Unit 6 – Multiplication and division (2)

1 Factor pairs

➜ pages 8–11

Discover

1. a) Reena is partly correct. One of the numbers could be 10, but that is not the only possibility.
b) The factor pairs for the number 20 are 1 and 20, 2 and 10, 4 and 5.

Think together

1. **1** × **12** = **12**
12 × **1** = **12**
2 × **6** = **12**
6 × **2** = **12**
4 × **3** = **12**
3 × **4** = **12**

2. The factor pairs for the number 18 are 1 and 18, 2 and 9, 3 and 6.

3. Children's answers will vary depending on the number they choose. Children should notice that: All numbers have a least one set of factor pairs. Square numbers have an odd number of factors.

2 Multiply and divide by 10

➜ pages 12–15

Discover

1. a) Children might think of 13 × 10 as ten 13s or 13 tens, or they might think about the place value of each digit.
b) **40** × 10 = 400 or 400 ÷ 10 = **40**

Think together

1. a) 7 × 10 = **70**
17 × 10 = **170**
37 × 10 = **370**
67 × 10 = 670
b) 30 ÷ 10 = **3**
130 ÷ 10 = **13**
430 ÷ 10 = **43**
930 ÷ 10 = 93

2. a) 27 × 10 = **270** **270** ÷ 10 = 27
b) **24** × 10 = 240 240 ÷ 10 = **24**
c) 350 × 10 = **3,500** **3,500** ÷ 10 = 350
d) **573** × 10 = 5,730 5,730 ÷ 10 = **573**

3. Children's answers will vary but they should notice that Lexi and Jamilla are doing a multiplication, Danny is doing a division and Ebo is doing an addition.
Lexi = 20 × 10 = 200
Jamilla = 20 × 10 = 200
Danny = 200 ÷ 10 = 20
Ebo = 20 + 10 = 30

3 Multiply and divide by 100

➜ pages 16–19

Discover

1. a) Aki's place value grid represents the correct way to multiply 13 by 10 and 100.
b) 13 × 100 = **1,300** **1,300** ÷ 100 = 13
100 × 13 = **1,300** **1,300** ÷ 13 = 100

Think together

1. a) 5 × 100 = **500**
15 × 100 = **1,500**
35 × 100 = **3,500**
75 × 100 = 7,500
b) 400 ÷ 100 = **4**
1,400 ÷ 100 = **14**
4,400 ÷ 100 = **44**
9,400 ÷ 100 = 94

2. a) 27 × 100 = **2,700** **2,700** ÷ 100 = 27
b) **29** × 100 = 2,900 2,900 ÷ 100 = **29**
c) 28 × 100 = **2,800** **2,800** ÷ 100 = 28
d) **30** × 100 = 3,000 3,000 ÷ 100 = **30**

3. Class 4A collected **4,800** 1p coins to make £48.
Class 4B collected 5,000 1p coins to make **£50**.

4 Related facts – multiplication

➜ pages 20–23

Discover

1. a) There are **24** boxes of pencils in 6 multipacks.
b) There are **240** pencils in total.

Think together

1. a) 3 × 5 = **15**
b) 3 × 50 = **150**
c) 3 × 500 = **1,500**

2. 3 × 40 = **120**
3 × 400 = **1,200**
30 × 4 = **120**
300 × 4 = **1,200**

3. a) 6 × 20 = **120** 4 × 70 = **280**
60 × 4 = **240** 30 × 9 = **270**
b) 6 × 200 = **1,200** 4 × 700 = **2,800**
600 × 4 = **2,400** 300 × 9 = **2,700**

5 Related facts – division

➜ pages 24–27

Discover

1. a) 8 ÷ 2 = **4**
80 ÷ 2 = **40**
800 ÷ 2 = **400**
b) 35 ÷ 5 = **7**
350 ÷ 5 = **70**
Children should predict: **3,500** ÷ **5** = **700**

Think together

1. a) 9 ÷ 3 = **3**
b) 90 ÷ 3 = **30**
c) 900 ÷ 3 = **300**

2. a) 8 ÷ 4 = 2
80 ÷ 4 = **20**
800 ÷ 4 = **200**
b) 12 ÷ 3 = **4**
120 ÷ 3 = **40**
1,200 ÷ 3 = **400**
c) 320 ÷ 8 = **40**
32 ÷ 8 = **4**
3,200 ÷ 8 = **400**

3. a) 7 × **80** = 560
700 × **8** = 5,600
560 ÷ 8 = **70**
5,600 ÷ 7 = 800
b) 40 ÷ 8 = 5
40 ÷ 5 = 8

6 Multiply and add

➜ pages 28–31

Discover

1. a) **12** chairs have bows.
There are **20** plain chairs.
There are **32** chairs in total.
b) To solve 8 × 4, you can add 3 groups of 4 (3 × 4) and 5 groups of 4 (5 × 4) to work out 8 groups of 4.

Think together

1. 5 × 6 = **30**
2 × 6 = **12**
7 × 6 = **42**

2. a) 7 × 3 = **21**
5 × 3 = **15** 2 × 3 = **6**
b) 9 × 3 = **27**
5 × 3 = **15** 4 × 3 = **12**

3. 9 × 4 = **36**

Children should discuss working out 9 × 4 by splitting 9 into two or three groups.

9 × 4: 5 × 4 + 4 × 4

9 × 4: 6 × 4 + 3 × 4

9 × 4: 7 × 4 + 2 × 4

9 × 4: 8 × 4 + 1 × 4

9 × 4: 3 × 4 + 3 × 4 + 3 × 4

7 Informal written methods

➜ pages 32–35

Discover

1. a) Andy's orchard: 10 × 6 = **60**
Jamilla's orchard: 8 × 6 = **48**
b) There are **108** apples in total.

Think together

1 a) Lexi has **50** pears.
Jamilla has **30** pears.
b) They have **80** pears in total.
c) 16 × 5 = **80**

2. a) 13 × 4 = **40** + **12** = **52**
b) 13 × 5 = **50** + **15** = **65**
c) 14 × 5 = **50** + **20** = **70**

3. a) Richard did 5 × 10 + 5 × 10 + 5 × 3 =
50 + 50 + 15 = 115
Kate did 5 × 20 + 5 × 3 = 100 + 15 = 115
Kate combined the first two sets into one set.
b) 16 × 5 = 10 × 5 + 6 × 5 = **80**
23 × 4 = 20 × 4 + 3 × 4 = **92**
31 × 8 = 30 × 8 + 1 × 8 = **248**

8 Multiply 2 digits by 1 digit

➜ pages 36–39

Discover

1. a) Bella has used expanded multiplication.
5 × 3 = 15
5 × 20 = 100
23 × 5 = 115
b) Danny has used formal column multiplication.

23 × 5 = 115

Think together

1. 22 × 6 = **132**

2. a) 34 × 5 = **170**
b) 35 × 4 = **140**
c) 45 × 3 = **135**

3. a) 32 × 4 = **128**
23 × 6 = **138**
43 × 7 = **301**
38 × 4 = **152**
b) The number of tens exchanged for ones increases by 1 each time.
c) To continue the pattern, 4 tens would be exchanged in the fifth question. For example:
27 × 6 = 162.

9 Multiply 3 digits by 1 digit

➜ pages 40–43

Discover

1. a) There are **312** seats in a section.
b) There are **936** seats in total.

Think together

1. There are **292** sweets in 2 jars.

2. There are **544** passengers in 4 planes.

3. **123** × 6 = 738 **312** × 6 = 1,872
231 × 6 = 1,386

10 Solve multiplication problems

➜ pages 44–47

Discover

1. a) There are **168** people going to Bolton Towers.

b) There are **408** people going on a trip today.

Think together

1. 192 + 225 = 417
There are **417** people in total going on a trip.

2. Ice skating costs £9 per child × 117 children = £1,053
Bowling costs £7 per child × 136 children = £952
Ice skating costs **£101** more than bowling.

3. a) 7 × 48 = 336 people
385 – 336 = 49
There will be **49** tickets available after the school has bought their tickets.
b) 336 × 6 = £2,016
The total cost of sending everyone to the play is **£2,016**.

11 Basic division

➜ pages 48–51

Discover

1. a) 42 ÷ 2 = 21
b) 36 ÷ 3 = 12

Think together

1. 48 ÷ 4 = **12**

2. a) 86 ÷ 2 = **43**
b) 68 ÷ 2 = **34**
c) 82 ÷ 2 = **41**

3. a) 39 ÷ 3 = **13** chunks of pineapple on each stick.
b) 39 ÷ 3 = **13** sticks
c) 48 ÷ 4 = **12** grapes on each stick.
d) 48 ÷ 4 = **12** sticks

12 Division and remainders

➜ pages 52–55

Discover

1. a) 39 ÷ 3 = **13**
There is no remainder.
b) **85 ÷ 4** = 21 r 1 and **57 ÷ 5** = 11 r 2

Think together

1. 37 ÷ 3 = **12 r 1**

2. a) 45 ÷ 4 = **11 r 1**
46 ÷ 4 = **11 r 2**
47 ÷ 4 = **11 r 3**
48 ÷ 4 = **12**
49 ÷ 4 = **12 r 1**
b) 65 ÷ 3 = **21 r 2**
66 ÷ 3 = **22**
67 ÷ 3 = **22 r 1**
68 ÷ 3 = **22 r 2**
69 ÷ 3 = **23**

3. a) All the odd numbers (excluding 1) leave a remainder when you divide by 2.
b) Numbers **11** to **19** and **21** to **29** leave a remainder when you divide by 10.
c) **12**, **17**, **22** and **27** leave a remainder of 2 when you divide by 5.
d) **9**, **14**, **19**, **24** and **29** leave a remainder of 4 when you divide by 5.

13 Divide 2-digit numbers

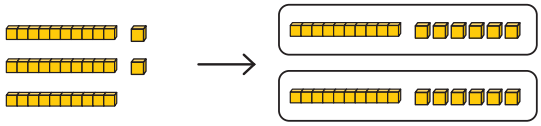
➜ pages 56–59

Discover

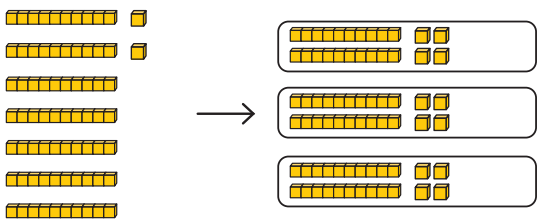
1. a) **56 ÷ 4** represents the number of bean bags in each lane.
b) 56 ÷ 4 = **14**

Think together

1. a) 32 ÷ 2 = **16**



b) 72 ÷ 3 = **24**



2. The first bar model shows 42 divided into 7 groups equals 6 in each group.

The second bar model shows 42 divided 6 groups equals 7 in each group.

3. a) A part-whole model splits a larger number into two smaller numbers which are easier to divide.
b) 85 ÷ 5 = **17**
c) 84 ÷ 7 = **12** 92 ÷ 4 = **23** 38 ÷ 2 = **19**

I4 Divide 3-digit numbers

➜ pages 60–63

Discover

1. a) There are **132** squares on the field.
Each sheep needs 3 squares.
To work out how many sheep can go in the field you need to work out **132** ÷ **3**.
b) 132 ÷ 3 = **44**

Think together

1. a) 424 ÷ 2 = **212** 224 ÷ 4 = **56**
b) **224** ÷ **4** needed the most number of exchanges.

2. a) 180 ÷ 2 = **90**
b) 180 ÷ 3 = **60**
c) 180 ÷ 4 = **45**
d) 180 ÷ 5 = **36**

3. a) Children should chose a part-whole model which makes it easier for them to work out 168 ÷ 6 = **28**.
b) 246 could be partitioned in the following ways: 240 + 6, 120 + 120 + 6 or 180 + 60 + 6.
c) Children should use one part-whole model to find the answer, such as: 180 ÷ 3 = 60, 60 ÷ 3 = 20 and 6 ÷ 3 = 2, 60 + 20 + 2 = 82 and so 246 ÷ 3 = **82**.

I5 Correspondence problems

➜ pages 64–67

Discover

1. a) There are **20** different ways for Amelia to choose one bucket and one spade.
b) This links to the multiplication 5 × 4 because there are 5 rows of 4 different matches. This is 5 lots of 4.
5 × 4 = 20

Think together

1. 6 × 4 = **24**
There are **24** different ways to choose one bucket and one spade.

2. 6 × **5** = 30
Zac has **5** pairs of shorts.

3. a) There are **28** unique pairs to choose from.
b) There are 8 socks, and each sock can be combined with 7 other socks, so 8 × 7. Children should remember that they have counted e.g. the spotty sock with the red sock and the red sock with the spotty sock, so they need to halve (divide by 2) to find the answer.

I6 Efficient multiplication

➜ pages 68–71

Discover

1. a) The factor pairs of 24 are 1 × 24, 2 × 12, 3 × 8 and 4 × 6.
b) 12 × 2 × 5 = 12 × 10 = 120
So, 24 × 5 = **120**

Think together

1. a) **5** × **6** = **30**
b) **5** × **30** = **150**

2. a) 36 × 5 = **180**
b) 18 × 18 = **324**

3. a) Richard is correct.
b) Children's answers will vary. For example, 48 = 4 × 12. So, 6 × 48 = 6 × 4 × 12 = 24 × 12 = 12 × 12 + 12 × 12 = 144 + 144 = 288.

End of unit check

➜ pages 72–73

1. B

2. A

3. B

4. A

5. C

6. D

7. D

8. D

9. A

Unit 7 – Length and perimeter

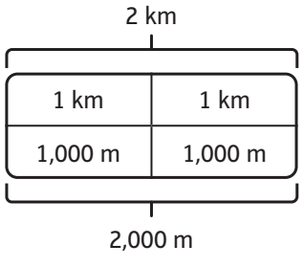
I Measure in km and m

➜ pages 76–79

Discover

1. a) The station is **2,000 m** away.

b)



Think together

1. a) 4 × 1,000 m = **4,000 m**
The beach is **4,000** metres away.
b) $\frac{1}{2}$ km is the same as **500 m**.
6 km is equivalent to **6,000 m**.
So the nearest town is **6,500 m** away.

2. a) 4,000 m = **4 km**
b) 4,100 m = **4 km 100 m**
c) 4,500 m = **4 km 500 m** = **4 $\frac{1}{2}$ km**
d) 4,250 m = **4 km 250 m** = **4 $\frac{1}{4}$ km**

3.

Village	Distance from here
Little Bampton	**3,000 m**
Battley	**750 m**
Kingsbridge	**7,500 m**
Southwell	**1,250 m**

2 Perimeter on a grid

➜ pages 80–83

Discover

1. a) Amelia will walk **28 m**.
b) The distance around the square swimming pool is **16 m**.

Think together

1. 5 + 8 + 5 + 8 = **26**
The perimeter is **26 m**.

2. 3 + 5 + 3 + 5 = 16
The perimeter is **16 cm**.

3. a) Children should explain that only two measurements are needed to find the perimeter of a rectangle: the length and the width. The perimeter can be found by doubling the length and doubling the width and adding them together.
b) Children should explain that they can double the width and length that they can see and add them together to work out the perimeter.

3 Perimeter of a rectangle

➜ pages 84–87

Discover

1. a) The perimeter of the mirror is 140 cm. The coloured lights are 120 cm long, so they will not fit around the mirror.
b) The width of the mirror is **20 cm**.

Think together

1. 7 + 7 + 4 + 4 = **22**
The perimeter is **22 m**.
The lanterns are **22 m** long.

2. 45 + 45 = 90
160 − 90 = 70
70 ÷ 2 = 35
The width of the mirror is **35 cm**.

3. The length and width added together must total 10 cm. For example: 1 cm and 9 cm, 2 cm and 8 cm, 4 cm and 6 cm, 5 cm and 5 cm.
Ash is right. All the sides of a square are the same length, so the perimeter is four times the same amount. But Astrid's method would not work with other rectangles because the sides are two different lengths.

4 Perimeter of rectilinear shapes

➜ pages 88–91

Discover

1. a) The perimeter of the flower bed is **24 m**.
b) Children should draw a flower bed shape on squared paper (1 square to represent 1 metre) with a total perimeter of 24 square lengths.

Think together

1. 8 + 5 + 2 + 3 + 6 + 2 = **26**
The perimeter of the flower bed is **26 m**.

2. The perimeter of the lawn is **52 m**.

3. Zac is correct. The total length and total width are the same in both rectilinear shapes. The area and number of sides do not make a difference.

5 Find missing lengths in rectilinear shapes

➜ pages 92–95

Discover

1. a) Side A is **9 m** long.
b) The perimeter of the pond is **32 m**.

Think together

1. a) 9 – 3 = 6
Side A is **6 m** long.
b) 12 – 8 = 4
Side B is **4 m** long.
c) 12 + 9 + 8 + 6 + 4 + 3 = 42
The perimeter is **42 m**.

2. Side A = 9 + 8 = 17 m
Perimeter = 20 + 9 + 10 + 8 + 10 + 17 = 74
The perimeter of the pen is **74 m**.

3. Perimeter = 12 + 12 + 4 + 4 + 20 + 20 = 72
The perimeter is **72 cm**.

6 Perimeter of polygons

➜ pages 96–99

Discover

1. a) Each shape has sides of equal length.
The triangle has three equal-length sides.
The square has four and the pentagon has five equal-length sides.
Shapes like these are called regular polygons.
All of the sides and all of the angles are of equal length.
b) Triangle: The perimeter is **18 cm**.
Square: The perimeter is **24 cm**.
Pentagon: The perimeter is **30 cm**.

Think together

1. a) The perimeter is **15 cm**.
b) The perimeter is **14 cm**.
c) The perimeter is **23 cm**.

2. a) **18 mm**
b) **13 mm**

3. Children's drawings and playground models will vary.

End of unit check

➜ pages 100–101

1. C

2. D

3. A

4. B

5. A

6. B

7. C

8. The perimeter is **24 cm**.

Unit 8 – Fractions (I)

I Count beyond I

→ pages 104–107

Discover

1. a) **3** equal slices make one whole pizza.

b) There are **1 $\frac{2}{3}$** pizzas in total.

Think together

1. a) $1\frac{3}{5}$

b) $2\frac{3}{5}$

c) $3\frac{3}{5}$

2. $1\frac{5}{8}$

3. Yes, all three diagrams represent $2\frac{5}{6}$.

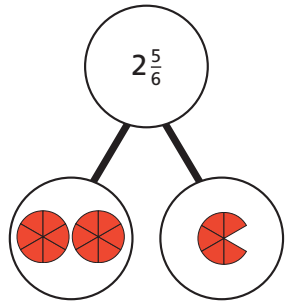
2 Partition a mixed number

→ pages 108–111

Discover

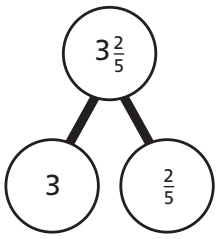
1. a) The children will make **2 $\frac{5}{6}$**.

b)

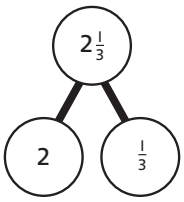


Think together

1.



2. a)



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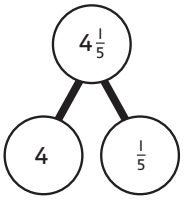

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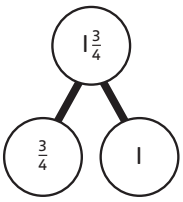
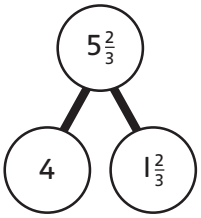


3.



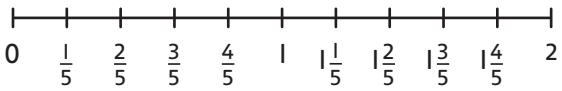
3 Number lines with mixed numbers

→ pages 112–115

Discover

1. a) **5** pieces of a cake make up the whole.

b)



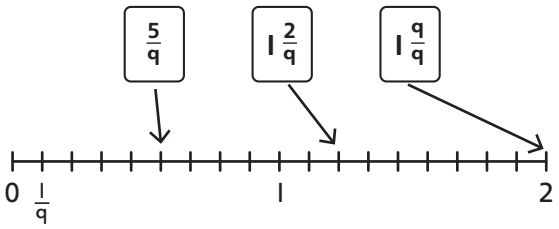
Think together

1. 0, $\frac{1}{3}$, $\frac{2}{3}$, 1, $1\frac{1}{3}$, **$1\frac{2}{3}$**, 2, **$2\frac{1}{3}$**, **$2\frac{2}{3}$**, 3

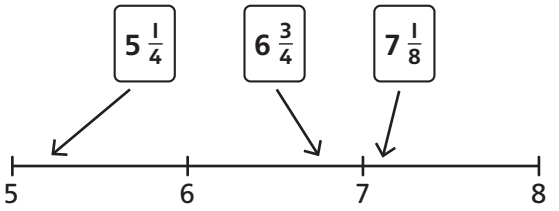
2. a) $\frac{5}{6}$, $1\frac{1}{6}$, $1\frac{5}{6}$

b) $3\frac{1}{4}$, $4\frac{3}{4}$

3. a)



b)



4 Compare and order mixed numbers

→ pages 116–119

Discover

1. a) Olivia has **$2\frac{3}{4}$** litres of liquid.

b) **Lee** has more liquid than Olivia.

Think together

1. a) **$2\frac{1}{5}$** > $1\frac{3}{5}$

b) **$2\frac{1}{6}$** < $2\frac{5}{6}$

Children should explain comparing the amounts by comparing the wholes first and then the parts.

2. Smallest to greatest: $1\frac{7}{8}$, $2\frac{3}{8}$, $2\frac{5}{8}$.

3. a) $3\frac{2}{5}$ is greater than $2\frac{3}{7}$ because $3 > 2$.

b) $2\frac{1}{5} < 2\frac{2}{5}$, $2\frac{3}{5}$, $2\frac{4}{5}$ or $2\frac{5}{5}$.

5 Convert mixed numbers to improper fractions

→ pages 120–123

Discover

1. a) Zac has **6** half rectangles.

b) Emma has **12** quarters.

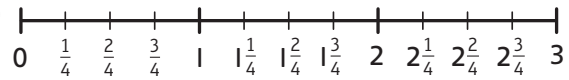
Think together

1. a) There are **11** $\frac{1}{3}$s or $\frac{11}{3}$.

b) There are **18** $\frac{1}{4}$s or $\frac{18}{4}$.

2. $3\frac{3}{4} = \frac{15}{4}$

3. a)



b) $\frac{11}{4} = 2\frac{3}{4}$

6 Convert improper fractions to mixed numbers

→ pages 124–127

Discover

1. a) Each triangle is $\frac{1}{6}$ of the hexagon.
There are **29** triangles in total.

b) $\frac{29}{6} = 4\frac{5}{6}$. You can make 4 whole hexagons and $\frac{5}{6}$ of another hexagon.

Think together

1. a) $2\frac{1}{3}$

b) $\frac{7}{3} = \frac{3}{3} + \frac{3}{3} + \frac{1}{3} = 1 + 1 + \frac{1}{3} = 2\frac{1}{3}$

c) $\frac{15}{4} = 3\frac{3}{4}$

2. a) and b) Children should copy the diagram and then shade 9 of the sections.

c) $\frac{9}{5} = 1\frac{4}{5}$

3. a) Olivia can fill **3** boxes completely.

b) **1** cube will be left over.

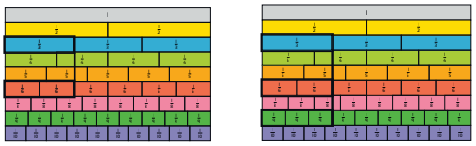
c) $3\frac{1}{8}$

7 Equivalent fractions

→ pages 128–131

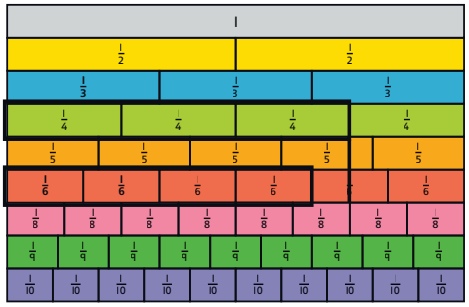
Discover

1. a)



$\frac{1}{3}$, $\frac{2}{6}$ and $\frac{3}{9}$ are equivalent.

b)



Max is not correct.

$\frac{3}{4}$ and $\frac{4}{6}$ are not equivalent.

Think together

1. a) False

b) True

c) False

2. $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$

3. **A** and **D** are equivalent: $\frac{3}{5} = \frac{6}{10}$.

B and **C** are equivalent: $\frac{6}{8} = \frac{3}{4}$.

8 Equivalent fraction families

→ pages 132–135

Discover

1. a) $\frac{1}{4} = \frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$

$\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{5}{10}$

b) $\frac{3}{15} = \frac{6}{30} = \frac{1}{5}$

Think together

1. $\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16}$

2. $\frac{1}{4} = \frac{3}{12}$ $\quad \frac{3}{5} = \frac{12}{20}$ $\quad \frac{6}{8} = \frac{12}{16}$

3. a) $\frac{6}{10}$ and $\frac{9}{15}$ are both equivalent to $\frac{3}{5}$.

b) Children's answers will vary. For example, $\frac{12}{20}$, $\frac{15}{25}$, $\frac{18}{30}$, $\frac{30}{50}$, $\frac{60}{100}$ and $\frac{90}{50}$.

9 Simplify fractions

➜ pages 136–139

Discover

1. a) $\frac{6}{9} = \frac{2}{3}$ of Mo's picture is shaded.

b) $\frac{16}{20} = \frac{4}{5}$ of Lexi's picture is shaded.

Think together

1. $\frac{3}{12}$ of Isla's picture is shaded.

$\frac{3}{12} = \frac{1}{4}$

2. a) $\frac{5}{15} = \frac{1}{3}$ of the cars are red.

b) $\frac{6}{15} = \frac{2}{5}$ of the cars are yellow.

3. Andy has shaded $\frac{9}{12} = \frac{3}{4}$.

Reena has shaded $\frac{60}{80} = \frac{6}{8} = \frac{3}{4}$.

Andy is correct. Reena has shaded more squares, but $\frac{9}{12}$ and $\frac{60}{80}$ are equivalent to $\frac{3}{4}$. Both children have shaded $\frac{3}{4}$.

End of unit check

➜ pages 140–141

1. C

2. B

3. B

4. A

5. C

6. **15** squares should be shaded in the rectangle.

$\frac{6}{8} = \frac{3}{4}$

$\frac{3}{4} = \frac{15}{20}$

Unit 9 – Fractions (2)

1 Add and subtract two or more fractions

➜ pages 144–147

Discover

1. a) Kate and Luis have eaten $\frac{7}{5}$ of pizza in total. This is the same as $\mathbf{1\frac{2}{5}}$ pizzas.

b) Luis's friends drink $\frac{2}{10}$ more juice than Kate's friends.

Think together

1. a) $\frac{5}{10}+\frac{3}{10}=\mathbf{\frac{8}{10}}$

b) $\frac{7}{10}+\frac{3}{10}=\mathbf{\frac{10}{10}=1}$

c) $\frac{9}{10}+\frac{5}{10}=\mathbf{\frac{14}{10}=1\frac{4}{10}}$

d) $\frac{7}{10}-\frac{3}{10}=\mathbf{\frac{4}{10}}$

e) $\frac{9}{10}-\frac{1}{10}=\mathbf{\frac{8}{10}}$

2. Max walks $\mathbf{\frac{15}{9}}$ or $\mathbf{1\frac{6}{9}}$ **km** in total.

3. a) $\mathbf{\frac{3}{8}+\frac{7}{8}}$ or $\mathbf{\frac{1}{8}+\frac{9}{8}}$ have a sum of $\frac{10}{8}$.

b) $\mathbf{\frac{7}{8}+\frac{5}{8}+\frac{9}{8}}=\frac{21}{8}=2\frac{5}{8}$ have the greatest total.

c) $\mathbf{\frac{1}{8}+\frac{7}{8}}=1$ or $\mathbf{\frac{3}{8}+\frac{5}{8}}=1$ or $\mathbf{\frac{7}{8}+\frac{9}{8}}=2$

d) $\mathbf{\frac{7}{8}-\frac{3}{8}}=\frac{4}{8}$ or $\mathbf{\frac{5}{8}-\frac{1}{8}}=\frac{4}{8}$ or $\mathbf{\frac{9}{8}-\frac{5}{8}}=\frac{4}{8}$

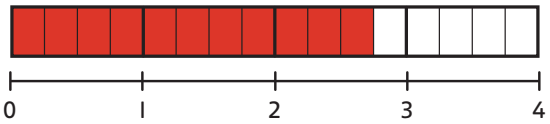
e) The cards $\mathbf{\frac{9}{8}-\frac{1}{8}}=\frac{8}{8}=1$ have the greatest difference.

2 Add fractions and mixed numbers

➜ pages 148–151

Discover

1. a)



b) The total length of the race is $2\frac{3}{4}+\frac{3}{4}=3\frac{2}{4}=\mathbf{3\frac{1}{2}}$ **km**.

Think together

1. a) $1\frac{2}{5}+\frac{1}{5}=\mathbf{1\frac{3}{5}}$

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

c) $1\frac{2}{5}+\frac{4}{5}=\mathbf{2\frac{1}{5}}$

2. Children should shade 7 more segments to work out the answer.

$2\frac{5}{8}+\frac{7}{8}=3\frac{4}{8}=\mathbf{3\frac{1}{2}}$

3. $1\frac{5}{6}+\mathbf{\frac{2}{6}}=2\frac{1}{6}$

$1\frac{5}{6}+\mathbf{\frac{4}{6}}=2\frac{1}{2}$

$1\frac{5}{6}+\mathbf{\frac{7}{6}}=3$

Triangle = 2

Square = 4

Circle = 7

3 Subtract from mixed numbers

➜ pages 152–155

Discover

1. a) $2\frac{1}{4}\text{ kg}-\frac{3}{4}\text{ kg}=1\frac{2}{4}\text{ kg}$

There are $\mathbf{1\frac{2}{4}}$ **kg** of spaghetti left.

b) $1\frac{2}{4}\text{ kg}-\frac{3}{4}\text{ kg}=\frac{3}{4}\text{ kg}$

Olivia has enough spaghetti to make the same meal again tomorrow.

Think together

1. $3\frac{1}{5}-\frac{4}{5}=\mathbf{2\frac{2}{5}}$ litres of water is left.

2. a) $1\frac{1}{9}-\frac{5}{9}=\mathbf{\frac{5}{9}}$

b) $1\frac{1}{9}-\frac{6}{9}=\mathbf{\frac{4}{9}}$

c) $1\frac{1}{9}-\frac{7}{9}=\mathbf{\frac{3}{9}=\frac{1}{3}}$

d) $1\frac{1}{9}-\frac{8}{9}=\mathbf{\frac{2}{9}}$

3. a) $1\frac{2}{7}-\frac{5}{7}=\mathbf{\frac{4}{7}}$

$\frac{9}{7}-\frac{5}{7}=\mathbf{\frac{4}{7}}$

The first calculation used the mixed number $1\frac{2}{7}$ and the second calculation used the improper fraction $\frac{9}{7}$. They are both the same number resulting in the same answer.

b) Children's answers will vary. For example, $3\frac{\mathbf{2}}{6}-\frac{\mathbf{7}}{6}=2\frac{1}{6}$ or $3\frac{\mathbf{6}}{6}-\frac{\mathbf{11}}{6}=2\frac{1}{6}$.

4 Subtract from whole amounts

➜ pages 156–159

Discover

1. a) Sofia has $\mathbf{1\frac{4}{6}}$ cheese and tomato pizza left.

b) Sofia sold **5** slices of mushroom pizza.

Think together

1. $3-\frac{2}{3}\;3=2\frac{\mathbf{3}}{\mathbf{3}}-\frac{\mathbf{2}}{\mathbf{3}}=\mathbf{2\frac{1}{3}}$

Holly has $\mathbf{2\frac{1}{3}}$ pizzas left for her family.

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

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

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

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

3. a) $5 - \frac{5}{8} = 4\frac{3}{8}$
b) Children's explanations will vary. For example, shading $4\frac{3}{8}$ sections and counting the remaining sections.
c) $5 - \frac{7}{8} = 4\frac{1}{8}$
$5 - \frac{9}{8} = 3\frac{7}{8}$

5 Problem solving – add and subtract fractions (I)

➜ pages 160–163

Discover

1. a) Lee walks $\mathbf{1\frac{2}{8}}$ **km** in total.
b) It is $\mathbf{\frac{6}{8}}$ **km** from the library to the harbour.

Think together

1. $\frac{1}{7} + \frac{2}{7} = \mathbf{\frac{3}{7}}$
$1 - \frac{3}{7} = \mathbf{\frac{4}{7}}$
The park is $\mathbf{\frac{4}{7}}$ **km** away from Aisha's house.

2. a) 1 m: Aaron should use the red ribbon.
b) $\frac{5}{11} + \frac{6}{11} = 1$: Aaron should use the dark blue and purple ribbons.
c) $\frac{2}{11} + \frac{4}{11} + \frac{5}{11} = 1$: Aaron should use the orange, light blue and dark blue ribbons.

3. Danny and Jamie ran $\mathbf{\frac{2}{5}}$ **km altogether**, so $\mathbf{\frac{1}{5}}$ **km each**.

6 Problem solving – add and subtract fractions (2)

➜ pages 164–167

Discover

1. a) They have $\mathbf{1\frac{2}{7}}$ **metres** of ribbon left.
b) There is $\mathbf{\frac{5}{7}}$ of a metre left now.

Think together

1. $\frac{4}{10} + \frac{3}{10} + \frac{2}{10} = \frac{9}{10}$
$\mathbf{\frac{9}{10}} < 1$
The juice will all fit into 1 jug.

2. $\frac{5}{8} + \frac{7}{8} = \frac{12}{8} = 1\frac{4}{8}$
$2 - 1\frac{4}{8} = 1\frac{8}{8} - 1\frac{4}{8} = \frac{4}{8}$
The third jug is $\mathbf{\frac{4}{8}}$ or $\mathbf{\frac{1}{2}}$ filled with juice.

3. Max could rearrange the fractions and add up each pair that makes a whole.
$\frac{1}{5} + \frac{4}{5} + \frac{3}{4} + \frac{1}{4} = \frac{5}{5} + \frac{4}{4} = 1 + 1 = 2$

7 Fraction of an amount

➜ pages 168–171

Discover

1. a) The smallest doll is **3 cm** tall.
b) The middle doll is **9 cm** tall.

Think together

1. a) The rubber is **3 cm** long.
b) The pencil is **21 cm** long.

2. $\frac{1}{3}$ of 15 cm = **5 cm**
$\frac{1}{5}$ of 15 cm = **3 cm**
$\frac{1}{7}$ of 42 cm = **6 cm**
$\frac{2}{3}$ of 15 cm = **10 cm**
$\frac{2}{5}$ of 15 cm = **6 cm**
$\frac{3}{7}$ of 42 cm = **18 cm**

3. Aki has £18. Ebo has £9. So, Aki has more money than Ebo.
Dexter is not correct because 8 and 4 are the denominators so they cannot be compared alone. Dexter needs to work out the unit fractions ($\frac{1}{4}$ and $\frac{1}{8}$) and then multiply them both by 3 to see how much Aki and Ebo have respectively.

8 Problem solving – fraction of an amount

➜ pages 172–175

Discover

1. a) There are **12** red cubes in Danny's tower.
b) Danny's tower has 30 cubes and Lee's tower has 16. Danny's tower has **14** more cubes than Lee's tower.

Think together

1. $24 \div 6 = 4$
Danny's tower has 4 red cubes.
$24 \div 8 = 3$
$3 \times 5 = 15$
Lee's tower has 15 red cubes.
$15 - 4 = 11$
Lee's tower has **11** more red cubes than Danny's tower.

2. Danny's tower has 48 cubes: $18 \div 3 = 6$, $6 \times 8 = 48$.
Lee's tower has 20 cubes: $18 \div 9 = 2$, $2 \times 10 = 20$.
Danny's tower has 28 more cubes.

3. There are 20 red roses, 18 yellow roses and 42 white roses.

End of unit check

➜ pages 176–177

1. C

2. B

3. C

4. C

5. A

6. Ambika has **£30** left.

Unit 10 – Decimals (I)

1 Tenths as fractions

➜ pages 180–183

Discover

1. a) Each piece is $\frac{1}{10}$ of the whole.

b) Danny removes $\frac{2}{10}$ of the jigsaw.
The answer is the same no matter which 2 pieces Danny removes.

Think together

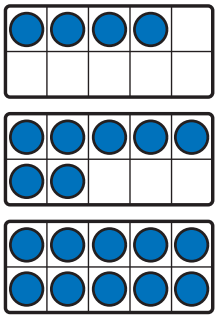
1. a) $\frac{3}{10}$ is shaded.

b) $\frac{7}{10}$ is shaded.

c) $\frac{9}{10}$ is shaded.

2. a) Reena has represented $\frac{3}{10}$.

b)



3. Reena is not correct because the puzzle is not divided into 10 equal pieces.

2 Tenths as decimals

➜ pages 184–187

Discover

1. a) The ten frame that represents $\frac{5}{10}$ is the one with counters on 5 of the 10 parts.

b) $\frac{5}{10}$ can be written as **0·5** as a decimal.

Think together

1. a) **0·1**

b) **0·3**

c) **0·8**

2. The red cubes represent **0·3** of the whole.

3. a) Aki said 0·10 after 0·9 but he should have said 1 as 10 tenths represents 1 whole.

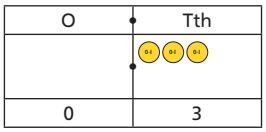
b) Jamie is correct. The circle is divided into 10 equal parts, 4 of which are shaded. 4 tenths represent 0·4.

3 Tenths on a place value grid

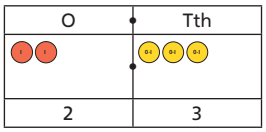
➜ pages 188–191

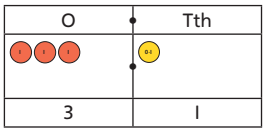
Discover

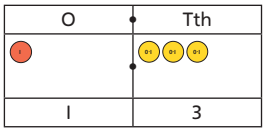
1. a) The shortest sunflower is **0·3 m**.



b)







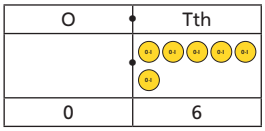
Think together

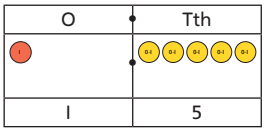
1. a) 1·4

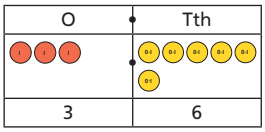
b) 2·5

c) 3·7

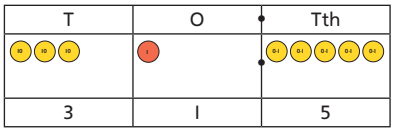
2.







3. a)



b) The value of each digit is 3 tens, 1 one and 5 tenths.

c) There are many other numbers that Danny could make. For example, 10·3, 51·9 and 95·3.

4 Tenths on a number line (I)

➜ pages 192–195

Discover

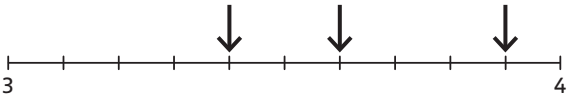
1. a) The two missing numbers are **0·3** and **0·7**.

b) Zac has made a mistake at the end of the number line. He should have put 1 instead of 0·10.

Think together

1. The missing numbers are:
a) 0·2, 0·5 and 0·9
b) 1·3 and 1·7

2. Children should point to 3·4, 3·6 and 3·9 on the number line.



3. Amelia and Olivia will say the number **0·5** at the same time.

5 Tenths on a number line (2)

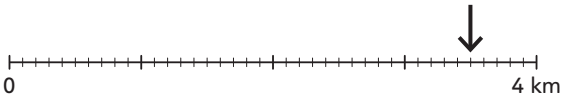
➜ pages 196–199

Discover

1. a) The beetle is $3\frac{4}{10}$ cm long. This can also be written as 3·4 cm.
b) The caterpillar is 4·1 cm long.

Think together

1. a)



b) Tom has travelled **3·5 km**.

2. Both children are correct because 9·3 is equivalent to $9\frac{3}{10}$.

3. a) Ambika and Emma will reach **5·5** at the same time.
Ambika will say 5·5 and Emma will say $5\frac{5}{10}$.
b) Emma will say **$7\frac{2}{10}$** when Ambika says 3·8.

6 Divide 1-digit by 10

➜ pages 200–203

Discover

1. a) Each new piece of rope would be **$\frac{3}{10}$ of a metre** or **0·3 m** long.
b) The calculation that shows what Holly has done is:
3 ÷ 10 = 0·3.
The 3 represents the length in metres of the original piece of rope.
The 10 represents the number of pieces this rope is cut into.
The 0·3 represents the length of each new piece of rope.

Think together

1. 40 tenths ÷ 10 = 4 tenths = **0·4**

2. **2 ÷ 10 = 0·2**
There will be **0·2 litres** of water in each glass.

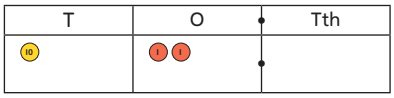
3. a) Tom has written the calculation incorrectly.
He should have written 9 ÷ 10, as 9 is the length of the whole fence and it is made out of 10 equally sized panels.
b) Counters would help Tom to visualise the 9 ones as 90 tenths.
90 tenths ÷ 10 = 9 tenths or 0·9

7 Divide 2-digits by 10

➜ pages 204–207

Discover

1. a) 12 can be partitioned into 1 ten and 2 ones.



b) Each book in Box A weighs **1·2 kg**.
The digits in 12 and 1·2 are the same, but their position has changed.

Think together

1. 2 tens ÷ 10 = 2 ones. Move the counters one place value column to the right.
3 ones ÷ 10 = 3 tenths. Move the counters one place value column to the right.
23 ÷ 10 = 2 ones and 3 tenths = 2·3

2. a) 17 ÷ 10 = **1·7**
28 ÷ 10 = **2·8**
39 ÷ 10 = **3·9**
45 ÷ 10 = **4·5**
75 ÷ 10 = **7·5**
b) Children should notice that the digits move one place value column to the right when divided by 10.

3. The largest answer is **5·4** (54 ÷ 10 = 5·4).
The smallest answer is **1·4** (14 ÷ 10 = 1·4).

8 Hundredths as fractions

➜ pages 208–211

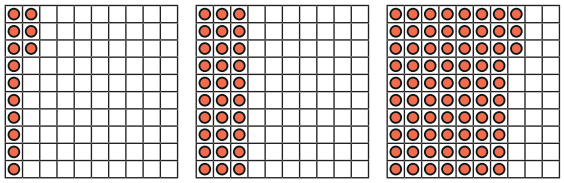
Discover

1. a) **$\frac{1}{100}$** of the hundredths grid is covered by striped counters.
b) **$\frac{10}{100} = \frac{1}{10}$** of the hundredths grid is covered by plain counters.

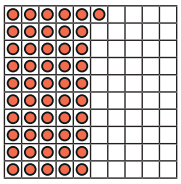
Think together

1. Amelia will say: four hundredths, five hundredths, six hundredths, seven hundredths, eight hundredths, nine hundredths, ten hundredths and eleven hundredths.
Amelia will write: $\frac{4}{100}$, $\frac{5}{100}$, $\frac{6}{100}$, $\frac{7}{100}$, $\frac{8}{100}$, $\frac{9}{100}$, $\frac{10}{100}$ and $\frac{11}{100}$.

2. **$\frac{7}{100}$** is represented.

3. a) 

b) $\frac{5}{10}$ covers 50 out 100 squares and $\frac{1}{100}$ covers 1 out 100 squares = 51 squares covered.



9 Hundredths as decimals

➜ pages 212–215

Discover

1. a) $\frac{7}{100}$ of the floor has been carpeted.

b) $\frac{7}{100}$ as a decimal is **0·07**.

Think together

1. a) 0·03
b) 0·19
c) 0·11

2. a) The hundredths grid shows $\frac{72}{100}$.

b) The hundredths grid shows $\frac{84}{100}$.

3. a) $\frac{29}{100}$ = **0·29** of the grid is now shaded.
b) Tom needs to shade **4** more squares to make 0·25.

10 Hundredths on a place value grid

➜ pages 216–219

Discover

1. a) Kate needs **5** hundredths counters to make 0·25.
b) Reena has made the number **0·52**.

Think together

1. a) 0·45 c) 1·23
b) 0·63 d) 3·05

2. The value of the 3 is not the same, for Luis it is 3 hundredths and for Bella it is 3 tenths.

3. a) Yes, Alex has made the number 0·25.
b) Children should make the number 0·32 in different ways using 0·01 and 0·10 counters. For example, 3 tenths counters and 2 hundredths counters, 2 tenths counters and 12 hundredths counters or 32 hundredths counters.

11 Divide 1 or 2 digits by 100

➜ pages 220–223

Discover

1. a) Each piece of pizza is **0·03 m** long.
b) Each piece of cake is **0·12 m** long.

Think together

1. a) 4 ones = **400** hundredths
400 hundredths ÷ 100 = **4** hundredths
4 ÷ 100 = **0·04**
b) 7 ÷ 100 = **0·07**
17 ÷ 100 = **0·17**
37 ÷ 100 = **0·37**

2. a) **16** ÷ 100 = 0·16
The starting number was **16**.
b) Children should recognise that to divide by 100, you can divide by 10 and then 10 again.
60 ÷ 10 = 6, 6 ÷ 10 = 0·6, so 60 ÷ 100 = **0·6**

3. 145 ÷ 100 = **1·45**

12 Divide by 10 and 100

➜ pages 224–227

Discover

1. a) Each plate has **3·2 kg** of cake.
b) Each person will get **0·32 kg** of cake.

Think together

1. 12 ÷ 10 = 1·2
12 ÷ 100 = 0·12
Children should notice that the digits move one place value column to the right when divided by 10 and two place value columns to the right when divided by 100.

2. Mrs Dean is correct because **67** ÷ 10 = 6·7 and **67** ÷ 100 = 0·67. Both Reena and Emma started with the number 67.

3. a) Children should use the bar model to work out $\frac{1}{10}$ of 38 kg is **3·8 kg**.
b) Children should explain that Mo is correct because $\frac{1}{10}$ of a number is the same as dividing by 10.
For example,
$\frac{1}{10}$ of 100 = 10 and 100 divided by 10 = 10.

End of unit check

➜ pages 228–229

1. C

2. D

3. C

4. B

5. C

6. D

7. C

8.