# 6 Fractions and percentages

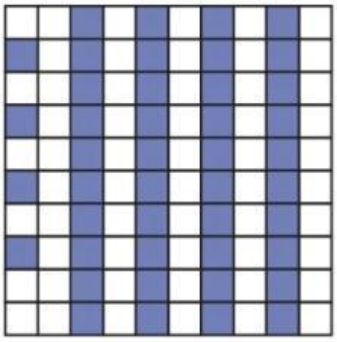
## Getting started

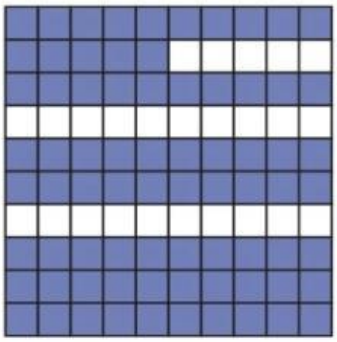
1 Maria eats $\frac{5}{8}$ of a chocolate bar with mass 240 g.

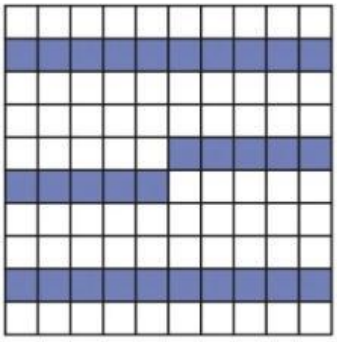
How many grams of chocolate does Maria eat?

2 What part of each diagram is shaded?

Write each answer as a percentage and as a fraction with a denominator of 100.

a 

b 

c 

3 Use each of the digits 4 and 5 once to complete these number sentences.

4.8 > ☐ .5 4.8 < ☐ .5



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**Continued**

4 Write these fractions, decimals and percentages in order starting with the smallest.

$\frac{3}{4}$ 0.2 $\frac{1}{4}$ 70% 0.3

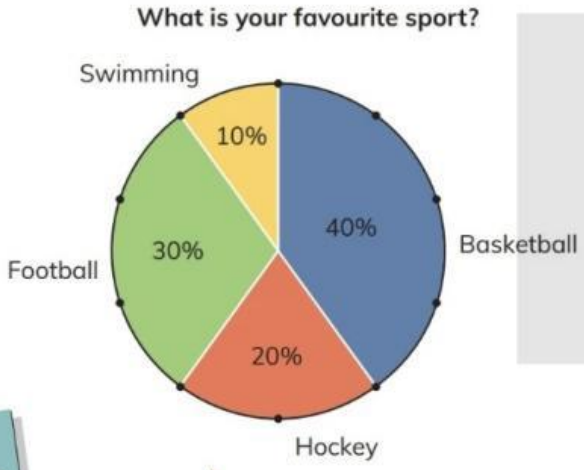
5 Use each of the digits 1, 5, 0 and 2 once to complete this statement.

$\frac{2}{10} = \frac{\square}{\square} = \square \bullet \square$

When do we use percentages?

Here are some examples.







Can you think of other times we use percentages?

This unit is all about fractions, decimals and percentages.



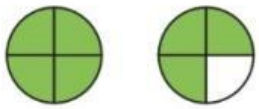
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# 6.1 Understanding fractions

**We are going to ...**

- represent a proper or improper fraction as a division
- use proper and improper fractions as operators.

An improper fraction represents a number greater than 1 whole.



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

For example, this diagram shows the improper fraction $\frac{7}{4}$.
This is equal to $1\frac{3}{4}$ which is a mixed number.
In this unit we will work with proper fractions, improper fractions and mixed numbers.

denominator
improper fraction
mixed number
numerator
operator
proper fraction

**Tip**

Remember, that > means 'greater than' and < means 'less than'



**Worked example 1**

Which is bigger $\frac{3}{4}$ of 20 or $\frac{4}{3}$ of 12?
Explain how you know.

$\frac{3}{4}$ of $20 = 3 \times \frac{1}{4}$ of 20
$= 3 \times 5 = 15$

$\frac{4}{3}$ of $12 = 4 \times \frac{1}{3}$ of 12
$= 4 \times 4 = 16$

So $\frac{4}{3}$ of $12 > \frac{3}{4}$ of 20

You can also work out $\frac{3}{4}$ of 20 by calculating $20 \div 4 \times 3 = 15$

$\frac{4}{3}$ of 12 is equivalent to $12 \div 3 \times 4$



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## Exercise 6.1

1 Represent these divisions as fractions.

a 5 divided by 6 b 6 divided by 5

c 10 divided by 4 d 4 divided by 10

2 Ahmed, Carlos, Ludvik, Oliver and Rajiv share 3 cakes between them.

What fraction of a cake does each person get?

3 Which word can you use to complete this sentence?

When you find $\frac{6}{5}$ of a number you are using a fraction as an _____ .

4 Calculate.

a $\frac{3}{4}$ of \$16 b $\frac{5}{4}$ of \$12 c $\frac{5}{2}$ of 4 metres

5 Halima swims $\frac{1}{2}$ of 500 metres and Bella swims $\frac{3}{10}$ of 800 metres.




Who swims further? Explain how you know.

6 Leroy and Wayne each have 90 bricks.

Leroy uses $\frac{3}{5}$ of his bricks to build a wall.

Wayne uses $\frac{5}{6}$ of his bricks to build a wall.

How many bricks do they have left altogether? Show your working.

Discuss your answer with your partner. Do you agree?

Look back at your answers to questions 5 and 6 where you had to show and explain your working. What improvements can you make? Discuss your ideas with your partner.



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7 Copy and complete this table to show fractions of 24.

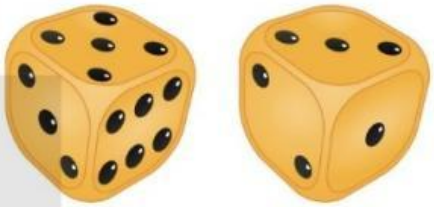
| Fraction | $\frac{1}{4}$ | $\frac{3}{4}$ | $\frac{5}{4}$ | $\frac{7}{4}$ | $\frac{9}{4}$ | $\frac{11}{4}$ |
|---|---|---|---|---|---|---|
| Amount | 6 | | | | | |

8 Calculate.

a $\frac{9}{4}$ of 16 b $\frac{7}{5}$ of 35 c $\frac{8}{7}$ of 14 d $\frac{4}{3}$ of 15

**Think like a mathematician**

Imagine that you roll two 1 – 6 dice and use them to make an improper fraction.



$\frac{5}{3}$ is an improper fraction

Write all the different improper fractions you could make.

**Tip**

Be systematic.



**Look what I can do!**

- ☐ I can represent a proper or improper fraction as a division.
- ☐ I can use proper and improper fractions as operators.



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# 6.2 Percentages

**We are going to ...**

- find percentages of whole numbers and shapes.

Have you ever seen a shop that is having a sale?

Sometimes shops will offer an amount off the price, for example $5 off.

More often though they offer a percentage off, for example 10% off or 25% off.

operator
percentage
per cent

If a jumper originally costs $20, but a 10% reduction is offered, how much money is taken off in the sale?



**Worked example 2**

Find 20% of these quantities.

a 50 b 20 cm c $30 d 110 kg

a 10% is 5 so 20% is 10

b 10% is 2cm so 20% is 4 cm

c 10% is $3 so 20% is $6

d 10% is 11kg so 20% is 22 kg

$10\% = \frac{1}{10}$ so to find 10% divide by 10.
Multiply the result by 2 to find 20%

Remember to write the units in the answer.

## Exercise 6.2

1 Find 10% of these quantities.

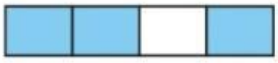
a 40 b 70 cm c $20 d 120 kg

2 A man has a mass of 80 kg. 60% of his total mass is water.
What is the mass of this water?

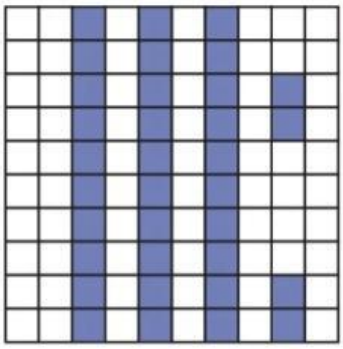
3 Helga says, 'To calculate 10% of a quantity, you divide it by 10, so to find 50%, you divide by 5.'

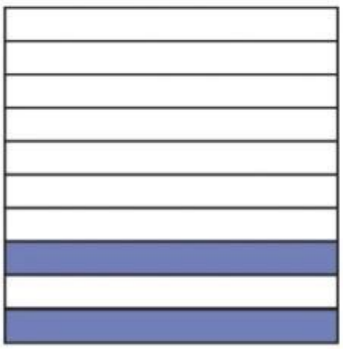
Helga is not correct. Explain what is wrong with her statement.

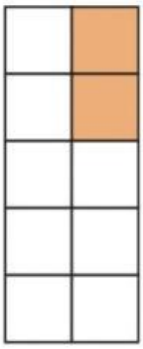
4 What percentage of the diagram is shaded?



5 What percentage of each diagram is shaded?

a 

b 

c 



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6 Calculate.

a 15% of 120 b 45% of 240 c 65% of 180

Check your answers to questions 5 and 6 with your partner.



7 Amy has $400. She spends 40% of her money on a new bike.

How much does she spend on the bike?

8 Song has strip of paper 20 cm long.

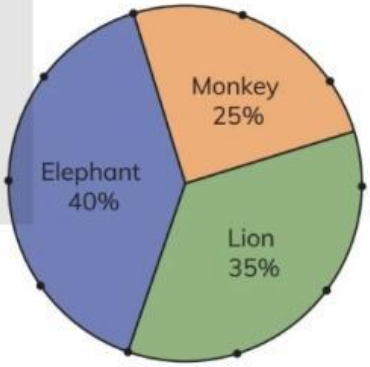
He cuts a 5 cm piece off the strip.

What percentage of the strip does he cut off?

9 a A coat originally costs $40. The price goes up by 10%. What is the new price?

b A garden centre sells plants at 25% off at the end of the month. The price of a plant was originally $8. What is its price at the end of the month?

10 The pie chart shows the favourite animals of Stage 6 children.




Tip

A pie chart shows a divided circle where each section represents a percentage of the total.



32 children chose elephants.

How many children are in Stage 6? Explain your answer.





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In questions 3 and 10 you had to write an explanation. Did you find that easy or hard? If you found it hard, try explaining answers to your partner first and then work together to write down your thoughts.

### Think like a mathematician

Here are twelve numbers.

10 20 25 40 50 60

75 100 150 160 500 600

Can you write four number sentences using each of the twelve numbers once?

□ % of □ is □ □ % of □ is □

□ % of □ is □ □ % of □ is □

### Tip



Try cutting out number cards and moving them around until you find the correct answer.

### Look what I can do!

☐ I can find percentages of whole numbers and shapes.





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# 6.3 Equivalence and comparison

**We are going to ...**

- reduce fractions to their simplest form
- recognise that fractions, decimals and percentages can have equivalent values
- compare fractions, decimals and percentages using the symbols =, > and <
- order fractions, decimals and percentages.

You can simplify a fraction if you can divide both the numerator and denominator by the same number.

$$\frac{4}{20} \overset{\div 2}{=} \frac{2}{10} \overset{\div 2}{=} \frac{1}{5}$$

equivalent fraction
simplest form simplify

$\frac{1}{5}$ is the simplest form of the fraction.

You will learn how to simplify fractions in this section.

**Worked example 3**

Kiki says $\frac{7}{10}$ is equivalent to 10.7

Davy says $\frac{7}{10}$ is equivalent to 0.7

Mohammed says $\frac{7}{10}$ is equivalent to 1.07

Do you agree with any of these students?

Explain your answer.



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