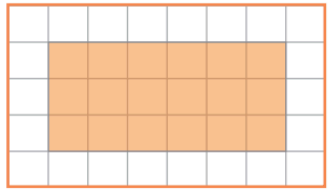
Key Vocabulary

- perimeter
- area
- volume
- cubic units (e.g. cm^3)
- cuboid
- width
- length
- rectangle
- rectilinear
- parallelogram
- perpendicular height

Area of Rectangles

length × width = area of a rectangle



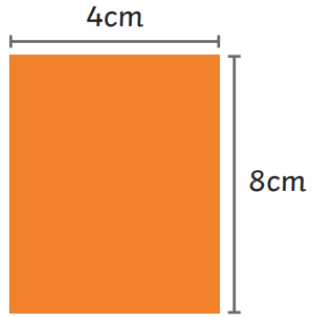
Counting squares:

area = $18cm^2$

Use formula:

6cm × 3cm

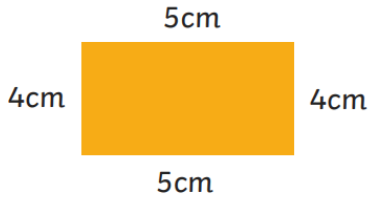
area = $18cm^2$



8cm × 4cm area = $32cm^2$

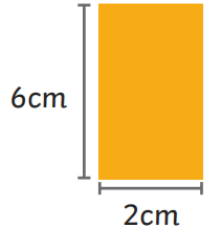
Perimeter of Rectangles

perimeter = length + width + length + width or (length + width) × 2



5cm + 4cm + 5cm + 4cm

area = $18cm^2$

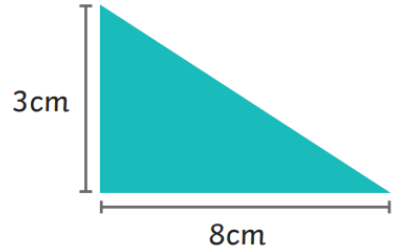


(6 + 2) × 2

area = $16cm^2$

Area of Triangles

base × perpendicular height ÷ 2 = area of a triangle



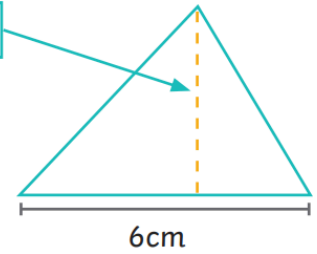
8cm × 3cm ÷ 2

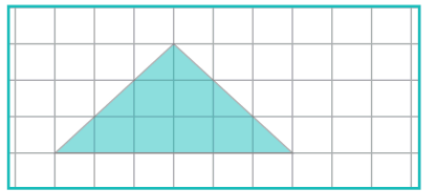
area = $12cm^2$

perpendicular height = 5cm

6cm × 5cm ÷ 2

area = $15cm^2$





Counting squares:

6 whole squares = $6cm^2$

6 half squares = $3cm^2$

$6cm^2 + 3cm^2 = 9cm^2$

area = $9cm^2$

Using formula:

6cm × 3cm

÷ 2 = $9cm^2$

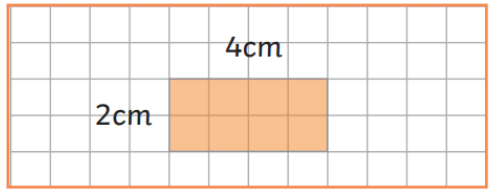
Perimeter and Area

Shapes with the same area can have different perimeters.

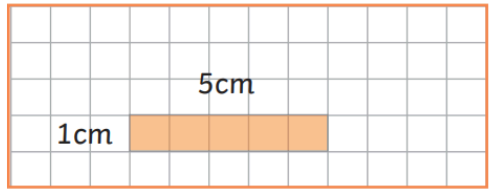
area = $8cm^2$ perimeter = 12cm

area = $8cm^2$ perimeter = 18cm

Shapes with the same perimeter can have different areas.



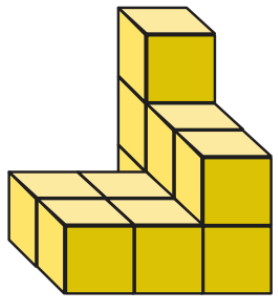
area = $8cm^2$ perimeter = 12cm



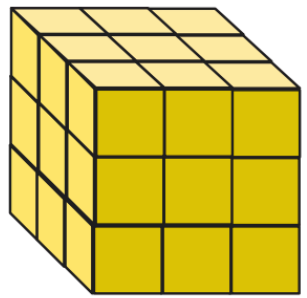
area = $5cm^2$ perimeter = 12cm

Volume - Counting Cubes

= $1cm^3$



$11cm^3$

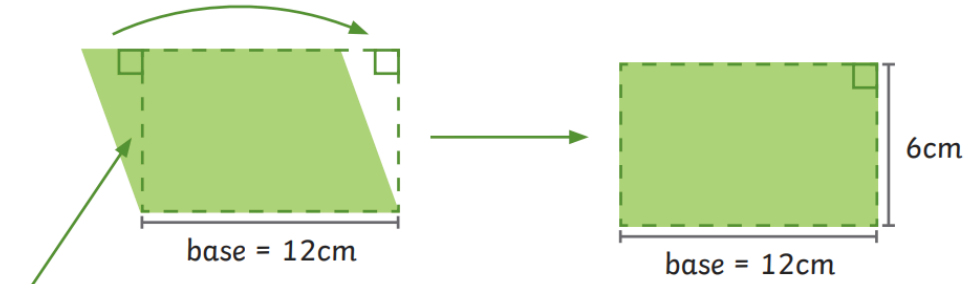


$27cm^3$

Area of Parallelograms

base × perpendicular height = area of a parallelogram

A parallelogram can be transformed into a rectangle.

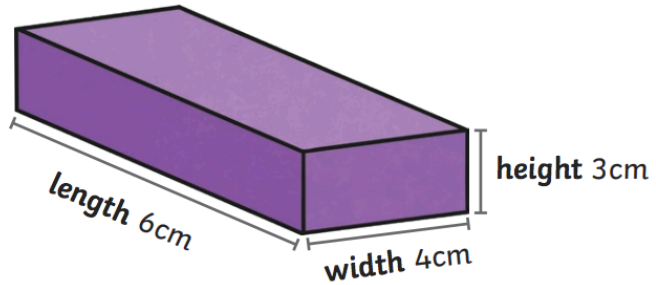


perpendicular height = 6cm

12cm × 6cm = $72cm^2$

Volume of Cuboids

length × width × height = volume of a cuboid



Multiply dimensions in **any** order:
3cm × 6cm × 4cm
volume = $72cm^3$

Ratio Knowledge Organiser

Key Vocabulary

- ratio
- proportion
- "for every... there are..."
- part
- whole
- scale factor
- enlargement
- similar shapes
- length
- width
- perimeter

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Ratio Language

For every 1 circle, there are 2 triangles.

For every 2 bananas, there are 3 apples.

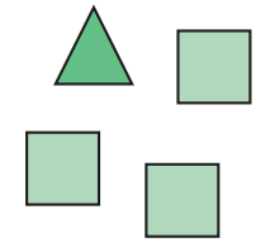
For every 1 football, there are 3 rugby balls.

Ratio and Fractions

For every 1 rugby ball, there are 2 footballs.

Ratio of rugby balls to footballs: 1:2

$\frac{1}{3}$ of the balls are rugby balls.



For every 1 triangle, there are 3 squares.

Ratio of triangles to squares: 1:3

$\frac{1}{4}$ of the shapes are triangles.

The Ratio Symbol

The ratio of footballs to rugby balls: 1:4

The ratio of rugby balls to footballs: 4:1

The ratio of circles to triangles: 2:3

The ratio of triangles to circles: 3:2

The ratio of apples to bananas: 1:2

The ratio of bananas to oranges: 2:3

The ratio of apples to bananas to oranges: 1:2:3

The ratio of oranges to bananas to apples: 3:2:1

Ratio

Knowledge Organiser

Ratio and Proportion Problem-Solving

To use the ingredients for 1 person, you divide all the quantities by 10 (÷ 10).

To use the ingredients for 5 people, you halve all the quantities (÷ 2).

Ingredients for Fruit Smoothie
(serves 10 people)

800g of bananas

500g of strawberries

200g of raspberries

700ml of milk

300ml of natural yogurt

To use the ingredients for 20 people, you double all the quantities (× 2).

In a bag of 15 sweets, there is 1 smiley face sweet for every 4 love heart sweets.

Therefore, there will be 3 smiley face sweets and 12 love heart sweets in the bag.

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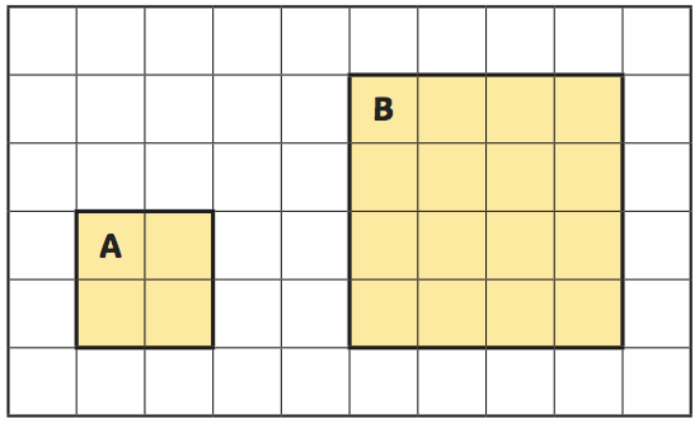
Scale Factors

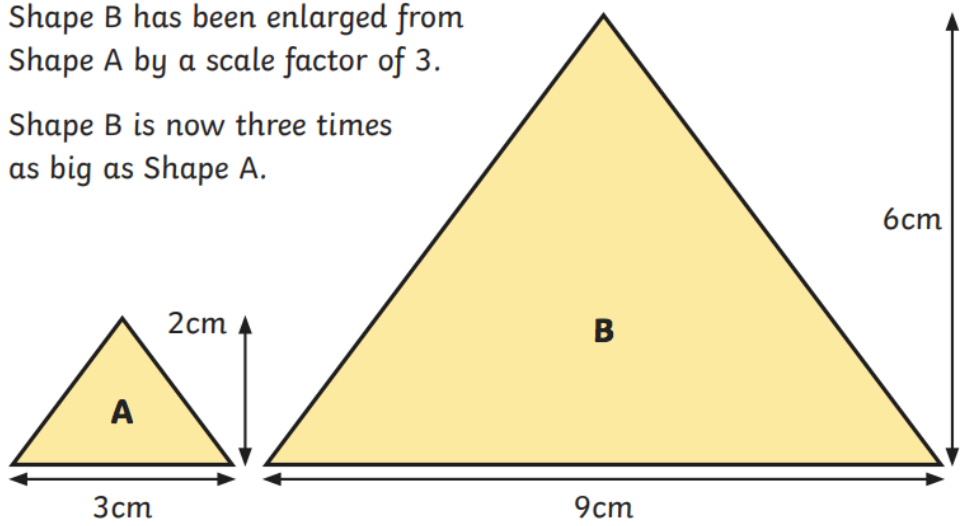


Shape A has been enlarged by a scale factor of 2 to make Shape B.

Shape B is now two times as big as Shape A.

Shape B has been enlarged from Shape A by a scale factor of 3.

Shape B is now three times as big as Shape A.



Percentages

Knowledge Organiser

Key Vocabulary

- per cent (%) = 'out of 100'
- percentage
- discount
- equivalent fraction
- equivalent decimal
- convert
- compare
- order
- the whole

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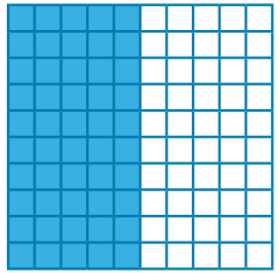
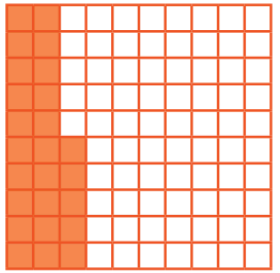
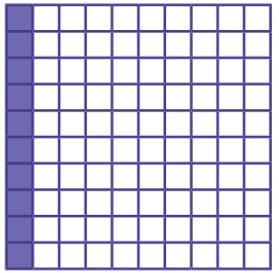
Equivalent Fractions, Decimals and Percentages



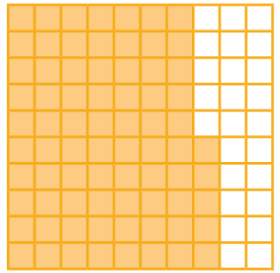
$\frac{50}{100} = \frac{1}{2} = 0.5 = 50\%$



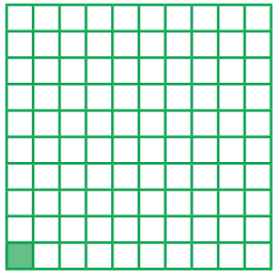
$\frac{25}{100} = \frac{1}{4} = 0.25 = 25\%$



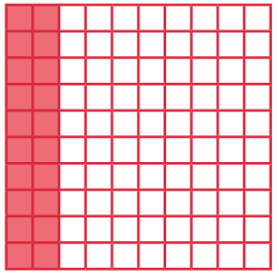
$\frac{10}{100} = \frac{1}{10} = 0.1 = 10\%$



$\frac{75}{100} = \frac{3}{4} = 0.75 = 75\%$

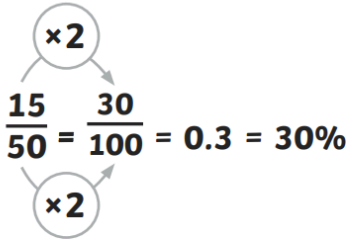


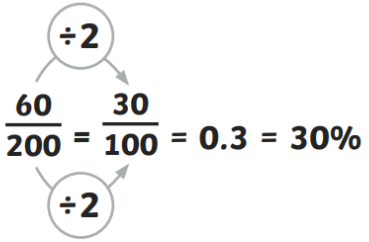
$\frac{1}{100} = 0.01 = 1\%$



$\frac{20}{100} = \frac{2}{10} = 0.2 = 20\%$

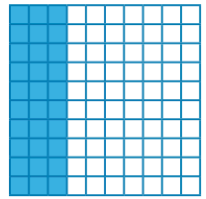
Fractions to Percentages



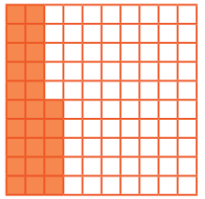


Order Fractions, Decimals and Percentages

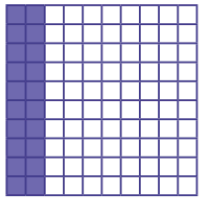
$\frac{3}{10} > 25\% > 0.2$



$\frac{30}{100} = 30\%$

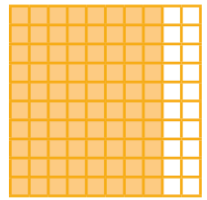


$\frac{25}{100} = 25\%$

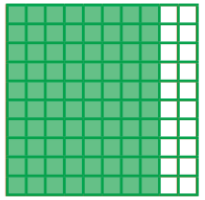


$\frac{20}{100} = 20\%$

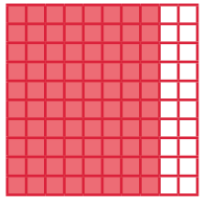
$80\% = 0.8 = \frac{4}{5}$



$\frac{80}{100} = 80\%$



$\frac{80}{100} = 80\%$



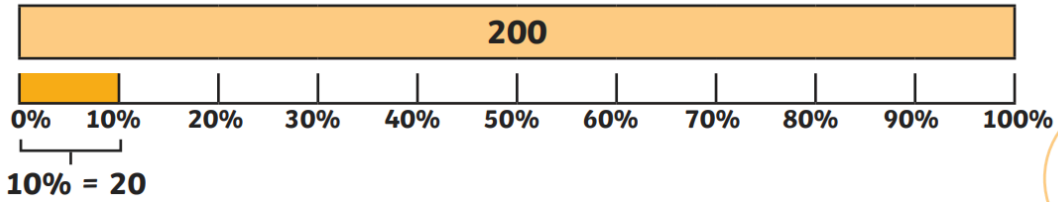
$\frac{80}{100} = 80\%$

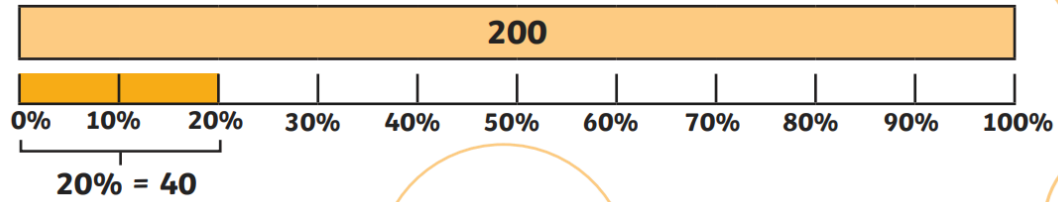
Percentages

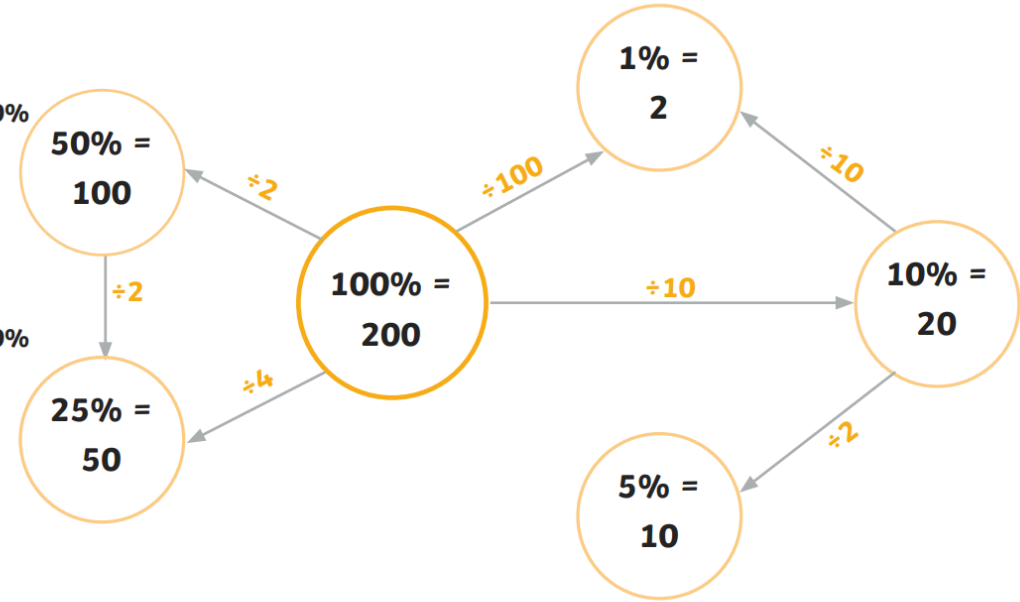
Knowledge Organiser

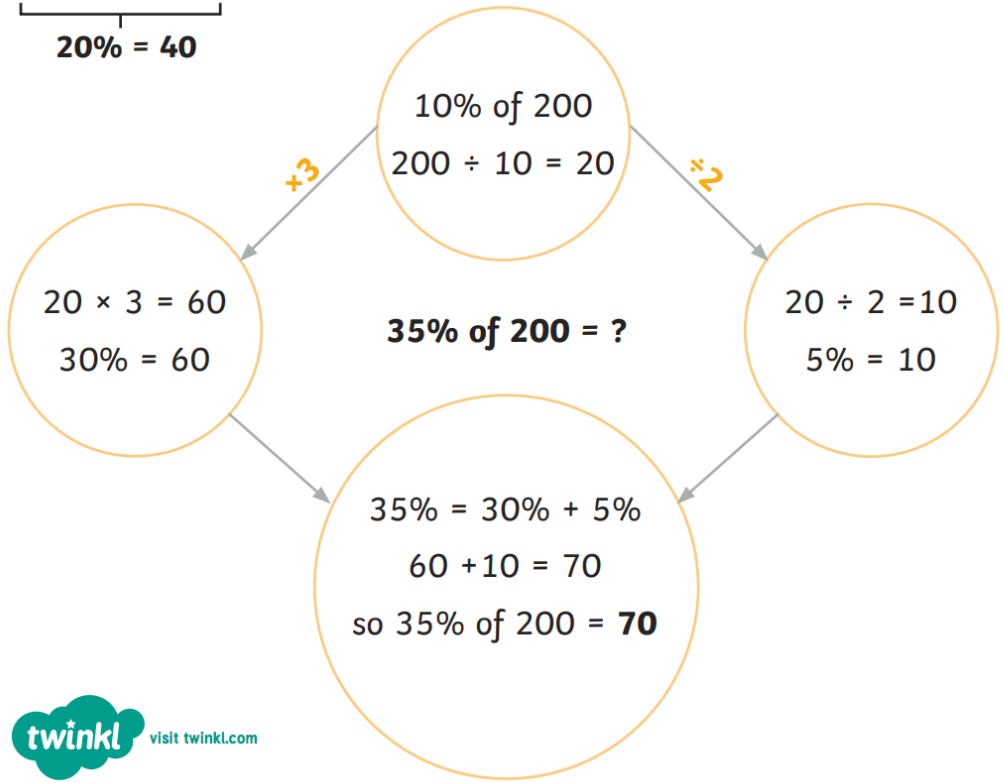
Finding a Percentage of an Amount

50% = $\frac{1}{2}$ so we can divide by 2	10% = $\frac{1}{10}$ so we can divide by 10	25% = $\frac{1}{4}$ so we can divide by 4	1% = $\frac{1}{100}$ so we can divide by 100



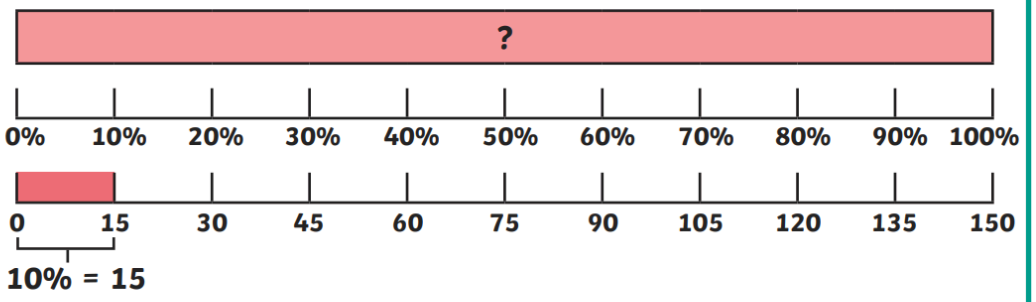






Percentages – Missing Values

Whole value (100%) of bar model = ?



We know 10% = 15 10% × 10 = 100% (the whole) so 15 × 10 = 150

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Decimals

Knowledge Organiser

Key Vocabulary

- decimal place
- decimal fraction
- recurring decimal
- equivalent fraction
- tenth
- sharing
- partitioning
- exchanging
- rounding to 3d.p.
- hundredth
- thousandth
- equal to
- remainder
- grouping

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Place Value

Tens	Ones	.	tenths	hundredths	thousandths
	1 1 1		0.1 0.1 0.1 0.1	0.01 0.01	0.001 0.001 0.001 0.001 0.001 0.001

$3 + \frac{4}{10} + \frac{2}{100} + \frac{6}{1000}$ ← **3.426** → $3 + 0.4 + 0.02 + 0.006$

1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

Fractions to Decimals

$\frac{7}{20} \overset{\times 5}{=} \frac{35}{100}$ or 0.35

$\frac{7}{25} \overset{\times 4}{=} \frac{28}{100}$ or 0.28

$\frac{7}{50} \overset{\times 2}{=} \frac{14}{100}$ or 0.14

$\frac{8}{200} \overset{\div 2}{=} \frac{4}{100}$ or 0.04

When the denominator is not a factor or multiple of 100

$\frac{7}{8} = 7 \div 8$

	0	.	8	7	5
8	7	.	$^{7}0$	$^{6}0$	$^{4}0$

Dividing Decimals by Integers

8.12 ÷ 4

	2	. 0	3
4	8	. $^{1}\not{1}$	$^{1}2$

6.93 ÷ 3 = 2.31

Ones	.	tenths	hundredths
1 1		0.1 0.1 0.1	0.01
1 1		0.1 0.1 0.1	0.01
1 1		0.1 0.1 0.1	0.01

Decimals

Knowledge Organiser

Multiplying and Dividing by 10, 100 and 1000

Thousands	Hundreds	Tens	Ones	tenths	hundredths	thousandths
			2	0	8	
		2	0	8		
			2	0	8	

× 10 ÷ 10

Thousands	Hundreds	Tens	Ones	tenths	hundredths	thousandths
		4	3	5		
4	3	5	0			
		4	3	5		

× 100 ÷ 100

Thousands	Hundreds	Tens	Ones	tenths	hundredths	thousandths
			1	3	5	1
1	3	5	1			
			1	3	5	1

× 1000 ÷ 1000

Multiplying Decimals by Integers

	3 .	4	5
×			3
1	0 .	3	5
	1	1	

3.21 × 3 = 9.63

Ones	tenths	hundredths
1 1 1 .	0.1 0.1	0.01
1 1 1 .	0.1 0.1	0.01
1 1 1 .	0.1 0.1	0.01

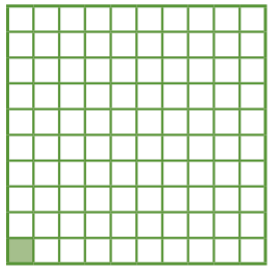
Decimal Numbers as Fractions

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

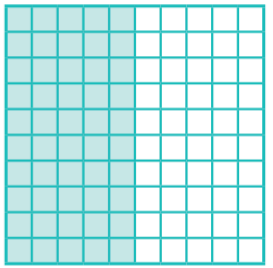
$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

$\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$ $\frac{4}{10}$ $\frac{5}{10}$ $\frac{6}{10}$ $\frac{7}{10}$ $\frac{8}{10}$ $\frac{9}{10}$ 1

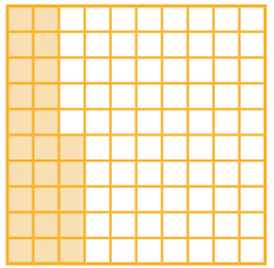
$\frac{1}{5}$ $\frac{2}{5}$ $\frac{1}{2}$ $\frac{3}{5}$ $\frac{4}{5}$



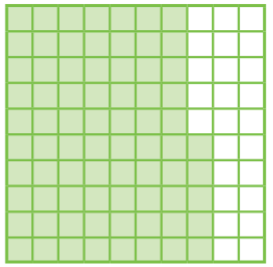
$\frac{1}{100} = 0.01$



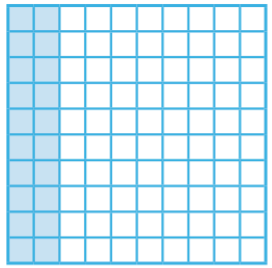
$\frac{50}{100} = \frac{1}{2} = 0.5$



$\frac{25}{100} = \frac{1}{4} = 0.25$



$\frac{75}{100} = \frac{3}{4} = 0.75$



$\frac{20}{100} = \frac{1}{5} = 0.2$

$\frac{1}{3} = 0.33$ $\frac{1}{8} = 0.125$ $\frac{1}{1000} = 0.001$

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Converting Units

Knowledge Organiser

Key Vocabulary

mass
gram
kilogram
capacity
volume
mililitre
litre
millimetre
centimetre
kilometre
foot
inch
ounce
pound
stone
pint
gallon

Converting Mass

1 tonne = 1000kg

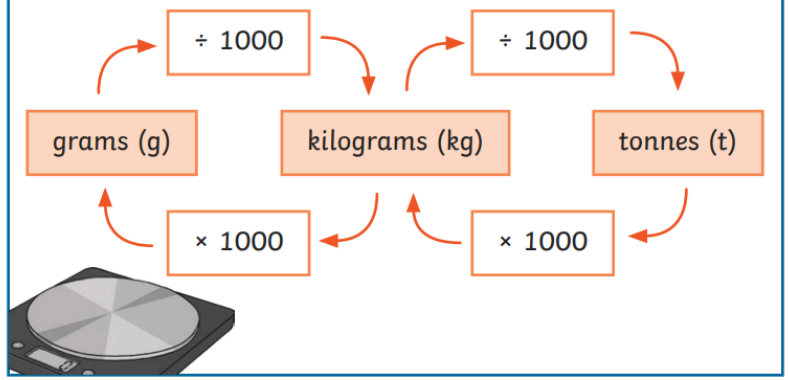
1000g = 1kg

$\frac{1}{10}$ kg = 0.1kg = 100g

$\frac{1}{4}$ kg = 0.25kg = 250g

$\frac{1}{2}$ kg = 0.5kg = 500g

$\frac{3}{4}$ kg = 0.75 = 750g



Converting Capacity

1000ml = 1l

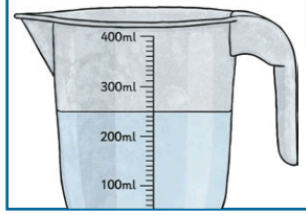
$\frac{1}{10}$ l = 0.1l = 100ml

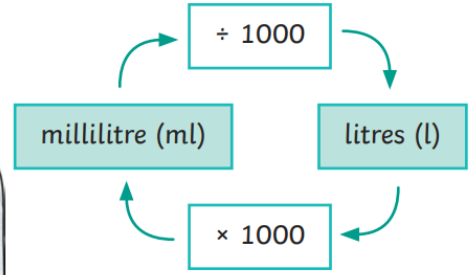
$\frac{1}{4}$ l = 0.25l = 250ml

$\frac{1}{2}$ l = 0.5l = 500ml

$\frac{3}{4}$ l = 0.75l = 750ml

$\frac{1}{100}$ l = 0.01l = 10ml





Converting Length

1000m = 1km

100cm = 1m

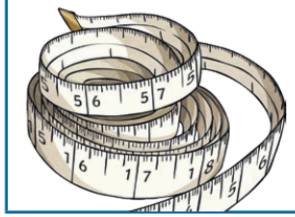
10mm = 1cm

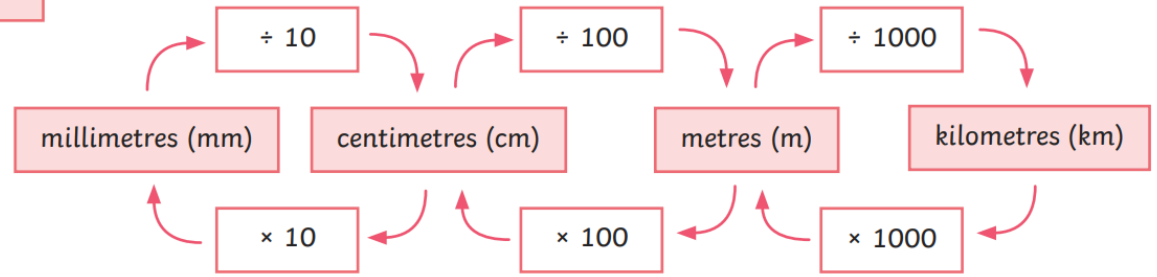
$\frac{1}{2}$ m = 0.5m = 50cm

$\frac{1}{4}$ m = 0.25m = 25cm

$\frac{3}{4}$ m = 0.75m = 75cm

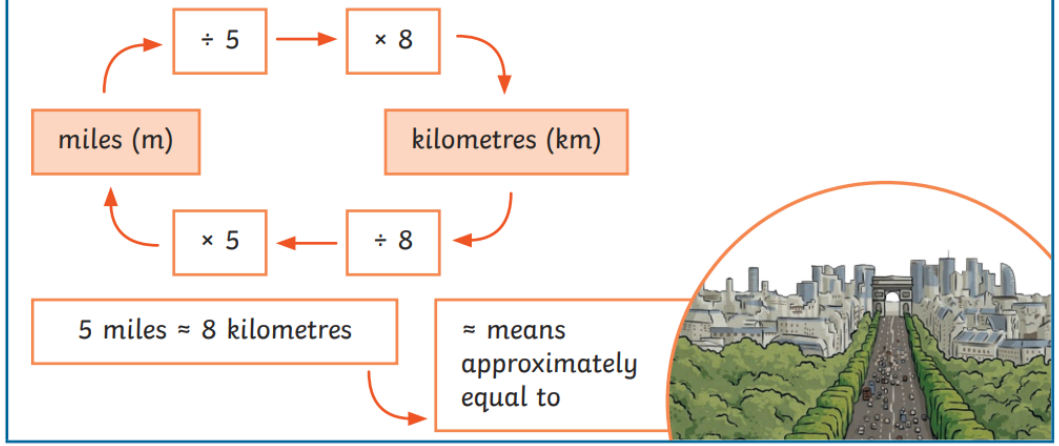
$\frac{1}{10}$ m = 0.01m = 10cm





Miles to Kilometres

You might measure the length of a road or the distance between two cities in miles or kilometres.



Time

Minute 1 minute = 60 seconds

Hour 1 hour = 60 minutes

Day 1 day = 24 hours

Week 1 week = 7 days

Year 1 year = 12 months = 52 weeks = 365 days

Imperial Measures

Things that could be measured using imperial units:

- Someone's height in feet and inches
- The mass of a bag of sugar in ounces
- The mass of a sack of potatoes in pounds
- A person's mass in stones
- A carton of milk in pints
- The amount of water in a bath in gallons

1 foot = 12 inches

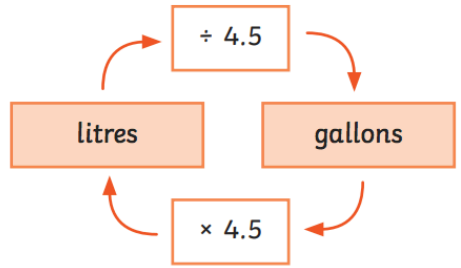
1 pound = 16 ounces

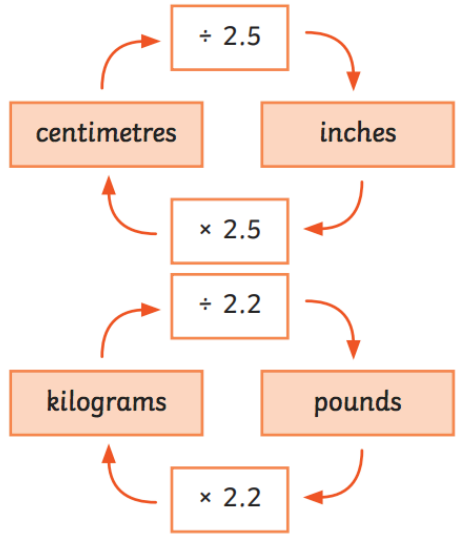
1 stone = 14 pounds

1 gallon = 8 pints

Metric to Imperial Conversions

metric (new)	imperial (old)
2.5 centimetres	1 inch
1 kilogram	2.2 pounds
4.5 litres	1 gallon





Algebra — Knowledge Organiser

Key Vocabulary

- term to term rule
- variable
- unknown
- expression
- equation
- formula
- one-step equation
- two-step equation
- substitution
- pairs of unknowns
- enumerate

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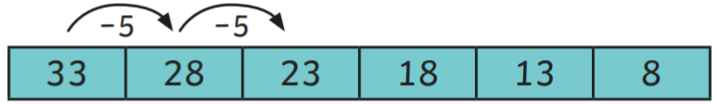
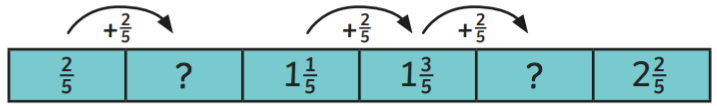
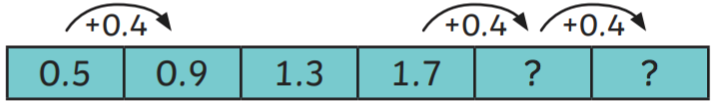
Linear Number Sequences

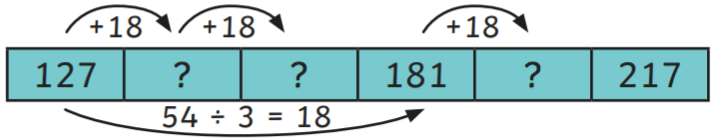
A linear number sequence is a sequence where each value increases or decreases by the same amount each time. Each number in a linear number sequence is called a **term**. The constant change between each number is called the term to term rule. To identify the **term to term rule**, find the difference between two adjacent terms.

When you know the term to term rule, you can use it to find the next number in the sequence. It can also be used to find a missing number within a sequence.









Forming Expressions

An expression is a group of numbers, letters and operation symbols.

Add 14 to a	$a + 14$
Subtract 20 from b	$b - 20$
Multiply c by 4	$4c$
12 more than d	$d + 12$
Multiply e by 3 and subtract 5	$3e - 5$
Add 12 to f and then multiply by 2	$2(f + 12)$

Forming Equations

$a + 14 = 20$
$b - 20 = 15$
$4c = 28$
$d + 12 = 30$
$3e - 5 = 10$
$2(f + 12) = 44$

An equation is a number statement with an equal sign (=). Expressions on either side of the equal sign are of equal value.

Formulas / Formulae

(The word formula has two possible plural forms, formulae and formulas.)

A formula is a special type of equation that shows the relationship between different substituted variables. Formulas are often used in geometry to find area and volume.

Area of triangle = (base × height) ÷ 2

Area of rectangle = length × width

(12.5 × hours worked) + 25 = cost of job

Algebra — Knowledge Organiser

Equations with Pairs of Unknowns

In an equation with two unknown numbers, there may be **several** possible values for the unknowns that will balance the equation.

$ab = 18$

a	b
1	18
2	9
3	6
6	3
9	2
18	1

$2a + b = 10$

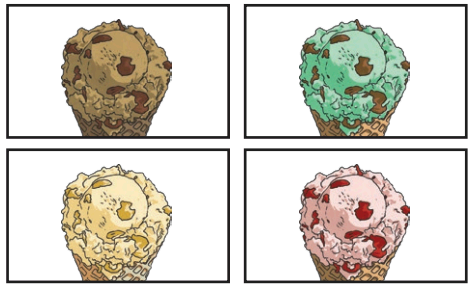
a	b
2	6
3	4
4	2
5	0

Enumerating Possibilities

Enumerating means making a complete list of answers to a problem.

- Use a system for finding the possibilities.
- Organise your findings in an ordered list or table.
- Have a way of deciding when all possibilities have been found.

There are four ice cream flavours.



Two scoops of two different flavours give six possible combinations.

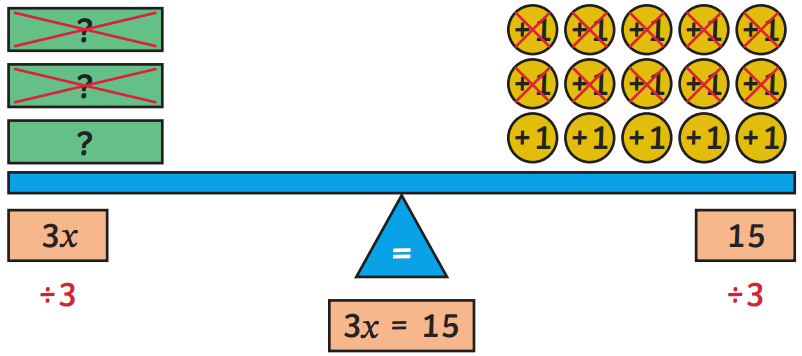
- chocolate and strawberry
- chocolate and vanilla
- chocolate and mint
- strawberry and vanilla
- strawberry and mint
- vanilla and mint

Solving One-Step and Two-Step Equations

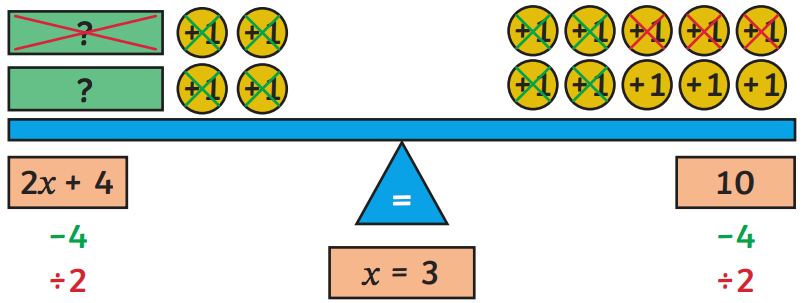
In algebra, missing numbers in equations are represented by letters. Any letter can be used but often the letter x is used. An algebraic x is written to look different to a normal letter 'x' to avoid confusion.

The multiplication sign is not used in algebra to avoid confusing it with the algebraic x used to show a missing number. Inverse operations are used to isolate the letter on one side of the equation.

$3x = 15$



$2x + 4 = 10$



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Year 6 Science Knowledge Organiser
Biology – Evolution

What should I already know?

- Which things are living and which are not.
- Identifying animals (e.g. amphibians, reptiles, birds, fish, mammals, invertebrates) and plants using classification keys
- Animals that are carnivores, herbivores and omnivores.
- Animals have **offspring** which grow into adults.
- The basic needs of animals for **survival** (water, food, air)
- Some animals have skeletons for support, protection and movement.
- Food chains, food webs and the role of predators and prey.
- Features of habitats and the animals and plants that exist there (**biodiversity**) .
- Examples of different **biomes**
- The life cycle of some animals and plants
- Sometimes **environments** can change and this has an effect on the plants and animals that exist there
- Living things **breed** to produce **offspring** which grow into adults. This is called **reproduction**.
- The role of Mary Anning in **palaeontology** and the discovery of **fossils**.
- The features of some rocks and the role they play in the formation of **fossils**

Key Vocabulary	
offspring	The young animal or plant that is produced by the reproduction of that species.
inheritance	This is when characteristics are passed on to offspring from their parents.
variations	The differences between individuals within a species.
characteristics	The distinguishing features or qualities that are specific to a species.
adaptation	An adaptation is a trait (or characteristic) changing to increase a living thing's chances of surviving and reproducing.
habitat	Refers to a specific area or place in which particular animals and plants can live.
environment	An environment contains many habitats and includes areas where there are both living and non-living things.

Offspring

Animals and plants produce offspring that are similar but not identical to them. Offspring often look like their parents because features are passed on.

Variation

In the same way that there is variation between parents and their offspring, you can see variation within any species, even plants.

Adaptive Traits

Characteristics that are influenced by the environment the living things live in. These adaptations can develop as a result of many things, such as food and climate.

Inherited Traits

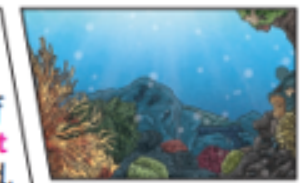
Eye colour is an example of an inherited trait, but so are things like hair colour, the shape of your earlobes and whether or not you can smell certain flowers.

Habitats

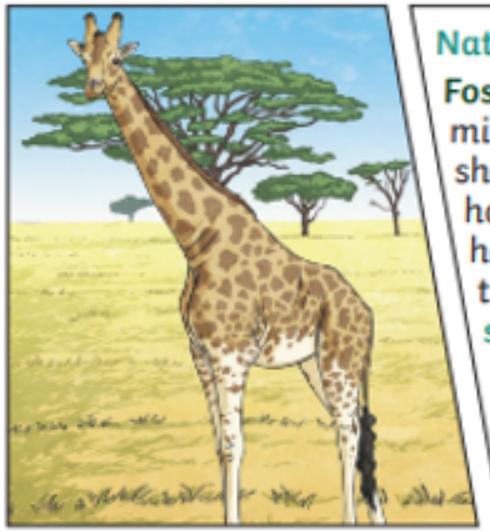
A good habitat should provide shelter, water, enough space and plenty of food.

Environments

There are many types of environment around the world. Polar regions, deserts, rainforests, oceans, rivers, and grasslands are all environments.



Key Vocabulary	
evolution	Adaptation over a very long time.
natural selection	The process where organisms that are better adapted to their environment tend to survive and produce more offspring.
fossil	The remains or imprint of a prehistoric plant or animal, embedded in rock and preserved.
adaptive traits	Genetic features that help a living thing to survive.
inherited traits	These are traits you get from your parents. Within a family, you will often see similar traits, e.g. curly hair.

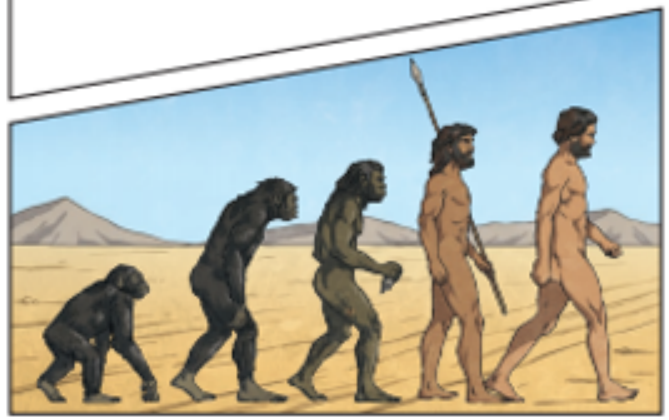


Natural Selection

Fossils of giraffes from millions of years ago show that they used to have shorter necks. They have gradually evolved through natural selection to have longer necks so that they can reach the top leaves on taller trees.

Fossils are the preserved remains, or partial remains, of ancient animals and plants. **Fossils** let scientists know how plants and animals used to look millions of years ago. This is proof that living things have evolved over time.

Evolution is the gradual process by which different kinds of living organism have developed from earlier forms over millions of years. Scientists have proof that living things are continuously evolving - even today!



Living Things		Habitat		Adaptive Traits
polar bear		arctic		Its white fur enables it to camouflage in the snow.
camel		desert		It has wide feet to make it easier to walk in the sand.
cactus		desert		It stores water in its stem.
toucan		rainforest		Its narrow tongue allows it to eat small fruit and insects.