



Unit 8: Percentages

Lesson 1: Percentage of (1)

→ pages 35–37

- 40
 - 20
 - 15
 - 150
 - 48
 - 4·8
- 20 yellow squares, 10 red squares and 4 blue squares.
 - 10 yellow triangles, 5 red triangles and 2 blue triangles.
- £6
 - £7·50
 - £2·50
 - £11·25
- 2 kg = 2,000 g
Pineapple: 25% of 2 kg = 500 g
Bananas: 10% of 2 kg = 200 g
Apples: 2,000 – 500 – 200 = 1,300 g
1,300 – 200 = 1,100 g
Emma bought 1,100 more grams of apples than bananas.
 - Aki: $1\frac{1}{2}$ kg = 1,500 g
25% of 1,500 g = 375 g
Bella: $3\frac{1}{2}$ kg = 3,500 g
10% of 3,500 g = 350 g
375 > 350
Aki bought more potatoes.
- 50% of 50 = 25 25% of 50 = 12·5 10% of 30 = 3
 - 50% of 5 = 2·5 25% of 500 = 125 10% of 300 = 30
 - 50% of 0·5 = 0·25 25% of 1,000 = 250 10% of 3 = 0·3
- Saturday: 50% of £40 = £20
£40 – £20 = £20

Sunday: 10% of £20 = £2
£20 – £2 = £18

Monday: 25% of £18 = £4·50
£18 – £4·50 = £13·50
£13·50 – £5·75 = £7·75

Richard has £7·75 left.

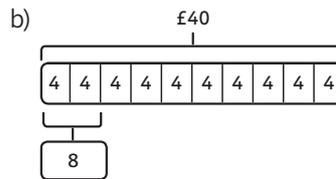
Reflect

Answers will vary; for example:
A bar model (whole labelled as 100%) divided into 10 equal parts (labelled 10%).
To find 10% of a number divide by 10.

Lesson 2: Percentage of (2)

→ pages 38–40

- $40 \div 5 = 8$
20% of £40 is £8.

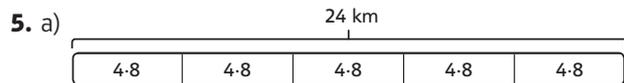


10% of £40 = £4
20% of £40 = £4 + £4
= £8

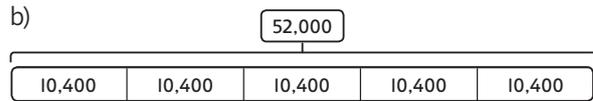
- 20% of 15 = 3
3 circles should be shaded.
- Zac is correct that to find 10% he divides by 10. However, to find 20% he needs to divide by 5, since $20\% \times 5 = 100\%$. This can also be shown with a bar model.

4.

Starting number	10% of the number	20% of the number
400	40	80
410	41	82
41	4·1	8·2
401	40·1	80·2
14	1·4	2·8
20·5	2·05	4·1



20% of 24 km = 4·8 km
Ambika has cycled 4,800 m.



20% of 52,000 = 10,400
10,400 fans support the away team.

- 20% of 400 g = 80 g
25% of 400 g = 100 g
100 – 80 = 20 g
There are 20 g more sugar than cocoa in the bar.
 - 4 squares is 25% of the bar.
25% of 80 g = 20 g
Andy has eaten 20 g of cocoa.

Reflect

Lexi is correct. If she knows 10%, she can multiply by 10 to get 100% which is the whole amount. She can also divide 10% by 10 to find 1% and using combinations of multiples of 10% and 1% can find any other amount.

Lesson 3: Percentage of (3)

→ pages 41–43

- 7
 - 6
 - 17
 - 0·61



2. Calculations completed and matched:
 1% of 300 = 3 → $300 \div 100 = 3$
 10% of 3,000 = 300 → $\frac{1}{10}$ of 3,000 = 300
 1% of 30 = 0.3 → $30 \div 100 = 0.3$
 10% of 300 = 30 → place value grid showing $\frac{1}{10}$ of 300 is 30
3. a) 1% of 1,200 = 12
 There are 12 Green Gobblins.
 b) $12 \times 3 = 36$
 3% of 1,200 = 36
 There are 36 Sapphire Specials.
4. a) 10% is £150. b) 10% is 15 m. c) 10% is 1.5 kg.
 1% is £15. 1% is 1.5 m. 1% is 150 g.
 2% is £30. 2% is 3 m. 3% is 450 g.
 3% is £45. 3% is 4.5 m. 6% is 900 g.
5. 2% of 600 = 12
 10% of 56 = 5.6
 3% of 250 = 7.5
 25% of 18 = 4.5
 1% of 500 = 5.5
 7% of 100 = 7
 Least 4.5 5.5 5.6 7 7.5 12 Greatest
6. a) Yes; 1% of 200 is 2 and 3% is 6. 1% of 300 is 3 and 2% is 6.
 b) Examples will vary; for example:
 5% of 200 is 10 and 2% of 500 is 10
 20% of 1,000 = 200; 10% of 2,000 = 200
 Children should notice that the answers are always equal.

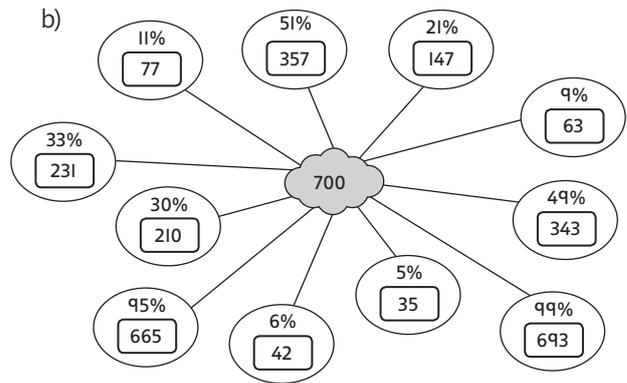
Reflect

Children should explain that to work out 3% of any number, first find 1% by dividing by 100 and then find 3% by multiplying 1% by 3. Diagrams may vary; for example: hundredths grid with 3 squares shaded.

Lesson 4: Percentage of (4)

→ pages 44–46

1. a) 30% of £400 = £120
 Each section of bar model is 40.
 $400 \div 10 = 40$
 $40 \times 3 = 120$
 b) 60% of 400 g = 240 g
 400 on top of bar model; each section is 40.
 c) 90% of 500 m = 450 m
 Each section of bar model is 50.
 d) 75% of £60 = £45
 Whole is £60
 Bar model split into 4 equal sections of £15.
2. There are 24 red tulips.
 There are 12 yellow tulips.
 There are 204 pink tulips.
3. a) 50% of 700 = 350
 10% of 700 = 70
 1% of 700 = 7



4. $11\% \text{ of } 32,500 = 3,575$ $29\% \text{ of } 32,500 = 9,425$
 $32,500 - 3,575 - 9,425 = 19,500$
 19,500 people finished the marathon.
5. Area of pitch: $100 \text{ m} \times 70 \text{ m} = 7,000 \text{ m}^2$
 Monday: $30\% \text{ of } 7,000 \text{ m}^2 = 2,100 \text{ m}^2$
 Tuesday: $7,000 - 2,100 \text{ m}^2 = 4,900 \text{ m}^2$
 $50\% \text{ of } 4,900 \text{ m}^2 = 2,450 \text{ m}^2$
 Wednesday: $1,250 \text{ m}^2$
 Thursday: $7,000 - 2,100 - 2,450 - 1,250 = 1,200 \text{ m}^2$
 1,200 square metres of the pitch still needed mowing on Thursday.

Reflect

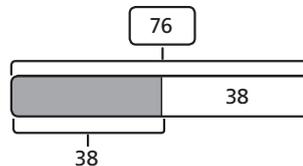
Methods will vary; for example:

$10\% \text{ of } 300 = 30$, $5\% \text{ of } 300 = 15$.
 So $80\% \text{ of } 300 = 8 \times 30 = 240$, then add 5% to give
 $85\% \text{ of } 300 = 240 + 15 = 255$.
 $10\% \text{ of } 300 = 30$, $5\% \text{ of } 300 = 15$. So $15\% \text{ of } 300 = 45$.
 $85\% = 100\% - 15\%$, so $85\% \text{ of } 300 = 300 - 45 = 255$.

Lesson 5: Finding missing values

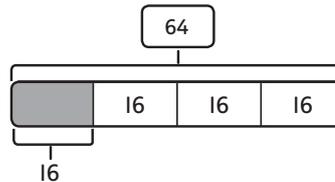
→ pages 47–49

1. a) 50% of 76 = 38



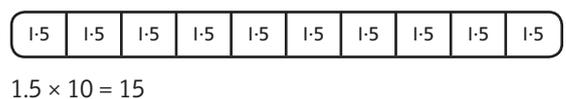
$38 \times 2 = 76$

- b) 25% of 64 = 16



$16 \times 4 = 64$

- c) 10% of 15 = 1.5





2. 40% of 60 = 24 → left-hand bar model with 24 in empty box
40% of 150 = 60 → right-hand bar model with 150 as whole
3. a) 70% = 63, so 100% = 90
30% of 90 = 27
There are 27 orange sweets.
b) The string was 320 cm long before Amelia cut it.
4. a) 420 b) 600
5. a) 10% of 90 = 9
20% of 45 = 9
30% of 30 = 9
b) 30% of 300 = 90
30% of 600 = 180
30% of 6,000 = 1,800
c) 60% of 150 = 90
60% of 75 = 45
60% of 7.5 = 4.5
6. 45 cm = 15% of length, so 15 cm = 5% of length, so total length = 15 cm × 20 = 300 cm.
So, perimeter is
20 cm + 300 cm + 20 cm + 300 cm = 640 cm
The perimeter of the whole rectangle is 640 cm.

Reflect

Diagrams will vary; for example:

Two bar models, one with 45 as the whole and split into 5 equal sections of 9, other model with 225 as the whole and split into 5 equal sections of 45.

Lesson 6: Converting fractions to percentages

→ pages 50–52

1. a) $\frac{3}{20} = \frac{15}{100} = 15\%$ c) $\frac{13}{50} = \frac{26}{100} = 26\%$
b) $\frac{4}{25} = \frac{16}{100} = 16\%$ d) $\frac{4}{40} = 10\%$
2. $\frac{19}{20} = \frac{95}{100} = \rightarrow 95\%$
 $\frac{19}{25} = \frac{76}{100}$ (numerator and denominator multiplied by 4)
→ 76%
 $\frac{19}{50} = \frac{38}{100} = \rightarrow 38\%$
3. Luis: $\frac{14}{20} = \frac{7}{10} = 70\%$
Kate: $\frac{28}{40} = \frac{7}{10} = 70\%$
Both scored 70%.

Week	Number of eggs laid	Number of eggs that hatched	Percentage of eggs hatched
Week 1	10	6	$\frac{6}{10} = 60\%$
Week 2	20	6	$\frac{6}{20} = 30\%$
Week 3	8	6	$\frac{6}{8} = 75\%$
Week 4	12	6	$\frac{6}{12} = 50\%$

5. a) $\frac{12}{20} = 60\%$ b) $\frac{8}{16} = 50\%$

6. blue = $\frac{42}{200} = 21\%$
grey = $\frac{60}{200} = 30\%$
black = $\frac{40}{200} = 20\%$
white = $\frac{44}{200} = 22\%$
yellow = $\frac{14}{200} = 7\%$

Reflect

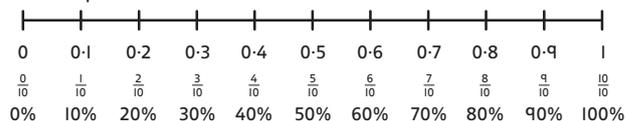
Methods may vary; for example:

Multiply numerator and denominator by 4 since $4 \times 25 = 100$ to make the fraction have a denominator of 100 and then write the numerator as the percentage, i.e. $\frac{3}{25} = \frac{12}{100} = 12\%$.

Lesson 7: Equivalent fractions, decimals and percentages (I)

→ pages 53–55

1. Equivalent decimals, fractions and percentages completed:



2. a) $0.39 = \frac{39}{100} = 39\%$
b) $0.25 = \frac{1}{4} (= \frac{25}{100}) = 25\%$
c) $0.4 = \frac{2}{5} (= \frac{40}{100}) = 40\%$
d) $1.00 = \frac{100}{100} = 100\%$
3. Amounts matched:
 $\frac{17}{100} \rightarrow 0.17$
 $\frac{7}{100} \rightarrow 0.07$
70% → 0.7
71% → 0.71

Percentage	Decimal	Fraction
66%	0.66	$\frac{66}{100} = \frac{33}{50}$
60%	0.6	$\frac{60}{100} = \frac{6}{10} = \frac{3}{5}$
9%	0.09	$\frac{9}{100}$
0%	0	0
90%	0.9	$\frac{9}{10}$

5. To convert a decimal to a percentage you write the digit in the tenths and hundredths columns as the percentage, so for decimals written to 2 decimal places (2 dp) Jamie is correct, but for decimals with more than 2 dp, you insert a decimal point after the second digit and then write the digits in the thousandths column after the decimal point, i.e. 0.125 as a percentage is 12.5%.
6. $0.5 \times 54 = 50\%$ of 54 = 27
 $0.1 \times 54 = 10\%$ of 54 = 5.4



$540 \times 0.2 = 20\% \text{ of } 540 = 108$
 $0.75 \times 54 = 75\% \text{ of } 54 = 40.5$
 $540 \times 0.25 = 25\% \text{ of } 540 = 135$
 $5,400 \times 0.99 = 99\% \text{ of } 5,400 = 5,346$

Reflect

Estimates will vary; for example:

$\frac{2}{3} = 0.666$ (recurring) = 66.6 (recurring)%

$\frac{7}{10} = 0.7 = 70\%$

Lesson 8: Equivalent fractions, decimals and percentages (2)

→ pages 56–58

- a) $\frac{4}{5} < 85\%$ b) $0.404 > \frac{100}{250}$ c) $99\% < \frac{199}{200}$
- $\frac{88}{1,000} = 0.088$
- $\frac{3}{10} < 0.55 < 57\% < 61\% < 0.62 < \frac{17}{25} < \frac{41}{50}$
- $1.8 = 1\frac{8}{10} = 1\frac{16}{20}$, so 1.8 is not more than $1\frac{17}{20}$.
- a) 65% b) 0.36 c) $\frac{1}{5,000} (= \frac{1}{200})$
- a) Diagrams will vary.
 Lexi has eaten $\frac{8}{9}$ of an apple altogether.
 $\frac{8}{9} = 0.888 = 88.89\%$ (rounded to 2 dp)
 Ebo has eaten 87% of an apple.
 $88.89 > 87$.
 Lexi has eaten the most apple.

b) Answers will vary; for example:
 Jamie eats $\frac{2}{9}$ of 2 oranges, Max has eaten 51% of an orange. Who has eaten the most orange?

Reflect

Answers will vary but children should recognise that it is easier to order numbers if they are in the same form. For example:

To order fractions, decimals and percentages they could all be converted to equivalent percentages and then put in order from smallest to greatest.

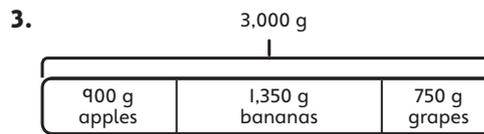
Lesson 9: Mixed problem solving

→ pages 59–61

- a) $\frac{80}{200} = \frac{2}{5}$ b) $\frac{160}{400} = \frac{2}{5}$ c) $\frac{80}{200} = \frac{2}{5}$ d) $\frac{80}{400} = \frac{1}{5}$

e) Answers will vary, but designs should have 3 white tiles for every tile with 40% shaded.
- a) This is $\frac{1}{2}$ of the whole shape.

b) Designs will vary but have an area of 5 squares.



The grapes weigh 750 g.

- Richard has 60%, which is $40\% + £25$.

$100\% = 40\% + 40\% + £25$
 $100\% = 80\% + £25$
 $100\% - 80\% = £25$
 $20\% = £25$
 $60\% = £25 \times 3 = £75$
 Richard has £75.
- The first percentage represents 45 out of 100 and the second score is 50 out of 100.

$\frac{45}{100} + \frac{50}{100} = \frac{95}{200} = 47.5\%$
- 50% of the left-hand shape is shaded. 50% of the rectangles are shaded and 50% of the circles are shaded, so in total 50% are shaded.
 25% of the right-hand shape is shaded. The shape is made up of three sections which each contain 4 of the same shape. 1 out of 4 equal shapes in each section is shaded, so $\frac{1}{4}$ of each section is shaded. So $\frac{1}{4}$, or 25%, of the whole shape is shaded.

Reflect

Answers will vary but the problem should involve 20% in some way; for example:

Bella has £40 and spends $\frac{4}{5}$. How much has she left?

End of unit check

→ pages 62–63

My journal

- a) Answers will vary; look for the shape being divided into other shapes. Children may shade 25% of each shape or 25% of the shape as a whole.

b) Answers will vary, but the equivalent of one full section (representing 20%) and $\frac{3}{4}$ of another section (representing 15%) should be shaded.



Power play

of	900	170	260	25	1
10%	90	17	26	2.5	0.1
1%	9	1.7	2.6	0.25	0.01
75%	675	127.5	195	18.75	0.75
100%	900	170	260	25	1
99%	891	168.3	257.4	24.75	0.99