Revision Booklet for AQE and PPTC (GL Assessments)

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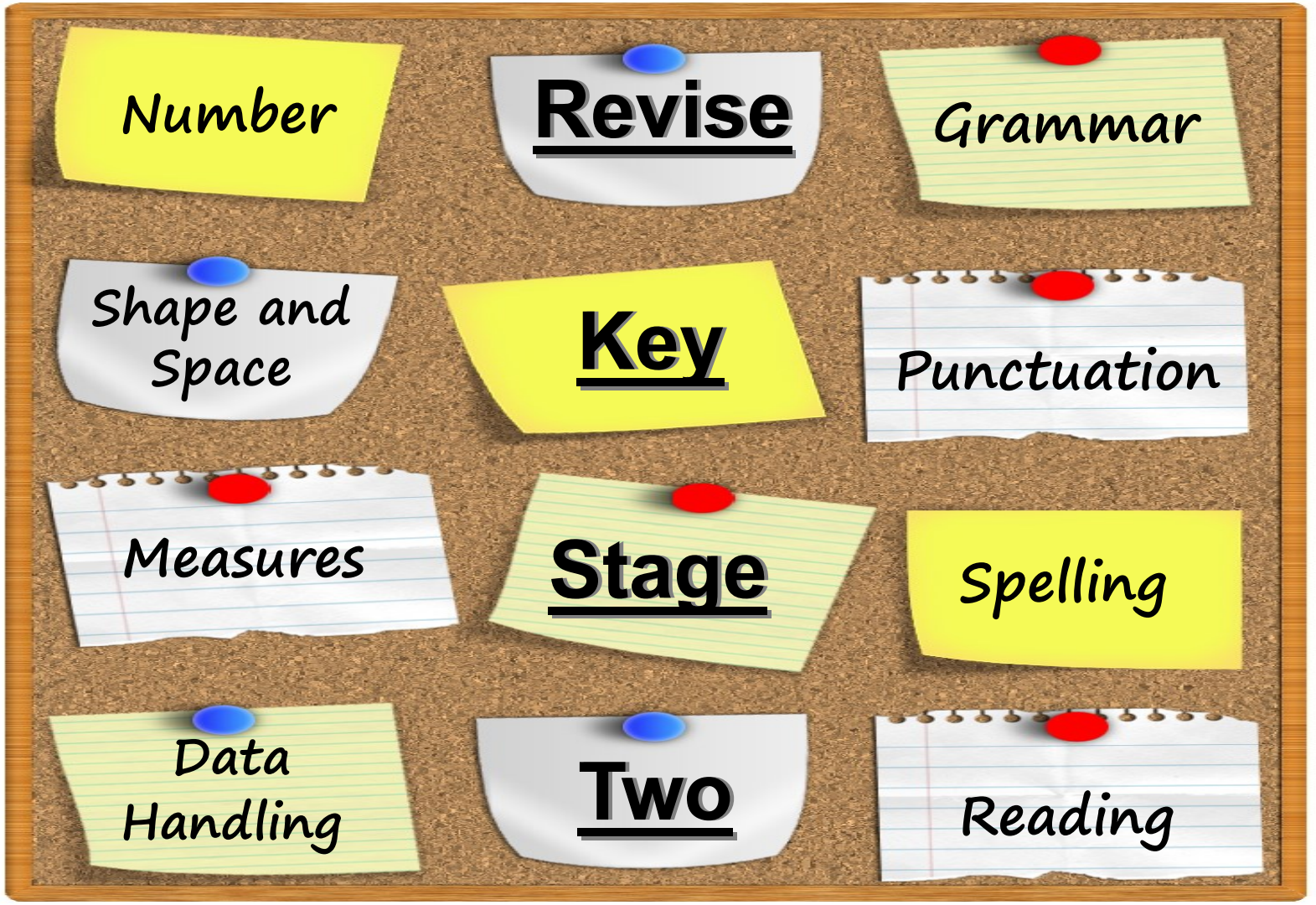


Number

Place Value

Place value is the value of a digit within a number depending on its partition within the number.

example

2 5 8 4 9 2 6 . 7 1 3

2 million	500 thousands	80 thousands	4 thousands	9 hundreds	2 tens	6 units	decimal point	7 tenths	1 hundredth	3 thousandths
or	or	or	or	or	or	or		or	or	or
2 000 000	500 000	80 000	4 000	900	20	6	.	0.7	0.01	0.003

Multiplying and Dividing by 10, 100 and 1000

x 10	Move all digits ONE place to the LEFT	e.g. 9.63	(x10)	96.3
÷ 10	Move all digits ONE place to the RIGHT	e.g. 25.4	(÷ 10)	2.54
x 100	Move all digits TWO places to the LEFT	e.g. 16.30	(x 100)	1630
÷ 100	Move all digits TWO places to the RIGHT	e.g. 725.3	(÷ 100)	7.253
x 1000	Move all digits THREE places to the LEFT	e.g. 0.364	(x 1000)	364
÷ 1000	Move all the digits THREE places to the RIGHT	e.g. 27.2	(÷ 1000)	O.0272

Rounding Off

Being able to round numbers is very useful for **estimating** answers. **Rounding off** numbers helps us estimate answers.

Rule: If the digit after the place to which you are rounding is 0, 1, 2, 3, 4 then **round down**.

If the digit after the place to which you are rounding is 5, 6, 7, 8, 9 then **round up**.

16.26	to the nearest tenth is	16.3
28.3	to the nearest unit is	28
47	to the nearest ten is	50
835	to the nearest hundred is	800
4510	to the nearest thousand is	5000
12 690	to the nearest ten thousand is	10 000

Fractions

Fractions

A **fraction** is a part of a whole.

Remember—a fraction is another way of writing a division $1 \div 4 = \frac{1}{4}$

the top number is called the numerator—the bottom number is the denominator

Equivalent Fractions

Equivalent fractions have the same value. They are formed when both the **numerator** and **denominator** of a fraction are **multiplied** or **divided** by the same number.

example

numerator → $\frac{3}{5} \xrightarrow{\times 2} \frac{6}{10}$ ← **denominator**

A fraction can be simplified or expressed in lowest terms by finding the largest number which will divide into both numerator and denominator.

example $\frac{12}{18} \xrightarrow{\div 3} \frac{2}{3}$

A **mixed number** is a number with both a whole and fraction,

example $4\frac{1}{5}$

whole *fraction part*

An **improper fraction** is a fraction whose numerator is bigger than its denominator and can be changed into a mixed number.

example $\frac{21}{5} = 4\frac{1}{5}$

Finding Fractions of Numbers

example

find $\frac{3}{4}$ of 16

first find $\frac{1}{4}$ of 16, which is 4

then find $\frac{3}{4}$, by multiplying 4 x 3

= 12

Fractions, Decimals & Percentages

Decimals

Decimals are another way of writing a fraction whose denominator is always 10, 100 and so on.

$$\frac{1}{2} = \frac{5}{10} = 0.5 \qquad \frac{1}{4} = \frac{25}{100} = 0.25$$

Percentages

Percentages are another way of writing a fraction whose denominator is always 100.

25 out of 100 = $\frac{25}{100}$ = **0.25** = **25%**

95 out of 100 = $\frac{95}{100}$ = **0.95** = **95%**

The words **per cent** mean out of **100**

To change a fraction to a percentage you must change it into a fraction with a denominator of 100.

example

$$\frac{6}{25} \begin{matrix} \text{-> x 4} \\ \text{-> x 4} \end{matrix} \frac{24}{100} = 24\%$$

To find percentages of numbers you can change the percentage into a simple fractions if possible.

example

25% of 60 = $\frac{1}{4}$ of 60 = 15

Finding 10% is often a useful step to finding other percentages.
(To find 10% simply divide by 10, as 10% = $^{1}/_{10}$)

Also, to find 5% -> first find 10% then divide by 2 to find 5%
15% -> find 10%, then find 5% and add together to make 15%

Fractions / Decimals / Percentages

The following tables show a list of common equivalences of fractions, decimals and percentages.

Fraction	Decimal	Percentage
$\frac{1}{2}$ ($^{5}/_{10}$)	0.5	50%
$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%
$\frac{1}{5}$ ($^{2}/_{10}$)	0.2	20%
$\frac{2}{5}$ ($^{4}/_{10}$)	0.4	40%
$\frac{3}{5}$ ($^{6}/_{10}$)	0.6	60%
$\frac{4}{5}$ ($^{8}/_{10}$)	0.8	80%
1/10	0.1	10%
3/10	0.3	30%
7/10	0.7	70%
9/10	0.9	90%
$\frac{1}{3}$	0.333	33 $\frac{1}{3}$ %
$\frac{2}{3}$	0.666	66 $\frac{2}{3}$%

Factors, Multiples, Prime Numbers, Square & Cubic Numbers, Triangular Numbers

Factors

The factors of a number are the numbers which will divide into that number leaving no remainder. Remember two factors of any number are the number 1 and the number itself.

example Factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24
(they are best worked out as pairs
e.g. 1 x 24, 2 x 12, 3 x 8, 4 x 6)

The Highest Common Factor is the highest number that divides into each number.

The Highest Common Factor of 12 and 24 is 12.

The Highest Common Factor of 9, 12 and 18 is 3.

Multiples and Prime Numbers

Multiples are formed when any whole number is multiplied by x1, x2, x3, x4 etc

example

Multiples of 5 are
5 x 1 = **5**
5 x 2 = **10**
5 x 3 = **15**
5 x 4 = **20**
5 x 5 = **25**

A number which has no other factors apart from the number 1 and the number itself is called a **prime number**.

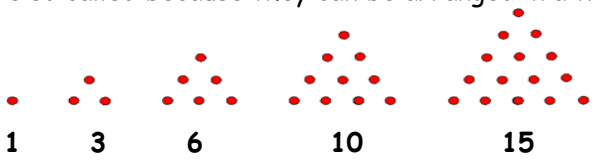
Prime numbers less then 100 are as follows:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

Numbers which look like prime numbers but are not include 51, 57, 81, 87 and 91. These numbers can be divided by 3 or 7.

Triangular Numbers

Triangular numbers are so called because they can be arranged in a triangle shape.



1 3 6 10 15

1 3 6 10 15 21 28 36 45 ← these are triangular numbers

+2 +3 +4 +5 +6 +7 +8 + 9

Square Numbers and Cubic Numbers

Numbers which are said to be **square numbers** are numbers which have been multiplied by themselves.

8^2 means 8 squared or 8 x 8 = 64

6^2 means '6 squared' or 6 x 6 = 36
This way of writing '7 squared' is called **index notation**

1^2	=	1 x 1	=	1
2^2	=	2 x 2	=	4
3^2	=	3 x 3	=	9
4^2	=	4 x 4	=	16
5^2	=	5 x 5	=	25
6^2	=	6 x 6	=	36
7^2	=	7 x 7	=	49
8^2	=	8 x 8	=	64
9^2	=	9 x 9	=	81
10^2	=	10 x 10	=	100
11^2	=	11 x 11	=	121
12^2	=	12 x 12	=	144

Cubic Numbers

Numbers which are said to be **cubic numbers** are numbers which have multiplied by themselves not just once but twice.

4^3 means '4 cubed' or 4 x 4 x 4 = 64

1^3	=	1 x 1 x 1	=	1
2^3	=	2 x 2 x 2	=	8
3^3	=	3 x 3 x 3	=	27
4^3	=	4 x 4 x 4	=	64
5^3	=	5 x 5 x 5	=	125
6^3	=	6 x 6 x 6	=	216
10^3	=	10 x 10 x 10	=	1000

Number Sequences,

Algebra, Function Machines

Number Sequences

A number sequence is formed when numbers change according to a rule or pattern.

Examples

9, 12, 15, 18, 21, etc

→ (+3) → (+3) → (+3) → (+3) →

2, 3, 5, 8, 12, 17, etc

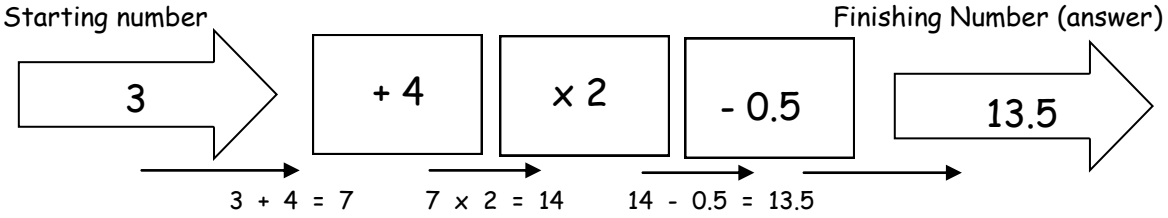
→ (+1) → (+2) → (+3) → (+4) → (+5) →

1, 3, 9, 27, 81, etc

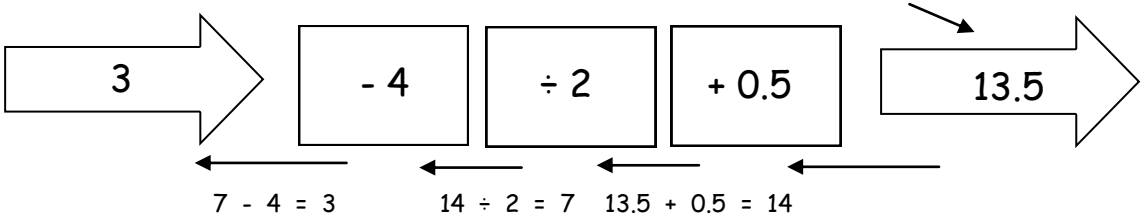
→ (x3) → (x3) → (x3) → (x3) →

Function Machines

A function machine has a **starting number** (input) and a **finishing number** (output).



Function machines can also operate backwards, beginning with the **finishing number**.



As it has been shown we can work out the starting number by going backwards from the finishing number and doing the inverse (opposite) operations.

Using a Letter for an Unknown Number (Algebra)

In **algebra a letter** can be used to stand for an unknown number.

example

a + 8 = 14	4b + 2 = 22
a = 6	4b = 20 so b = 5

4b means '4 multiplied by b'

Shape & Space - Lines

Horizontal

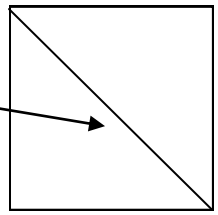
A line 'straight across' from West to East (parallel to the Earth's horizon)

Vertical

A line straight North to South

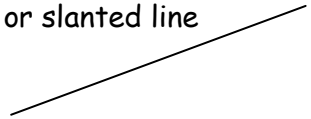
Diagonal

A line joining opposite corners in a shape



Oblique

A sloping or slanted line



Perpendicular

Lines meet or cross at right angles to each other

Lines can also be perpendicular even though they do not meet (but if they were extended they would meet at a right angle (90°).

perpendicular lines

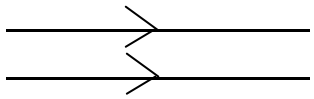
perpendicular lines

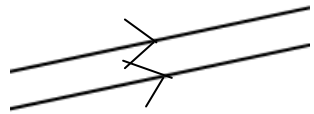
perpendicular lines

Parallel

Parallel lines always remain the same distance apart and therefore never meet.

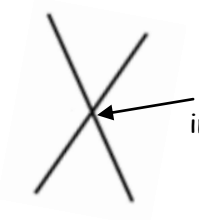
They usually have arrows on them to indicate they are parallel.





Intersection

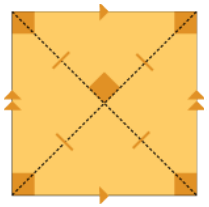
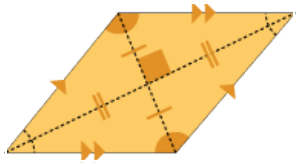
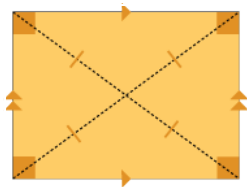
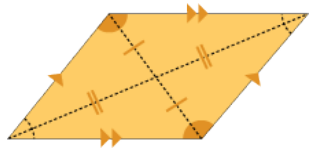
It is the point where lines meet or cross.

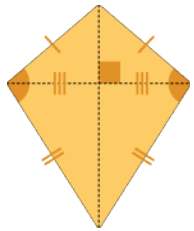
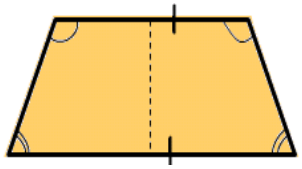
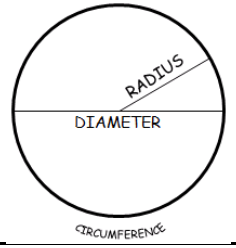


intersection

Shape & Space - Quadrilaterals & Circle

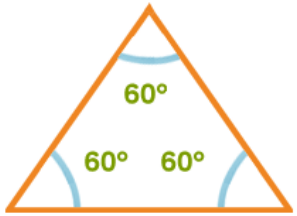
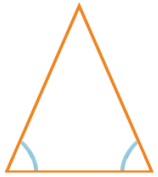
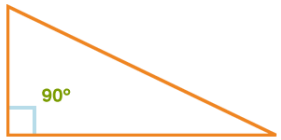
A quadrilateral is a flat 4 sided shape.

Quadrilateral	Properties
Square 	• A square is a regular quadrilateral. • All angles are equal (90°). • All sides are of equal length. • Opposite sides are parallel. • The diagonals bisect each other at 90°. • The diagonals are equal in length. • 4 lines of symmetry.
Rhombus 	• Diagonally opposite angles are equal. • All sides are of equal lengths. • Opposite sides are parallel. • Opposite angles are equal. • The diagonals bisect each other at 90°. • 2 lines of symmetry.
Rectangle 	• All angles are equal (90°). • Opposite sides are of equal length. • Opposite sides are parallel. • The diagonals are equal in length. • 2 lines of symmetry.
Parallelogram 	• Diagonally opposite angles are equal. • Opposite sides are of equal length. • Opposite sides are parallel. • The diagonals bisect each other. • No lines of symmetry.

Quadrilateral	Properties
Kite 	• Two pairs of sides are of equal length. • One pair of diagonally opposite angles is equal. • Only one diagonal is bisected by the other. • The diagonals cross at 90°.
Trapezium 	• One pair of opposite sides is parallel. • One pair of parallel sides. • No sides equal in length. • No equal angles. • No lines of symmetry.
Isosceles Trapezium 	• One pair of sides equal in length. • Two pairs of adjacent angles equal. • One pair of parallel sides. • One line of symmetry.
Circle 	• The **circumference** is the outside edge of a circle. • The **diameter** is a line which divides the circle into 2 semi circles. • A **radius** is a line from the centre to the circumference. • The **radius** is always **half** the length of the **diameter**.

Shape & Space - Triangles & Polygons

Triangles are flat with three sides.

Triangle	Properties
Equilateral triangle 	• All three sides are equal. • All angles are 60°. • 3 lines of symmetry.
Isosceles triangle 	• Two sides equal in length. • Two equal angles. • One line of symmetry.
Right angled triangle 	• Contains one right angle.
Scalene triangle 	• All three sides are different length. • No equal angles. • No lines of symmetry.

Polygons are a flat shape with three or more straight sides.

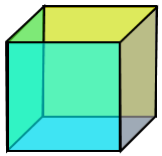
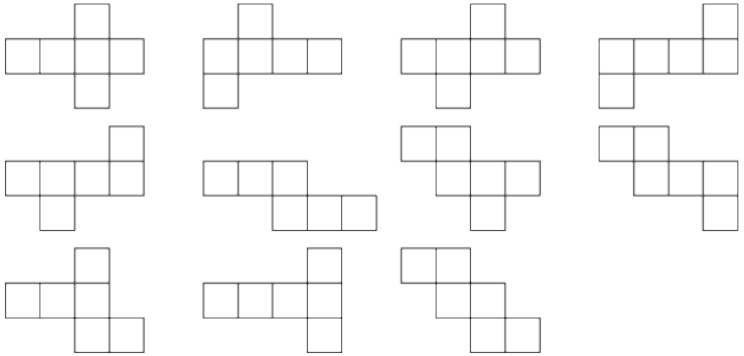
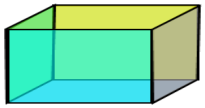
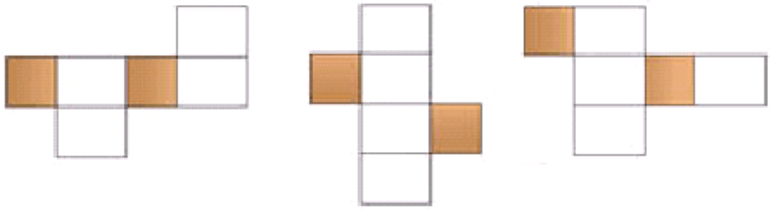
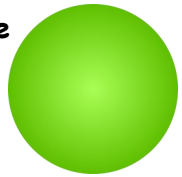
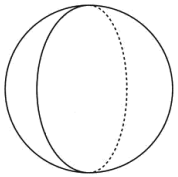
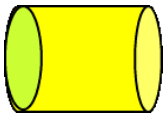
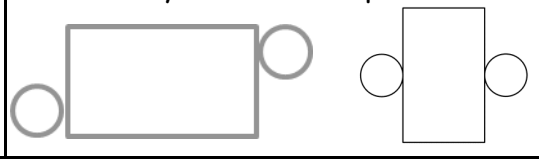
Polygon	Properties
Pentagon	• 5 sides
Hexagon	• 6 sides
Heptagon	• 7 sides
Octagon	• 8 sides
Nonagon	• 9 sides
Decagon	• 10 sides

A regular shape has all sides equal in length and all the angles are equal.

A regular shape has the same number of lines of symmetry as it does sides.

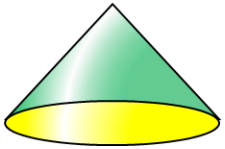
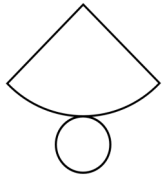
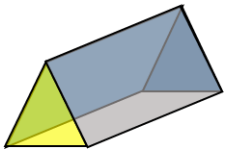
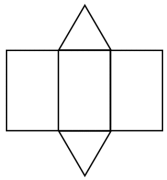
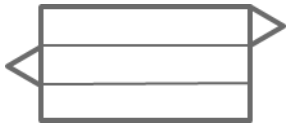
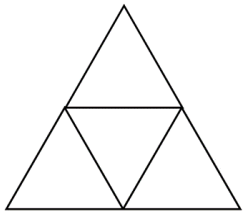
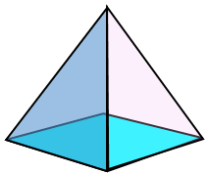
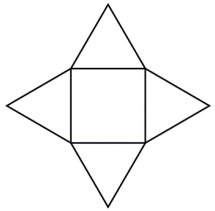
Shape & Space - 3D Shapes

3D shapes have faces (sides), edges and vertices (corners). The exception is the sphere which has no edges or vertices.

3D Shape	Properties	Nets
Cube 	• 6 faces (all square). • 8 vertices (or corners). • 12 edges.	There are 11 possible nets of a cube. 
Cuboid 	• 6 faces (6 rectangles or 4 rectangles and 2 squares). • 8 vertices (or corners). • 12 edges.	There are 10 possible nets of a cuboid. Here are 3 examples. 
Sphere 	• A 'ball' shape, that will roll. • One perfectly curved surface. • No vertices. • No edges.	
Cylinder 	• 2 flat faces (cylinder) 1 curved surface. • 2 curved edges, no vertices. • 2 edges.	Nets of cylinders are represented like this: 

Shape & Space - 3D Shapes

3D shapes have faces (sides), edges and vertices (corners). The exception is the sphere which has no edges or vertices.

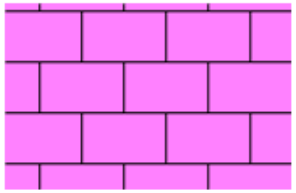
3D Shape	Properties	Nets
Cone 	• 1 flat circular face. • 1 curved surface. • 1 vertex. • 1 curved edge.	
Triangular prism 	• 5 faces (3 rectangles and 2 triangles). • 6 vertices. • 9 straight edges.	There are 8 nets of triangular prisms. Here are 2 examples.  
Triangular based pyramid (tetrahedron) 	• 4 faces (all triangles). • 4 vertices. • 6 edges	
Square based pyramid 	• 5 faces (4 triangles and 1 square) • 5 vertices. • 8 edges.	

A **prism** keeps its shape along all its length.

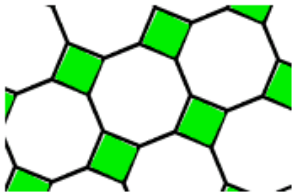
A **pyramid** narrows and reaches a point at the top.

Shape & Space - Tessellation & Co-ordinates

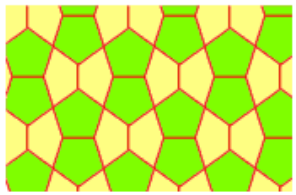
Tessellation is a pattern of shapes that fit together without leaving any gaps.



Rectangles

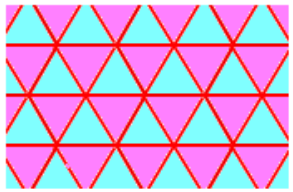


Octagons and Squares

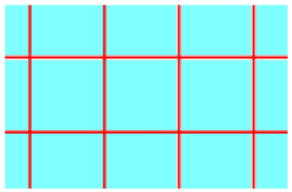


Different Pentagons

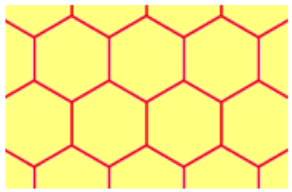
A **regular** tessellation is a pattern made by repeating a regular polygon. There are only 3 regular tessellations:



Triangles

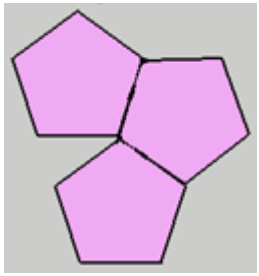


Squares

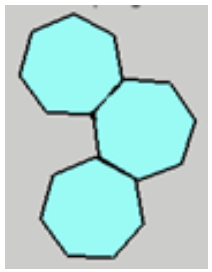


Hexagons

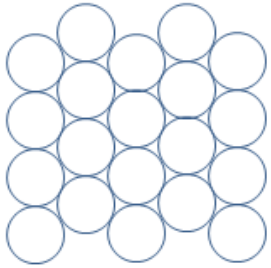
These shapes do not tessellate.



Pentagons



Heptagon

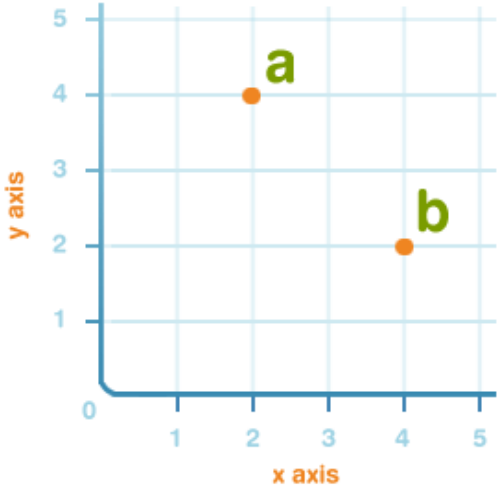


Circles

Co-ordinates

- A grid has an x-axis (horizontal axis) and a y-axis (vertical axis).
- A point on a grid has two numbers to identify its position. These two numbers are known as the point's coordinates.
- Coordinates are always written as the number of steps **across** first, then the number of **steps up or down**.

Point **a)** has coordinates of (2,4)
Point **b)** has coordinates of (4,2)

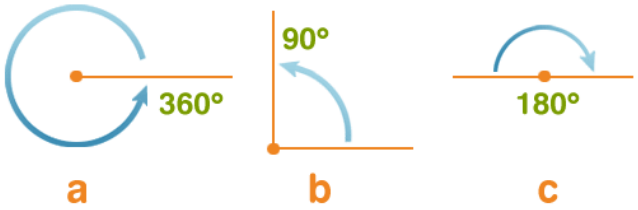


(co-ordinates should be written inside brackets and be separated by a comma)

Shape & Space - Angles, Direction & Turning

Angles

Angles are a measure of turn. Angles are measured in **degrees**.
The sign for degrees is °.
One **whole** turn is **360°**. **a** is an example of a whole turn.
One **quarter** turn is **90°** or a right angle. **b** is an example of a quarter turn.
One **half** turn is **180°** or a straight line. **c** is an example of a half turn.



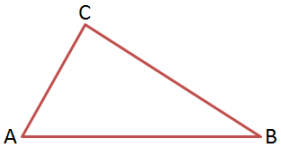
Types of angles

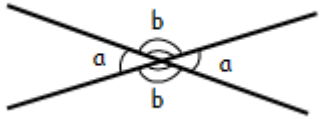
a) An angle less than 90° is **acute**.
b) An angle exactly 90° is **right angle**.
c) An angle between 90° and 180° is **obtuse**.
d) An angle exactly 180° is **straight**.
e) An angle greater than 180° is **reflex**.

Total of angles

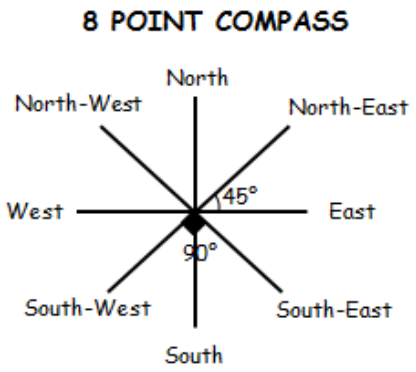
Three angles in a triangle add up to 180°. Four angles in a quadrilateral add up to 360°.

Where two lines **intersect**, opposite angles are equal.





Direction - Compass Points



45° turn	= $^1/_2$ right angle	= $^1/_8$ turn
90° turn	= 1 right angle	= $^1/_4$ turn
135° turn	= $1^1/_2$ right angles	= $^3/_8$ turn
180° turn	= 2 right angles	= $^1/_2$ turn
225° turn	= $2^1/_2$ right angles	= $^5/_8$ turn
270° turn	= 3 right angles	= $^3/_4$ turn
315° turn	= $3^1/_2$ right angles	= $^7/_8$ turn
360° turn	= 4 right angles	= 1 complete turn

Measures - Length

The metric units of length are **millimetres**, **centimetres**, **metres** and **kilometres**.

10 mm = 1 cm
100 cm = 1 m
1000 mm = 1 m
1000 m = 1 km
100 000 cm = 1 km
1 000 000 mm = 1 km

Conversion between metric units of length is as follows;

			To convert / to change
10 mm	= 1 cm		millimetres to centimetres: divide by 10
1 mm	= $^{1}/_{10}$ cm	= 0.1 cm	centimetres to millimetres: multiply by 10
100 cm	= 1 m		centimetres to metres: divide by 100
1 cm	= $^{1}/_{100}$ m	= 0.01 m	metres to centimetres: multiply by 100
1000 m	= 1 km		metres to kilometres: divide by 1000
1 m	= $^{1}/_{10\,00}$ km	= 0.001 km	kilometres to metres: multiply by 1000

examples of unit conversion;

cm -> mm
(x 10)
1.6 cm = 16 mm
20.3 cm = 203 mm
0.3 cm = 3 mm

mm -> cm
(÷ 10)
183 mm = 18.3 cm
62 mm = 6.2 cm
6 mm = 0.6 cm

m -> cm
(x 100)
1.52 m = 152 cm
16 m = 1600 cm
0.7 m = 70 cm

cm -> m
(÷ 100)
175 cm = 1.75 m
25 cm = 0.25 m
6 cm = 0.06 m

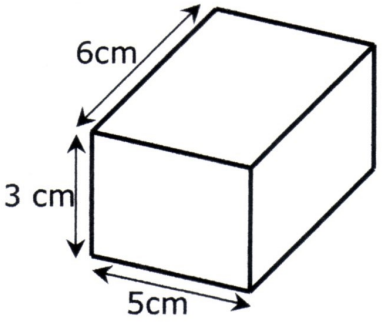
km -> m
(x 1000)
2.56 km = 2560 m
12 km = 12 000 m
0.2 km = 200 m
0.01 km = 10 m
0.005 km = 5 m

m -> km
(÷ 1000)
5600 m = 5.6 km
450 m = 0.45 km
63 m = 0.063 km
2 m = 0.002 km

Measures - Volume, Capacity & Weight

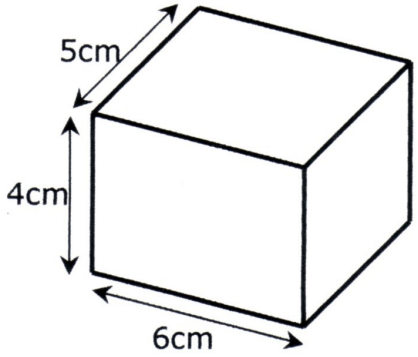
Volume is the amount of space taken up by a solid object.

volume = length x width x height



volume = 6 x 5 x 3

= 90 cm^3



volume = 5 x 6 x 4

= 120 cm^3

To work out the volume of the solids below, we

multiply length by breadth by height

Volume is measured in cubic units -

mm^3 - **cubic millimetres**

cm^3 - **cubic centimetres**

m^3 - **cubic metres**

Capacity is the amount of space inside a hollow container.

The standard unit for measuring capacity is the **litre**.

			To convert / to change
1000 ml	= 1 L		millimetres to litres: divide by 1000
1 ml	= $^1/_{1000}$ L	= 0.001 L	litres to millimetres: multiply by 1000

1 litre	= 1000 ml	$^3/_4$ litre	= 750 ml
$^1/_2$ litre	= 500 ml	$^1/_5$ litre	= 200 ml
$^1/_4$ litre	= 250 ml	$^1/_{10}$ litre	= 100 ml

- A standard size drinks can holds 330 ml
- A medicine spoon holds 5 ml
- An average kitchen sink holds 20 litres.

The weight of an object is measured in **grams** or **kilograms**.

			To convert / to change
1000 g	= 1 kg		grams to kilograms: divide by 1000
1 g	= $^1/_{1000}$ kg	= 0.001 kg	kilograms to grams: multiply by 1000

1 kg	= 1000 g	$^1/_4$ litre	= 250 ml
$^1/_2$ kg	= 500 g	$^3/_4$ litre	= 750 ml

- A bag of sugar weighs 1 kg.
- A teaspoon of sugar weighs about 4 g.
- A family car weighs 1500 kg.

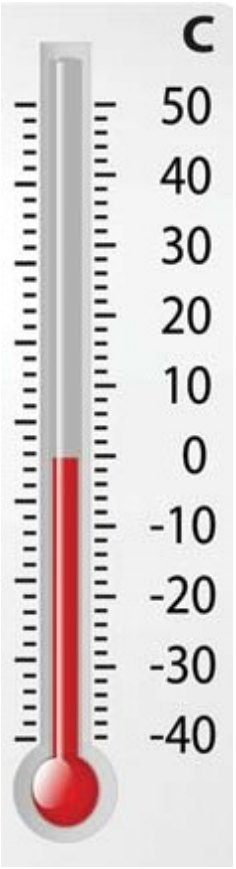
Measures - Temperature

Temperature measures how hot or cold something is.

A **thermometer** measures temperature.

Freezing point = 0°C

Boiling point = 100°C



The difference in temperature between:

-20°C and 20°C is 40°C. (The number of degrees between the two numbers on the thermometer).

-15°C and 20°C is 35°C.

-10°C and 20°C is 30°C.

-5°C and 20°C is 25°C.

0°C and 20°C is 20°C.

Measures - Time & Calendar

This table converts 12 hour clock times to 24 hour clock times.

12 Hour	24 Hour	12 Hour	24 Hour
Midnight 12:00 am	00:00 or 24:00	Midday 12:00 pm	12:00 hrs
1:00 am	01:00 hrs	1:00 pm	13:00 hrs
2:00 am	02:00 hrs	2:00 pm	14:00 hrs
3:00 am	03:00 hrs	3:00 pm	15:00 hrs
4:00 am	04:00 hrs	4:00 pm	16:00 hrs
5:00 am	05:00 hrs	5:00 pm	17:00 hrs
6:00 am	06:00 hrs	6:00 pm	18:00 hrs
7:00 am	07:00 hrs	7:00 pm	19:00 hrs
8:00 am	08:00 hrs	8:00 pm	20:00 hrs
9:00 am	09:00 hrs	9:00 pm	21:00 hrs
10:00 am	10:00 hrs	10:00 pm	22:00 hrs
11:00 am	11:00 hrs	11:00 pm	23:00 hrs

Only 12 hour clock times use am (before midday) or pm (after midday)

NB Midnight is 12:00 am or 00:00 hrs

Midday is 12:00 pm or 12:00 hrs

60 seconds	= 1 minute	12 months	= 1 year
60 minutes	= 1 hour	365 days	= 1 year
24 hours	= 1 day	366 days	= 1 leap year
7 days	= 1 week	10 years	= 1 decade
2 weeks (14 days)	= 1 fortnight	100 years	= century

Thirty days has September
April, June and November
All the rest have thirty-one
Except February alone
Which has twenty-eight days clear
And twenty-nine in each leap year.

30 days	September April June November	31 days	January March May July August October December

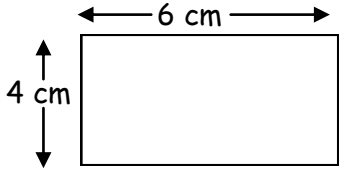
*February has 29 days in a **leap year** which occurs every four years.*
A leap year can be found by dividing the last two digits of the year by 4.
It is a leap year if there is no remainder.

Leap years are 2004, 2008, 2012, 2016, 2020, 2024, 2028, 2032, etc

Measures - Area

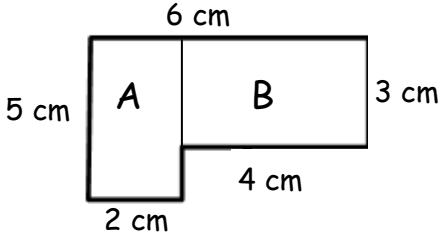
The **area** of a shape is the amount of space inside that shape.

The area of a rectangle is found by multiplying its length by its breadth.



Area = length x breadth
Area = 6 cm x 4 cm
Area = 24 cm^2

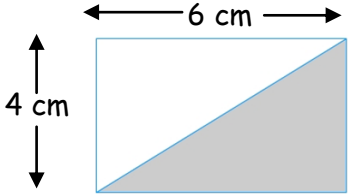
Area of composite shapes:



Area is measured in square units -
mm^2 = square millimetres
cm^2 = square centimetres
m^2 = square metres
km^2 = square kilometres

Total Area of shape = Area of A + Area of B
Area = (5 cm x 2 cm) + (3 cm x 4 cm)
Area = 10 cm^2 + 12 cm^2
Area = 22 cm^2

The **area of a triangle** is half the area of the square or rectangle that it fits inside.



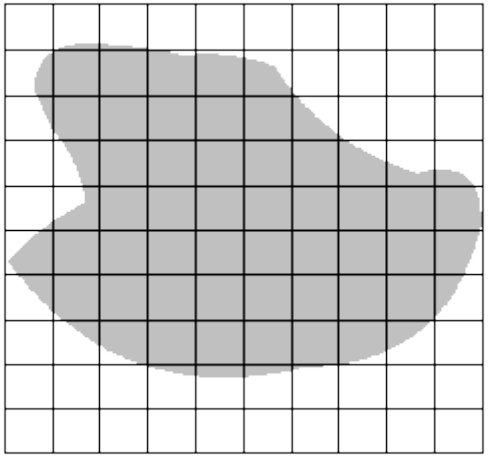
Area = $^1/_2$ of (6 cm x 4 cm)
= $^1/_2$ of 24 cm^2
= 12 cm^2

Area of shaded triangle = 12 cm^2
This is half of the area of the rectangle that it fits inside.

The area of irregular shapes is found by counting the whole squares and adding those squares where the area is more than half.

Ignore squares where the area is less than half.

Answer will not be exact, but they should be good estimates.



Each square represents 1 cm^2.

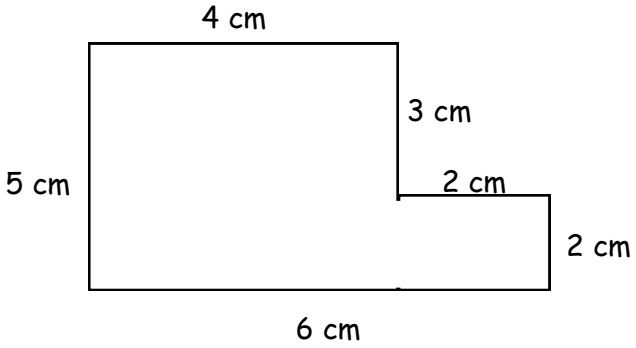
The approximate area of this irregular shape is 46 cm^2.

Measures - Perimeter

The **perimeter** is the distance around a shape.

To find the perimeter we add the lengths of **all the sides of the shape.**

The perimeter of this shape is 20 cm.



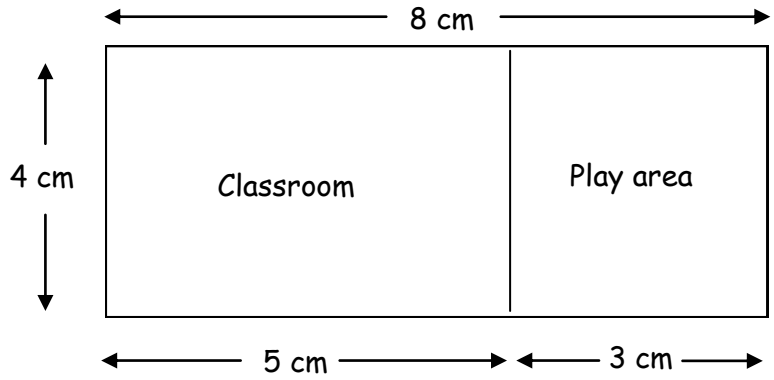
The perimeter of this shape is 22 cm.

Drawing to Scale

Scale drawing can represent objects which are much larger in real life.

Below is a scale drawing of a classroom with a play area.

Scale 1 cm : 2 m



Perimeter of Classroom = 4 cm + 5 cm + 4 cm + 5 cm = 18 cm
Actual perimeter = 36 m
(1 cm = 2 m)

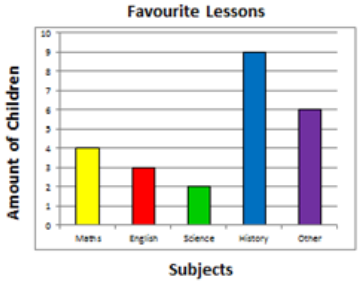
Area of Classroom
= L x B
= 4 cm x 5 cm
= 8 m x 10 m (1 cm = 2 m)
= 80 m^2

Perimeter of Play area = 4 cm + 3 cm + 4 cm + 3 cm = 14 cm
Actual perimeter = 28 m
(1 cm = 2 m)

Area of Play area
= L x B
= 4 cm x 3 cm
= 8 m x 6 m (1 cm = 2 m)
= 48 m^2

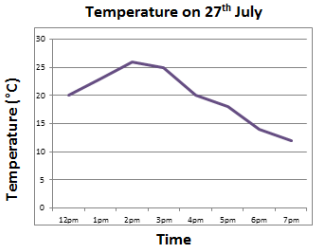
Handling Data - Data Representation

Bar Graph



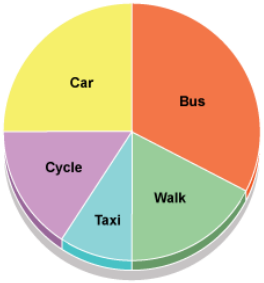
Bar graphs (charts) are a way of displaying information using bars. The bars are the same width but vary in height. The height depends on the value of the amount on the vertical axis.

Line Graph



A **line graph** shows how something can change over a period of time. To get an accurate reading, it is important to look carefully at the values indicated on the vertical and horizontal axes.

Pie Chart



Pie charts are circles divided into **segments**, where each segment represents a fraction of the total amount.

Tally Marks

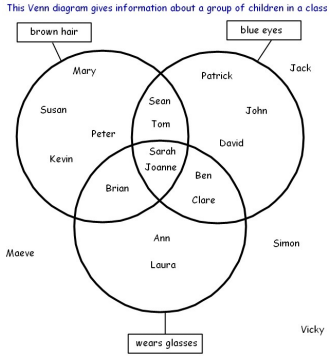
Tally marks are used to record data or information.

They are grouped in sets of five for ease of counting.

example

𝍸 𝍸 || = 12

Venn Diagram



A **Venn diagram** shows the relationship between a group of different things. Venn diagrams sort data into two or three circles which overlap in the middle. Each circle follows a certain rule, so any numbers or objects placed in the overlapping part (the intersection) follow both rules.

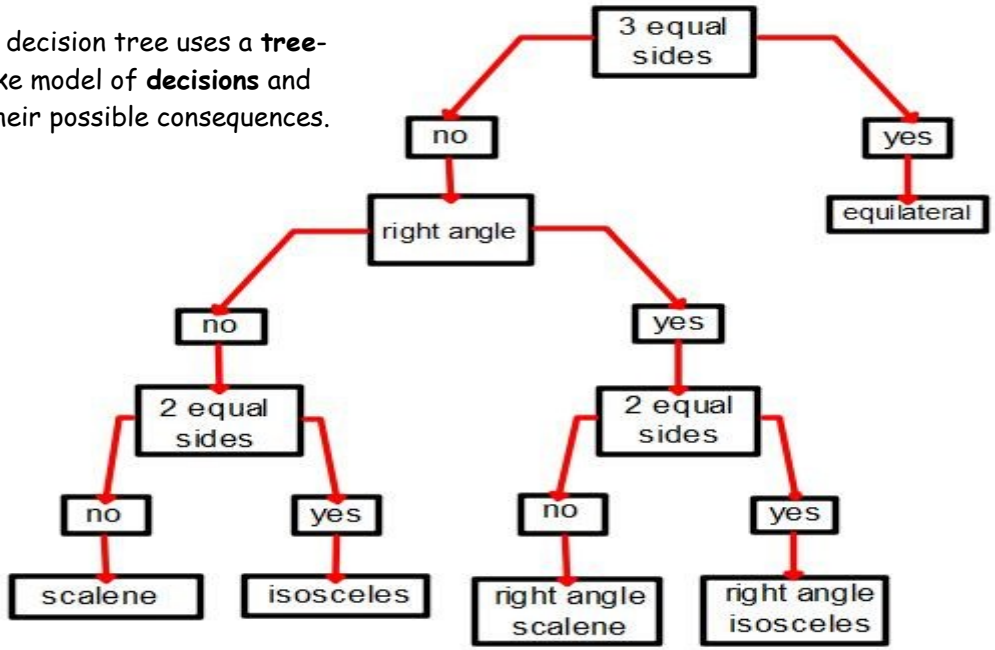
Carroll Diagram

	Odd numbers	Even numbers
Less than 20	1 3 5 7 9 11 13 15 19	2 4 6 8 10 12 14 16 18
Not less than 20	21 23 25 27 29 31 33 35 37	22 24 26 28 30 32 34 36 38

A **Carroll diagram** is a diagram used to sort a number or an object by certain rules or conditions.

Decision Tree Diagram - Triangles

A decision tree uses a **tree**-like model of **decisions** and their possible consequences.



Handling Data - Mean (average) & Range and Probability

Mean (average) and Range

To find the **mean** (or **average**) of a set of numbers add them together and divide by the amount of numbers you added together.

example

The following temperatures were recorded at noon throughout a week in July.

Mon	19°C
Tue	21°C
Wed	18°C
Thur	22°C
Fri	19°C
Sat	21°C
Sun	20°C

$$\text{mean} = \frac{19 + 21 + 18 + 22 + 19 + 21 + 20}{7} = \frac{140}{7} = 20°C$$

The **range** is the difference between the largest and smallest numbers in any given set.

example

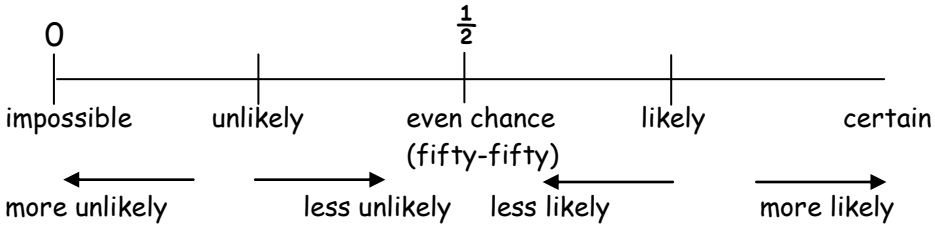
the range of the temperatures is 22°C - 18°C = 4°C

Probability

Probability is part of mathematics where we try to measure the chance of something happening.

It is a judgement of how **likely** or **unlikely** the event is to happen.

A probability line looks like this:



example

impossible	->	a human can fly unaided by technology
very unlikely	->	your best friend will be exactly the same height as you
unlikely	->	rolling a dice and getting a 6
even change (fifty-fifty)	->	tossing a coin and getting a head
likely	->	you will sleep better after a lot of exercise
very likely	->	it will be warmer in the UK in July than December
certain	->	there are 24 hours in each day

Grammar - Nouns & their plurals

Common Nouns
A noun is the name of a person, place, thing or idea.
Examples include; pencil, book, car, dream, bravery, hope.

A noun which refers to one thing is **singular** in number.
A noun which refers to more than one thing is **plural** in number.

Examples of nouns that break normal rules;

The nouns listed below ending with f add an s to make the plural.		The nouns listed below ending with o add s to make the plural. They are usually associated with music. They can also be the shortened form of words ending in the letter o.		The nouns listed below ending in a vowel plus o (eg eo, io, or oo) add on s to make the plural.	
roof reef chief gulf brief	roofs reefs chiefs gulfs briefs	piano solo soprano banjo cello piccolo photo memo	pianos solos sopranos banjos cellos piccolos photos memos	studio radio cockatoo igloo tattoo	studios radios cockatoos igloos tattoos

Forming Plurals from Singular Nouns;

What letter the word ends in	How to make singular nouns into plurals	Examples	
		Singular	Plural
For words ending with: b d e g k l m n p r t w th	add s	cow ship arm straw bean	cows ships arms straws beans
For words ending with: s sh ch x o	add es	tomato dish glass catch fox	tomatoes dishes glasses catches foxes
If words ends with y, but has a vowel directly before the y	add s	toy donkey valley	toys donkeys valleys
If words ends with y, but has a consonant directly before the y	take away the y and add ies	library body company	libraries bodies companies
For words ending with: f fe	take away the f or fe and add ves	thief calf wife leaf shelf sheaves	thieves calves wives leaves shelves sheaves

Grammar - Proper Nouns & Possessive Nouns

A **proper noun** is the actual name of a person, place, thing or idea.

Examples include:

David
Susan
Africa
River Nile
Big Ben
Mr Brown
Captain Stuart Dickson
Foreign Legion
Europe
Google
Queen Mary
French
Coca-Cola

Forming Nouns

Nouns can be formed from verbs.

Examples include;

Verb	Noun
accept	acceptable
act	action
advise	advice
approve	approval
behave	behaviour
believe	belief
calculate	calculation

Verb	Noun
choose	choice
collect	collection
compare	comparison
complain	complaint
construct	construction
create	creation
decide	decision

Verb	Noun
depart	departure
discover	discovery
divide	division
exclaim	exclamation
exist	existence
explain	explanation
explode	explosion

Verb	Noun
extend	extension
fly	flight
grow	growth
hate	hatred
imagine	imagination
inform	information
injure	injury

Verb	Noun
invade	invasion
know	knowledge
lose	loss
move	movement
persuade	persuasion
reduce	reduction
satisfy	satisfaction

Grammar - Verbs

A word which describes an action is called a **verb**.
Examples include; run, jump, play, speak and think.

Actions which are happening currently (in present time) are written in the **present tense**.
Actions which have happened in the past are written in the **past tense**.
Actions which have happened in the past and require a helping word are written as a **past participle**.

Examples include:

Present Tense	Past Tense	Past Participle
I am	I was	I have been
I become	I became	I have become
I bite	I bit	I have bitten
I bleed	I bled	I have bled
I break	I broke	I have broken
I buy	I bought	I have bought
I catch	I caught	I have caught
I choose	I chose	I have chosen
I do	I did	I have done
I drink	I drank	I have drunk
I eat	I ate	I have eaten
I fall	I fell	I have fallen
I fly	I flew	I have flown
I go	I went	I have gone
I hide	I hid	I have hidden

Present Tense	Past Tense	Past Participle
I kneel	I knelt	I have knelt
I know	I knew	I have known
I ring	I rang	I have rung
I rise	I rose	I have risen
I see	I saw	I have seen
I shake	I shook	I have shaken
I sing	I sang	I have sung
I sink	I sank	I have sunk
I speak	I spoke	I have spoken
I swim	I swam	I have swum
I take	I took	I have taken
I teach	I taught	I have taught
I wear	I wore	I have worn
I wind	I wound	I have wound
I write	I wrote	I have written

Grammar - Adverbs & Pronouns

A word which describes how and action is done is called an **adverb**.

Adverbs usually end in **-ly** and can be formed from adjectives.

Examples include;	quick	quickly
	soft	softly
	brave	bravely

Some adjectives change their **-y** to an **-i** and add **-ly**.

Examples include;	lucky	luckily
	hungry	hungrily
	lazy	lazily

Some adjectives drop their **-e** and add **-ly**.

Examples include;	sensible	sensibly
	simple	*simply*
	true	*truly*

Please note, all adverbs do not have to end in **-ly**.

For example the word **fast** and **well** are both adverbs.

A word which replaces a noun is called a **pronoun**.

Examples include; I, you, we, he, she, it, us, they, you, me, him, her, them

Pronouns which show possession include; mine, yours, ours, his, hers, its, theirs

Grammar - Adjectives

A word which describes a noun is called an **adjective**.

Examples include; hot, cold, green, sad, young, beautiful

Comparing Adjectives

Many adjectives can have **-er** and **-est** added to them without any change in spelling.

Examples include;			
	smart	smarter	smartest
	bright	brighter	brightest
	rough	rougher	roughest

Adjectives ending with the letter **e** drop this letter when adding -er and -est.

Examples include;			
	safe	safer	safest
	large	larger	largest
	brave	braver	bravest

Adjectives ending with the letter **y** change this letter to **-i** before adding -er and -est.

Examples include;			
	heavy	heavier	heaviest
	noisy	noisier	noisiest
	luck	luckier	luckiest

Some adjectives **double** the last letter before adding -er and -est.

Examples include;			
	thin	thinner	thinnest
	hot	hotter	hottest
	big	bigger	biggest

Some adjectives follow the pattern below when comparing things.

Examples include:			
	beautiful	more beautiful	most beautiful
	delicious	more delicious	most delicious
	honest	more honest	most honest

Finally some adjectives follow their own individual pattern when comparing things.

Examples include;			
	good	better	best
	bad	worse	worst
	little	less	least

Forming Adjectives

Below are examples of adjectives which have been formed from nouns.

Noun	Adjective
anger	angry
child	childish
danger	dangerous
fortune	fortunate
giant	gigantic
hero	heroic
metal	metallic
mystery	mysterious
skill	skilful
value	valuable

Grammar - Conjunctions & Prepositions

A word which connects two groups of words is called a **conjunction**.

Examples include; and, but, yet, when, since, while, until, if, as, for, so that, until, though, unless, because, whether, although

Examples used in sentences;

Peter buttered his toast **while** Joe fried the eggs.
The match was cancelled **because** of heavy rain.
The weather was very cold **so** Mike wore gloves.

A word which shows the relationship between one thing and another thing in a sentence is called a **preposition**.

Examples include; before, from, beneath, behind, across, down, below, throughout, with, on, off, past, under, during, above, among, outside, upon, over, after, through, along, inside

Examples used in sentences;

The orange was sitting **on** the book.
The balled was kicked **through** the window.
Inside the old house there were many strange animals.

Alphabetical Order, Homophones and Synonyms

Alphabetical Order

Arranging words alphabetically means putting the words in the order of the alphabet by using the first letters of the words. If the first letters of the words are the same, use the second letters - if they are the same, use the third letters, and so on.

Examples using the first letter;

book, canoe, giraffe, swan, yacht

Examples using the second letter;

hand, heart, hive, horse, hurry

Examples using the third letter;

flash, flesh, flinch, flour, flush

Examples using the fourth letter;

strict, stride, strife, strike, string

Examples using the fifth letter;

concave, concert, concise, concrete, concussion

Synonyms

A word which is similar in meaning to another word is called a **synonym**.

Examples include;

leave	abandon
annual	yearly
assistance	help
short	brief
fierce	ferocious
generous	kind
inquire	ask
stationary	still
vacant	empty
wealthy	rich

Homophones

Words which sound the same but have different meaning are called **homophones**.

Examples include;

allowed	*aloud*	*principal*	*principle*
ball	*bawl*	*read*	*red*
beach	*beech*	*read*	*reed*
board	*bored*	*right*	*write*
cereal	*serial*	*scene*	*seen*
coarse	*course*	*sight*	*site*
flour	*flower*	*stair*	*stare*
groan	*grown*	*stationary*	*stationery*
hear	*here*	*throne*	*thrown*
hole	*whole*	*threw*	*through*
key	*quay*	*waist*	*waste*
knew	*new*	*wood*	*would*
missed	*mist*		

Opposites (antonyms) and Prefixes

Opposites (Antonym)

A word which is opposite is meaning to another word is called an **antonym**.

Examples include;

add	subtract
loud	quiet
better	worse
dark	light
birth	death
open	close
true	false
float	sink

Opposites using a prefix

A prefix is a letter or a group of letters placed at the beginning of a word usually to mark an opposite.

Common prefixes include

dis-	mis-	in-	im-
disappear	misbehave	incapable	impatient
disagree	miscalculate	incorrect	imperfect
dislike	misprint	indirect	immortal
discontinue	miscopy	invisible	impossible
disallow	misfire	independent	impolite
disadvantage	misheard	incurable	improbable
disconnect	mislead	inequality	immovable
disloyal	misplace	indiscipline	impure

un-	il-	ir-	non-
unhealthy	illegal	irregular	nonsense
unpopular	illegible	irrational	non-stop
uncertain	illiterate	irreplaceable	non-existent
unsuitable	illegitimate	irresponsible	non-essential
unequal	illogical	irreverent	nonentity
unconscious		irrational	
unfriendly		irrespective	
ungrateful			

Punctuation - Apostrophes: Contractions and Possession

Contractions combine two words to form one word using an apostrophe to replace a letter or letters.

*Examples for **not**;*

isn't	weren't	don't
wasn't	aren't	haven't
doesn't	mightn't	shan't
hasn't	mustn't	didn't
can't	won't	wouldn't

- wont = will not shan't = shall not

*Examples for **is/has**;*

he's	*it's*	*there's*
who's	*where's*	*she's*
that's	*how's*	*what's*

*Examples for **are**;*

we're	you're	they're

*Examples for **have**;*

I've	you've	we've,
they've	where've	

*Examples for **will**;*

I'll	you'll	she'll
he'll	they'll	it'll
we'll	there'll	

*Examples for **would**;*

I'd	you'd	she'd	
he'd	they'd	we'd	who'd

*Examples for **am**;*

I'm

To show **possession** (ownership) of a **singular nouns** write the noun which indicates the owner and then add 's.

Examples include:

the girl's dress	the dress belonging to the girl
the boy's toy	the toy belonging o the boy
the child's arm	the arm belonging to the child

To show possession (ownership) of a **plural noun** which ends with **s**, write the apostrophe after the **s**.

Examples include:

the girls' playground	the playground belonging to the girls
the dogs' tails	the tails belonging to the dogs
the animals' zoo	the zoo belonging to the animals

To show possession (ownership) of a **plural noun** which does not end with **s**, write the apostrophe before the **s**.

Examples include:

the children's bikes	the bikes belonging to the children
the workmen's tools	the tools belonging to the workmen
the oxen's field	the field belonging to the oxen

Punctuation - Speech Marks

Direct Speech

In **direct speech** the actual words used by a speaker are always enclosed in speech marks (or inverted commas).

For example; "I am not going out today," said Sarah.
The actual words spoken by Sarah were: " I am not going out today."

The inverted commas come before the first word spoken and after the last word spoken.
They always come after the punctuation mark at the end of the speech.

Sometimes the unspoken words can come first.

For example; Peter said, "It is going to be sunny today."

In the final example of the unspoken words come between the spoken words.

For example; "It's time to leave," said mum, "and you haven't packed your bags yet!"

Spelling - Word endings (suffixes)

-or, -ar, -er, -ur word endings

Examples include;

-or	-ar	-er	-ur
ancestor	beggar	adviser	femur
bachelor	burglar	announcer	incur
conductor	circular	dancer	lemur
doctor	familiar	employer	recur
inferior	grammar	hacker	slur
inventor	particular	labourer	sulphur
junior	peculiar	meddler	
radiator	popular	register	
sculptor	regular	reporter	
sailor	scholar	waiter	
superior	similar		

-ory, -ary, -ery, -ury word endings

Examples include;

-ory	-ary	-ery	-ury
category	canary	archery	century
dormitory	contrary	battery	injury
factory	dictionary	crockery	luxury
history	glossary	delivery	mercury
ivory	military	discovery	treasury
memory	ordinary	jewellery	
predatory	necessary	misery	
respiratory	primary	mystery	
sensory	salary	nursery	
territory	voluntary	slippery	

Spelling - Word endings (suffixes)

-le, -el, -al word endings

Examples include;

-le	-el	-al
ankle	channel	arrival
article	dispel	burial
castle	enamel	central
dazzle	expel	comical
doodle	marvel	disapproval
marble	repel	general
miserable	squirrel	global
nocturnal	travel	mammal
noodle	tunnel	rival
rifle	vowel	signal

-ance, -ence word endings

Examples include;

-ance	-ence
acceptance	absence
allowance	commence
clearance	confidence
disturbance	dependence
grievance	existence
hindrance	influence
fragrance	obedience
insurance	occurrence
performance	sentence
substance	sequence

Spelling - Word endings (suffixes)

-ent, -ant word endings

Examples include;

-ent	-ant
absent	accountant
accent	arrogant
accident	assistant
achievement	attendant
agreement	brilliant
content	defiant
component	dependant
descent	entrant
document	fragrant
equivalent	gallant
excitement	ignorant
frequent	inhabitant
ingredient	occupant
innocent	participant
management	pheasant
nutrient	pleasant
patient	reluctant
student	restaurant
transparent	significant
violent	triumphant

-tion, -sion word endings

Examples include;

-tion	-sion
action	admission
application	conclusion
collection	decision
correction	division
destruction	explosion
explanation	extension
imagination	illusion
introduction	invasion
invitation	impression
occupation	permission
preparation	persuasion
reduction	provision
reflection	revision
section	session
solution	vision

able / ible word endings

Examples include;

-able	-ible
acceptable	accessible
achievable	audible
adjustable	collectible
admirable	convertible
advisable	divisible
believable	edible
capable	eligible
charitable	flexible
comfortable	horrible
curable	illegible
dependable	impossible
desirable	inaudible
forgettable	indefensible
irritable	invincible
lovable	possible
moveable/movable	responsible
probable	sensible
suitable	terrible
valuable	visible

Other English (literary) terms which may appear in tests

abbreviation - a word or a phrase which has been shortened.

Examples include;

mathematics	maths
kilogramme	kg
Royal Air Force	RAF

alliteration - the repetition of the same sound or letter at the beginning of each or most of the words in a phrase or sentence.

Examples include;
The beautiful baby bounced in the bright sun.
The lion licked its lip.

analogy - a comparison of two things based on them being alike in some way.

Examples include;
Foot is to toes as hand is to fingers.
London is to England as Paris is to France.
Food is to famine as water is to drought.

similes - a simile compares two things using the words 'as' or 'like'.

Examples include;

as white as snow	sings like an angel
as quick as lightning	sleep like a log
as light as a feather	like two peas in a pod

idioms - an idiom is a word or phrase which means something different from its literal (actual) meaning.

Examples include;
to change the way you have behaved in the past - to turn over a new leaf
to boast about yourself - blow your own trumpet

proverbs - a proverb is a wise saying which has become popular over many years.

Examples include;
a fool and his money are easily parted
all well that ends well
better late than never