Year 6 into 7 Mathematics Workbook

Percentages

Unit 20: Percentages

20.1 Equivalent percentages

Concept Corner

Fill in the spaces below:

denominator	decimals	simplified
fraction	100	

A percentage can also be represented as a _____ out of _____.

Percentages can be converted into fractions. Sometimes these can be _____:

$36\% = \frac{36}{100} = \frac{9}{25}$ $75\% = \frac{\quad}{100} = \frac{\quad}{\quad}$

Percentages can also be converted into _____:

$17\% = \frac{17}{100} = 0.17$ $0.05 = \frac{\quad}{100} =$ _____ %

https://corbettmaths.com/2012/08/19/percentages-to-decimals/

2. Gemma thinks that 70% = 0.07, Gemma is wrong. Explain the mistake that she has made.

3. Write the following percentages and decimals in ascending order:

a) 35% 0.2 0.08 12% 78% 0.7

1. Fill in the gaps in the percentage and decimal equivalences below:

a) 50% = _____

b) _____% = 0.25

c) 36% = _____

d) _____% = 0.08

e) 2% = _____

f) 12.5% = _____

g) _____% = 0.0023

h) 320% = _____

i) _____% = 14.1

2. Gemma thinks that 70% = 0.07, Gemma is wrong. Explain the mistake that she has made.

3. Write the following percentages and decimals in ascending order:

a) 35% 0.2 0.08 12% 78% 0.7

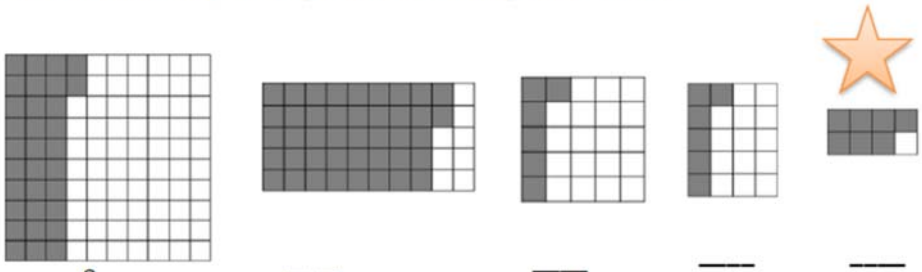
b) 37 423% 0.489 3.23% 12 300% 0.004%

https://corbettmaths.com/2012/08/20/percentages-to-fractions/

4. Draw a line linking each fraction to the correct percentage and fill in the two empty boxes:

$\frac{3}{4}$	90%
$\frac{1}{5}$	$66\frac{2}{3}\%$
$\frac{9}{\square}$	41%
$\frac{1}{2}$	75%
$\frac{\square}{100}$	50%
$\frac{2}{3}$	20%

5. What fraction and percentage of each of these grids is shaded?



$\frac{8}{25}$ ____ ____ ____ ____ ____

____ % ____ % ____ % ____ % ____ %

6. Copy and complete the table below:

Fraction	Decimal	Percentage
$\frac{3}{4}$		
	0.2	
		62.5%

7. True or false:

a) $20\% = 0.2$

b) $40\% = \frac{1}{4}$

c) $\frac{3}{10} = 3\%$

d) $5\% = \frac{1}{5}$

e) $\frac{4}{25} = 16\%$

f) $33\% = \frac{1}{3}$

https://corbettmaths.com/2013/03/29/fractions-to-percentages/

8. By converting to percentages, write the following fractions in ascending order:

$\frac{11}{8}$ $\frac{3}{4}$ $\frac{3}{2}$ $\frac{2}{5}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{7}{10}$

9. In each question re-write the values in descending order:

a) 47% $\frac{1}{2}$ 0.49 _____

b) $\frac{3}{5}$ 0.66 62% _____

c) 42% $\frac{4}{10}$ 0.44 _____

10. Write $<$, $>$ or $=$ in each box to make the below statements correct:

a) $\frac{1}{4} \square 20\%$

b) $0.68 \square \frac{7}{10}$

c) $\frac{2}{3} \square 66\frac{2}{3}\%$

d) $1.48 \square \frac{3}{2}$

e) $97\% \square \frac{48}{50}$

f) $1\% \square 0.001$

g) $\frac{1}{8} \square 13\%$

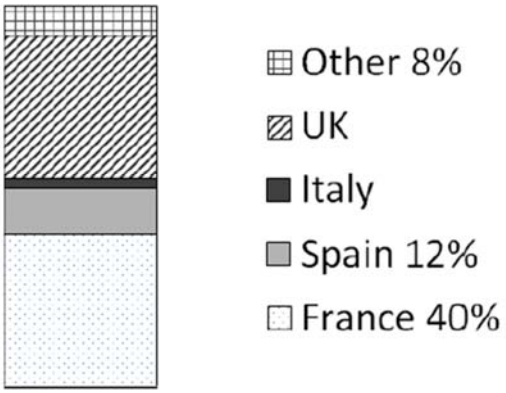
h) $33.3\% \square \frac{1}{3}$

11. Three fifths of the buildings on a road are shops.

a) What percentage are **not** shops?

b) If there are 200 buildings on the road how many are **not** shops?

12. Below is a compound bar chart showing the holiday destinations of a group of people:



a) $\frac{3}{8}$ of the group holidayed in the UK. Calculate this as a percentage.

b) What percentage holidayed in Italy?

c) What fraction holidayed in Italy?

13. $\frac{7}{20}$ of the animals on a farm are sheep and $\frac{2}{5}$ are cattle.

a) What percentage of the animals are sheep?

b) What percentage of the animals are cattle?

c) If there are 480 animals how many are either sheep or cattle?

https://corbettmathsprimary.com/2018/07/18/percentages-of-amounts-video/

20.2 Percentage of a Quantity

Concept Corner

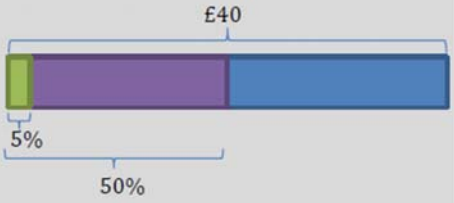
Percentages of quantities can be calculated in many different ways. Complete the gaps in these methods to find **45% of £40**:

Example 1: 45% = 50% – 5%

Find 50% of £40: ***£40 ÷ = £20***

Then find 5%: ***50% ÷ = £20 ÷ = £2***

Then find the difference between the values: _____



Example 2: 45% = 25% + 20%

Find 25% of 40: ***£40 ÷ = £10***

Find 20% of 40: ***£40 ÷ = £8***

Then add the two values: _____

Example 3: 45% = 45 × 1%

Find 1% of 40: ***£40 ÷ = £0.40***

Find 45% of 40: **45 × 0.40 =** _____

Describe how you might find 7.5% of £80:

_____

_____

_____

1. Calculate the following percentages of amounts:

a) 50% of £80

b) 10% of 250 m

c) 25% of 800 g

d) 1% of 1200 ml

e) 50% of 17 tonnes

f) 10% of £36

g) 25% of 7 litres

h) 1% of £45.60

2. Calculate the following percentages of amounts:

a) 20% of 120

b) 75% of 72

c) 5% of 70

d) 40% of 85

e) 80% of 555

f) 15% of 22

g) 45% of 130

h) 95% of 60

i) 99% of 370

j) 9% of 63

Choose either question e) or question i). Explain how you decided on your method to calculate the percentage. Can you find a better way?

3. A quick way to find 10% of a quantity is to divide by 10.
   Sarah says that this is because 10% is one tenth of 100%.
   Rachel says that the method works because you always divide by the number of percent.
   Explain why Sarah is correct and Rachel is wrong.

4. True or false:

a) Elizabeth says that to find 50% of an amount we can divide by two because 50% is half of 100%.

b) Charles says that to find 5% of an amount we can divide by 5.

c) Philip says that to find 20% of an amount we can divide by 5 because 20% is $\frac{1}{5}$ of 100%.

5. In each question circle the odd one out:

a) 25% of 64	16% of 100	25% of 60
b) 30% of 330	200% of 49	50% of 198
c) 90% of 10	12.5% of 80	10% of 100
d) 40% of 60	60% of 40	6% of 40

6. 44% of 1200 = 528. Use this fact to calculate:

a) 55% of 1200

b) 88% of 1200

c) 22% of 1200

d) 44% of 12

e) 28% of 1200

f) 1200% of 44

g) 12% of 44

h) 22% of 600

7. Joe owes Jess £160. He pays back 65% of this. How much has he paid back?

8. At a music festival 55% of the crowd are from the UK, 25% are from elsewhere in Europe and the rest are from outside Europe.
   There were 1100 people from the UK. How many people were there from outside Europe?

9. Calculate the following percentages of quantities. Round your answers to 1 decimal place where necessary.
   a) 20% of £84.20
   b) 75% of 47 kg
   c) 40% of $371
   d) 15% of 8.3 m
   e) 145% of 28 m
   f) 195% of 22 minutes
   g) 299% of €472

10. Calculate the following:

a) 11% of 390

b) 85% of 640

c) 32% of 250

d) 155% of 60

11. Calculate the following as fractions:

a) 25% of $\frac{1}{2}$

b) 30% of $\frac{1}{5}$

12. Write the following as percentages:

a) The reciprocal of $\frac{4}{3}$

b) The reciprocal of $\frac{5}{8}$

https://corbettmaths.com/2013/02/15/reverse-percentages/

20.3 Finding the whole given a percentage

Concept Corner

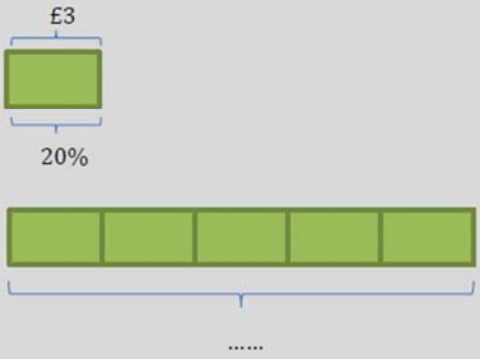
We can use bar models to help us find the whole given a percentage.

Alexi spends 20% of his pocket money on a magazine.

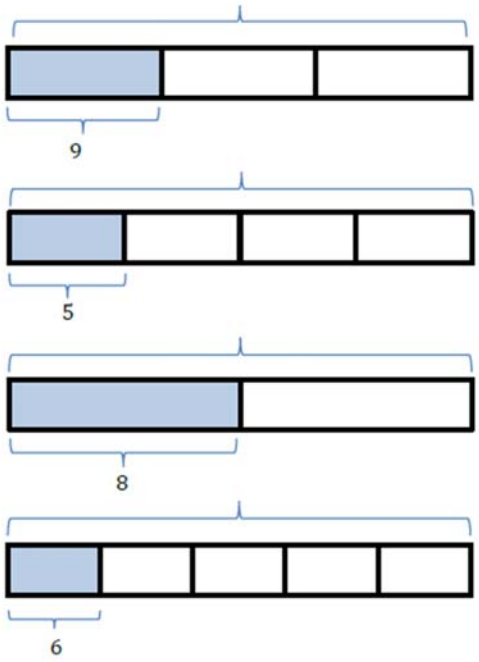
The magazine costs £3. How much does Alexi get as pocket money?

20% = £3

100% = ...



1. Match the bar models to the calculations and use these to help you calculate the whole:



25% of _____ = 5

20% of _____ = 6

$33\frac{1}{3}$% of _____ = 9

50% of _____ = 8

2. Find the value of the whole if:
   a) 50% of the number is 11

   b) 25% of the number is 10

   c) 5% of the number is 7

   d) 4% of the number is 2.2

3. 25% of Karen's weekly pocket money is exactly £2.30.
   How much pocket money does she get each week?

4. 5% of a packet of peanuts contains 9 peanuts. How many peas will there be in:
   a) One packet?

   b) Four packets?

5. Find the value of:
   a) Three times the number when 20% of the number is 3

   b) A half of the number when 2% of the number is 8

   c) One fifth of the number when $33\frac{1}{3}$% of the number is 10

6. A bike is on sale and costs 80% of its original price.
   The bike now costs £240.
   What was the original price of the bike?
   You can use the bar model below to help.

Sale
Now £240

7. Find the value of:
   a) The number when 40% of the number is 10

   b) The number when 75% of the number is 12

   c) Half of the number when 60% of the number is 18

   d) Half of the number when 8% of the number is 12

   e) $\frac{2}{5}$ of the number when 80% is 1.8

https://corbettmaths.com/2012/08/21/expressing-one-quantity-as-a-percentage-of-another/

20.4 One quantity as a percentage of another

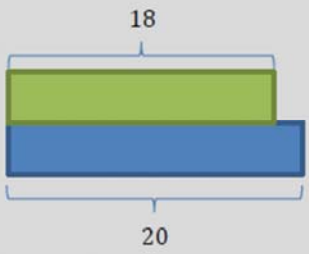
Concept Corner

One quantity can be expressed as a percentage of another.

Sarah scored 18 out of 20 on her maths test.

This can be written as a fraction and converted to a percentage.

$$\frac{18}{20} = \frac{90}{100} = 90\%$$



1. Fill in the gaps in these equivalences:

a) $\frac{87}{100} =$ _____ %

b) $\frac{9}{100} =$ _____ %

c) _____ = 73%

d) $\frac{1}{2} =$ _____ %

e) $\frac{3}{10} =$ _____ %

f) $\frac{4}{5} =$ _____ %

g) _____ = 60%

h) $\frac{21}{50} =$ _____ %

i) $\frac{7}{20} =$ _____ %

j) $\frac{24}{40} =$ _____ %

2. Match up these test scores to their equivalent percentages. Fill in any blanks.

13 out of 20	28%
29 out of 50	65%
42 out of __	58%
7 out of 25	70%
__ out of 40	75%

3. 25 children were invited to a Birthday party and 18 of them attended. What percentage attended?

4. 150 people were asked their favourite TV channel and 50 of them chose BBC 1. What percentage **did not** choose BBC 1?

5. Five farms went to a market. The amount of produce they brought and the amount they sold are shown in the table below. Complete the empty column showing the percentage of produce sold for each farm.

	Kilograms of produce	Kilograms sold	Percentage sold
Farm A	64	48	
Farm B	20	16	
Farm C	30	20	
Farm D		12	50 %
Farm E	8		25%

6. Write either <, > or = in the gaps below to make each statement correct:

a) 67% _____ $\frac{7}{10}$

b) $\frac{1}{5}$ _____ 20%

c) $\frac{9}{20}$ _____ 90%

d) 5% _____ $\frac{5}{200}$

e) $\frac{8}{25}$ _____ 37%

f) 70.5% _____ $\frac{141}{200}$

https://corbettmaths.com/2012/08/21/increasing-or-decreasing-by-a-percentage/

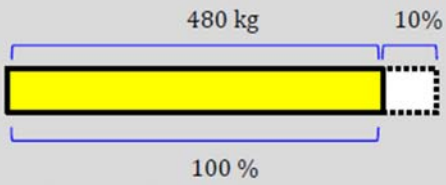
20.5 Increase and decrease by a percentage

Concept Corner

To **increase** 480 kg by 10%:

i) Find 10% of 480:

10% = 480 ÷ 10 = 48



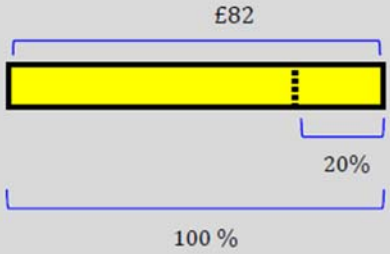
ii) **Add** this to the original amount:

480 + 24 = £ _____

To **decrease** £82 by 20%:

i) Find 20% of £82:

20% = _____



ii) **Subtract** this from the original amount:

_____

1. A bag of sweets normally contains 250 grams of sweets. A limited-edition bag contains **20% more**. What mass of sweets does the limited-edition bag contain?

2. Sarah is 1.2 m tall on 1st January. Her height **increases by 30%** in a year.
   How tall is she at the end of the year?

3. Rachel buys a mobile phone for £150. After a year she sells it for **40% less** than she paid.
   How much does she sell the phone for?

4. Sadiq can run 200 m in 41 seconds. He trains really hard and sets a new personal best which is 10% quicker than his previous time.
   What is his new best time?

5. Last July a hotel had an average of 280 guests per night. This July the number **decreased by 12.5%**. How many guests did they have in total this July?

6. Chelsea's average attendance in 2014-15 was 42 000. Their average attendance fell by 15% in 2015-16.
   Mohsin says "Chelsea's average attendance in 2015-16 was 6300."
   Mohsin is **wrong**. Explain his mistake and calculate the correct attendance.

7. Cara is booking 4 people onto a flight to Paris. The flights normally cost £86 per person but the travel agent has some special offers. Which offer should she choose? Explain your answer:

Offer 1	**Offer 2**	**Offer 3**
A 10% discount on the total price	Buy three flights and get fourth flight half price	A £40 discount on the total price

8. Circle the calculation that gives a greater answer in each question below:

   a) £80 increased by 15% ***or*** £120 decreased by 25%

   b) 45kg increased by $66\frac{2}{3}\%$ ***or*** 88kg decreased by 12.5%

   c) 1.5km increased by 50% ***or*** 3km decreased by 30%

9. The local Council decided to charge 25% less tax. This saved Geoff £24 a month.

   a) How much was his council tax before the discount?

   b) How much is his council tax after the discount?

10. Nathan was given a 5% pay rise. His pay **increased by** £2400.

   a) What was his salary before the pay rise?

   b) What is his salary including the pay rise?

11. Manchester United, Arsenal and Liverpool spent a total of £340 million on transfer fees.
Arsenal spent 25% more than Liverpool.
Manchester United spent 100% more than Liverpool.
How much did Liverpool spend?

12. Sian, Raphael and Conor went shopping. They spent a total of £132.
Raphael spent 25% more than Sian.
Conor spent 60% less than Raphael.
a) How much did Raphael spend?

b) How much did Conor spend as a percentage of Sian's spending?

20.6 Mixed percentage problems

1. 25% of Sara's class take the bus to school. If there are 28 people in her class how many people take the bus?

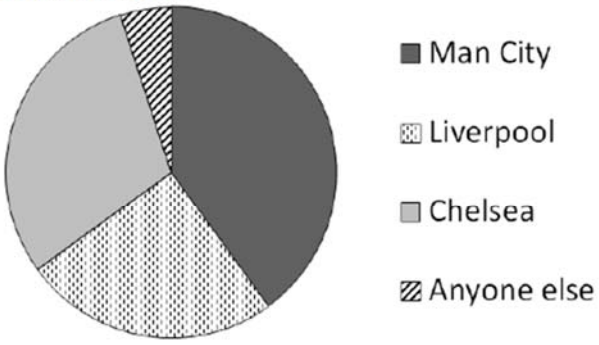
2. A shirt normally costs £32. How much would it cost after a 15% discount?

3. Adrian gets 24% pay rise on his salary of £32000. How much is his new salary?

4. Sally had a 25% discount code for the cinema. She used it and saved £3 per ticket.
   a) How much do tickets normally cost?

   b) How much did Sally pay per ticket?

5. A group of football fans were asked who they thought would win the FA Cup. The pie chart below shows the results:



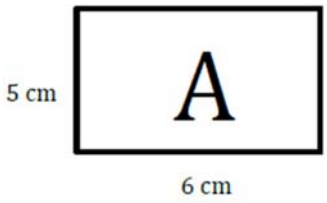
   a) Estimate the **percentage** of people who chose **Liverpool**?

   b) If 60 fans chose Liverpool use your estimate to calculate the **total number** of football fans.

   c) 5% of football fans chose **anyone else**. Use your answer from part b) to estimate how many people this is.

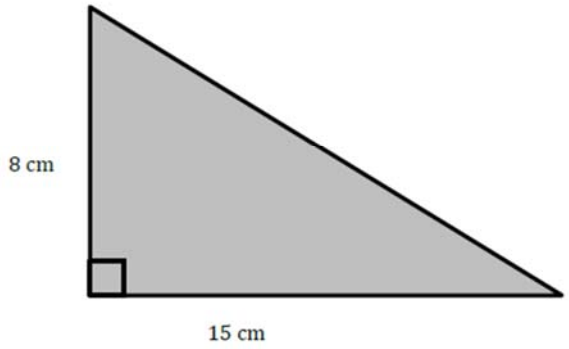
6. On a bus 30% of the travellers are children. $\frac{2}{5}$ are adult men and the rest are adult women. There are 24 adult women on the bus. How many travellers are there altogether?

7. Draw a rectangle with an area 30% smaller than rectangle A.



8. Tom bought a painting for £1000. He sold it to Dawn for 10% more than he paid for it. Dawn then sold it to Taylor for 10% less than she paid for it.
Did Taylor pay more or less than Tom for the painting?

9. Sam wants to draw a **rectangle** with an area that is 40% of the area of the triangle below. Draw a possible rectangle below giving the dimensions:



Reflections

This space is for you to write your reflections on the whole unit on percentages.

You may wish to write about:

- Things you've learnt
- Things you found difficult
- Other areas of maths you used in this topic
- Topics you need to revisit/revise in the future