

WARM-UP

1 Simplify:

a $\frac{12}{100}$

b $\frac{20}{100}$

c $\frac{35}{100}$

d $\frac{75}{100}$

e $\frac{60}{100}$

f $\frac{50}{100}$

2 Multiply these decimals by 100.

a 0.99

b 0.58

c 0.9

d 1.22

e 0.08

f 1.5

3 Which is larger in each of the following pairs?

a $\frac{1}{2}$ or 55%

b $\frac{3}{4}$ or 70%

c 0.89 or 98%

4 Copy and complete.

a $61\% = \frac{\square}{100}$

b $9\% = \frac{\square}{100}$

c $37\% = \frac{\square}{100}$

d $121\% = \frac{\square}{100}$

e $1\% = \frac{\square}{100}$

f $75\% = \frac{\square}{100} = \frac{3}{\square}$

5 Copy and complete the following table.

Fraction	Decimal	Percentage
$\frac{1}{100}$		
	0.1	
	0.25	
		50%
$\frac{3}{4}$		

WALT Convert fractions to percentages (Revision)

Success Criteria I canI know

- how to convert fractions to decimals
- Divide fractions - by dividing numerator with the denominator
- Multiply fraction with 100

Mark your WARM up do now

- 1 a $\frac{3}{25}$ b $\frac{1}{5}$ c $\frac{7}{20}$ d $\frac{3}{4}$ e $\frac{3}{5}$ f $\frac{1}{2}$
- 2 a 99 b 58 c 90 d 122 e 8 f 150
- 3 a 55% b $\frac{3}{4}$ c 98%
- 4 a 61 b 9 c 37 d 121 e 1 f 75, 4

5

Fraction	Decimal	Percentage
$\frac{1}{100}$	0.01	1%
$\frac{1}{10}$	0.1	10%
$\frac{1}{4}$	0.25	25%
$\frac{1}{2}$	0.5	50%
$\frac{3}{4}$	0.75	75%

■ Converting percentages

- To change a decimal or a fraction into a percentage, *multiply* by 100%.

For example: $\frac{1}{2} \times 100\% = 50\%$ $0.5 \times 100\% = 50\%$

- To convert a percentage into a fraction, *divide* by 100%, using fraction

notation. For example: $37\% = \frac{37}{100}$

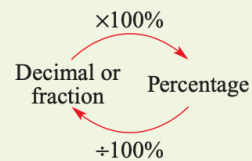
- To convert a percentage into a decimal, *divide* by 100%.

For example: $8\% = 8 \div 100$
 $= 0.08$

■ Percentage composition

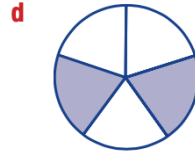
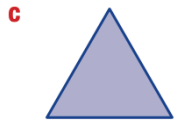
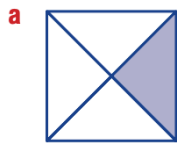
- To express one quantity as a percentage of another, write them as a fraction (make sure the units are the same). Then convert this fraction to a percentage by multiplying by 100%.

For example: 8 grams out of 32 grams = $\frac{8}{32} \times 100\%$
 $= 25\%$



Key ideas

1 What percentage of each of the following diagrams has been shaded?



2 What percentage of each of the following diagrams is not shaded?



3 Copy and complete this table of common percentages.

%	10%			50%			
Fraction			$\frac{1}{4}$			$\frac{1}{3}$	$\frac{2}{3}$
Decimal		0.2			0.75		

4 Scott scored 38 out of 50 on a maths quiz and Sarah scored 79% on the same test. Who scored the highest mark?

Example 1 Percentages and fractions

a Write $\frac{12}{25}$ as a percentage.

b Write 7.5% as a simple fraction.

Solution

$$\begin{aligned} \text{a } \frac{12}{25} &= \frac{12}{25} \times 100\% \\ &= 48\% \end{aligned}$$

$$\begin{aligned} \text{b } 7.5\% &= \frac{7.5}{100} \\ &= \frac{15}{200} \\ &= \frac{3}{40} \end{aligned}$$

Explanation

Multiply the fraction by 100%.

$$\frac{12}{25} \times 100\% = \frac{12}{\cancel{25}_1} \times \frac{100^4}{1}$$

Write the percentage as a fraction, using a denominator of 100. $\frac{7.5}{100}$

Multiply this fraction by $\frac{2}{2}$ so that we don't have a decimal in the fraction and it will be easier to

$$\text{simplify. } \frac{7.5}{100} \times \frac{2}{2} = \frac{15}{200}$$

$$\text{Simplify. } \frac{15}{200} = \frac{3}{40}$$

5 Express the following fractions as percentages.

a $\frac{1}{5}$

b $\frac{4}{5}$

c $\frac{8}{10}$

d $\frac{3}{10}$

e $\frac{1}{4}$

f $\frac{1}{8}$

g $\frac{3}{4}$

h $\frac{12}{20}$

i $\frac{14}{25}$

j $\frac{7}{20}$

k $\frac{9}{100}$

l $\frac{3}{40}$

Multiply by 100%



6 Express the following percentages as simplified fractions.

a 19%

b 23%

c 99%

d 5%

e 22%

f 45%

g 74%

h 75%

i 2.5%

j 17.25%

k 1%

l 125%

Divide by 100%.



Example 2 Converting between percentages and decimals

a Write 0.45 as a percentage.

b Write 25% as a decimal.

Solution

a $0.45 = 0.45 \times 100\% = 45\%$

b $25\% = 25\% \div 100\% = 0.25$

Explanation

Multiply by 100%. This moves the decimal point 2 places to the right.

Divide by 100%. This moves the decimal point 2 places to the left.

7 Express the following decimals as percentages.

a 0.78

b 0.95

c 0.65

d 0.48

e 0.75

f 1.42

g 0.07

h 0.3

i 0.03

j 1.04

k 0.12

l 0.1225

Move the decimal point two places to the right.



8 Express the following percentages as decimals.

a 12%

b 83%

c 57%

d 88%

e 99%

f 100%

g 120%

h 5%

Example 3 Writing a quantity as a percentage

Write 50c out of \$2.50 as a percentage.

Solution

$$50\text{c out of } \$2.50 = \frac{50}{250} \times 100\% \\ = 20\%$$

Explanation

Convert to the same units (\$2.50 = 250c) and write as a fraction. Multiply by 100%, cancelling first.

9 In each of the following cases, express the first quantity as a percentage of the second.

- a** 5 g out of 200 g **b** 40 c out of \$4
c 10 km out of 200 km **d** 3 s out of 1 minute
e 200 m out of 1 km **f** 100 mL out of $\frac{1}{2}$ L
g 200 c out of \$1 **h** 45 marks out of a possible 60 marks

Write as a fraction, then multiply by 100%.



Problem-solving and Reasoning

10 Copy and complete the table of the favourite summer sports of Year 9 students.

Sport	Number of students who chose sport	Fraction of the total	Percentage of the total
Swimming	44		
Golf	12		
Volleyball	58		
Cricket	36		
TOTAL			



Today's timeline

15 Copy and complete this table. In the first two columns, insert the times that you did each activity. Use that information to help you fill in the other columns.

a	Time you went to bed last night:	Time you woke up this morning:	Hours and minutes spent in bed:	Percentage of a day spent in bed:
b	Time you started breakfast today:	Time you finished breakfast today:	Minutes spent eating breakfast:	Percentage of the day you spent at breakfast:
c	Time school started today:	Time school is due to finish today:	Hours and minutes spent at school:	Percentage of the day spent at school:
d	Time this maths lesson started:	Time this maths lesson will finish:	Minutes spent in the maths lesson:	Percentage of the day spent in the maths lesson:
e	Time school will finish today:	Time you will arrive home:	Minutes spent travelling home:	Percentage of the day spent travelling home:
f	Time you started your homework yesterday:	Time you finished your homework yesterday:	Minutes spent on homework:	Percentage of your day spent on homework:
g	Time you started watching TV or playing games yesterday:	Time you finished watching TV or playing games:	Minutes spent at this activity:	Percentage of the day spent at this activity:
h	Time you woke up today:	Time you will go to bed tonight:	Hours and minutes spent awake today:	Percentage of the day spent awake:

11 Toni loses 31.5 cents in the dollar in tax. Express this as a percentage.



12 Bad weather stopped a cricket game for 35 minutes of a scheduled $3\frac{1}{2}$ hour match. What percentage of the scheduled time was lost?



13 Joe lost 4 kg and now weighs 60 kg. What percentage of his original weight did he lose?

What was Joe's original weight.



14 A company claims that the apple pies it makes are 97% fat free. If the nutritional information on the side of the pack states that total fat is 7 grams of the 250 gram pie, is the claim correct?

2.2 Applying percentages



The media often quotes percentages in news stories and advertisements. For example:

- 90% of dentists prefer this toothbrush.
- There is a 45% chance of rain.
- A swing of 5% towards the Liberals is expected in the next election.

It is important to be able to find a percentage of a quantity or amount.

Median sale price	% change from '08	Previous 4 weeks	% change from '08
\$375,000	-2.6%	45	17.6%
\$303,750	2.6%	16	-50.0%
\$370,000	10.4%	55	-8.3%
\$343,500	1.0%	59	25.5%
\$355,000	11.8%		-50.0%
\$376,000	-6.0%		
\$420,000	-11.1%		
	-18.7%		

Check your answers Next page

1 a 25% b 50% c 100% d 40%

2 a 75% b 70%

3

%	10%	20%	25%	50%	75%	$33\frac{1}{3}\%$	$66\frac{2}{3}\%$
Fraction	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{2}{3}$
Decimal	0.1	0.2	0.25	0.5	0.75	0.3	0.6

4 Sarah, $79\% > \frac{38}{50} = 76\%$

5 a 20% b 80% c 80% d 30%

e 25% f $12\frac{1}{2}\%$ g 75% h 60%

i 56% j 35% k 9% l $7\frac{1}{2}\%$

6 a $\frac{19}{100}$ b $\frac{23}{100}$ c $\frac{99}{100}$ d $\frac{1}{20}$

e $\frac{11}{50}$ f $\frac{9}{20}$ g $\frac{37}{50}$ h $\frac{3}{4}$

i $\frac{1}{40}$ j $\frac{69}{400}$ k $\frac{1}{100}$ l $1\frac{1}{4}$

7 a 78% b 95% c 65% d 48%

e 75% f 142% g 7% h 30%

i 3% j 104% k 12% l 12.25%

8 a 0.12 b 0.83 c 0.57 d 0.88

e 0.99 f 1.0 g 1.2 h 0.05

9 a 2.5% b 10% c 5% d 5%

e 20% f 20% g 200% h 75%

10

Sport	Number of students who chose sport	Fraction of the total	Percentage of the total
Swimming	44	$\frac{22}{75}$	$29\frac{1}{3}\%$
Golf	12	$\frac{2}{25}$	8%
Volleyball	58	$\frac{29}{75}$	$38\frac{2}{3}\%$
Cricket	36	$\frac{6}{25}$	24%
TOTAL	150	1	100%

11 31.5%

12 $16\frac{2}{3}\%$

13 $6\frac{1}{4}\%$

14 Yes, 2.8% fat content

15 Answers will vary.