left over.

2. a) 50 ÷ 5 = 10
17 ÷ 5 = 3 r 2
So, 67 ÷ 5 = 13 r 2

b) 50 ÷ 5 = 10
15 ÷ 5 = 3
So, 67 ÷ 5 = 13 r 2

3. a) 23 r 1
b) 13 r 1
c) 16 r 2
d) 14 r 2

4. a) 33 r 1
b) 22 r 1
c) 16 r 3
d) 13 r 2
e) 11 r 1

5. 16 chocolate bars are needed (76 ÷ 5 = 15 r 1, so 16 bars are needed and 4 pieces will be left over).

6. Yes. There are many possible answers: 21, 51, 81, 111, 141, 171, 201, 231, … (adding 30 each time).

Reflect

Explanations will vary; for example:
It is not possible to divide 7 by 4 without a remainder (no odd numbers are divisible by 4). The greatest possible remainder, when dividing by 4, is 3.

Lesson 14: Dividing a 3-digit number by a 1-digit number

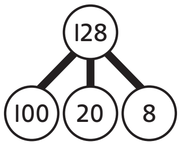
→ pages 45–47

1. a) 100 ÷ 2 = 50   80 ÷ 2 = 40
8 ÷ 2 = 4
50 + 40 + 4 = 94
So, 188 ÷ 2 = 94

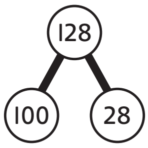
b) 180 ÷ 3 = 60   9 ÷ 3 = 3
60 + 3 = 63
So, 189 ÷ 3 = 63

c) 150 ÷ 5 = 30   45 ÷ 5 = 9
30 + 9 = 39
So, 195 ÷ 5 = 39

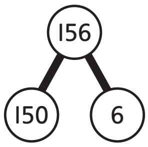
d) 250 ÷ 5 = 50   25 ÷ 5 = 5
50 + 5 = 55
So, 275 ÷ 5 = 55

2. a)


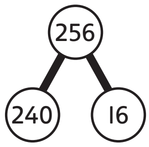
128 ÷ 2 = 64

b)


128 ÷ 2 = 64

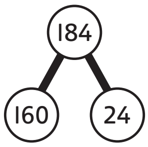
c)


156 ÷ 3 = 52

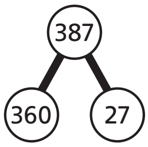
d)


256 ÷ 4 = 64

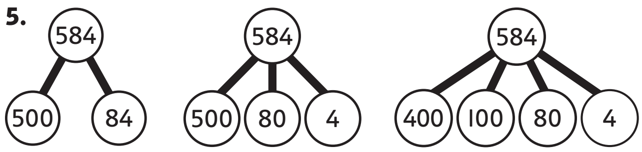
3. a) 37
b) 44
c) 156
d) 124

4. a)


184 ÷ 4 = 46

b)


360 ÷ 9 = 40 and 27 ÷ 9 = 3;
387 ÷ 9 = 43

5.


(or acceptable alternative)

Reflect

Methods may vary; for example:
Use a part-whole model to split 172 into 160 and 12. Then divide 160 by 4 to give 40 and 12 by 4 to give 3. 40 + 3 = 43 so 172 ÷ 4 = 43. This method works since 172 is split into numbers that are easily divisible by 4 (different answers and partitions possible).

Lesson 15: Problem solving – division

→ pages 48–50

1. 96 ÷ 2 = 48   Each class gets 48 pens.

2. 57 ÷ 3 = 19   They each get £19.

3. 44 ÷ 5 = 8 r 4   9 benches are needed.

4. True. 77 ÷ 2 = 38 r 1; 49 ÷ 4 = 12 r 1. The remainder is 1 in both cases.

5. Different answers possible, for example: 35 ÷ 4 = 8 r 3, 43 ÷ 5 = 8 r 3, 51 ÷ 6 = 8 r 3, 83 ÷ 10 = 8 r 3

6. No, the remaining children cannot stand in pairs. 7 × 5 = 35 and 58 – 35 = 23. There is an odd number of children remaining (23); this is not divisible by 2.

Reflect

Explanations may vary; for example:
If a number ends in a 0 or a 5 it is divisible by 5, so any number that does not end in a 0 or a 5 will have a remainder. For a number to be divisible by 3 it must be in the 3 times-table or can be partitioned into numbers that are divisible by 3.

End of unit check

→ pages 51–53

My journal

1.

$$\begin{array}{rccc} & & 4 & 5 \\ \times & & & 7 \\ \hline & 3 & 1 & 5 \\ \hline & & {}_{3} & \end{array} \qquad \begin{array}{rccc} & 1 & 3 & 2 \\ \times & & & 6 \\ \hline & 7 & 9 & 2 \\ \hline & {}_{1} & {}_{1} & \end{array}$$

78 can be partitioned into 60 and 18, 60 ÷ 6 = 10, 18 ÷ 6 = 3, 68 ÷ 6 = 13 (other partitions possible).
94 can be partitioned into 50 and 44, 50 ÷ 5 = 10, 44 ÷ 5 = 8 r 4, 94 ÷ 5 = 18 r 4 (other partitions possible).

2. The answers are the same (126 × 3 = 378) whichever method is used. On the left-hand side there is the expanded method for column multiplication whereas on the right-hand side they have carried over the tens.

Power puzzle

1.

Number divided by	2	3	4	5	6	7	8
Remainder	1	1	1	4	1	0	1

2.

Number divided by	2	3	4	5	6	7	8
Remainder	0	2	2	0	2	1	2

3.

Number divided by	2	3	4	5	6	7	8
Remainder	1	0	3	1	3	2	3

4. When dividing by 2 there is a remainder for odd numbers but no remainder for even numbers.
The remainders increase by 1 as the numbers increase (i.e. from 48 to 49 to 50 to 51) until a number divisible by that number is reached and then the remainder is 0.

5. This must be an odd number because it leaves a remainder of 1 when divided by 2. It is divisible by 3. It ends in either a 2 or a 7 (because it has a remainder of 2 when divided by 5). However, if it ends in a 2 it is even and so this is not possible. It must end in a 7. One number that ends in a 7 and is divisible by 3 is 27. Now, checking the other remainders:
27 ÷ 4 = 6 r 3
27 ÷ 5 = 5 r 2
27 ÷ 6 = 4 r 3
27 ÷ 7 = 3 r 6
27 ÷ 8 = 3 r 3

So, 27 is an answer. Other answers are possible, for example: 867; 1,707; … (adding 840 each time).

Unit 7: Measure – area

Lesson 1: What is area?

➜ pages 54–56

1. a) Answers will depend on the size of counters.
   b) This is its area.
2. a) The area of this quadrilateral is 9 dominoes.
   b) The area of this triangle is 15 buttons.
3. a) Area is the word used to describe the space inside a 2D shape.
   b) The space inside each shape should be shaded.
4. Boxes for a), b) and d) ticked (accept other answers with reasoning; for example, a child may argue that a) does not properly show area as the space taken up by each child will be different).
5. Explanations will vary, but should reference the following:
   All playing cards cover the same space but coins of different value cover different space so are not good objects to measure area.
6. This is sometimes true. It depends on the shape and its size.

Reflect

The area will vary depending on the item chosen. Explanations of how to measure area may vary; for example: The area can be measured by counting how many counters it takes to cover it.

Lesson 2: Counting squares (1)

➜ pages 57–59

1. A ➜ Area = 8 squares
   B ➜ Area = 3 squares
   C ➜ Area = 6 squares
   D ➜ Area = 5 squares
   E ➜ Area = 7 squares
2. a)

Shape	Area (squares)
A	5
B	4
C	9
D	6
E	9

   b) Shapes C and E have the same area.
3. The area of the piece of paper is 8 squares.
4. He has not fitted the shapes together exactly so the squares do not completely fill the space.
5. T A B L E T O P

6. a) 1, 4, 9, 16
   b) 25, 36, 49
   Each shape is a square and so has equal sides.
   The sequence is the square numbers i.e. 1 × 1 = 1, 2 × 2 = 4, 3 × 3 = 9, 4 × 4 = 16, 5 × 5 = 25, 6 × 6 = 36, 7 × 7 = 49 …

Reflect

Explanations may vary; for example:
The area is the space a shape takes up and is measured in squares. The area of a shape can be found by counting the number of squares that can fit in it.

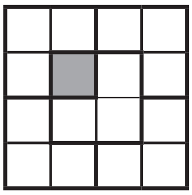
Lesson 3: Counting squares (2)

➜ pages 60–62

1. a)

Object	Area (squares)
Desk	10
Chair	5
Wardrobe	18
Mat	10
Bookshelf	7
Bed	32
Answers will vary	Answers will vary

   b) Answers will vary depending on object.
2. Rectangle A has an area of 18 squares.
   Rectangle B has an area of 10 squares.
   Area of A + B = 18 squares + 10 squares = 28 squares.
   The whole shape has an area of 28 squares.
3. Answers will vary depending on rectangles drawn.
   Total area will be a multiple of 3.
4. 20 squares
5. Different answers possible. Each field should have an area of 3 squares; for example:



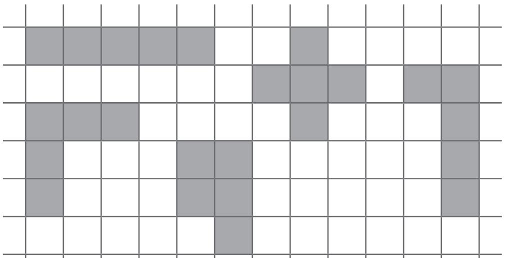
Reflect

Methods may vary; for example:
Line up the sides of the shape with the edges of the squares as much as possible. Draw around the cardboard shape and then count the number of squares within the shape outline.

Lesson 4: Making shapes

➜ pages 63–65

1. Answers will vary. Children should draw five rectilinear shapes with an area of 5 squares, for example:



2. Answers will vary. Children should draw two rectilinear shapes with an area of 6 squares.

3. Ticked: 1st shape (made from four 2×2 concrete slabs) and 2nd shape (made from four 1×1 concrete slabs).

4. a) The 1st and 3rd shapes and the 2nd, 4th and 5th shapes are the same. They have included shapes which are reflections and rotations of each other.
b) They could try turning the page to view shapes from different positions or cut the shapes out of paper to see if they fit into the area of another shape.

5. Answers will vary depending on letters and how they are drawn. Children should work out the area of letters in their name.

Reflect

Descriptions may vary; for example:

1. Make a chain of the squares.

2. Then move only 1 of the squares to begin with.

3. Then move 2 of the squares at a time, repeating with an extra square each time while checking for reflections and rotations.

Lesson 5: Comparing area

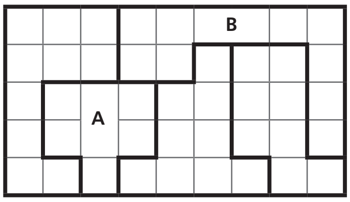
➜ pages 66–68

1. a) Answers will vary.
b)

Player	Area of shape
Abdul	52
Bryony	38
Chloe	50

c) Abdul has won since he has made the shape with the largest area.

2. a) and b)



c) The area of the whole board is 45 squares.

3. a) 5 squares and 4 squares; shape on the left coloured
b) 3 squares and 1 square; shape on the left coloured
c) 9 squares and 10 squares; shape on the right coloured
d) 7 squares and 7 squares; neither shape coloured (same size)

4. Sometimes true; the area of the shape depends not only on its height and width but also on its shape.

Reflect

Methods may vary; for example:
To compare the areas of two shapes, I would count the number of squares inside each shape to find out which one had the larger area.

End of unit check

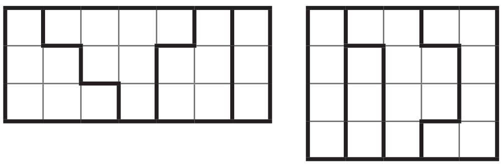
➜ pages 69–70

My journal

Shapes will vary but are likely to be rectangles with areas of 12 squares, i.e. 1×12, 2×6 and 3×4. Look for children deciding on the measurements for their shapes by finding factors of 12 (1, 2, 3, 4, 6, 12) demonstrating understanding of the link between area and multiplication.

Power play

a)



Students could add together the number of squares of all the pieces to find the area of the two rectangles then see how this area can be divided into 2 to give the size of the two rectangles.

b) The areas of the chocolate bars are 20 squares and 21 squares.

c) Answers will vary but look for answers explaining that the longer, narrower bar has an area of 21 squares and so is bigger than the area of the other rectangle which is 20 squares. Therefore, they would likely choose the bigger bar of chocolate!

Unit 8: Fractions (I)

Lesson I: Tenths and hundredths (I)

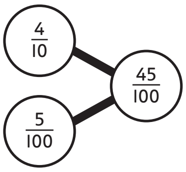
➜ pages 71–73

1. a) 9 tenths are shaded. $\frac{9}{10}$ are shaded.
   b) 83 hundredths are shaded. $\frac{83}{100}$ are shaded.
   c) 7 tenths are shaded.
   d) 3 tenths are shaded. $\frac{3}{10}$ are shaded.
   e) 65 hundredths are shaded. $\frac{65}{100}$ are shaded.

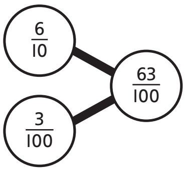
2. a) 7 squares shaded on the tenths grid; 70 squares shaded on the hundredths grid.
   b) 31 squares shaded on the hundredths grid. $\frac{69}{100}$ are not shaded.

3. Explanations will vary; for example:
Andy is correct because 96 squares are shaded on the hundredths grid and each square is $\frac{1}{100}$.
Bella is correct because $\frac{9}{10} + \frac{6}{100} = \frac{90}{100} + \frac{6}{100} = \frac{96}{100}$.
Emma is correct because $\frac{8}{10} + \frac{16}{100} = \frac{80}{100} + \frac{16}{100} = \frac{96}{100}$.

4. There are 4 tenths and 5 hundredths.
$\frac{4}{10} + \frac{5}{100} = \frac{45}{100}$



There 6 tenths and 3 hundredths.
$\frac{6}{10} + \frac{3}{100} = \frac{63}{100}$



Reflect

Methods may vary; for example:
Divide the square piece of paper into one hundred smaller squares. Shading 10 squares would give a tenth and shading 1 square would equal a hundredth.

Lesson 2: Tenths and hundredths (2)

➜ pages 74–76

1. $\frac{3}{10}, \frac{4}{10}, \frac{5}{10}, \frac{6}{10}, \frac{8}{10}, \frac{9}{10}$

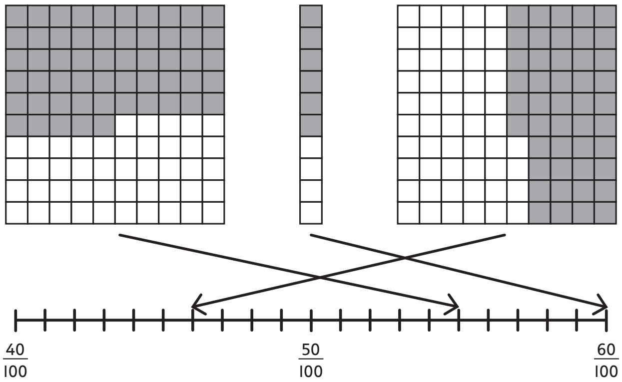
2. a) The fraction shown is 61 hundredths or $\frac{61}{100}$.
   b) The fraction shown is 9 tenths or $\frac{9}{10}$.
   c) The fraction shown is $\frac{99}{100}$.

3. Answers will vary; for example:
It is the same because $\frac{30}{100}$ on the hundredths grid is 3 columns of 10 small squares, this is equivalent to shading 3 columns on the tenths grid (i.e. $\frac{3}{10}$), so $\frac{3}{10} = \frac{30}{100}$.

4. a) $\frac{7}{10} = \frac{70}{100}$ c) $\frac{1}{10} = \frac{10}{100}$
   b) $\frac{5}{10} = \frac{50}{100}$ d) $\frac{9}{10} = \frac{90}{100}$

5. a) $\frac{32}{100} = \frac{3}{10} + \frac{2}{100}$ b) $\frac{87}{100} = \frac{8}{10} + \frac{7}{100}$

6. $\frac{55}{100}$ ➜ 5 marks to the right of $\frac{50}{100}$
$\frac{6}{10}$ ➜ $\frac{60}{100}$
$\frac{46}{100}$ ➜ 6 marks to the right of $\frac{40}{100}$



Reflect

Explanations may vary; for example:
No. Although 5 squares are shaded in both diagrams, the grids are different. The diagram on the left shows $\frac{5}{10}$ and the diagram on the right shows $\frac{5}{100}$.

Lesson 3: Equivalent fractions (I)

➜ pages 77–79

1. a) $\frac{2}{3} = \frac{4}{6}$
   b) $\frac{6}{8} = \frac{3}{4}$
   c) $\frac{5}{10} = \frac{4}{8} = \frac{6}{12}$

2. a) $\frac{5}{8}$ is not equal to $\frac{1}{2}$.
   b) $\frac{3}{6}$ is not equal to $\frac{3}{9}$.
   c) $\frac{4}{8}$ is not equal to $\frac{1}{4}$.
   d) $\frac{4}{6}$ is equal to $\frac{6}{9}$.
   e) $\frac{4}{4}$ is equal to $\frac{9}{9}$.

3. a) Top strip with $\frac{1}{3}$ shaded (1 section) and bottom strip with $\frac{3}{9}$ (3 sections) shaded.
   b) Top strip with $\frac{2}{5}$ (2 sections) shaded and bottom strip with $\frac{4}{10}$ (4 sections) shaded.
   c) Top strip with $\frac{1}{4}$ (1 section) shaded, middle strip with $\frac{2}{8}$ (2 sections) shaded and bottom strip with $\frac{3}{12}$ (3 sections) shaded.

4. Lee is incorrect. Explanations may vary; for example:
Lee's strip is divided into 4 sections (quarters) and Zac's strip is divided into 8 sections (eighths). So Lee's fraction strip shows $\frac{3}{4}$ and Zac's shows $\frac{3}{8}$ and $\frac{3}{4} > \frac{3}{8}$.

Reflect

Explanations will vary; for example:
Each strip on a fraction wall shows one whole divided into different fractions. Equivalent fractions will line up on the fraction wall.

Lesson 4: Equivalent fractions (2)

➜ pages 80–82

1. a) $\frac{1}{2} = \frac{3}{6}$
b) 8 sections of right-hand diagram shaded; $\frac{4}{5} = \frac{8}{10}$
c) 2 sections of right-hand diagram shaded; $\frac{1}{4} = \frac{2}{8}$
d) Answers will vary but fractions should be equivalent to $\frac{2}{3}$; $\frac{10}{15} = \frac{2}{3}$

2. a) $\frac{1}{2} = \frac{4}{8}$
b) $\frac{3}{4} = \frac{15}{20}$
c) $\frac{3}{5} = \frac{9}{15}$
d) $\frac{1}{6} = \frac{4}{24}$
e) $\frac{2}{7} = \frac{6}{21}$
f) Answers will vary but fractions should be equivalent to $\frac{5}{6}$.

3. Lines drawn to connect equivalent fractions: $\frac{1}{5} = \frac{4}{20}$
$\frac{2}{3} = \frac{4}{6}$
$\frac{10}{20} = \frac{1}{2}$
$\frac{5}{6} = \frac{10}{12}$
$\frac{2}{9} = \frac{6}{27}$
$\frac{11}{12} = \frac{55}{60}$

4. a) Answers will vary but left-hand numerator should be 9 × right-hand numerator each time; for example:
$\frac{9}{45} = \frac{1}{5}$, $\frac{18}{45} = \frac{2}{5}$, $\frac{27}{45} = \frac{3}{5}$
b) Answers will vary but right-hand denominator should be 3 × left-hand denominator each time; for example:
$\frac{6}{8} = \frac{18}{24}$, $\frac{6}{9} = \frac{18}{27}$, $\frac{6}{10} = \frac{18}{30}$

5. a) Answers will vary; for example: $\frac{5}{6} = \frac{10}{12} = \frac{15}{18} = \frac{20}{24}$
b) Answers will vary; for example: $\frac{10}{10} = \frac{20}{20} = \frac{30}{30} = \frac{40}{40}$
c) Answers will vary; for example: $\frac{1}{8} = \frac{2}{16} = \frac{3}{24} = \frac{4}{32}$

6. Explanations will vary; for example:
12 and 20 are both divisible by 4 so $\frac{12}{20} = \frac{3}{5}$. Multiplying both the numerator and the denominator by 3 gives $\frac{9}{15}$. So $\frac{12}{20} = \frac{9}{15}$, i.e. they are equivalent.

Reflect

Methods will vary; for example:
Multiplying the numerator and denominator by the same number will give equivalent fractions or you can use a fraction wall to find fractions that line up.

Lesson 5: Simplifying fractions

➜ pages 83–85

1. a) $\frac{2}{10} = \frac{1}{5}$
b) Dividing the numerator and denominator by 5;
$\frac{5}{10} = \frac{1}{2}$

2. a) $\frac{6}{9} = \frac{2}{3}$ b) $\frac{10}{12} = \frac{5}{6}$

3. Lines drawn to match the diagrams with the fractions:
Top diagram ➜ $\frac{3}{4}$
Middle diagram ➜ $\frac{1}{2}$
Bottom diagram ➜ $\frac{4}{5}$

4. Richard ate $\frac{8}{20}$, Zac ate $\frac{3}{5} = \frac{12}{20}$ and Ambika ate $\frac{8}{10} = \frac{16}{20}$.
Richard ate the least amount of chocolate.

5. a) Divide numerator and denominator by 6 (giving $\frac{2}{5}$).
b) Divide numerator and denominator by 8 (giving $\frac{1}{4}$).
c) Divide numerator and denominator by 18 (giving $\frac{1}{2}$).

6. No, Lee is incorrect. The numerator and denominator are both divisible by 3 and so can be simplified further, i.e. $\frac{3}{9} = \frac{1}{3}$.

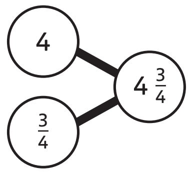
Reflect

Explanations may vary, but should reference that a fraction is in its simplest form when there is no number (other than 1) that will divide into both the numerator and the denominator.

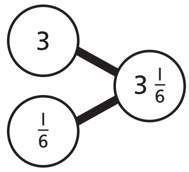
Lesson 6: Fractions greater than 1 (1)

➜ pages 86–88

1. a) There are 4 wholes and $\frac{3}{4}$ or $4\frac{3}{4}$ circles.



b) There are 3 wholes and $\frac{1}{6}$ or $3\frac{1}{6}$ hexagons.

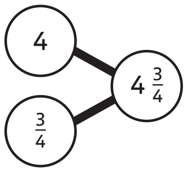


2. There are 2 wholes and $\frac{5}{8}$ or $2\frac{5}{8}$ rectangles shaded.

3. a) 1 whole rectangle shaded and 3 columns shaded on other rectangle.
b) 3 wholes circles shaded with 3 segments shaded on final circle.

4. a) 14
b) 2, 2
c) $2\frac{2}{6}$
d) 13
e) 2, 1
f) $2\frac{1}{6}$

5. Answers will vary; for example:



Reflect

Answers will vary and could include a part-whole model splitting $2\frac{3}{4}$, fraction strips or shapes showing $2\frac{3}{4}$.

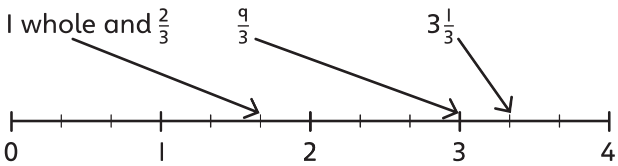
Lesson 7: Fractions greater than I (2)

→ pages 89–91

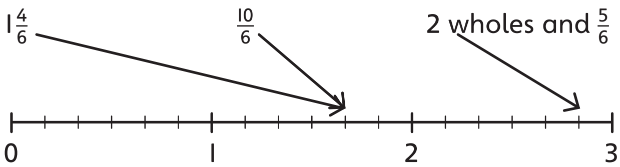
1. a) 1 whole box is used.
b) $\frac{5}{8}$ of a box is used.

2. a) $\frac{9}{4}$ (or $2\frac{1}{4}$) b) $\frac{16}{9}$ (or $1\frac{7}{9}$)

3. a)



b)



4. a) 2 wholes and $\frac{2}{5} = \frac{12}{5}$
b) $\frac{9}{6}$ = 1 whole and $\frac{3}{6} = 1\frac{3}{6}$

5. $\frac{10}{3}$, 3 wholes and $\frac{1}{3} = 3\frac{1}{3}$

6. Yes, the arrow is pointing to $1\frac{1}{2}$. Explanations may vary; for example: the line shows $\frac{12}{8}$ which written as a mixed number is $1\frac{4}{8}$ which simplifies to $1\frac{1}{2}$.

Reflect

Fractions greater than 1 can be written as mixed numbers or improper fractions. A mixed number has whole numbers and parts, and improper fractions have numerators that are larger than the denominators.

Answers will vary as to which children prefer.

End of unit check

→ pages 92–93

My journal

$\frac{3}{12}$ simplifies to $\frac{1}{4}$; fractions that are equivalent to $\frac{1}{4}$ include $\frac{2}{8}$, $\frac{4}{16}$, $\frac{5}{20}$ (other answers possible)

$\frac{6}{18}$ simplifies to $\frac{1}{3}$; fractions that are equivalent to $\frac{1}{3}$ include $\frac{2}{6}$, $\frac{3}{9}$, $\frac{4}{12}$ (other answers possible)

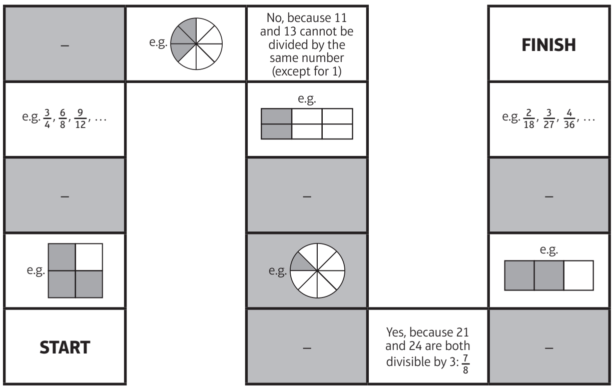
$\frac{11}{20}$ cannot be simplified; fractions that are equivalent to $\frac{11}{20}$ include $\frac{22}{40}$, $\frac{33}{60}$, $\frac{44}{80}$ (other answers possible)

Explanations will vary but should show that children know when a fraction cannot be further simplified.

Power play

Children may choose to use a number line, hundredths grid or shapes to help them with the game.

Answers will vary; for example:



Unit 9: Fractions (2)

Lesson 1: Adding fractions

→ pages 94–96

1. $\frac{4}{5} + \frac{2}{5} = 1\frac{1}{5}$. Tino eats $1\frac{1}{5}$ bales of hay.

2. $\frac{7}{9} + \frac{5}{9} = \frac{12}{9}$. Alexis runs $\frac{12}{9}$ km in total.

3. a) $\frac{6}{4}$ c) $\frac{16}{12}$ e) $\frac{9}{5}$

b) $\frac{6}{5}$ d) $\frac{13}{10}$ f) $\frac{13}{9}$

4. Calculations matched to answers:

$\frac{6}{7} + \frac{3}{7} = 1\frac{2}{7}$

$\frac{5}{7} + \frac{1}{7} + \frac{6}{7} = \frac{12}{7}$

$\frac{3}{7} + \frac{4}{7} = 1$

$\frac{6}{7} + \frac{5}{7} = \frac{11}{7}$

5. a) Fred has added the numerators together and then the denominators together, rather than adding just the numerators and leaving the denominator the same.

b) $\frac{10}{8}$ (children may write this as $\frac{5}{4}$ or $1\frac{2}{8}$ or $1\frac{1}{4}$)

6. Missing numbers:

a) 3, 3, 4

b) 6, 4, 5

c) Different answers are possible; for example:

$\frac{15}{8} = \frac{3}{8} + \frac{6}{8} + \frac{6}{8}$ (missing numerators total 12)

$\frac{15}{8} = \frac{4}{8} + \frac{5}{8} + \frac{6}{8}$ (missing numerators total 11)

$\frac{15}{8} = \frac{5}{8} + \frac{5}{8} + \frac{5}{8}$ (missing numerators total 10)

$\frac{15}{8} = \frac{6}{8} + \frac{5}{8} + \frac{4}{8}$ (missing numerators total 9)

Reflect

Diagrams may vary; for example, children may draw a number line marked in fifths and count on $\frac{4}{5}$ from $\frac{4}{5}$. Alternatively, children may draw two shapes divided into fifths with $\frac{4}{5}$ of each shaded.

Lesson 2: Subtracting fractions (1)

→ pages 97–99

1. $2\frac{7}{10} - \frac{9}{10} = 1\frac{8}{10}$ Rusty ate $1\frac{8}{10}$ kg this week.

2. $3\frac{1}{5} - \frac{4}{5} = \frac{12}{5}$ (or $2\frac{2}{5}$)

3. a) $1\frac{4}{8}$ b) $2\frac{5}{9}$ c) $1\frac{8}{11}$

4. a) 3 b) $\frac{1}{7}$

5. a) $1\frac{3}{5}$ d) $2\frac{5}{8}$

b) $2\frac{2}{3}$ e) $6\frac{6}{12}$

c) $\frac{6}{8}$ f) $5\frac{1}{8} - \frac{5}{8} = 4\frac{4}{8}$

g) Answers may vary; for example: $3\frac{1}{6} - \frac{7}{6} = 2$

h) $4\frac{2}{10}$ i) $\frac{3}{5}$

6. $4\frac{2}{9}$ m

Reflect

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

Diagrams may vary; for example, children may draw a fraction strip showing $2\frac{1}{5}$ with $\frac{3}{5}$ crossed out.

Lesson 3: Subtracting fractions (2)

→ pages 100–102

1. $2 - \frac{3}{8} = 1\frac{8}{8} - \frac{3}{8} = 1\frac{5}{8}$. Amelia has $1\frac{5}{8}$ cake left.

2. a) $3 - \frac{1}{5} = 2\frac{4}{5}$ d) $3 - \frac{4}{5} = 2\frac{1}{5}$

b) $3 - \frac{2}{5} = 2\frac{3}{5}$ e) $3 - \frac{5}{5} = 2\frac{0}{5}$

c) $3 - \frac{3}{5} = 2\frac{2}{5}$

3. a) $2\frac{3}{7}$

b) Explanations may vary; for example:
Mary has worked out the answer to $\frac{5}{7} - \frac{2}{7}$, not $5 - \frac{2}{7}$.
The correct answer is $5 - \frac{2}{7} = 4\frac{7}{7} - \frac{2}{7} = 4\frac{5}{7}$

4. a) $3\frac{3}{9}, 3\frac{2}{9}, 3\frac{1}{9}$ c) $9\frac{1}{3}, 7\frac{1}{3}, 5\frac{1}{3}$

b) $4\frac{3}{9}, 4\frac{2}{9}, 4\frac{1}{9}$ d) $5\frac{1}{4}, 5\frac{1}{5}, 5\frac{1}{10}$

5. a) $\frac{4}{7}$ c) $15\frac{7}{9}$ e) 5

b) $\frac{2}{3}$ d) $\frac{2}{3}$ f) 10

6. Explanations may vary; for example:
No, after 60 mins Jen will have run
$\frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} = \frac{30}{8} = 3\frac{6}{8}$ km.

Reflect

No, the calculation is not correct. $4 - \frac{3}{4} = 3\frac{1}{4}$. Diagrams may vary; for example, children could draw 4 circles divided into quarters; subtracting 3 quarters leaves 3 wholes and 1 quarter.

Lesson 4: Problem solving – adding and subtracting fractions (1)

→ pages 103–105

1 a) $3 - \frac{5}{7} = 2\frac{7}{7} - \frac{5}{7} = 2\frac{2}{7}$
There is $2\frac{2}{7}$ kg of flour left in the cupboard.

b) $\frac{5}{7} + \frac{6}{7} = \frac{11}{7}$ Tulpesh uses $1\frac{4}{7}$ kg of flour.

c) $2\frac{2}{7}$ kg of flour is used in total.

2. The farmer ploughed $1\frac{2}{7}$ acres of his field in total.

3. $\frac{9}{17}$ of the juice is remaining.

4. There are many possible ways; for example: $\frac{3}{8} + \frac{9}{8} - \frac{5}{8} = \frac{7}{8}$

5. $\frac{4}{7}$ kg of strawberries were left.

Reflect

Many different answers are possible. Encourage children to demonstrate an understanding of adding or subtracting fractions using common denominators. They should be able to fluently convert whole numbers to fractions and vice versa as necessary.

Lesson 5: Problem solving – adding and subtracting fractions (2)

➜ pages 106–108

1. $\frac{12}{8}$ of the Spanish omelettes have been eaten in total.
2. Missing numbers:
   a) 2 d) 2 f) 3
   b) 4 e) 3 g) 2
   c) 5
   h) The possible calculations are: $\frac{1}{5}+\frac{1}{5}+\frac{5}{5}$; $\frac{1}{5}+\frac{2}{5}+\frac{4}{5}$; $\frac{1}{5}+\frac{3}{5}+\frac{3}{5}$; $\frac{2}{5}+\frac{2}{5}+\frac{3}{5}$ (together with variations where fractions are written in a different order).
3. Missing numbers:
   a) 4 b) 10 c) 2
4. Explanations may vary but should reference the following:
   $\frac{3}{8}+\frac{7}{8}+\frac{7}{8}=\frac{17}{8}=\frac{8}{8}+\frac{8}{8}+\frac{1}{8}=2\frac{1}{8}$. Two full jars with $\frac{1}{8}$ left over.
5. Florence runs $2\frac{1}{4}$ km more than Kofi.
6. a) $\frac{3}{6}+\frac{2}{5}+\frac{3}{6}+\frac{3}{5}=\frac{3}{6}+\frac{3}{6}+\frac{2}{5}+\frac{3}{5}=1+1=2$
   b) $\frac{4}{7}+\frac{3}{8}+\frac{5}{8}+\frac{3}{7}=\frac{4}{7}+\frac{3}{7}+\frac{3}{8}+\frac{5}{8}=1+1=2$
   c) $\frac{4}{5}+\frac{1}{5}-\frac{2}{3}=1-\frac{2}{3}=\frac{1}{3}$

Reflect

Many different calculations are possible; for example:
$1+\frac{7}{10}=\frac{10}{10}+\frac{7}{10}=\frac{17}{10}$
Encourage children to demonstrate confidence when they convert whole numbers to fractions and vice versa.

Lesson 6: Calculating fractions of a quantity

➜ pages 109–111

1 a) 42 ÷ 7 = 6; The small teddy bear is 6 cm tall.
  b) 42 ÷ 7 = 6
  6 × 4 = 24; The medium teddy bear is 24 cm tall.
2. a) 10 m b) 18 kg c) £15
3. Working out may vary, but look for children recognising the following:
   The statement is true: 24 ÷ 8 = 3, so $\frac{3}{8}$ of 24 is 3 × 3 = 9; 36 ÷ 4 = 9, so $\frac{1}{4}$ of 36 is 9.
4. Calculations matched to answers:
   $\frac{2}{3}$ of 18 ➜ 12; $\frac{1}{9}$ of 18 ➜ 2
   $\frac{5}{6}$ of 18 ➜ 15; $\frac{7}{18}$ of 18 ➜ 7
5. Missing numbers:
   a) 6 c) 7
   b) 40 d) $\frac{5}{6}$
6. $\frac{5}{7}$ of 56 is 40 so Chloe scored 40 marks in the test.
   $\frac{3}{8}$ of 56 is 21 so Mike got 21 marks wrong in the test. He therefore scored 56 – 21 = 35 marks in the test. Chloe got 5 more marks than Mike.

Reflect

Different contexts and answers are possible, but most are likely to be based on the calculation $\frac{7}{9}$ of 45 cm is 35 cm. For example: A piece of ribbon is 45 cm long. Amy cuts $\frac{7}{9}$ of the ribbon. How long is the piece Amy cuts?

Lesson 7: Problem solving – fraction of a quantity (I)

➜ pages 112–114

1 a) 3 × 6 = 18. Amelia has to complete 18 questions in total.
  b) 12 ÷ 2 = 6 6 × 5 = 30
  Amelia has to learn 30 spellings in total.
2. a) 25 b) 108
3. There were 30 buttons at the start.
4. Ethan gives £30 to his friend.
5. a) 15 b) 4
6. The total distance Jen and Toshi have to drive is 72 km.

Reflect

Different diagrams are possible, for example, a bar model split into 5 equal sections with 3 sections labelled as £60. 1 section is equal to £20 and so the whole amount is 5 × £20 = £100.

Lesson 8: Problem solving – fraction of a quantity (2)

➜ pages 115–117

1. $\frac{2}{9}$ of 36 is greater.
2. a) 60 b) 45
3. a) Red = 2; Blue = 6; Yellow = 8
   b) Red = 24; Blue = 6; Green = 10
4. 387
5. Missing numbers:
   a) 36 b) 5

Reflect

Explanations may vary; for example:
If $\frac{2}{3}$ of a number is equal to 18 then to find $\frac{1}{3}$ it is necessary to divide by 2 (not 3). This gives $18 \div 2 = 9$ and so $\frac{1}{3}$ of the number is equal to 9. To find the original number it is necessary to find 3 thirds ($\frac{3}{3} = 1$) and so to multiply by 3 (not 2) to give $9 \times 3 = 27$. The original number is 27 not 12.

End of unit check

➜ pages 118–119

My journal

1. a) $1 = \frac{6}{6}$ so, $1\frac{5}{6} = \frac{6}{6} + \frac{5}{6} = \frac{11}{6}$
b) $\frac{5}{6} + \frac{3}{6} = \frac{8}{6} = \frac{6}{6} + \frac{2}{6} = 1\frac{2}{6}$
c) $2 = 1 + \frac{6}{6}$ so, $2 - \frac{5}{6} = 1\frac{6}{6} - \frac{5}{6} = 1\frac{1}{6}$

Power puzzle

Emma gets 8 grapes, Andy gets 13 grapes, Reena gets 9 grapes and Lee gets 9 grapes.

Holly eats 9 grapes in total. Andy gets the most grapes.

Unit 10: Decimals (1)

Lesson 1: Tenths (1)

➜ pages 120–122

1. a) This shows $\frac{2}{10}$ or 0·2.
b) This shows $\frac{4}{10}$ or 0·4.
c) The white cubes represent $\frac{7}{10}$ or 0·7.
The grey cubes represent $\frac{3}{10}$ or 0·3.
d) The white beads represent $\frac{4}{10}$ or 0·4.
The grey beads represent $\frac{6}{10}$ or 0·6.

2. a) 3 tenths counters in the tenths (Tth) column.
b) 1 counter in 8 squares of the ten frame (8 counters in total).

3. Missing numbers:
a) 0·1 c) $\frac{7}{10}$
b) $\frac{3}{10}$ d) 0·6

4. 0·2, 0·3, … , 0·5, 0·6, … , 0·9, 1·0

5. Emma is incorrect because $\frac{1}{10}$ as a decimal is 0·1 (the digit 1 written in the tenths column).

6. Alex is thinking of 0·8.

Reflect

Various representations are possible including 6 tenths counters in a place value grid, 6 counters in a ten frame, a fraction strip divided into 10 with 6 sections shaded and as a fraction $\frac{6}{10}$.

Lesson 2: Tenths (2)

➜ pages 123–125

1. a) The number 4·3 has 4 ones and 3 tenths.
b) The number 2·6 has 2 ones and 6 tenths.
c) 4 tens counters and 6 tenths counters in the place value grid; the number 40·6 has 4 tens, 0 ones and 6 tenths.
d) 7 tens counters, 5 tens counters and 1 tenth counters in the place value grid; the number 75·1 has 7 tens, 5 ones and 1 tenth.

2. a) The shaded parts represent $\frac{13}{10}$ or 1·3.
b) 23 tenths shaded (2 wholes and 3 tenths).

3. Statements matched:
This number has 7 tenths ➜ 0·7
The digit in the tenths column is 1 more than the digit in the ones column ➜ 74·5
There are more ones than tenths ➜ 7·6
This number has 15 tenths ➜ 1·5

4. 1·0

5. a) The largest number that could be made is 8·7.
b) The smallest number that could be made is 2·6.
c) 82 < 82·6 < 83 82 < 82·7 < 83

Reflect

Max is incorrect. The one is in the tens column, not the tenths column. The value of each digit is 1 ten, 2 ones and 3 tenths.

Lesson 3: Tenths (3)

➜ pages 126–128

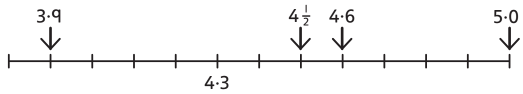
1. a) The worm is 1·2 cm long.
b) The ladybird is 0·8 cm long.

2. a) The container holds 9·5 ml of water.
b) The container holds 15·9 ml of water.

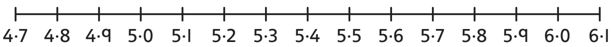
3. a) The grasshopper is 9·6 cm long.
b) The second grasshopper is 8·9 cm long.

4. 3·9, 4, 4·1, 4·2, 4·3, 4·4, …, 4·6, 4·7, 4·8, 4·9, …, 5·1, 5·2

5. Arrows drawn to correct mark on number line:



6. Explanations may vary but should reference the following:
The number '4·10' has been incorrectly written. This number is one tenth (0·1) more than 4·9 and so is 5.



Reflect

It is true. Both numbers have 5 wholes. $\frac{4}{10}$ is 4 tenths, which is written as a decimal as 0·4. So, $5\frac{4}{10}$ = 5·4

Lesson 4: Dividing by 10 (1)

➜ pages 129–131

1. a) 2 ones = 20 tenths
20 tenths ÷ 10 = 2 tenths
2 ÷ 10 = 0·2
b) 8 ones = 80 tenths
80 tenths ÷ 10 = 8 tenths
So 8 ÷ 10 = 0·8
c) 7 ÷ 10 = 0·7

2. Each section in the bar model represents 0·5;
5 ÷ 10 = 0·5

3. Explanations may vary but should reference the following:
1 ones counter is equal to 10 tenths counters. However, Max is dividing by 10 and so dividing 1 whole (or 10 tenths) by 10 gives 1 tenth, i.e. 1 ÷ 10 = $\frac{1}{10}$ or 0·1.

4. a) 6 ÷ 10 = 0·6 e) 4 ÷ 10 = 0·4
b) 8 ÷ 10 = 0·8 f) 0·5 = 5 ÷ 10
c) 1 ÷ 10 = 0·1 g) 0·3 = 3 ÷ 10
d) 0 ÷ 10 = 0 h) 10 ÷ 10 = 1

5. I disagree because 5 ÷ 10 = 0·5 or $\frac{5}{10}$. Explanations may vary; for example: using a place value grid and exchange shows that 5 is equal to 50 tenths. Dividing 50 tenths by 10 gives 5 tenths or 0·5.

6. Explanations of patterns may vary; for example, when a single-digit number is divided by 10 the answer will have the digit in the tenths column and 0 in the ones column.
The pattern will continue: 4 ÷ 10 = 0·4; 5 ÷ 10 = 0·5, …

Reflect

Methods will vary but children could include using a place value grid and exchange to convert the ones into tenths and then divide these by 10. Answers should show that when a single-digit number is divided by 10 the answer will have the digit in the tenths column and 0 in the ones column.

7. The missing number could be 78, 77, 76, 75 or 74.
5 ways.

Reflect

Answers will vary; for example:

Same: Both are being divided by 10. The digits stay the same but their positions in the place value grid change; they will move one place to the right. The digit in the ones column will become the digit in the tenths column. Answers to both will have no digit in the tens column.

Different: The answer when dividing the 2-digit number by 10 will have a (non-zero) digit in the ones column, whereas the answer when dividing the 1-digit number by 10 will have zero in the ones column. Dividing the 2-digit number by 10 could make a whole number (if the 2-digit number was a multiple of 10) but dividing the 1-digit number by 10 will always produce a decimal.

Lesson 5: Dividing by 10 (2)

➜ pages 132–134

1. a) 2 tens = 20 ones
20 ones ÷ 10 = 2 ones
4 ones = 40 tenths
40 tenths ÷ 10 = 4 tenths
So, 24 ÷ 10 = 2 ones and 4 tenths = 2·4

b) 4 tens = 40 ones
40 ones ÷ 10 = 4 ones
5 ones = 50 tenths
50 tenths ÷ 10 = 5 tenths
So, 45 ÷ 10 = 4 ones and 5 tenths = 4·5

c) 51 ÷ 10 = 5·1

2. 28 ÷ 10 = 2·8

3. Explanations may vary; for example:
The 4 tens are equal to 40 ones, the 7 ones are equal to 70 tenths. 40 ones ÷ 10 = 4 ones and 70 tenths ÷ 10 = 7 tenths. 4 ones + 7 tenths = 4.7.
The digits stay the same but their positions in the place value grid change as they move one column to the right.

4. False
False
True
True

5. a) 46 ÷ 10 = 4·6 d) 3·9 = 39 ÷ 10
b) 18 ÷ 10 = 1·8 e) 39 ÷ 10 = 3·9
c) 72 ÷ 10 = 7·2 f) 6·5 = 65 ÷ 10

6. Sometimes true; if the 2-digit number has the digits 1 to 9 in the ones column then dividing by 10 will give an answer with a digit in the tenths column. However, if the 2-digit number has a 0 in the ones column, then dividing by 10 will give a 0 in the tenths column, which does not need to be written in. For example: 12 ÷ 10 = 1·2 but 10 ÷ 10 = 1.

Lesson 6: Hundredths (1)

➜ pages 135–137

1. a) 2 squares shaded in the hundredths grid $\frac{2}{100}$ 0·02
b) 14 squares shaded in the hundredths grid $\frac{14}{100}$ 0·14
c) 5 squares shaded in the hundredths grid $\frac{5}{100}$ 0·05

2. $\frac{10}{100}$ or 0·1

3.

Fraction	$\frac{16}{100}$	$\frac{18}{100}$	$\frac{20}{100}$	$\frac{22}{100}$	Any fraction
Decimal	0·16	0·18	0·2 (or 0·20)	0·22	Decimal equivalent

4. a) $\frac{32}{100}$ = 0·32
b) 0·27 = $\frac{27}{100}$
c) 0·39 = $\frac{39}{100}$
d) Nineteen hundredths = 0·19
e) 0·46 = 46 hundredths
f) $\frac{52}{100}$ = 0·52
g) 0·59 = $\frac{59}{100}$
h) $\frac{93}{100}$ = 0·93
i) Ninety hundredths = 0·90 (or 0·9)
j) 0·03 = 3 hundredths

5. Jamie is correct. Explanations may vary; for example: There are 20 squares shaded, which is $\frac{20}{100}$ or 0·20. This could also be written as 0·2.
2 columns are shaded. Each column is 1 tenth, which as a fraction is $\frac{2}{10}$ and as a decimal is 0·2.

Reflect

Explanations will vary, but children should reference that, when placed in a place value grid, the 7 in 0·07 would be in the hundredths column, meaning it is $\frac{70}{100}$.

Lesson 7: Hundredths (2)

➜ pages 138–140

1. a) 44 squares shaded in hundredths grid $\frac{44}{100}$ 0·44
b) 14 hundredths counters $\frac{14}{100}$ 0·14
c) 15 squares shaded in hundredths grid $\frac{15}{100}$ 0·15

2. Mo has $\frac{23}{100}$, or 0·23
Isla has $\frac{45}{100}$, or 0·45
Zac has $\frac{32}{100}$, or 0·32

3. 0·5 + 0·5 = 1

4. $\frac{83}{100}$ 0·83

5. I disagree because 5 squares are shaded; this is 5 hundredths or $\frac{5}{100}$, which written as a decimal is 0·05.

6. 0·40 is 4 tenths, which is equivalent to 40 hundredths; Ebo should shade 40 squares on the hundredths grid.

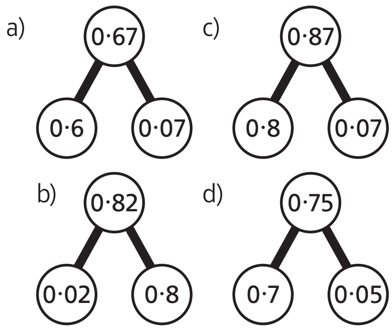
Reflect

0·31, 0·32, 0·33, 0·34, 0·35, 0·36, 0·37, 0·38, 0·39. There are 9 ways of completing the number sentence using decimals with 2 digits after the decimal point.

Lesson 8: Hundredths (3)

➜ pages 141–143

1. a) The 3 tenth counters represent 0·3.
The 5 hundredth counters represent 0·05.
3 tenths and 5 hundredths make 0·35.
b) The 5 tenth counters represent 0·5.
The 3 hundredth counters represent 0·03.
5 tenths and 3 hundredths make 0·53.
c) The 4 tenth counters represent 0·4.
The 5 hundredth counters represent 0·05.
4 tenths and 5 hundredths make 0·45.

2.


3. Missing numbers:
a) 7 c) 27
b) 17 d) 37

4. a) 0·47 = 0·4 and 0·07
b) 0·3 and 0·05 = 0·35
c) 0·4 and 0·06 = 0·46
d) 0·51 = 0·5 and 0·01
e) 0·09 and 0·3 = 0·39
f) 0·37 = 0·3 and 0·07

5. Disagree. Luis has six 0·01 (hundredths) counters and three 0·1 (tenths) counters. This makes 0·36.

6. 0·1, 0·2, 0·3, 0·31, 0·32, 0·42, 0·43, 0·44, 0·45, 0·46, 0·47, 0·48, 0·58, 0·59, 0·6

Reflect

Explanations may vary; for example:
Since 10 hundredths are equal to 1 tenth, 57 hundredths can be represented by:

5 tenths and 7 hundredths; 4 tenths and 17 hundredths; 3 tenths and 27 hundredths; 2 tenths and 37 hundredths; 1 tenth and 47 hundredths.

Lesson 9: Dividing by 100

➜ pages 144–146

1. a) 5 ones = 500 hundredths
500 hundredths ÷ 100 = 5 hundredths
So, 5 ÷ 100 = 0·05
b) 10 squares split into 10 parts means there are 100 tenths.
100 tenths ÷ 100 = 1 tenth
1 square split into 100 pieces means there are 100 hundredths.
100 hundredths ÷ 100 = 1 hundredth
11 ÷ 100 = 0·11

2. The digits move 2 columns to the right; for example:
15 ÷ 100 = 0·15

3. a) 0·08 c) 0·14 e) 0·55
b) 0·09 d) 0·15 f) 0·65

4. False
False
True
True

5. a) 0·54 d) 0·32 g) 50
b) 63 e) 0·35 h) 0·23
c) 5 f) 36

6. a) The value of the digit 5 in the answer is $\frac{5}{100}$ (5 hundredths).
b) The value of the digit 9 in the answer is $\frac{9}{100}$ (9 hundredths).

Reflect

Explanations may vary; for example:
$\frac{12}{100}$ is the same as 12 ÷ 100, so if you know that $\frac{12}{100}$ = 0·12 then you know 12 ÷ 100 = 0·12.

Lesson 10: Dividing by 10 and 100

→ pages 147–149

1. a) The mass of each box is 4·5 kg.
   b) The mass of each bowl is 0·3 kg.
2. 83 ÷ 10 = 8·3
3. Circled: 3 hundredths
4. a) 5·6, 0·56
   b) 34, 34
   c) 7·2, 0·72
   d) 10, 100
5. a) 6·8
   b) 0·46
   c) 0·18
   d) 10
   e) 97
   f) 0
6. a) Danny would get the answer 0·96.
   96 ÷ 10 = 96 so Danny started with the number 96.
   96 ÷ 100 = 0·96
   b) Bella would get the answer 0·7.
   7 ÷ 100 = 0·07 so Bella started with the number 7.
   7 ÷ 10 = 0·7
7. $\frac{1}{10}$ of 7 is 0·7
   $\frac{1}{100}$ of 70 is 0·7
   So $\frac{1}{10}$ of 7 is equal to $\frac{1}{100}$ of 70.

Reflect

Explanations may vary; for example:

The values of the digits change but the order of the digits remains the same. The digits move one column to the right when dividing by 10 and 2 columns to the right when dividing by 100.

So, (answer when you divide a number by 100) = (answer when you divide a number by 10) ÷ 10

End of unit check

→ pages 150–151

My journal

1. 1·34, 1·43, 3·14, 3·41, 4·13, 4·31, 13·4, 14·3, 31·4, 34·1, 41·3, 43·1
2. Different answers possible. Look for children confidently identifying the values of the digits. Pictorial representations could include place value grids, hundredths grids and part-whole models.

Power play

Check that children can understand the game and play it correctly.

Unit 11: Decimals (2)

Lesson 1: Making a whole

➜ pages 6–8

1. a) 0·2 + 0·8 = 1 c) 0·48 + 0·52 = 1
b) 0·9 + 0·1 = 1 d) 0·07 + 0·93 = 1

2. a) 0·61 b) 0·87

3. a) 0·3 + 0·7 = 1; missing part is seven 0·1 counters
b) 0·1 + 0·5 + 0·4 = 1; missing part is five 0·1 counters
c) Different answers possible but two missing numbers must total 0·8; for example: 0·1 + 0·2 + 0·7; missing parts to show numbers chosen (using 0·1 counters)

4. a) 0·4 c) 0·68
b) 0·16 d) 0·91

5. a) 0·23 + 0·77 = 1
b) 1 = 0·11 + 0·89
c) Different answers possible but two missing digits must total 10; for example:
1 – 0·61 = 0·39
d) Different answers possible but two missing digits must total 9; for example:
0·86 = 1 – 0·14

6. a) Different arrangements are possible but 0·3 must be in the centre; 0·5 and 0·2 complete a row/column; 0·6 and 0·1 complete a column/row; for example:

	0·6	
0·5	0·3	0·2
	0·1	

b) Different arrangements are possible but 0·48 must be centre number; 0·2 and 0·32 complete a row/column; 0·23 and 0·29 complete a column/row; for example:

	0·23	
0·32	0·48	0·2
	0·29	

Reflect

Possible calculations: 0·1 + 0·9 = 1, 0·2 + 0·8 = 1, 0·3 + 0·7 = 1 … 0·9 + 0·1 = 1 (some children may include 0 + 1 = 1 and 1 + 0 = 1)

Using number bonds to 10 and dividing each number by 10 would give these calculations.

Lesson 2: Writing decimals

➜ pages 9–11

1. a) 6·8 c) 10·5
b) 7·09 d) 0·04

2. Missing section in model: 0·4
3·49 = 3 ones + 4 tenths + 9 hundredths

3. Image A does not represent 0·12.

4. Missing elements in table completed:
a) 7·21
b) 2 tens + 9 ones + 3 tenths + 4 hundredths 29·34
c) 1 hundred + 5 ones + 6 tenths 105·6
d) 17·01
e) 0·53
f) 0·53
Children should notice that e) and f) are both 0·53; this is because 1 tenth equals 10 hundredths and so 5 tenths are equal to 50 hundredths, i.e. 0·53 = 5 tenths and 3 hundredths = 53 hundredths.

5. Mo = 4·27, Emma = 4·24, Danny = 8·24 (assuming that each number is chosen by only one child)

6. Zac = 54·6, Ambika = 3·77, Luis = 53·96

Reflect

Lee is not correct; the number is 30·47 which is not a 3-digit number. The number contains 4 digits, even though one of the digits is a zero.

Lesson 3: Comparing decimals

➜ pages 12–14

1. a) Circled: 9·9 9·5 < 9·9
b) Circled: 8·31 8·13 < 8·31
c) Circled: 20·06 20·06 > 20·05
d) Circled: 100·52 100·25 < 100·52

2. Richard needs to consider the position of the counters in the place value grid, not the number of counters overall. Both numbers have 3 ones, but 3·21 has 2 tenths whereas 3·07 has 0 tenths. So, 3·21 is bigger than 3·07 (3·21 > 3·07).

3. 0·23 < 0·32

4. a) 4·56 < 4·72
b) 12·9 < 18·7
c) 9·45 > 9·05
d) 3·18 > 3·12
e) 26·39 < 27·49
f) 120·26 = 120·26
g) 3 tenths + 5 hundredths < 5 tenths + 4 hundredths

5. a) Different answers possible:
6·04, 6·14, 6·24, 6·34. 6·44, 6·54, 6·64
b) Different answers possible; for example:
2·03 < 2·34, 2·13 < 2·35, 2·23 < 2·36,
2·33 < 2·37 …
c) Different answers possible but whole number part of each number must be 19; for example:
19·25 < 19·31, 19·35 < 19·42, 19·45 < 19·53 …

6. Different answers possible:
29·93, 29·94, 29·95, 29·96, 29·97, 29·98, 29·99, 30·00, 30·01, 30·02

Reflect

Isla should start with the tens.

Then she should look at the ones.

Then she should look at the tenths and then the hundredths.

Lesson 4: Ordering decimals

→ pages 15–17

1. 6·7, 7·2, 7·9

2. a) 10·97 (bottom left)
b) 10·97 > 10·79 > 10·09 > 10·07

3. a) 7·42, 27·24, 27·48, 72·45
b) 5·94, 5·49, 4·59, 4·53

4. List D is not in ascending order.

5. Aki is incorrect; the numbers are ordered biggest to smallest not smallest to biggest.

6. a)

Name	Time (in seconds)
Andy	27·79
Mo	28·02
Lee	28·24
Danny	28·42
Ebo	29·53

b) Andy was the fastest.
c) Ebo was the slowest.

7. Different answers possible; for example:
4·01, 4·19, 5·01, 5·02, 5·12 (check that numbers are in ascending order)

Reflect

0·62 and 0·65 both have 6 tenths but 0·62 has 2 hundredths whereas 0·65 has 5 hundredths, so 0·65 is bigger than 0·62. 0·71 has 7 tenths which is more than 6 tenths, so 0·71 is bigger than both 0·62 and 0·65. Thus 0·62 < 0·65 < 0·71.

Lesson 5: Rounding decimals

→ pages 18–20

1. a) 2·7 is between 2 and 3.
2·7 rounded to the nearest whole number is 3.
b) 10·3 is between 10 and 11.
10·3 rounded to the nearest whole number is 10.
c) 28·3 is between 28 and 29.
28·3 rounded to the nearest whole number is 28.

2. a) 9·6 rounded to the nearest whole number is 10.
b) 20·8 rounded to the nearest whole number is 21.

3. a) 5 e) 50
b) 13 f) 150
c) 65 g) 400
d) 0 h) 90

4. Mo's number cannot be 55·5 since this will be 56 when rounded to the nearest whole number.

5. a) 4·9 rounded to the nearest whole number is 5.
b) 8·5 rounded to the nearest whole number is 9.
c) Possible missing digit: 1, 2, 3 or 4 (or 0)
d) Possible answers: 22·5, 22·6, 22·7, 22·8, 22·9, 23·0, 23·1, 23·2, 23·3 or 23·4

6. Possible answers: 80·3 or 80·4

Reflect

Look at the tenths to see whether to round down to the nearest whole number or to round up. If there are 4 or less tenths round down and if there are 5 or more tenths round up. There are 6 tenths in 43·6 and since this is 5 or more tenths then 43·6 is rounded up to 44.

Lesson 6: Halves and quarters

→ pages 21–23

1. a) 0·25 = $\frac{1}{4}$ (or an equivalent fraction; for example: $\frac{25}{100}$)
b) 0·50 = $\frac{1}{2}$ (or an equivalent fraction; for example: $\frac{50}{100}$)

2. a) 75 squares shaded
b) $\frac{3}{4}$ = 0·75

3. a) $\frac{1}{4}$ = 0·25 c) $\frac{3}{4}$ = 0·75
b) $\frac{2}{4}$ = 0·5 d) $\frac{1}{2}$ = 0·5

4. a) 1 square shaded
b) 12 squares shaded
c) 6 squares shaded

5. Bella is correct; 0·5 is equivalent to $\frac{1}{2}$ and so Zac and Emma have the same number of apples (6 each).

6. 0·25 is equivalent to $\frac{1}{4}$. $\frac{1}{4}$ = 6 counters. Thus, the total number of counters is 6 × 4 = 24. Hence there are 24 – 6 = 18 grey counters.
Lee has 18 grey counters.

Reflect

Grid should show 75 squares shaded which are 75 hundredths ($\frac{75}{100}$), which is equal to 0·75.

Lesson 7: Problem solving – decimals

→ pages 24–26

1. 1 kg = 1,000 g
3 kg = 3,000 g
8,600 g = 8 kg and 600 g
5,300 g = 5 kg and 300 g

2. 2 kg 200 g 2 kg 200 g 2 g

3. Circled:
a) 1,000 ml c) 8 litres
b) 1 l 500 ml d) 2,030 ml

4. 3 children are tall enough to go on the ride.

5. The width of the football field is 300 metres.

6. a) 500 m
b) 6 km and 300 m
c) 5,700 m
d) 3,500 m
e) 3,050 m

7. a) 800 ml
b) 2,950 g
c) 1 kg and 700 g

8. 102 millilitres < 450 ml < $\frac{1}{2}$ a litre (500 ml) < 0·25 of 4 litres (1,000 ml) < 1 l 200 ml (1,200 ml)

Reflect

Explanations will vary but children should recognise that you need to multiply by 1,000 since 1 litre = 1,000 ml, 1 kg = 1,000 g and 1 km = 1,000 m.

End of unit check

→ pages 27–28

My journal

Same: All numbers are decimals and contain the digits 2 and 7. 7·2 and 7·20 have the same value.

Different: The values of the digits are different for the cards 7·20 and 0·27.

Power puzzle

Container	Number of litres the container holds
glass	0·2 l
jug	1 l
bucket	7 l
barrel	140 l
paddling pool	1,120 l

It would take 5,600 glasses to fill the paddling pool.

Unit 12: Money

Lesson 1: Pounds and pence

→ pages 29–31

1. a) 159 pence b) 254 pence c) 109 pence

2. a) 2 pounds 76 pence
b) 4 pounds 25 pence
c) 7 pounds 8 pence

3. Notes/coins circled:
a) £5, £2, £1, 50p, 20p and 2p
b) £10, £2, 10p, 5p, 2p and 1p

4. Missing amounts:
a) 78p c) 195p
b) £3 and 67p d) 1,095p

5. a) £1·97 b) £4·06 c) £2·40

6. a) £2·58 f) 895p
b) £3·70 g) 209p
c) £4·08 h) 290p
d) £12·57 i) 1,115p
e) 118p j) 900p

7. Box A = £3 Box C = £3·10
Box B = £30 Box D = £29

Reflect

£3·18; £3 and 18 pence; 318p

Lesson 2: Pounds, tenths and hundredths

→ pages 32–34

1. a) 27p = £0·27
b) 98p = £0·98
Different methods possible; some may count the number of squares with coins in, possibly counting in 10s. Another way is to subtract the empty squares from 100, i.e. 100 – 2 = 98.

2. a) 40p = £0·40 b) 90p = £0·90

3. a) £0·72 b) £2·40 c) £2·04

4. Coins circled:
a) Four possible combinations:
20p, 5p and 2p
20p, 5p, 1p and 1p
10p, 10p, 5p and 2p
10p, 10p, 5p, 1p and 1p
b) Four possible combinations:
£1, 20p and 10p
£1, 20p, 5p, 2p, 1p, 1p and 1p
£1, 10p, 10p and 10p
£1, 10p, 10p, 5p, 2p, 1p, 1p and 1p
c) Two possible combinations:
£1, 2p and 1p
£1, 1p, 1p and 1p

5. Aki is incorrect; he has £4·30, and he has counted the coins correctly but written the money notation incorrectly. When writing an amount of money in pounds and using the decimal point, you should always have two digits after the decimal point. So, there needs to be a zero after the 3 in this case, i.e. £4·3 should be written as £4·30.

6. a)

$\frac{3}{10}$ of £1	$\frac{3}{100}$ of £1	$\frac{73}{100}$ of £1	$\frac{9}{10}$ of £1	$\frac{90}{100}$ of £1
30p	3p	73p	90p	90p

b) Amal gets £0·40 change.

Reflect

Answers will vary; for example:

Same: Both amounts are made using the digits 1, 3 and 0. Both amounts have 1 pound.

Different: The amounts have different values for the pence since the 0 and 3 are in different places, so the first amount is £1 and 30 pence whereas the second amount is £1 and 3 pence.

Lesson 3: Ordering amounts of money

→ pages 35–37

1. a) Circled: yo-yo
Explanations may vary; for example:
It is the only item with 0 pounds so must be the least expensive.
b) Circled: headphones
Explanations may vary; for example:
I converted all the prices to pence and then compared.

2. Circled: crocodile toy bucket and spade eraser

3. a) 72p > 50p £2 < £8
72p < 500p £2 = 200p
72p > 5p £2 < £2·05
72p < £5 £2 > 195p
b) Seven pounds eighty pence > £7·09
£5·99 < six pounds

4. a) £0·25 £2·05 255 pence £5·25
b) £0·84 408 pence 4 pounds eighty pence £8·04 £8·40

5. a) eight pounds ninety pence £0·99 98 pence £0·89
b) 11 pounds £1·11 110 pence 1 pound 1 pence £0·01

6. Missing digits:
a) 5 or 6
b) 8 or 9
c) 5 or 6
d) 5, 6, 8 or 9

7. Isla ➜ £3·50
Amelia ➜ £5·30
Richard ➜ 385 pence
Max ➜ 5 pounds and 3 pence

Reflect

Isla is incorrect; to make a comparison she needs to use the same units of either pounds or pence. 3 pounds = 300 pence.

257 < 300

Lesson 4: Rounding money

➜ pages 38–40

1. a) £2
b) £3
c) £10
d) Number line marked from £12 to £13
£12·70 rounded to the nearest pound is £13.

2. a) £2·40
b) £0·80

3.

Item	Price rounded to the nearest £1	Price rounded to the nearest 10p
Hat £1.95	£2	£2 (or £2·00)
Shoes £8.24	£8	£8·20
Shorts £3.50	£4	£3·50

4. Circled: ball and towel

5. Answers will vary; accept any answer between £2·45 and £2·54.

6. Yes, if the price of the baseball caps was in the range £4·45 to £4·49.

Reflect

To round to the nearest £1, look at the digit in the ten pence position (tenths in terms of place value); the 8 represents 80p and this is closer to 100p than 0p, so the amount should be rounded up to the next pound. £3·89 therefore rounds up to £4 when rounded to the nearest pound.

To round to the nearest 10p, look at the digit in the one pence position (hundredths in terms of place value); the 9 represents 9 pence, and this is closer to 10p than 0p, the amount should be rounded up to the next ten pence. £3·89 therefore rounds up to £3·90 when rounded to the nearest 10p.

Lesson 5: Using rounding to estimate money

➜ pages 41–43

1. a) £1·56 rounded to the nearest £1 is £2.
£4·12 rounded to the nearest £1 is £4.
£2 + £4 = £6
An estimate of the total cost is £6.
b) £1·56 rounded to the nearest 10p is £1·60.
£4·12 rounded to the nearest 10p is £4·10.
£1 + £4 = £5
60p + 10p = 70p
So £5 + 70p = £5·70
An estimate of the total cost is £5·70.
c) The estimate of £5·70 is more accurate because rounding to the nearest 10p is closer to the original amount.

2. Sugar = 70p; coffee = £3·60
An estimate of the total cost is £4·30.

3. Cake = £2; water = £1; rucksack = £4. Total cost is £7.
Max has an over estimate, since all prices have been rounded up.

4. £7·49

5. To the nearest £1,000 the car costs £8,000. Sofia has savings of about £2,000.
£8,000 – £2,000 = £6,000
I estimate Sofia needs to save £6,000.

6. Explanations will vary; for example:
When rounding to the nearest pound, each of these items is rounded down. So, Lexi's estimate of £19 for the total cost is an underestimate and the actual total will be more than this. This means that the actual cost could be over £20, which would mean Lexi would not have enough money.

Reflect

Suggestions may vary; for example:

An advantage with rounding to the nearest pound is that it is easy to add the amounts since it involves adding whole numbers.

A disadvantage is that it is not as accurate as rounding to the nearest 10 pence and could produce an under estimate.

Lesson 6: Problem solving – pounds and pence

→ pages 44–46

1. a) £4·55
b) £5 and 37p
c) £5 + £4 = £9
55p + 37p = 92p
£9 and 92p = £9·92
Max and Olivia have £9·92 in total.

2. £2·45 = £2 and 45p
£1·59 = £1 and 59p
£2·45 + £1·59 = £3 and 104p = £3 + £1 + 4p = £4·04
Jamilla spends £4·04 in total.

3. a) £32·56 b) £5·67

4. £2·15

5. £3·65

6. £13·35 + £7·40 = £20·75
£25 – £20·75 = £4·25
The minimum number of coins Lexi will get in her change is 4 (£2 + £2 + 20p + 5p).

Reflect

Methods may vary.

£2·55 + 70p + £1·68 = £4·93

Richard spends £4·93 so he will get £0·07 or 7p change if he pays with a £5 note.

Lesson 7: Problem solving – multiplication and division

→ pages 47–49

1. 3 × £1 = £3 3 × 26p = 78p
£3 and 78p = £3·78
3 glasses of milk cost £3·78.

2. a)

$$\begin{array}{rrrr} & & 4 & 8 \\ \times & & & 7 \\ \hline & 3 & 3 & 6 \\ \hline & & {}_5 & \end{array}$$

48p × 7 = 336p
336p = £3·36

b)

$$\begin{array}{rrrr} & & 9 & 2 \\ \times & & & 5 \\ \hline & 4 & 6 & 0 \\ \hline & & {}_1 & \end{array}$$

5 × 92 = 460p
460p = £4·60

3. a) £3·18 × 6 = £19·08
b) 5 × £7·49 = £37·45

4. a) 160p ÷ 4 = 40p 12p ÷ 4 = 3p
40p + 3p = 43p
A scone costs 43p.
b) 1 ruler costs £0·43.
(This is the same calculation as a) but with the price written in pounds rather than pence.)

5. a) £0·92 b) £1·38

6. $\frac{1}{3}$ of £9·72 = £3·24
$\frac{2}{3}$ = 2 × £3·24 = £6·48
$\frac{2}{3}$ of £9·72 = £6·48

7. Assuming that burgers and buns can be bought individually:

3 burgers costs £4·62, so 12 cost £4·62 × 4 = £18·48

1 bread bun costs £1·20 ÷ 5 = £0·24, so 12 cost £0·24 × 12 = £2·88

£18·48 + £2·88 = £21·36

The total cost is £21·36.

Reflect

Answers will vary; the easiest way is to round one book up to £8 and find the approximate cost of 8.

£8 × 8 = £64

The price of each book has been rounded up by 1p for each book, so this cost is 1p × 8 = 8p over.
£64·00 – £0·08 = £63·92

Lesson 8: Solving two-step problems

→ pages 50–52

1. a) 4 × 17p = 68p 4 × 23p = 92p
68p + 92p = 160p = £1·60
The total cost is £1·60.
b) 23p + 17p = 40p
4 × 40p = 160p = £1·60
The total cost is £1·60.
c) The method used in part b) is more efficient. This is because when you add the price of one lemon and one pepper the answer is a multiple of 10 so it is easy to multiply.

2. 3 × 80p = £2·40
£2·40 + 0·45 = £2·85
Tom spends £2·85.

3. Yes. Explanations may vary; for example:
Each pen costs less than 50p. The ruler and the paperclip each cost less than 40p. So, the items altogether will cost less than 50p + 50p + 40p+ 40p, which is £1·80.
Others answers could involve adding exact amounts:
0·35 + 0·96 + 0·32 = £1·63

4. Carrots = 32p each onions = 18p each
32p = 18p = 50p
The total cost of buying a carrot and an onion is 50p.

5. The football costs £7. (The toy train costs £11.)

Reflect

Answers will vary depending on children's previous experience and levels of confidence.

Lesson 9: Problem solving – money

→ pages 53–55

1. 5 × 84p = 420p = £4·20
   Andy gets £0·80 change.
2. a) If the bars of chocolate cost £1 each he would pay £8 for 8 bars and get £2 change. Since Max received more than £2 change the bars of chocolate must cost less than £1 each.
   b) £10 = 1,000p, £3·52 = 352p
   1,000p – 35p2 = 648p
   648p ÷ 8 = 81p
   A bar of chocolate costs £0·81.
3. It is cheaper to pay for 6 throws at £1·20 because this costs 20p for each throw compared with 25p a throw when paid for individually.
4. Power Cabs: £3 + (8 × £0·40) = £3 + £3·20 = £6·40
   A1 Cars: 9 × £0·70 = £6·30
   The least expensive taxi company for Sofia is A1 Cars.
5. £2·67 + £5·75 = £8·42
6. No, Amelia is not correct.
   Buying individual buns is 4 × £0·60 = £2·40, but you get 1 free so the cost is £2·40 for 5, compared with the pack of 5 at £2·50.

Reflect

Answers will vary. 4 bread rolls at 55p each = 4 × £0·55 = £2·20, so the price children suggests for 4 rolls must be less than £2·20.

End of unit check

→ pages 56–57

My journal

Ebo will need to convert the amounts to pence (£1·34 = 134p). He can then add 134 + 72 = 206p = £2·06.

Power puzzle

1. A toaster costs £24.
   A kettle costs £48.
2. The radio costs £85.
3. A pair of speakers cost £51.
   A pair of headphones costs £17.
   A camera costs £87.
   headphones (£17) < toaster (£24) < kettle (£48)
   < speakers (£51) < radio (£85) < camera (£87)
   < laptop (£425)

Unit 13: Time

Lesson 1: Units of time (1)

➜ pages 58–60

1. a)

1 minute 45 seconds

1 minute	45 seconds
60 seconds	45 seconds

60 seconds + 45 seconds = 105 seconds

b)

3 hours 12 minutes

1 hour	1 hour	1 hour	12 mins
60 minute	60 minute	60 minute	12 mins

3 × 60 minutes = 180 minutes

180 minutes + 12 minutes = 192 minutes

c)

157 seconds

1 minute	1 minute	37 secs
60 seconds	60 seconds	37 secs

2 minutes 37 seconds

2.

1 × 6 = 6	1 × 60 = 60	1 hour = 60 minutes
2 × 6 = 12	2 × 60 = 120	2 hours = 120 minutes
3 × 6 = 18	3 × 60 = 180	3 hours = 180 minutes
4 × 6 = 24	4 × 60 = 240	4 hours = 240 minutes
10 × 6 = 60	10 × 60 = 600	10 hours = 600 minutes

3. a) Completed in Practice Book
b) 1 hour and 35 minutes
c) 2 hours and 25 minutes

4. Ella's dad finished the marathon 130 minutes after the winner.

5. 3,600 drops will be in the bowl after 1 hour (60 × 60).

Reflect

Different methods are possible; for example:

There are 60 minutes in 1 hour.
152 – 60 = 92
92 – 60 = 32
So, there are 2 hours and 32 minutes in 152 minutes.

Lesson 2: Units of time (2)

➜ pages 61–63

1. a)

21 days		
7 days	7 days	7 days

21 ÷ 7 days = 3 weeks

The orange juice should be used within 3 weeks.

b)

3 weeks and 5 days

1 week	1 week	1 week	5 days
7 days	7 days	7 days	5 days

3 × 7 days + 5 days = 26 days

The parcel should be delivered in 26 days.

c)

36 months

12 months	12 months	12 months
1 year	1 year	1 year

3 years

The toy is suitable for children over 3 years old.

2. Lines drawn to match
4 years ➜ 48 months
12 weeks ➜ 84 days
2 years ➜ 730 days
6 weeks 6 days ➜ 48 days
7 months ➜ about 30 weeks

3. Lee has calculated 53 × 7 = 371. This would tell you the number of days in 53 weeks.
To find the number of weeks in 53 days, Lee should have calculated 53 ÷ 7 to get the answer 7 weeks and 4 days.

4. a) 5 weeks + 13 days = 6 weeks 6 days
b) 38 months – 2 years = 14 months

5. Explanations completed:
months in a number of years, multiply by 12.
years in a number of months, divide by 12.
days in a number of weeks, multiply by 7.
weeks in a number of days, divide by 7.

6. Answers will vary; for example:
9 years, 11 weeks and 4 days
9 × 365 + 2 extra days in leap years = 3,287
11 × 7 = 77
3,287 + 77 + 4 = 3,368
I am 3,368 days old.

Reflect

Explanations may vary; for example:

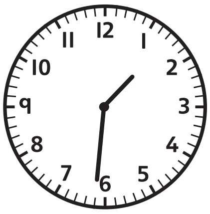
I can find the answer by dividing 20 by 12 and writing the remainder as months.

20 ÷ 12 = 1 r 8, so 20 months is 1 year and 8 months.

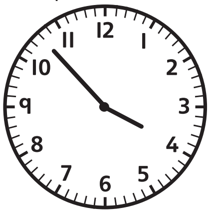
Lesson 3: Converting times (1)

→ pages 64–66

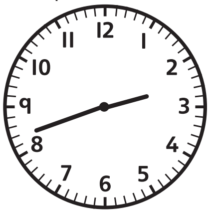
1. a) 1:31 am



c) 3:53 pm



b) 2:42 pm



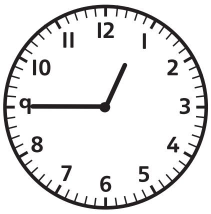
d) 4:04 am

2. The correct digital time is 10:58.
Emma has mistakenly read the number each hand is closest to.
Max has correctly read the minutes as 58 but incorrectly read the hours as 11 because the hour hand is almost at 11.

3. a)

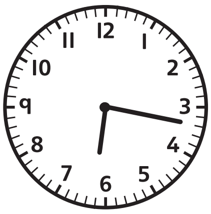
2:12 am

b)



12:45 pm

c)

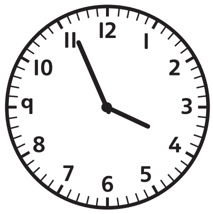


6:17 pm

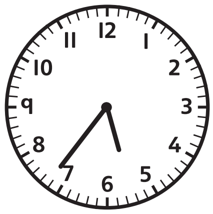
4. In the digital time, the 9 represents 9 hours because quarter to 10 is the same as 9:45.
In the analogue time, the minute hand pointing to the 9 represents 45 minutes past the hour, or a quarter to the next hour.

5. Order of answers will vary:

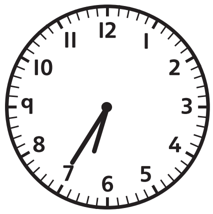
3:56 pm



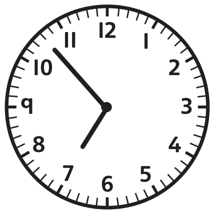
5:36 pm



6:35 pm



6:53 pm



Reflect

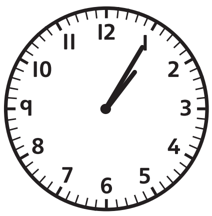
Explanations will vary; for example:

To convert from analogue into digital, I would look at the hour (short) hand to identify the hour it is pointing at or has just gone past. I would write this hour before the colon. Then I would look at the minute (long) hand and work out how many minutes it is after the hour by counting how many small intervals the minute hand has turned through (clockwise) since passing the 12. I would write this after the colon (using two digits; for example: writing 02 for 2 minutes). If the time is the morning, I would write 'am' after the time and if it is the afternoon I would write 'pm'.

Lesson 4: Converting times (2)

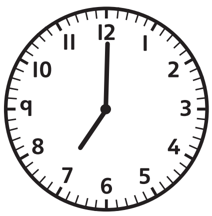
→ pages 67–69

1. a)

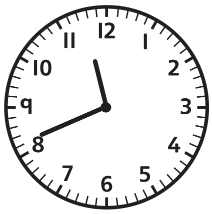


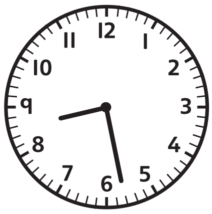
01:05

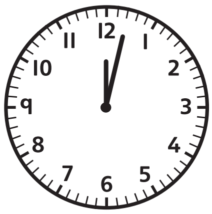
b)

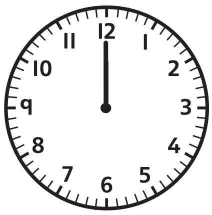


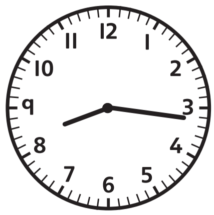
19:00

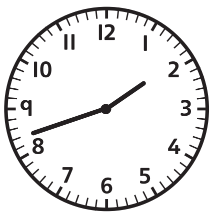
c)

23:41

d)

08:28

e)

00:02

2. a) 00:00


c) 20:16


b) 13:42


d: 09:51


3. a) 03:42
24-hour time is written using 4 digits so you need to put a zero before the 3.
b) 15:42
No need for the pm after a 24-hour time.

4. Max's watch will show 15:47.

5. Many answers are possible; for example:

05:12	5:12 am
10:07	10:07 am
13:04	1:04 pm
14:30	2:30 pm

Reflect

Explanations will vary. Children should recognise that 24-hour times have 4 digits and 12-hour times need to specify whether they are 'am' or 'pm'; for example:

To convert a 12-hour am time to 24-hour:
If the hour is 12, replace with 00; if the hour is 1 to 9, write a 0 in front; if the hour is 10 or 11, leave as is.

To convert a 12-hour pm time to 24-hour:
If the hour is 12, leave as is; if the hour is 1 to 11, add 12.

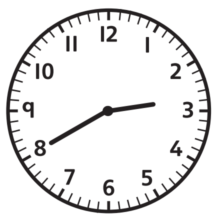
To convert a 24-hour time to 12-hour:
If the hour is 00, replace with 12 and write 'am' after the time; if the hour is 01 to 09, remove the 0 and write 'am'; if the hour is 10 or 11, write 'am'; if the hour is 12, write 'pm'; if the hour is 13 to 23, subtract 12 and write 'pm'.

Lesson 5: Problem solving – units of time

→ pages 70–72

1. a) Team A was the first to complete Stage I. It took 9 days.
b) It took 3 weeks and 2 days altogether for Team B to complete Stages 1 and 2.
c) Team A took 49 days.
Team B took 51 days.
Team A reached the summit 2 days before Team B.

2. 1 minute 40 seconds
3 minutes 50 seconds
7 minutes 20 seconds
1 hour 15 minutes
3 hours 32 minutes

3.

14:40

4. Dan (21 months) > Ben (22 months)) > Abdul (24 months)) > Cerys (25 months)

5. The bus left the station at 12:27.

Reflect

Explanations may vary; for example:

Divide 108 by 12 to get 9 years.

End of unit check

→ pages 73–74

My journal

Answers will vary, but children should work out that 100 months is 8 years and 4 months, or convert their ages from years to months and compare.

Power puzzle

06:56 = 6:56 am
3 hours 46 minutes = 226 minutes
60 months = 5 years
clock showing 4 minutes to 6 = 17:56
8 weeks 4 days = 60 days
4 years 11 months = 59 months
clock showing 10 past 1 = 13:10

Odd one out is 01:02.

Unit 14: Statistics

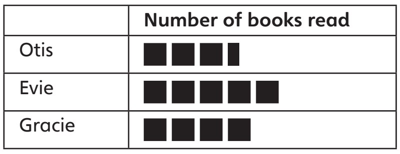
Lesson 1: Charts and tables (1)

➜ pages 75–77

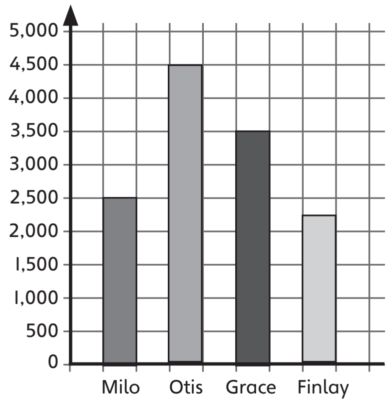
1 a) Each icon represents 8. Each half icon represents 4.
8 + 8 + 4 = 20
Kieron has 20 jigsaw piece cards.
b) Each quarter icon represents 2.
Kieron has 34 normal cards.
c) Amy has 25 shiny cards.

2. Evie read 20 fiction books.
Gracie read 8 non-fiction books.
Otis read 3 poetry books.
Gracie read 37 books in total.

3.



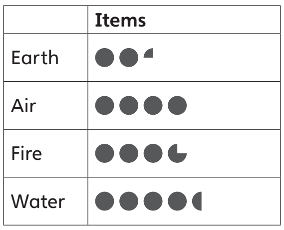
4. Milo: 2,500
Grace: 3,500



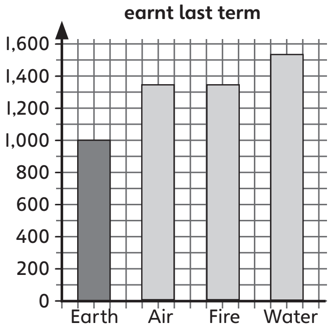
5.

Number of class points per team in Year 4

Each ● represents 100 points.



Total number of class points earnt last term



Reflect

Children may give different answers but should be able to give reasons; for example:

Pictograms are the best way to display data because it is easy to count the pictures.

Bar charts are the best way to display data because you can read the data using the scale on the axis.

Lesson 2: Charts and tables (2)

➜ pages 78–80

1. a) 21 + 14 = 35
Alice won 35 marbles in December and May.
b) Otis won 18 marbles in May.
Alice won 14 marbles in May.
18 – 14 = 4
Otis won 4 more marbles in May than Alice.
c) The children won 70 marbles in May.

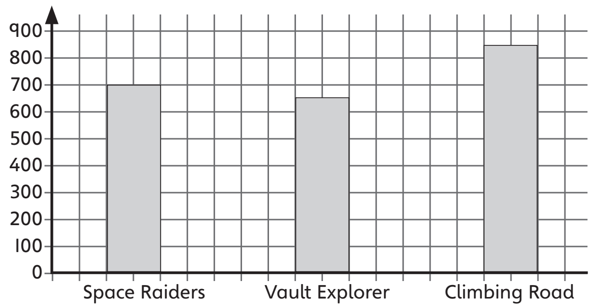
2. **Number of visitors**

	History Museum	Science Museum	Total
Saturday	625	800	1,425
Sunday	745	725	1470
Monday	390	390	780

3. **Number of points earned**

	Space Raiders	Vault Explorer	Climbing Road
Sarah	700	650	850
Tom	550	200	800

Number of points scored by Sarah



4. a) 20
b) Wednesday
130

Reflect

Answers will vary; look for children discussing both pictograms and bar charts and giving reasons for which graph they prefer.

Lesson 3: Line graphs (1)

➜ pages 81–83

1. a) 20 c) 60
   b) 55 d) 150
2. a) 110
   b) 12 pm
3. The shadow was the longest at 8:00 am.
   It was 130 cm long.
   The shadow was the shortest at 12:00 pm.
   It was 30 cm long.
   Many different answers possible; for example:
   The shadow was the same length at both 9:00 am and 10:00 am.
   The shadow was the same length at both 10:15 am and 2:30 pm.
4. No. Line graphs are used to track changes over periods of time. Bar graphs are used to make comparisons between different groups. Since this data is making comparisons, a bar chart is more suitable.
5. a) Vertical axis labelled in tens from 0.
   0 written at start of horizontal axis; 60 written half-way between 30 and 90.

Time	30 minutes	60 miles	90 minutes	120 minutes	150 minutes
Distance	20 miles	45 miles	55 miles	55 miles	80 miles

   b) The graph is level between 90 and 120 minutes which means that the car was not moving, so it must have been in a traffic jam at this time.

Reflect

Line graphs are used to track changes over a periods of time, whereas bar graphs are used to make comparisons between different groups.

Lesson 4: Line graphs (2)

➜ pages 84–86

1. a) There was 6 mm more water in the container at 11 am.
   b) It took 2 hours for the water to increase from 22 mm to 32 mm.
   Explanations may vary; for example:
   The graph shows the water level between 11 am and 12 pm as being horizontal. This means it stopped raining for one hour and took 2 hours for the water level to raise from 22 mm to 32 mm.
   At 11 am the water level reached 22 mm and at 1 pm it had reached 32 mm, so it took 2 hours for the water level to increase from 22 mm to 32 mm.
2. a) Evie took 9,000 steps during the day.
   b) Evie took about 1,750 steps between 12 pm and 3 pm.
   c) 1 hour
3. 72 m (approximately)
   Explanations may vary; for example:
   The top of the graph shows the greatest height the ball reaches before it drops back to the ground.
4. Different answers possible; for example:
   The temperatures in Spain are very <u>different</u> when comparing summer and winter temperatures, with much warmer temperatures in July compared with December. The <u>warmest</u> temperature is 32 °C at 12 pm in July and the <u>coldest</u> is 5 °C at 8 am and 5 pm in December. The temperatures on 1 July are <u>more than</u> or equal to 18 °C and the temperatures on 1 December are <u>less than</u> or equal to 18 °C.

Reflect

Different answers are possible; for example:

One important thing I am going to remember when looking at line graph data is read the axes clearly / look for different gradients in the line / use the data to make comparisons / use a ruler to read across the graph.

Lesson 5: Problem solving – graphs

➜ pages 87–89

1. a) Lily and Maisie took 2,000 more steps than Tom and Kieron.
   b) Gracie walked 6,500 steps.
2. a) 7
   b) Belfast
   c) Edinburgh
3. a) Otis walked furthest in the last 2 hours of his walk.
   b) Explanations may vary; for example:
   In the first 2 hours he walked 5 km – 0 km = 5 km and in the last 2 hours he walked 17 km – 11 km = 6 km.
   c) £72 (12 × £6)
4. Approximately 4,250 (8,500 – 4,250)

Reflect

Different questions are possible; for example:

Estimate the difference between the population of Spixworth and Windermere; Which town has the largest population?

End of unit check

➜ pages 90–92

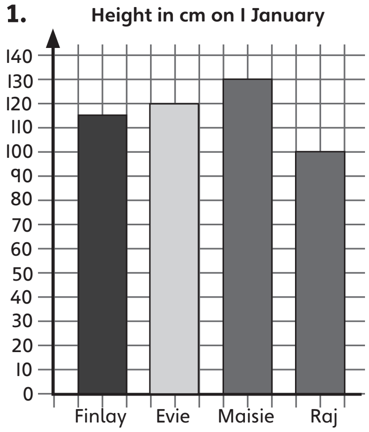
My journal

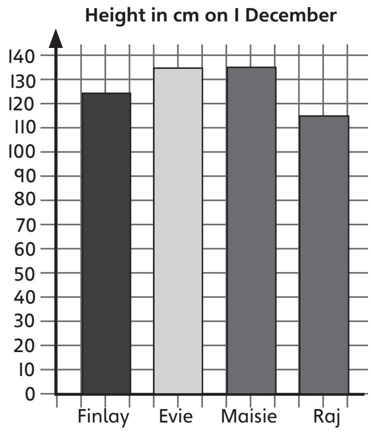
Different answers possible; for example:

The price of the car started at more than £1 at 9 am and reached a total of £5·50 altogether by 6 pm but remained less than £6. The price rose more quickly between 12 pm and 3 pm compared to between 10 am and 12 pm.

Power puzzle

1.





Unit 15: Geometry – angles and 2D shapes

Lesson 1: Identifying angles

→ pages 93–95

1. a) Ticked: 3rd and 5th angle
b) Ticked: 4th and 5th angles
c) Ticked: 2nd angle

2. Size and orientation of angles will vary but must be a right angle, an acute angle and an obtuse angle.

3. The trapezium (top right corner) is in the wrong place since it has 2 acute angles and 2 obtuse angles so belongs in the top left cell in the diagram.

4. Angles a) and d). Angle a) is a right angle and so will fit exactly. Angle d) is acute and so will also fit.

5. Tree or pond.

Reflect

Descriptions may vary; for example:

An acute angle is an angle that is less than a right angle (or quarter turn).
An obtuse angle is an angle greater than a right angle (or quarter turn) but less than a straight line (or half turn).
A right angle is a quarter turn or 90°.

Lesson 2: Comparing and ordering angles

→ pages 96–98

1. a) d b c a
b) b c a d
c) d b c a

2 a) A B D C E
b) The more sides a regular shape has, the bigger the interior angles.

3. Answers will vary, but ensure that angles are in ascending order and ideally include an acute angle, a right angle and an obtuse angle.

4. Sometimes true; if the angles are less than 45°, then adding them together will be less than 90° and will thus make an acute angle. However, combining 2 acute angles which are both more than 45° will make an obtuse angle.

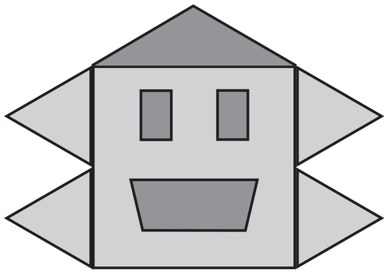
Reflect

Acute angles are smaller than a right angle (a quarter turn) and obtuse angles are greater than a right angles (a quarter turn) but smaller than a straight line (half turn).

Lesson 3: Identifying regular and irregular shapes

→ pages 99–101

1. a) Circled: square and equilateral triangle
b) Circled: all shapes except the equilateral triangle
c)



red blue

2. Children should have drawn two different squares.

3. Children should have drawn one regular and one irregular hexagon.

4. A

5. Different solutions are possible:
Shape on top left can be joined to the shape at top right; the trapezium in the middle of the bottom row can be joined to another copy of itself to make a hexagon. Also, 6 equilateral triangles (in the middle of the top row) can be joined together to make a hexagon.

Reflect

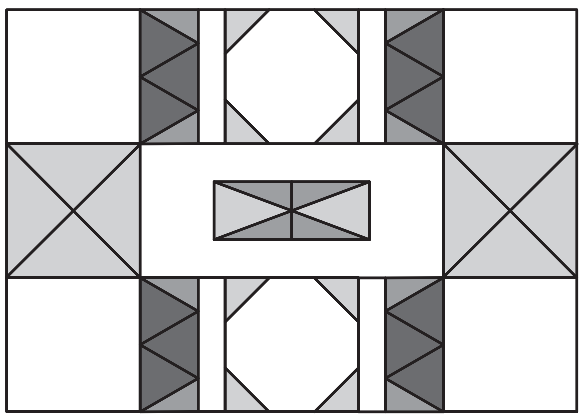
A regular shape has sides which are all the same length and angles which are all the same size.

Lesson 4: Classifying triangles

→ pages 102–104

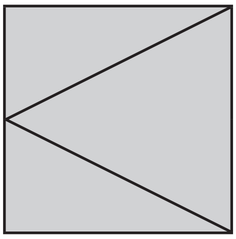
1. a) Circled: 1st and 3rd triangles
b) Circled: 2nd triangle
c) Circled: 1st and 4th triangles

2.



red blue yellow

3.



4.

	2 or 3 equal sides	No equal sides
2 or 3 equal angles	A, C	
No equal angles		B, D

5. There are 25 isosceles triangles altogether.

Reflect

An equilateral triangle has sides of equal length and all angles of equal size (60°). An isosceles triangle has 2 sides the same length and 2 angles equal in size. A scalene triangle has all sides different lengths and all angles different sizes. A right-angled triangle has 1 angle which is a right angle (90°). Right-angled triangles can be isosceles or scalene.

Lesson 5: Classifying and comparing quadrilaterals

➜ pages 105–107

1. a) Circled: rectangle (top left), rhombus (top right), square (bottom left), trapezium (bottom right)
b) Circled: both squares (bottom left, bottom right)
c) Circled: all shapes except the square

2. Answers will vary but must include 2 squares and 4 non-square quadrilaterals (orientation will vary).

3. Shapes matched:
Trapezium ➜ bottom shape
Rhombus ➜ 3rd shape from top (a square is a special sort of rhombus)
Parallelogram ➜ top shape and 3rd shape from top (a square is a special sort of parallelogram)
Rectangle ➜ 2nd shape from top and 3rd shape from top (a square is a special sort of rectangle)

4. Check children have drawn four different parallelograms.

Reflect

A rhombus has 4 equal sides but can have different sized angles. A square is a type of rhombus but with angles of equal size (right angles or 90°).

Lesson 6: Deducing facts about shapes

➜ pages 108–110

1. a) Circled: rectangle (3rd shape), triangle (4th shape)
b) Circled: parallelogram (2nd shape), rectangle (3rd shape), trapezium (4th shape)
c) Circled: parallelogram (1st shape), right-angled triangle (2nd shape), right-angled triangle (5th shape)
d) Circled: trapezium (3rd shape), triangle (4th shape), parallelogram (5th shape)

2. Different answers are possible including irregular pentagons, irregular octagons, irregular dodecagons (12-sides).

3. It could be an equilateral triangle (all angles 60°) or a scalene triangle.

4. It could be a parallelogram, a rhombus, a trapezium, a kite, an arrow-head or a quadrilateral with all sides and angles different. It cannot be a square or a rectangle since these shapes only have right angles.

5. Headings in top row left to right:
Quadrilateral Not quadrilateral
Headings in left-hand column top to bottom:
Angles not all equal Angles all equal

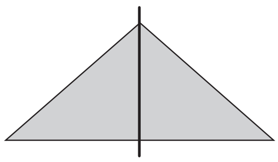
Reflect

Answers will vary. Children should recognise that they need to consider the properties of its sides, i.e. how many sides and whether they are equal in length and parallel. They should also consider the properties of its angles, i.e. whether they are equal in size, acute/obtuse or right angles.

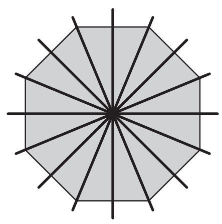
Lesson 7: Lines of symmetry inside a shape

➜ pages 111–113

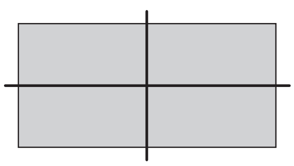
1. a)



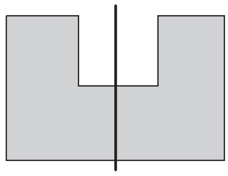
c)



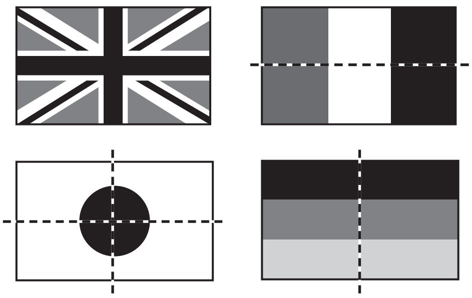
b)



d)



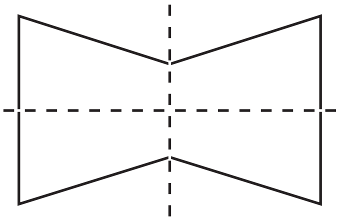
2. (No line of symmetry)



3. Shapes drawn into table:

	Regular	Irregular
4 or more lines of symmetry	Square Regular hexagon Regular octagon	
Fewer than 4 lines of symmetry	Equilateral triangle	Parallelogram Rectangle

4. Answers will vary; for example:



5. Answers will vary; for example:
a) Isosceles trapezium
b) Rhombus
c) Equilateral triangle

Reflect

Answers may vary but should include that there are infinite lines of symmetry; for example:

If you fold a circle along any line which goes through its centre, the 2 halves match exactly. There are an infinite number of such lines so a circle has infinite lines of symmetry.

Lesson 8: Lines of symmetry outside a shape

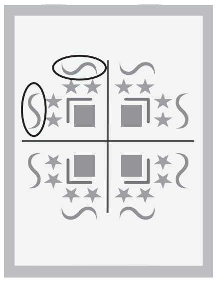
➜ pages 114–116

1. Table completed to show:
a) Symmetric
b) Not symmetric
c) Symmetric

2. 2 lines of symmetry drawn: horizontal and vertical lines through centre of pattern

3. 4 lines of symmetry drawn: horizontal, vertical and diagonal lines of symmetry through the centre of pattern

4. 'S' shapes in top left corner of the pattern are the wrong way around.



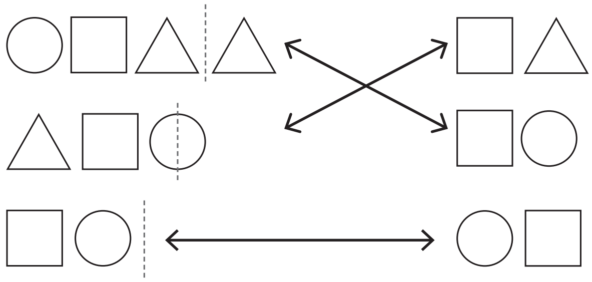
Reflect

Answers will vary; check that patterns are symmetrical.

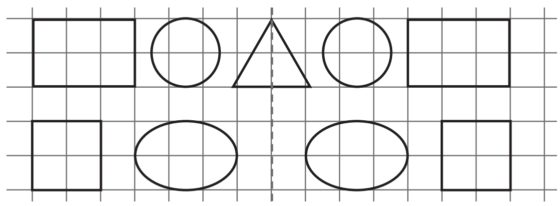
Lesson 9: Completing a symmetric figure

➜ pages 117–119

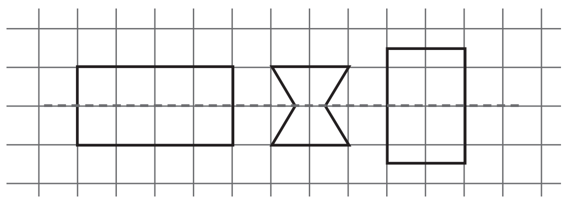
1.



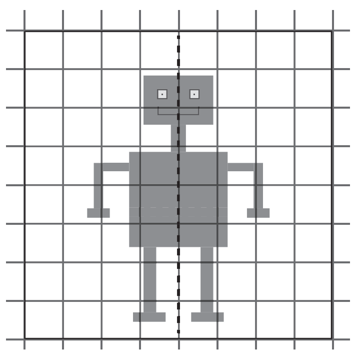
2. a)



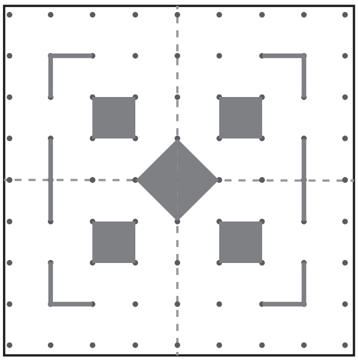
b)



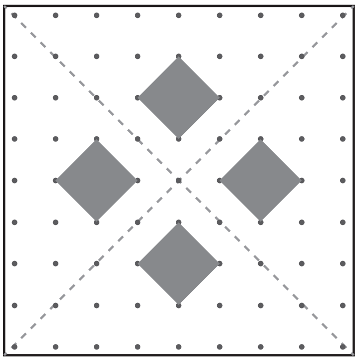
3.



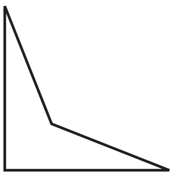
4.



5.



6. Answers will be a kite (or arrow-head); for example:



7. Answers will vary. Check children's pattern is symmetrical in both diagonal lines of symmetry.

Reflect

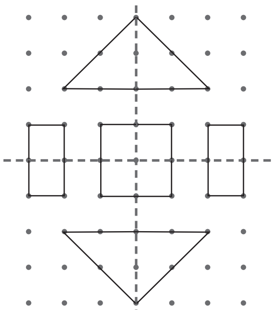
Answers will vary; ensure that pattern has 2 lines of symmetry.

Lesson 10: Completing a symmetric shape

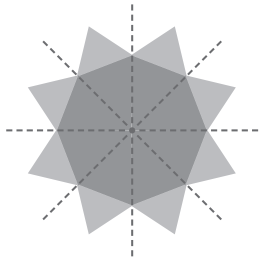
→ pages 120–122

1. Check shapes are completed accurately to form:
a) Rectangle c) Octagon
b) Hexagon d) Triangle (isosceles)

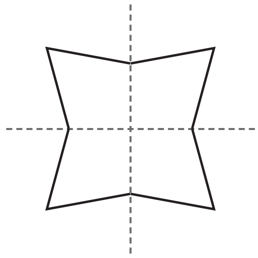
2. 2 triangles (isosceles), 1 square and 2 (non-square) rectangles.



3.



4. Answers will vary; for example:



5. No; it is correct that you cannot have a shape with exactly 2 lines of symmetry and an odd number of sides. Look for children drawing different shapes with an odd number of sides and finding the lines of symmetry.

Reflect

Answers will vary; for example:

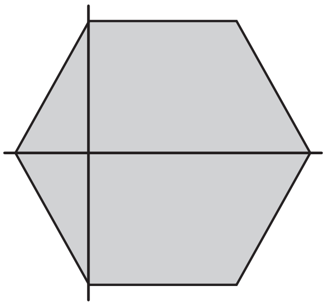
When completing a symmetric shape, it is important to use a mirror to check the shape; count the number of sides on one side of the line.

End of unit check

→ pages 123–125

My journal

1.



2. The angles of a triangle add up to 180°. An obtuse angle is more than 90°. If 2 of the angles in the triangle were obtuse then they would make more than 90° + 90° = 180, which is not possible. Any diagrams should show this.

Power puzzle

Answers will vary. Look for children using the minimum number of folds to make the shapes.

Unit 16: Geometry – position and direction

Lesson 1: Describing position (1)

→ pages 126–128

1. a) Cliff or hill
   b) Woods
   c) Moor
   d) Cliff (accept moor or hill)
2. Answers will vary; for example:
   a) The camp is next to the cliff, close to the hill.
   b) The cave is between the swamp and the pond, close to the sea.
   c) The pond is between the cave and the hill.
   d) The swamp to the left of the cave.
   e) The moor in between the woods and the cliff.
   f) The cliff is left of the camp.
3. The line would go through the woods and the moor.
4. No; the woods are between the cave and the moor but they are closer to the moor.
5. Answers will vary; for example:
   The woods are one square up from the moor.
   The cave is two squares to the right of the swamp.
   Using a grid makes it easier to describe where the places are because you can describe position using squares. It is also more accurate.

Reflect

Answers will vary; look for children explaining that maps provide a visual image for the locations of lots of places at once. Children should recognise that using squares or grids means that distances can be described using squares and it is easier to describe moving between the places on the map.

Lesson 2: Describing position (2)

→ pages 129–131

1. a) The statue is at (7,4).
   b) The other fence posts are at (4,6) and (6,6).
   c) The other rose bush is at (3,3).
2. (1,6), (0,6) and (0,3)
3. No, Jamie has the coordinates the wrong way round. The gnome is at (5,3).
4. Answers might vary between (8,5), (8,4) or (8,3).
5. To the left of the house, in the bottom left corner.
6. a) (0,6)   b) (1,3)
7. (4,5) because it is not at the entrance to the shed (A), in the middle of the patio (B) or the path (C) or in the middle of the pond (E).

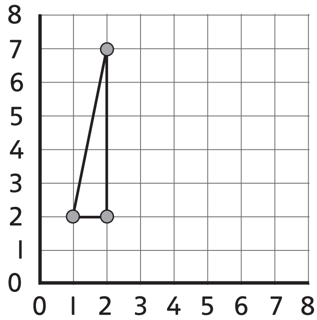
Reflect

No, Ebo is incorrect because he has the directions the wrong way round; he needs to go 2 squares right and 4 squares up.

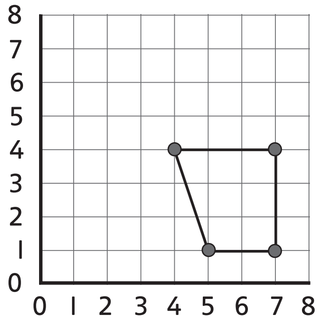
Lesson 3: Drawing on a grid

→ pages 132–134

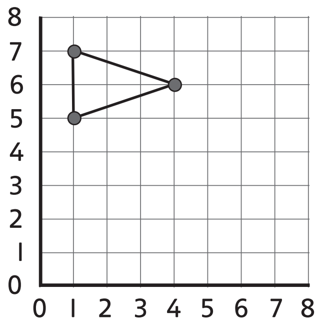
1. a)



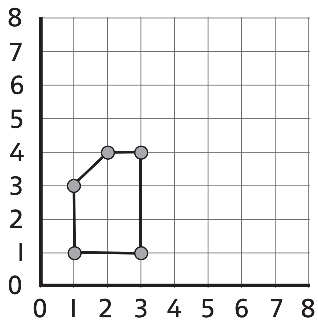
b)



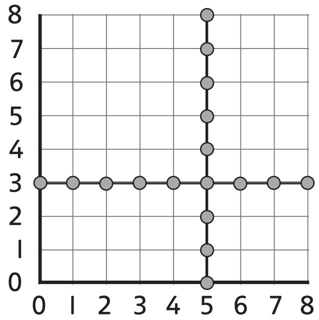
2. a) Triangle



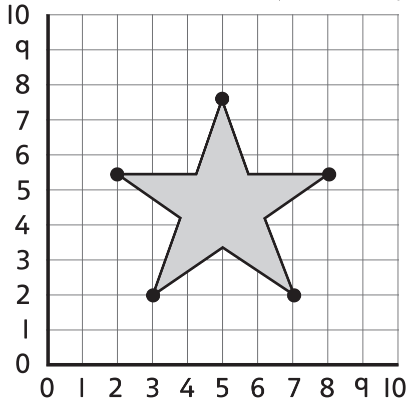
b) Pentagon



3. a) Line 1: Horizontal line going through 3 on the vertical axis.
   Line 2: Vertical line going through 5 on the horizontal axis.

b) 

4. a) and b) Answers will vary; for example:



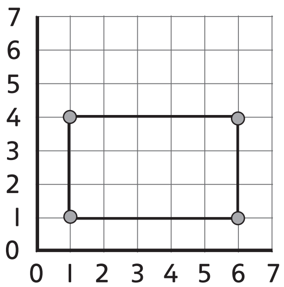
Coordinates: (3,2), (7,2), $(8,5\frac{1}{2})$, $(5,7\frac{1}{2})$, $(2,5\frac{1}{2})$

Reflect

This line will go through the 3 on the horizontal axis and is vertical. We know this because the first number, which we read along the horizontal axis, is always 3.

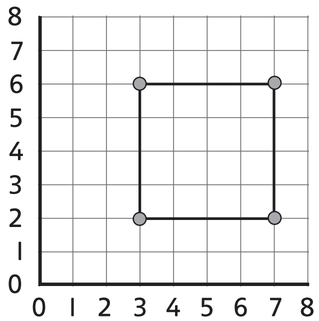
Lesson 4: Reasoning on a grid

➜ pages 135–137

1. 

(1,1)
(6,1)
(6,4)
(1,4)

2. a) (7,2), (7,6) and (3,6).

b) 

3. Answers will vary. Check children have drawn three more rectangles of same size, each with a vertex at (4,4)

4. a) (2,9), (8,9) and (8,3).
b) Order may vary:
(9,3), (9,8) and (2,8).
(7,3), (7,10) and (2,10).

Reflect

Answers will vary but should include symmetrical reasoning, understanding of the properties of shapes and addition.

Lesson 5: Moving on a grid

➜ pages 138–140

1. a) Pier c) Rig
b) Turbine d) Harbour

2. Start ➜ D ➜ A ➜ C ➜ B ➜ F ➜ E

3. a) (4,1) c) (0,0)
b) (1,3) d) (2,4)

4. a) (74,126) b) (72,128)

5. (7,6), (7,7), (12,7), (12,6)

Reflect

Yes, if you know the coordinates at the start and end of a move you can tell whether you moved up or down and left or right. Explanations will vary; for example:,

If the first number increases (from start to end), this means a move to the right. If it decreases, it means a move to the left. Likewise, if the second number increases (from start to end), this means a move upwards and. If it decreases, it means a move downwards.

Lesson 6: Describing a movement on a grid

➜ pages 141–143

1. a) Andy goes 1 left, 2 down.
b) Danny goes 2 left, 1 up.
c) Andy goes 1 right, 2 up.
d) Andy goes 3 left, 1 down.

2. Instructions might be either way round:
a) 1 left, 3 down
b) 5 right, 1 up
c) 2 left, 2 up
d) 2 right, 2 down
e) 3 right, 4 up
f) 3 right, 0 up

3. Reena moved 2 right, 3 up.

4. Order might vary:
2 left, 1 up
1 left, 2 up
1 right, 2 up
2 right, 1 up
2 left, 1 down
1left, 2 down
1 right, 2 down
2 right, 1 down

Reflect

To do the reverse movement, do the same number of moves in the opposite direction across and the same number of moves in the opposite direction up or down; for example: the reverse moves for 5 left, 2 up are 5 right, 2 down.

End of unit check

→ pages 144–146

My journal

1. Cards A and D will take you from (5,5) to (10,10) because 5 left and 10 right gives a total of 5 right, and 10 up and 5 down gives a total of 5 up. So, the total move is 5 right and 5 up.

2. (4,5)

Power play

Grids will vary.