INTO YEAR 7....
KNOWLEDGE ORGANISERS

INTO Y7 – MEASUREMENT...

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Converting Units

What do I need to be able to do?

By the end of this unit you should be able to:

- Recognise metric measures
- Convert metric measures
- Calculate with metric measures
- Understand Miles and Kilometre relationships
- Recognise Imperial measures and conversions

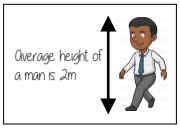
Keywords

Length: the distance from one point to another
Mass: a measure of how much matter is in an object
Capacity: the amount an object can contain (normally liquids)
Volume: the amount of 3-dimensional space an object takes up (units of length cubed)
Convert: to change a value or expression from one value to another
Imperial: a system of weights and measures originally developed in England
Metric: a system of measuring that replaced the imperial system to fall in line with the rest of Europe
Proportion: values of two items that increase in the same ratio

Metric measures

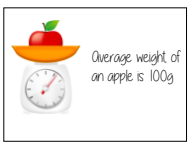
Length Common units of length or distance are

Millimetres (mm) – "Milli" prefix means one thousandth or ÷ 1000
Centimetres (cm) – "Centi" prefix means one hundredth or ÷ 100
Metres (m)
Kilometres (km) – "Kilo" prefix means a thousand × 1000



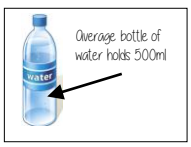
Mass (Weight)

Grams (g)
Kilograms (kg) – "Kilo" prefix means a thousand × 1000
Tonnes (t)



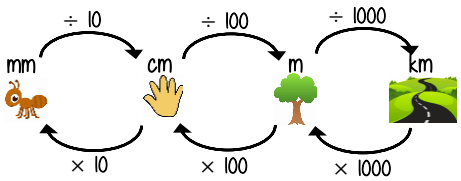
Capacity

Millilitre (ml) - "Milli" prefix means one thousandth or ÷ 1000
Litre (l)

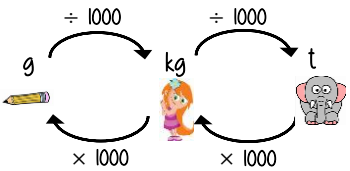


Metric conversions

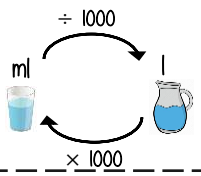
Length



Mass



Capacity

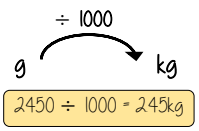


Milli – thousandth
Centi – hundredth
Kilo - thousand

Metric calculations

A package weighs 350g. How much will 7 packages weigh? Give your answers in kilograms

The final weight is in grams



2450 ÷ 1000 = 2.45kg

2450						
350	350	350	350	350	350	350

Calculations tips:

- Do all calculations in the same unit (often the smaller measurement)
- Read for the units of your answer
- Do all conversions of units at the same time
- Represent your image pictorially where possible

Miles and Kilometres

Miles and kilometres are normally used as measures of distance

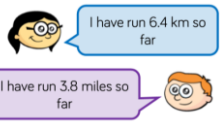
≈ symbol represents "is approximately equal to"

5 miles ≈ 8 kilometres

Conversion calculations

How many kilometres is 15 miles?

x 3 → 5 miles ≈ 8 kilometres
→ 15 miles ≈ 24 kilometres



Ron has 1.2 miles left to run
Annie has 1 mile left to run
Annie has run the furthest

Ron and Annie are running a 5-mile race. Who has run the furthest?

5 miles ≈ 8 kilometres → ÷ 8
0.625 mile ≈ 1 kilometre
4 miles ≈ 6.4 kilometre → x 6.4

Imperial measures

Length

2.5 cm ≈ 1 inch

1 foot = 12 inches

Mass

1 pound (lb) = 16 ounces

1 stone = 14 pounds (lbs)

Capacity

1 gallon = 8 pints

In 1965 Britain converted to the metric system for measurement to fall in line with the rest of Europe. We still use an imperial measurement of miles for distance and speed on our roads.

INTO Y7 – MEASUREMENT ...

Perimeter, Area and Volume

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What do I need to be able to do?

By the end of this unit you should be able to:

- Display same areas
- Calculate area and perimeter
- Find the area of a triangle
- Find the area of a parallelogram
- Find volume by counting cubes
- Find the volume of a cuboid

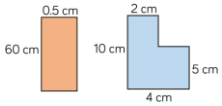
Keywords

Area: the size of a surface (2D shapes)
Perimeter: the distance around a 2D shape
Volume: the amount of 3-dimensional space an object takes up (with liquid this is called capacity)
Perpendicular: two lines that meet at 90°
Vertex: a point where two or more-line segments meet
Face: any of the flat surfaces of a solid object
Edge: a line segment on the boundary joining one vertex to another
Commutative: you can swap the order around in the calculation and still achieve the same answer

Shapes with the same area

All the shapes have an area of 12cm² – they are all made up of 12 squares.

The shapes below also have the same area

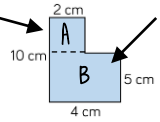


Area

Rectangle/ Square area = **Base x Height**

Compound Shapes

Area of A
The height of shape A is 5cm
2 x 5 = 10cm²

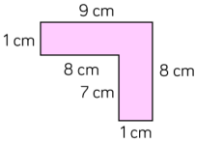


Area of B
4 x 5 = 20cm²

Total area = Area A + Area B = 10 + 20 = **30cm²**

Perimeter

Length around the outside of the shape



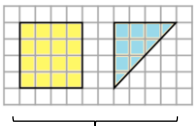
In compound shapes make sure all the lengths have measurements

Perimeter = 9cm + 8cm + 1cm + 7cm + 8cm + 1cm
= 34cm

Perimeter often asks about boundaries or walls in questions

Area of triangles

Area can be calculated by counting squares.
Often this is an estimation with triangles if it does not cut a square in half.



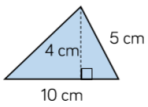
Notice the relationship between the square and the triangle.

Area triangle = $\frac{1}{2}$ area of the square

Right-angled triangles

The height of a right-angled triangle

Perpendicular heights

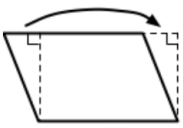


The perpendicular height meets the base at 90°

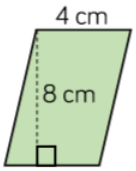
Area = $\frac{1}{2}$ x 10 x 4 = **20cm²**

Area triangle = $\frac{1}{2}$ x base x perpendicular height

Area of parallelograms



Parallelogram = **Base x Perpendicular height**



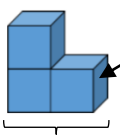
Area = 4 x 8 = **32cm²**

Properties of parallelograms

- Two sets of parallel lines
- Four sides (quadrilateral)
- Interior angles = 360°
- Opposite angles are equal
- 2D shape

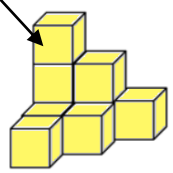
Volume (counting cubes)

Each cube has a given volume. E.g. 1cm³



This shape is made up of 3 cubes.
So the volume is 3cm³

Always check the units of measurement. Volume can be mm³, cm³, m³, km³

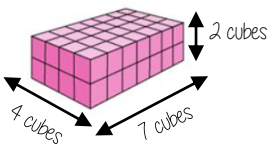


Don't forget about cubes you can't see. This is a 3D shape.

The volume of this shape is 9cm³

Use multilink cubes to notice that volume can be any shape – it is the number of cubes that make up the value

Volume of cuboids

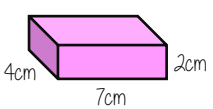


Counting cubes

Counting the cubes = 56cm³

OR

There are 28 cubes on the bottom row and two rows.
28 x 2 = 56



Volume of cuboid = **length x width x height**

Volume = 4 x 7 x 2 = 56cm³

Properties of cuboids

- 3D shape
- 8 vertices
- 6 faces
- 12 edges

Remember multiplication is commutative so the values can be multiplied in any order

INTO Y7 – NUMBER ...

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Ratio

What do I need to be able to do?

By the end of this unit you should be able to:

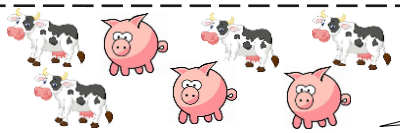
- Use ratio language
- Understand ratios and fractions
- Use the : symbol for ratio
- Calculate ratios
- Use scale factors
- Calculate scale factors
- Link ratio and proportion

Keywords

Ratio: a statement of how two numbers compare
Enlargement: to change the size of a shape
Proportion: a statement that links two rations
Scale Factor: the multiple that increases/ decreases a shape in size
Part: a section of a whole
Scale: the comparison of something drawn to its actual size
Order: to place a number in a determined sequence

Ratio Language

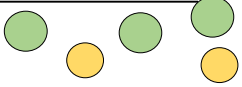
"For every XXX of XXX there are XXX of XXX"



For every 4 cows there are 3 pigs

For every 3 pigs there are 4 cows

Ratios and fractions



For every 3 green counters there are 2 yellow counters

The ratio of green to yellow counters is 3 : 2

The fraction of green counters is:

$\frac{3}{5}$

There are 3 green counters

There are 5 counters overall

The fraction of yellow counters is:

$\frac{2}{5}$

There are 2 yellow counters

The ratio symbol

"For every 2 strawberries I have 4 bananas and 6 berries"

Ratio of strawberries, bananas and berries 2 : 4 : 6

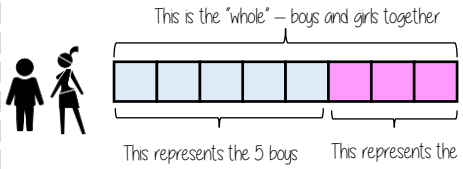
The order of notation follows the order of the parts

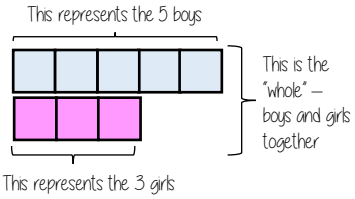
The colon notation is the symbol for ratio "For every..."

Representing a ratio

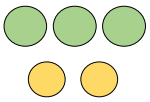
"For every 5 boys there are 3 girls"

5:3



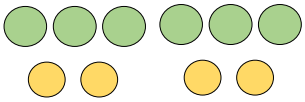


Proportion



The ratio of green to yellow counters is 3 : 2

$\frac{3}{5}$ are green $\frac{2}{5}$ are yellow



The ratio of green to yellow counters is 6 : 4

$\frac{6}{10} = \frac{3}{5}$ are green

$\frac{4}{10} = \frac{2}{5}$ are yellow

Ratio increases proportionally

The proportion remains the same

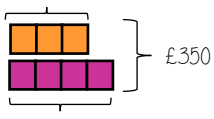
Sharing a whole into a given ratio

James and Lucy share £350 in the ratio 3:4
Work out how much each person earns

Model the Question

James : Lucy

3 : 4



Find the value of one part

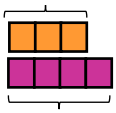
Whole: £350
7 parts to share between
(3 James, 4 Lucy)

□ = one part

£350 ÷ 7 = £50

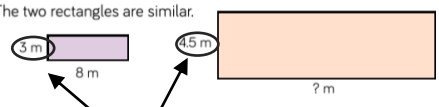
James = 3 x £50 = £150

Lucy = 4 x £50 = £200



Scale Factors

The two rectangles are similar.

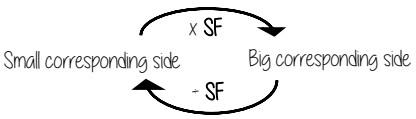


Use **corresponding** sides to calculate a scale factor

This is an enlargement of scale factor 1.5

Scale factor can also be calculated by:

Bigger corresponding side
Smaller corresponding side



INTO Y7 – GEOMETRY ...

Properties of shape

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What do I need to be able to do?

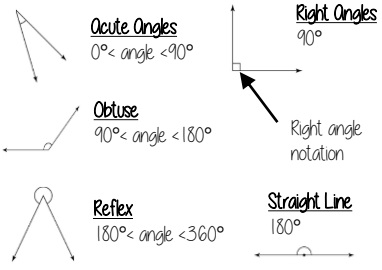
By the end of this unit you should be able to:

- Measure with a protractor
- Classify and calculate angles
- Know and calculate angles in a triangle
- Know properties of angles in special quadrilaterals
- Know properties of angles in regular polygons
- Draw shapes and nets of 3D shapes

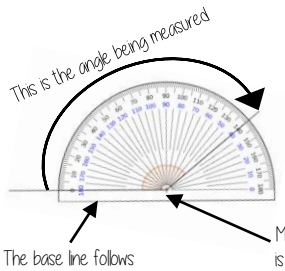
Keywords

Protractor: mathematical equipment used to measure angles
Angle: the amount of turn between two lines around their common point
Adjacent: lying next to each other
Sum: addition
Quadrilateral: a four-sided polygon
Polygon: an enclosed 2D shape made up of straight lines
Scalene triangle: a triangle with all different sides and different angles
Regular Polygon: a polygon with equal angles and all sides the same size

Measuring angles



Measure angles to 180°

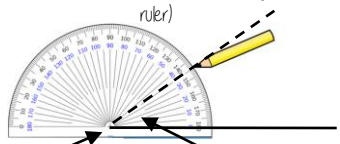


Read from 0° on the base line. Remember to use estimation. This is an obtuse angle so between 90° and 180°

Draw angles up to 180°

Draw a 35° angle

Make a mark at 35° with a pencil and join to the angle point (use a ruler)



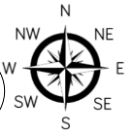
Make sure the cross is at the end of the line (where you want the angle)

The angle

Angles as measures of turn

Clockwise | Anti-Clockwise

East to South is a quarter turn clockwise



Quarter Turn
90°
Clockwise

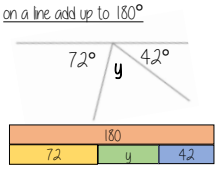
Half Turn
180°

Three-quarter Turn
270°
Anti-Clockwise

Full Turn
360°

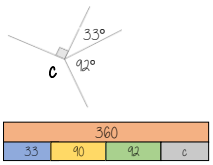
Calculating missing angles

Adjacent angles that share a common point on a line add up to 180°



72 + y + 42 = 180
180 – 72 – 42 = y
66 = y

The sum of angles around a point is 360°



33 + 90 + 92 + c = 360
360 – 90 – 92 – 33 = c
c = 155

Vertically opposite angles are equal

Opposite angles made from straight lines connecting are equal size

Triangles

All interior angles in a triangle add up to 180°

Isosceles Triangles
Two sides the same length
Base angles the same size

Equilateral Triangles
All sides the same length
All angles the same size

Look for combinations of angle rules in triangles. Dash notation indicates equal length sides.

Quadrilaterals

All interior angles in a quadrilateral add up to 360°

Rhombus
All sides equal size
Opposite angles are equal

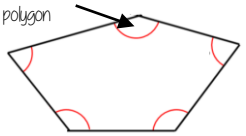
Kite
No parallel lines
Equal lengths on top sides
Equal lengths on bottom sides
One pair of equal angles

Trapezium
One pair of parallel lines

Polygons

(number of sides – 2) x 180

Interior Angles
The angles enclosed by the polygon

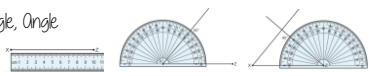


This is an **irregular** polygon – the sides and angles are different sizes

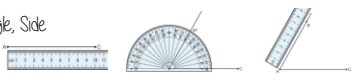
Remember this is **all** of the interior angles added together

Drawing Triangles

Side, Angle, Angle



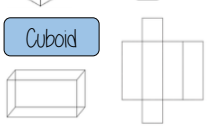
Side, Angle, Side



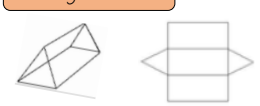
3D shapes and nets

Cube

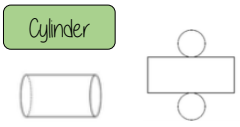
Cuboid



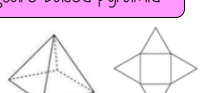
Triangular Prism



Cylinder



Square based pyramid



Vertex: a point where two or more line segments meet
Face: any of the flat surfaces of a solid object
Edge: a line segment on the boundary joining one vertex to another

INTO Y7 – STATISTICS ...

@whisto_maths

Statistics

What do I need to be able to do?

By the end of this unit you should be able to:

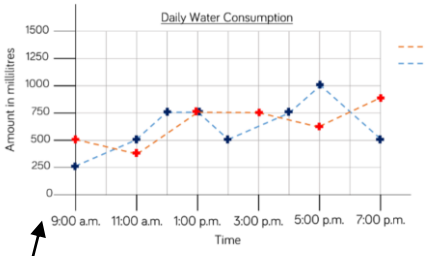
- Read and interpret line graphs
- Draw line graphs
- Circles
- Read and interpret pie charts
- Draw pie charts
- The mean

Keywords

Protractor: equipment used to measure and draw angles
Trend: a line on a graph showing the general direction the points seem to follow.
X-axis: the horizontal axis
Y-axis: the vertical axis
Mean: the average of all the numbers
Circumference: the perimeter of a circle. The line around the outside.
Diameter: a straight line that goes through the centre of a circle. The longest line in a circle.
Radius: a straight line from the centre to the radius. (Half the length of the diameter)

Line graphs

A method to observe trends in data over time and make comparisons between groups of data.



A key identifies the data set each line represents

Make comparisons between the data and then relate this information back to the context of the data

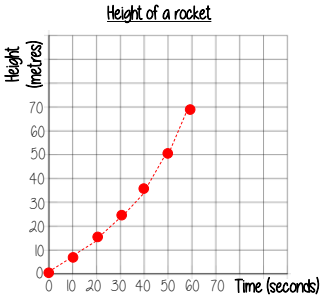
"On Tuesday, more water was consumed at 5pm this could have been a period of exercise"

The axes are labelled and show a clear timescale

Drawing line graphs

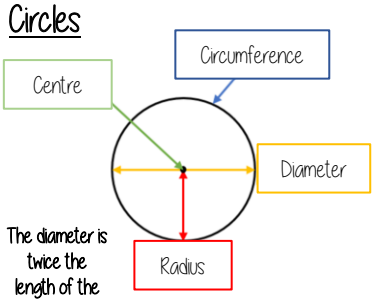
Time (seconds)	Height (metres)
0	0
10	8
20	15
30	25
40	37
50	50
60	70

- Join each point with a straight line
- Have regular intervals on both axes



Time is labelled across the x axis

Circles



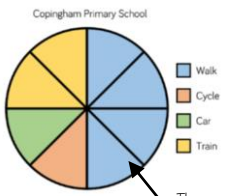
The diameter is twice the length of the radius

Read and interpret pie charts

Always read the data for the total amount the pie chart represents

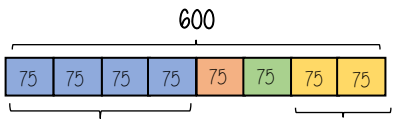
There are 360° in a circle

Copingham Primary School has 600 students



There are 8 equal sectors in this pie chart

This bar model represents the information in the bar chart



Walking represents half of this data

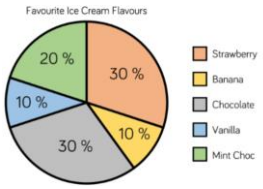
Train represents a quarter of this data

Pie charts with percentages

This survey asked 160 people

The whole pie chart represents 100%

10% = $\frac{1}{10}$ 50% = $\frac{1}{2}$ 25% = $\frac{1}{4}$



Strawberry 30% = $\frac{3}{10}$

160 ÷ 10 = 16

16 x 3 = 48

This is 10% make other calculations from this value

Draw pie charts

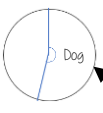
Type of pet	Dog	Cat	Hamster
Frequency	32	25	3

There were 60 people asked in this survey (Total frequency)

$\frac{32}{60}$ "32 out of 60 people had a dog"

This fraction of the 360 degrees represents dogs

$\frac{32}{60}$ X 360 = 192°



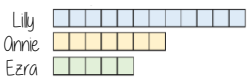
Use a protractor to draw This is 192°

Multiple method
0s 60 goes into 360 – 6 times
Each frequency can be multiplied by 6 to find the degrees (proportion of 360)

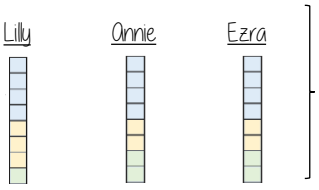
The mean

Mean – a measure of average. It gives an idea of the central value

Lilly, Onnie and Ezra have the following cubes



Finding the mean amount is the average amount each person would have if shared out equally



The mean number of blocks would be 8 each

The information is redistributed equally across all groups