

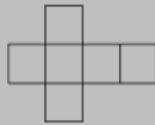
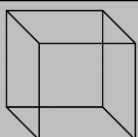
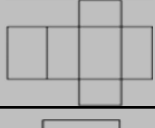
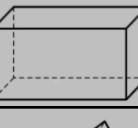
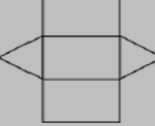
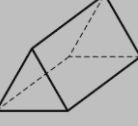
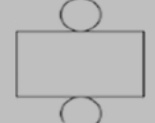
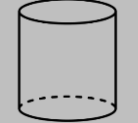

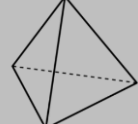
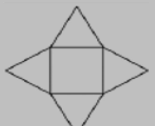
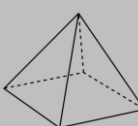


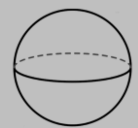
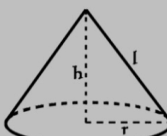
# Unit 11

## 3D Geometry

PROPERTIES OF 3D SOLIDS	
surface	the <b>outside layer</b> of an object, it has an <b>area</b> and <b>can be flat or curved</b>
face	any of the <b>individual flat surfaces</b> of a <b>solid object</b>
edge	for a 3D shape, the <b>line segment</b> where <b>two faces</b> meet
vertex (vertices)	for a 3D shape, the <b>point</b> where <b>two or more edges</b> meet, a <b>corner</b>

2D REPRESENTATIONS OF 3D SHAPES	
plan	a <b>2D view</b> of a <b>3D solid</b> as viewed <b>from above</b> , <b>birds-eye view</b>
elevation	the <b>2D view</b> of a <b>3D solid</b> from the <b>front</b> or the <b>side</b>
net	a <b>pattern</b> that you can <b>cut</b> and <b>fold</b> to make a <b>model</b> of a 3D shape

VOLUME		
volume	the amount of <b>space</b> a <b>3D shape</b> takes up	
volume units	$\text{mm}^3$ , $\text{cm}^3$ , $\text{m}^3$ ...	
prism	volume = <b>area of cross section</b> x <b>length</b>	
cube	volume = <b>one side cubed</b> (or, <b>area of square</b> x <b>length of prism</b> )	$V = l^3$
cuboid	volume = <b>area of rectangle</b> x <b>length of prism</b>	$V = lbh$
triangular prism	volume = <b>area of triangle</b> x <b>length of prism</b>	$V = \frac{lbh}{2}$
cylinder	volume = <b>area of circle</b> x <b>length of prism</b>	$V = \pi r^2 h$
pyramid	volume = $\frac{1}{3}$ x <b>area of cross section</b> x <b>length</b>	
square based pyramid	volume = $\frac{1}{3}$ x <b>area of square base</b> x <b>height of pyramid</b>	$V = \frac{lbh}{3}$
cone	volume = $\frac{1}{3}$ x <b>area of circle base</b> x <b>height of cone</b>	$V = \frac{\pi r^2 h}{3}$
sphere	$V = \frac{4}{3}\pi r^3$	

3D SOLIDS			
prism	a 3D solid with a consistent cross section		
cube	6 faces 12 edges 8 vertices		
cuboid	6 faces 12 edges 8 vertices		
triangular prism	5 faces 9 edges 6 vertices		
cylinder	2 faces with 1 curved surface  2 edges no vertices		
pyramid	a solid three-dimensional shape with a polygon base, and triangular faces that meet at the apex (a vertex)		
triangular based pyramid (tetrahedron)	4 faces 6 edges 4 vertices		
square based pyramid	5 faces 8 edges 5 vertices		
cone	1 face with 1 curved surface  1 edge 1 vertex		
sphere	All dimensions are the same. The centre point is equal from every point on its surface.		
SURFACE AREA			
surface area	the total area of all the surfaces on a 3D shape		
surface area method	find the area of each face separately, then add them together		
surface area of a sphere	$A = 4\pi r^2$		
surface area of a cone	curved surface area = $\pi rl$ circle base area = $\pi r^2$ add these together		

# Unit 12

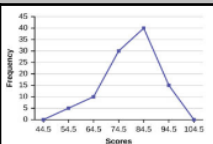
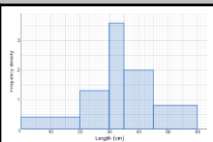
## Statistics

TYPES OF DATA	
<b>data</b>	a collection of <b>information</b>
<b>qualitative</b>	data that can only be <b>written in words</b> , not numbers, e.g. eye colour, favourite animal
<b>quantitative</b>	<b>numerical</b> data, e.g. shoe size, height of a plant
<b>continuous</b>	<b>numerical data</b> that can be <b>measured</b> , e.g. height of a plant, it has an infinite number of possible values within a selected range, it is <b>on a scale</b>
<b>discrete</b>	data which can only take <b>certain values</b> , e.g. eye colour, shoe size (categorical in science)
<b>grouped</b>	numerical data that has been ordered and <b>sorted into groups</b> called classes
<b>data representation</b>	a <b>table or chart or graph</b> which gives more meaning to a set of data these include <b>bar charts, line graphs, pictograms, pie charts, stem and leaf diagrams, two-way tables, scatter graphs, frequency polygons and histograms</b>

COMPARING DATA	
<b>comparing data</b>	<b>compare averages</b> to say who is <b>better/faster/taller</b> <b>compare ranges</b> to say who is <b>more consistent / less varied</b>

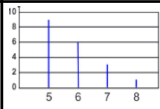
AVERAGES AND RANGE FROM A FREQUENCY TABLE	
<b>mean</b>	method: <b>multiply the variables by their frequencies</b> (fx column), <b>total the fx column</b> , <b>divide by total frequency</b>
<b>mode / modal class</b>	the most frequent value or class; the one with the <b>highest frequency</b>
<b>median</b>	<b>use half the total frequency</b> to find the <b>middle position</b> , then <b>locate the row</b> this occurs in using the 'subtotal' column
<b>range</b>	<b>difference between the largest and smallest values of the variable</b> (first column)

DISPLAYING GROUPED DATA	
<b>class width</b>	the <b>range of a group</b> (class) i.e. aged 15-20 has a class width of 5
<b>histogram</b>	the <b>area</b> of the bars represents the frequency, there are <b>no gaps</b> between bars
<b>frequency density</b>	the <b>heights</b> of the bars on a histogram $\text{frequency density} = \frac{\text{frequency}}{\text{class width}}$
<b>frequency polygon</b>	a line graph made by plotting the <b>frequency</b> against the <b>midpoints</b> of each group



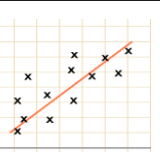
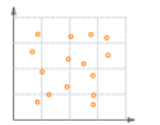
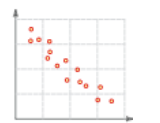
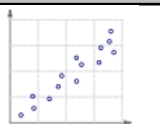
DISPLAYING UNGROUPED DISCRETE NUMERICAL DATA	
<b>stem and leaf diagram</b>	a way of displaying a <b>list of numbers</b> the <b>stem goes down</b> and the <b>leaves go out</b> to the right, It has a <b>key</b>
<b>vertical line graph</b>	like a <b>bar chart</b> , but the <b>bars have no width</b> , they are just <b>straight lines up the page</b>

stem	leaf
5	6
6	7, 7, 9
7	2, 4, 7, 7, 8

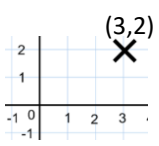
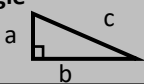



DISPLAYING BIVARIATE DATA	
<b>bivariate data</b>	data containing <b>two variables</b>
<b>variable</b>	something that can <b>change or vary</b>
<b>two-way table</b>	shows information about <b>two variables</b> which <b>do not overlap</b> , the <b>numbers represent frequencies</b>
<b>scatter graph</b>	a <b>graph</b> to show <b>bivariate data</b>
<b>correlation</b>	when there is a <b>relationship</b> between two sets of data, but we don't know if one caused the other
<b>causation</b>	when the independent variable <b>causes</b> the dependent variable
<b>positive correlation</b>	as one variable increases, the other <b>increases</b>
<b>negative correlation</b>	as one variable increases, the other <b>decreases</b>
<b>no correlation</b>	there is <b>no relationship</b> between the two variables
<b>line of best fit</b>	a line that <b>best represents</b> the data on a scatter graph In maths GCSE it is <b>always straight</b> , but in science it can be curved
<b>outlier</b>	a value that ' <b>lies outside</b> ' most of the other values in a set of data, it is <b>much smaller</b> or <b>much larger</b> than the other values in a set of data

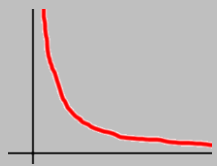
	Female	Male	Total
English	12	18	30
Maths	28	27	55
Science	19	16	35
Total	59	61	120



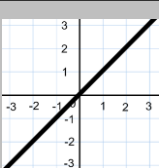
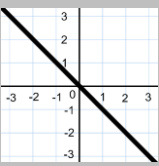
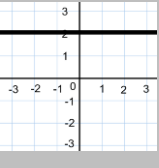
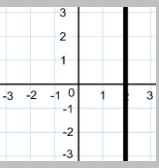
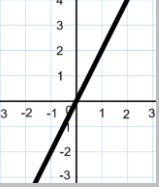
MISLEADING REPRESENTATIONS	
<b>misleading representations</b>	Look for: <ul style="list-style-type: none"> <li><b>frequency scales: too large, or too small; has missing numbers; doesn't start at zero;</b></li> <li><b>the axes are incorrectly labelled;</b></li> <li><b>data is missing;</b></li> <li><b>bar charts with varying width bars or varying space between them;</b></li> <li><b>proportions for pie charts not adding up to 100%</b></li> </ul>

COORDINATES	
<b>axis</b> (plural: axes)	the <b>x axis</b> is <b>horizontal</b> the <b>y axis</b> is <b>vertical</b>
<b>quadrant</b>	the <b>four regions</b> separated by the axes
<b>coordinate</b>  e.g. 	give a <b>position</b> of a <b>point</b> on a grid the <b>first number (x)</b> moves <b>left (-)</b> or <b>right (+)</b> the <b>second number (y)</b> moves <b>up (+)</b> or <b>down (-)</b> <b>(x, y)</b> e.g. (3,2) means the point that is 3 to the right and 2 up from the origin
<b>origin</b>	the coordinate <b>(0, 0)</b>
<b>line segment</b>	a line joining <b>two points</b>
<b>length of line segment</b>	<b>distance</b> between two points calculated using <b>Pythagoras' theorem</b> .
<b>Pythagoras' theorem</b>	a relationship between the <b>3 sides</b> on a <b>right angled triangle</b>   $a^2 + b^2 = c^2$
<b>midpoint</b>	the <b>middle</b> of a <b>line segment</b>

DIRECT PROPORTION	
<b>direct proportion</b>	as <b>one increases</b> , the other <b>increases</b> at the <b>same rate</b> if <b>y is directly proportional to x</b> , this can be written as <b><math>y \propto x</math></b>
<b><math>y = kx</math></b>	an equation of the form <b><math>y=kx</math></b> represents direct proportion, where k is the <b>constant of proportionality</b>
<b>direct proportion graphically</b>	

INVERSE PROPORTION	
<b>inverse proportion</b>	if two quantities are in inverse proportion, as <b>one increases</b> , the <b>other decreases</b> in <b>proportion</b> their <b>product</b> is always the <b>same</b> if <b>y is inversely proportional to x</b> , this can be written as <b><math>y \propto \frac{1}{x}</math></b>
<b><math>y = \frac{k}{x}</math></b>	an equation of the form <b><math>y = \frac{k}{x}</math></b> represents inverse proportion, where k is the <b>constant</b>
<b>inverse proportion graphically</b>	

# Unit 13: Graphs and Proportion

LINEAR GRAPHS		
<b><math>y = x</math></b>	every point on this line, the <b>y coordinate is equal to the x coordinate</b> e.g. (3,3), (-2,-2), (0,0)	
<b><math>y = -x</math></b>	every point on this line, the <b>y coordinate is equal to the negative of the x coordinate</b> e.g. (3, -3), (-2,2)	
<b><math>y = a</math></b>	these lines are always <b>horizontal</b> for example <b><math>y = 2</math></b> , every point on this graph, the <b>y coordinate equals 2</b> , e.g. (0,2), (5,2)	
<b><math>x = a</math></b>	these lines are always <b>vertical</b> for example <b><math>x = 2</math></b> , every point on this graph, the <b>x coordinate equals 2</b> , e.g. (2,0), (2,5)	
<b><math>y = kx</math></b>	these lines always go through the <b>origin</b> for example <b><math>y = 2x</math></b> , every point on this graph, the <b>y coordinate is double the x coordinate</b> , e.g. (2, 4), (1, 2)	
<b><math>y = mx + c</math></b>	the <b>general equation</b> of a <b>linear graph</b> <b>m</b> is the <b>gradient</b> <b>c</b> is the <b>y-intercept</b> <b>when plotting:</b> use a <b>table of values</b> , substitute in values of ' <b>x</b> ' to generate ' <b>y</b> ', plot the <b>coordinates</b> , join with line	
<b>gradient</b>	How <b>steep</b> a line is. Can be positive or negative. <b>(Change in y)</b> <b>(Change in x)</b> It gives the <b>rate of change</b> .	
<b>y- intercept</b>	where the line <b>crosses the y-axis (0, a)</b>	

SCALE	
<b>scale</b>	the <b>ratio</b> of the lengths in a <b>model/map/diagram</b> to the <b>lengths</b> in <b>real life</b>
<b>scale factor</b>	the <b>ratio</b> of <b>corresponding sides</b> of <b>two similar shapes</b>
<b>units in scales</b>	<b>scales with units:</b> use the <b>box method</b> to find the new value giving it in the correct units  <b>scales without units:</b> <b>both sides</b> of the scale have the <b>same unit stated</b> in the <b>question</b> , use the <b>box method</b> to find the new value and then <b>convert</b> the answer <b>to sensible units</b>

# Year 9 Unit 2: Algebraic Expressions

SEQUENCES	
sequence	a <b>pattern of terms/numbers</b> which <b>follow a rule</b>
position-to-term rule ( $n^{\text{th}}$ Term)	a <b>rule</b> which allows you to <b>calculate any term</b> that is in the <b><math>n^{\text{th}}</math> position</b> of the sequence
generate	to <b>produce</b> or <b>create</b>
linear sequences	a sequence where the <b>difference between terms increases or decreases</b> by the <b>same amount</b> each time also known as an <b>arithmetic</b> sequence use <b>DiNO</b> to find the <b><math>n^{\text{th}}</math> term</b> to <b>generate a sequence substitute values of 'n'</b> in, e.g. 2nd term, $n=2$ <i>algebraically: <math>x_n = an + b</math></i>
common difference	the amount we <b>add</b> or <b>subtract</b> each time in a <b>linear sequence</b>
quadratic sequences	a sequence of numbers with an <b><math>n^2</math></b> in the <b>position to term rule</b> ( $n^{\text{th}}$ term) the <b>second difference</b> between consecutive terms is <b>constant</b> <i>algebraically: <math>x_n = an^2 + bn + c</math></i>
geometric sequences	a sequence of numbers where each term is found by <b>multiplying the previous one by a number</b> called the <b>common ratio 'r'</b> <i>algebraically: <math>x_n = ar^{n-1}</math></i> <b>increasing:</b> the <b>ratio</b> is an <b>integer</b> , <b>decreasing:</b> the <b>ratio</b> is a <b>fraction</b>
common ratio (r)	the amount we <b>multiply</b> by each time in a geometric sequence, can be a fraction

## INSTRUCTIONS: GENERAL

expand	<b>multiply</b> terms inside a bracket by those outside the bracket, <b>remove the brackets using the grid method</b>
simplify	to reduce to its <b>simplest form</b>

## FACTORISING

factorise	finding the <b>factors</b> of an expression the reverse of <b>expand</b> , it is when we write an expression <b>using brackets</b> , use <b>reverse grid</b>
factor	a quantity which <b>divides equally</b> into a number, e.g. <i>factors of 8 are 1, 2, 4 and 8</i>
factorising a general quadratic	quadratic: $x^2 + bx + c$ , factorised form: $(x + ?)(x + ?)$ '?' are <b>two numbers</b> whose <b>product</b> is ' <b>c</b> ' and <b>sum</b> is ' <b>b</b> ', <b>split the middle term</b> and put into a <b>reverse grid</b> to find the <b>brackets</b>
difference of two squares	quadratic: $a^2 - b^2$ factorised form: $(a - b)(a + b)$ <b>square root each number</b> from the <b>original expression</b>

## INSTRUCTIONS: EQUATIONS AND INEQUALITIES

rearrange	<b>changing the subject</b> of a formula sometimes called <b>transposing</b> use <b>inverse operations</b> and the <b>balancing method</b> , like when we solve an equation
inverse	the <b>opposite</b>
balance an equation	do the <b>same</b> to <b>both sides</b> of the " <b>=</b> " use to <b>solve</b> an equation, or <b>rearrange</b> a formula
subject of an equation	a <b>single unknown</b> or <b>variable</b> that everything else is <b>equal</b> to
solution of an equation	a <b>value</b> we can put in <b>place of a variable</b> that makes the equation <b>true</b>
order of operations	the laws regarding the <b>order</b> in which to <b>calculate</b> , used in algebra too <b>brackets, other, multiply and divide, add and subtract</b>
solving inequalities	using the <b>balancing method</b> to write an inequality in its <b>simplest form</b>
solving quadratic equations	To solve you must <b>factorise</b> the <b>quadratic equation</b> then set each bracket <b>equal to zero</b> to find <b>solutions for x</b> .

## LINEAR SEQUENCES inks to: LINEAR GRAPHS

$y = mx + c$	the <b>general equation</b> of a linear graph <b>m</b> is the <b>gradient</b> <b>c</b> is the <b>y-intercept</b>
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## ALGEBRAIC NOTATION


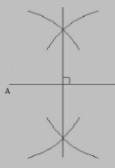
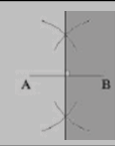
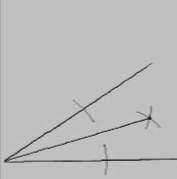
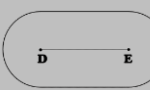
coefficient	a number used to <b>multiply</b> a variable the number that comes in <b>front</b> of a <b>letter</b> , e.g. $3b$ means $3 \times b$ the <b>coefficient</b> is <b>3</b> , the <b>variable</b> is <b>b</b>
simplifying algebraic fractions	<b>factorise</b> the <b>numerator</b> and <b>denominator</b> and <b>cancel common factors</b> , sometimes requires factorisation
identity	an equation that is <b>true for all</b> of its <b>variables</b> , indicated by the <b><math>\equiv</math> symbol</b> e.g. $b + b \equiv 2b$
prove	<b>even number:</b> $2n$ , <b>odd number:</b> $2n+1$ or $2n-1$ , <b>consecutive numbers:</b> $n, n+1, n+2$ , <b>consecutive even numbers:</b> $2n, 2n+2, 2n+4$ , <b>consecutive odd numbers:</b> $2n+1, 2n+3, 2n+5$ or $2n-1, 2n-3, 2n-5$ , <b>multiples of a number:</b> <b>it will factorise by that number</b>

# Unit 15: Geometry Angles

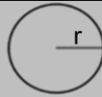
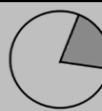
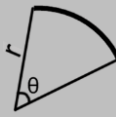
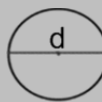


## LOCI VOCABULARY

loci	a locus is a <b>path of points</b> that <b>follow a rule</b>
equidistant	<b>equal</b> distance
regions	' <b>more/further than</b> ' indicates <b>shading outside the loci</b> ' <b>within/less than</b> ' indicates <b>shading inside the loci</b>

## LOCI

locus of points equidistant from A	a circle with <b>A at the centre</b> radius is the <b>distance given</b>	
locus of points equidistant from two points	<b>perpendicular bisector</b> : open compass to <b>over halfway</b> , draw an <b>arc</b> from each end, <b>join</b> where they cross	
locus of points closer to B than A	<b>perpendicular bisector</b> of AB, shade the side closest to B	
locus of points equidistant from two lines	an <b>angle bisector</b> : place compass on corner, <b>draw two arcs</b> cross both lines, one further away, draw lines <b>joining top left cross to bottom right</b> and <b>vice versa</b> , <b>join</b> where these lines meet to <b>corner</b>	
locus of points a set distance from a line	create <b>two semi-circles</b> at either end <b>joined</b> by two <b>parallel lines</b>	

## CIRCLE CALCULATIONS

circle area	$A = \pi r^2$ area = pi x radius <sup>2</sup>	
sector	the <b>region</b> of a circle <b>enclosed</b> by two <b>radii</b> and an <b>arc</b>	
sector area	$A = \frac{\theta}{360} \pi r^2$ area = the <b>fraction</b> of the full circle x pi x radius <sup>2</sup>	
circumference of a circle	$C = \pi d$ circumference = pi x diameter	
arc	a <b>part</b> of the <b>circumference</b> of a circle	
arc length	$L = \frac{\theta}{360} \pi d$ arc length = the <b>fraction</b> of the full circle x pi x diameter	

## CONGRUENCE

congruent	objects with <b>exactly</b> the <b>same shape</b> and <b>size</b> <b>all angles</b> and <b>all sides</b> are the same
similarity	two shapes are similar when <b>one is an enlargement</b> of the other <b>all angles</b> are the same, but the <b>lengths of sides</b> are <b>different</b>
scale factor	the <b>ratio</b> of <b>corresponding sides</b> of two similar shapes

## CONGRUENT TRIANGLES

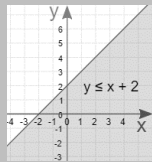

there are <b>four ways</b> to <b>prove triangle congruency</b>	
side, angle, side (SAS)	show <b>two sides</b> and the <b>angle between them</b> are <b>congruent</b>
angle, side, angle (ASA)	show <b>two angles</b> and the <b>side between them</b> are <b>congruent</b>
side, side, side (SSS)	show <b>all corresponding sides</b> are <b>congruent</b>
right-angle, hypotenuse, side (RHS)	show both triangles have a <b>right angle</b> , <b>congruent hypotenuses</b> and <b>one other congruent side</b>

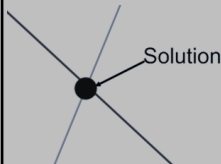
## SIMILARITY

two or more shapes with **congruent angles** but **corresponding sides** all linked by the **same scale factor**  
if the **scale factor** of enlargement is **x**  
**length** scale factor: **x**  
**area** scale factor: **x<sup>2</sup>**  
**volume** scale factor: **x<sup>3</sup>**

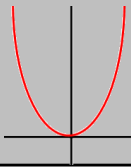
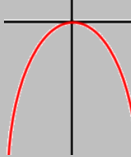
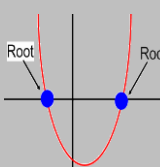
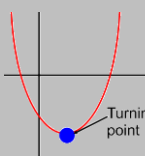
## ANGLES IN POLYGONS: FACTS


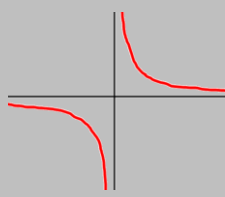
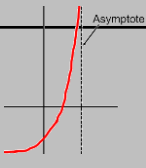
polygon	a <b>2D shape</b> with <b>3 or more straight sides</b>	
regular polygon	a polygon with <b>sides</b> that are all <b>equal</b> and <b>angles</b> that are all <b>equal</b>	
interior angle	an angle <b>inside</b> a <b>polygon</b>	
sum of interior angles	$(n - 2) \times 180^\circ$ where n is the number of sides	
interior angle of regular polygon	$\frac{(n - 2) \times 180}{n}$ where 'n' is number of sides	
exterior angle	the angle formed <b>outside</b> a polygon when <b>one side is extended</b> interior angle + exterior angle = <b>180°</b> because they made a <b>straight line</b> <b>all exterior sum to 360°</b>	
some polygon interior angle sums	triangle = 180° quadrilateral = 360° pentagon = 540° hexagon = 720°	heptagon = 900° octagon = 1080° nonagon = 1260° decagon = 1440°

INEQUALITIES		
inequality	where <b>two expressions</b> are <b>not equal</b> in value	
inequality symbols	< less than	> greater than
	≤ less than or equal to	≥ greater then or equal to
plotting inequalities	create a <b>table of values</b> and <b>substitute</b> in values of 'x' (like with linear graphs) < or > means a <b>dashed</b> line ≤ or ≥ means a <b>solid</b> line	
inequality regions	for greater than symbols, shade <b>above</b> the line	
	for less than symbols, shade <b>below</b> the line	
simultaneous inequalities (graphically)	<b>regions</b> can be <b>shaded</b> that <b>satisfy inequalities</b> : strict (< or >) are a dashed line ----- non-strict (≤ or ≥) are a solid line _____ 	

SIMULTANEOUS EQUATIONS		
simultaneous	occurring at the <b>same time</b>	
simultaneous equations	equations with the <b>same variables</b> whose <b>solutions</b> hold the <b>same value</b> must be <b>solved</b> at the <b>same time</b> to find the values of 'x' and 'y'	
solving	<b>add or subtract the equations to eliminate one variable</b> , then <b>solve</b> as a <b>linear equation</b> variables must have the <b>same coefficient</b> to be eliminated when one variable is known, <b>substitute</b> into one of the equations and <b>solve</b> to find the <b>value</b> of the <b>other variable</b>	
	for the variable being eliminated with... the <b>same sign</b> , <b>subtract</b> the equations <b>different signs</b> , <b>add</b> the equations	
same coefficients of variables	when simultaneous equations have variables with the <b>same coefficients</b> , decide whether to <b>add</b> or <b>subtract straight away</b>	
different coefficients of variables	when simultaneous equations have variables with <b>different coefficients</b> , find the <b>LCM</b> and <b>scale up</b> (multiply) the equations until they have the same coefficient, then <b>add</b> or <b>subtract</b>	
solve by substitution	make <b>one variable</b> the <b>subject</b> of one of the equations and <b>substitute</b> into the other to eliminate it, then <b>solve</b> as with linear	
simultaneous equations (graphically)	can be <b>solved graphically</b> by <b>plotting the two lines</b> and finding the <b>coordinate where they cross</b>	

## Unit 16: Algebraic Graphs

QUADRATIC GRAPHS		
quadratic graph	a graph where the <b>highest power</b> of x is <b>x<sup>2</sup></b> general format <b>ax<sup>2</sup> + bx + c</b> it is always a <b>parabola</b> (a <b>U-shape</b> ) in the general format, ' <b>c</b> ' is where the graph <b>crosses the y-axis</b>	
	$y = x^2$	
	$y = -(x^2)$	
roots (of graphs)	the ' <b>solutions</b> ' of a graph, where a <b>function equals zero</b> can be found in a graph where the <b>curve meets the x axis</b>	
turning point	the point where a graph <b>turns</b> , from negative to positive gradient or positive to negative gradient	

OTHER NON-LINEAR GRAPHS		
cubic graph	a graph where the highest power of x is <b>x<sup>3</sup></b> general format <b>ax<sup>3</sup> + bx<sup>2</sup> + cx + d</b> ' <b>d</b> ' is where the graph <b>crosses the y-axis</b>	
	$y = x^3$	
reciprocal graph	$y = \frac{k}{x}$ the graph has <b>asymptotes</b> on the <b>x-axis and y-axis</b> (as it is impossible to divide by zero)	
asymptote	a straight line a <b>graph approaches</b> but <b>never touches</b>	
exponential graph	$y = k^x$ the graph has an <b>asymptote on the x-axis</b>	