

# Maths Higher Y10

Half Terms 1-6

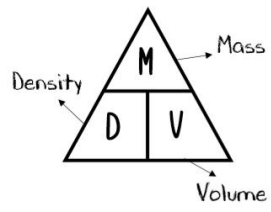


# Maths Year 10 Higher Autumn 1

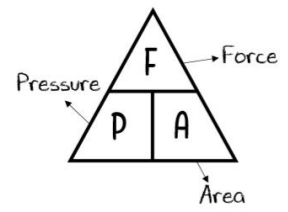
<b>Rearrange Formulae</b>	<b>Formula</b>	A special type of <b>equation</b> that shows the relationship between <b>variables</b>	A = bh is the <b>formula</b> for the <b>area</b> of a rectangle
	<b>Formulae</b>	Plural of <b>formula</b>	(area = base x height)
	<b>Subject</b>	The <b>variable</b> that is being worked out. It is the letter on its own on one side of the equals sign	A is the <b>subject of the formula</b> .
	<b>Inverse Operation</b>	The opposite <b>operation</b>	Multiply is the <b>inverse operation</b> to divide
	<b>Expression</b>	Contains <b>numbers, operations</b> and one or more <b>variables</b>	$4x + 3y$
	<b>Factorise</b>	Rewrite an <b>expression</b> into <b>brackets</b>	$6x + 3 = 3(2x + 1)$
	<b>Rearrange</b>	Move <b>terms</b> around using <b>inverse operations</b>	$t + u = v \rightarrow t = v - u$
	<b>Change the subject of a formula</b>	Isolate a <b>term</b> using <b>inverse operations, rearranging the formula</b>	Make y the subject of the formula: $t = 3y + 4x$
	<b>Rearrange complex formulae</b>	Isolate a <b>term</b> using <b>inverse operations</b> , requires more steps	If the subject appears more than once you will need to <b>factorise</b>
<b>Linear Graphs</b>	<b>Equation</b>	The rule for finding <b>coordinates</b> for your <b>graph</b>	$y = 3x - 4$
	<b>Plot linear graphs</b>	Plot all points and join with a straight line	Remember to label <b>x and y axis</b>
	<b>Midpoint of a line</b>	The middle of a <b>line segment</b>	Formula: Add <b>x coordinates</b> $\div 2$ , Add <b>y coordinates</b> $\div 2$

<b><math>y = mx + c</math></b>	<b>Gradient</b>	How steep the line is	<b>m in <math>y=mx+c</math></b>
	<b>Y intercept</b>	<b>Where the graph crosses the y axis</b>	<b>c in <math>y = mx + c</math></b>
	<b>Parallel</b>	<b>Parallel lines</b> have the same <b>gradient</b>	<b>m in <math>y=mx+c</math></b>
	<b>Perpendicular</b>	<b>Perpendicular lines</b> cross at $90^\circ$	Their <b>gradients</b> multiplied together equal -1
<b>Compound Measures</b>	<b>Standard Units</b>	One <b>unit</b>	time, mass, length, money, volume, area
	<b>Compound Units</b>	Made of two or more <b>units</b>	speed, rates of pay, prices
	<b>Speed</b>	<b>Speed = distance <math>\div</math> time</b>	30 miles per hour
	<b>Density</b>	<b>Density = mass <math>\div</math> volume</b>	6 g/litre
	<b>Pressure</b>	<b>Pressure = force <math>\div</math> area</b>	$N/m^2$

Density



Pressure



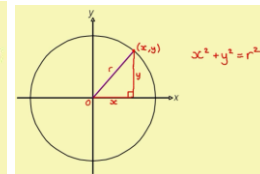
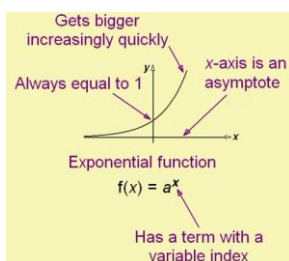
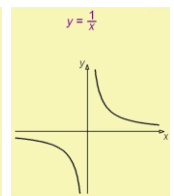
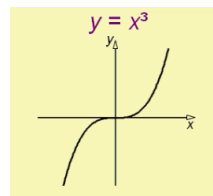
Average Speed



# Maths Year 10 Higher Autumn 2

<b>Quadratic Graphs, Turning Points and Roots</b>	<b>Quadratic Graphs</b>	<b>Equations</b> in the form $y = ax^2 + bx + c$	The graphs are a U shape
	<b>Roots</b>	Where the graph crosses the <b>x axis</b>	
	<b>Turning Points</b>	The <b>coordinate</b> of where the graph turns	It is the bottom or the top of the graph
	<b>Factorising</b>	Rewrite the <b>equation</b> in <b>brackets</b> .	When we <b>solve</b> it tells us the <b>roots</b> of the <b>equation</b>
<b>Further Expanding and Factorising</b>	<b>Coefficient</b>	The number <b>multiplying a term</b>	The <b>4</b> in $4x$
	<b>Expanding brackets</b>	Rewrite the <b>equation</b> without <b>brackets</b> , using <b>multiplication</b>	Remember to <b>simplify</b>
	<b>Completing the Square</b>	A way of <b>solving quadratic equations</b>	Also tells us the <b>coordinates</b> of the <b>turning point</b>
	<b>The Quadratic Formula</b>	<b>Quadratic equations</b> of form $ax^2+bx+c=0$ can be solved using the <b>formula</b> :  'minus <b>b</b> plus/minus the square root of <b>b</b> squared minus four <b>ac</b> divided by two <b>a</b> '	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
	<b>Numerator</b>	The top number in a fraction	<b>a/b</b>
	<b>Denominator</b>	The bottom number in a fraction	<b>a/b</b>
	<b>Simplify</b>	Dividing the <b>numerator</b> and <b>denominator</b> by the <b>highest common factor</b>	6/18 divide both <b>numerator</b> and <b>denominator</b> by 6 to get 1/3
<b>Algebraic Fractions</b>	To <b>simplify</b> we <b>factorise</b> the <b>numerator</b> and <b>denominator</b>	Cancel any common <b>factors</b>	

<b>Linear Simultaneous Equations</b>	<b>Solve Simultaneous Equations</b>	<b>Simultaneous equations</b> are two <b>equations</b> with two unknowns. They are called simultaneous because they must both be solved at the same time.  Use the <b>elimination method</b> : 1) Get rid of the terms that are the same 2) If the operation signs are the same then subtract the remaining terms. If the operation signs are NOT the same you have to add the remaining terms. 3) <b>Solve the equation</b> to find the <b>variable x or y</b> 4) <b>Substitute</b> your known variable back into one of the equations to find the remaining variable.
	<b>Cubic</b>	An <b>equation</b> with the highest power of x is $x^3$
	<b>Reciprocal</b>	An <b>equation</b> where x is in the <b>denominator</b>
	<b>Exponential</b>	An <b>equation</b> where x is in the <b>index (power)</b>
<b>Further Graphs</b>	<b>Circle</b>	The <b>equation of a circle</b> with the <b>centre</b> at the <b>origin</b> is:  $x^2 + y^2 = r^2$ The equation $(x - a)^2 + (y - b)^2 = r^2$  Where the <b>centre</b> is at (a, b) and r is the <b>radius</b>



# Maths Year 10 Higher Spring 1

<b>Probability</b>	<b>Mutually Exclusive Events</b>	<b>Mutually exclusive events</b> cannot happen at the same time. <b>Events</b> sum to 1.
	<b>Venn Diagrams</b>	Comparing 2 or more sets of <b>data</b> that share some things in common
	<b>Element</b>	A list of numbers, objects or outcomes
	<b>Universal Set</b>	Contains all of the <b>elements</b> for our question
	<b>Set notation</b>	<b>A</b> – all <b>elements in A</b> <b>A'</b> – all <b>elements not in A</b> <b>B</b> – all <b>elements in B</b> <b>B'</b> – all <b>elements not in B</b>
	<b>Intersection</b>	<b>A ∩ B</b> – all the <b>elements in both A and B</b>
	<b>Union</b>	<b>A ∪ B</b> – all the <b>elements in A or B or both</b>
	<b>Tree Diagrams</b>	Used when there are two or more <b>events</b> . Each pair of <b>branches</b> add to 1 ( <b>mutually exclusive</b> ) To find the <b>probabilities</b> we <b>multiply</b> along the <b>branches</b>
	<b>Capture and Recapture</b>	<b>Population</b>
<b>Sampling</b>		A smaller group that is taken from the <b>population</b>
<b>Random Sampling</b>		Every member of the <b>population</b> is <b>equally likely</b> to be chosen
<b>Stratified Sampling</b>		Represents the <b>population</b> , the numbers in the <b>sample</b> are <b>proportional</b> for each category. $\text{Number selected from each strata} = \left( \frac{\text{strata size}}{\text{total population}} \right) \times \text{sample size}$
<b>Capture/recapture</b>		<b>Population size</b> = $\frac{\text{number in 1st sample} \times \text{number in 2nd sample}}{\text{number in 2nd sample that are marked}}$

<b>Standard Form</b>	<b>Write number in standard form</b>	A way of writing large or small numbers $a \times 10^b$ $1 \leq a < 10$
	<b><math>10^8</math></b>	Positive power, <b>multiply</b>
	<b><math>10^{-4}</math></b>	Negative power, <b>divide</b>
	<b>Base</b>	The number that will be multiplied by itself (eg $5^3$ the <b>base</b> is 5)
	<b>Index number</b>	Another word for <b>power</b> , plural is <b>indices</b>
	<b>Multiply indices</b>	Numbers with the same <b>base</b> , <b>add</b> the <b>index numbers</b>
	<b>Divide indices</b>	Numbers with the same <b>base</b> , <b>subtract</b> the <b>index numbers</b>
<b>Proportion (further)</b>	<b>Direct Proportion</b>	As one amount increases, so does another at the <b>same rate</b> , eg. the number of hours worked and your pay
	<b>Direct Proportion Formula</b>	$y \propto x$ $y = kx$ for a constant $k$
	<b>Inverse Proportion</b>	As one amount increases, another decreases, eg. the more decorators you have will reduce the time it will take to paint a wall
	<b>Inverse Proportion Formula</b>	$y \propto \frac{1}{x}$ $y = \frac{k}{x}$ for a constant $k$

## Maths Year 10 Higher Spring 2

<b>Surds</b>	<b>Rational number</b>	A number that can be written as a <b>fraction</b> For example: $1.5 = 3/2$
	<b>Irrational number</b>	A number that cannot be written as a <b>fraction</b> For example: $\pi = 3.14\dots$ and does not repeat
	<b>Surd</b>	A <b>square root</b> that gives an <b>irrational answer</b> . A <b>surd</b> is an exact answer For example: $\sqrt{16} = 4$ so is not a <b>surd</b> (it is <b>rational</b> ) $\sqrt{2} = 1.4142\dots$ and never repeats so is a <b>surd</b> (it is <b>irrational</b> )
	<b>Simplify surds</b>	$\sqrt{a} \times \sqrt{a} = a$ $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$ $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$
	<b>Expand Brackets with surds</b>	<b>Multiply</b> each term in the first <b>bracket</b> by each term in the second <b>bracket</b>
	<b>Rationalise the Denominator</b>	Getting rid of any <b>surds</b> from the <b>denominator</b> of <b>fractions</b>
	<b>Difference of two squares</b>	$a^2 - b^2 = (a+b)(a-b)$
	<b>Recurring Decimals</b>	<b>Recurring decimal</b>
<b>Terminating decimal</b>		A <b>decimal</b> that ends, it has a <b>finite</b> number of <b>digits</b> , eg $0.25$
<b>Dot notation</b>		Two dots show the beginning and end of a <b>recurring group</b> of numbers  $0.\dot{3}1\dot{2}$ is equal to $0.312312312\dots$

<b>Bounds</b>	<b>Inequalities</b>	$x < y$ x is <b>less than</b> y $x > y$ x is <b>greater than</b> y $x \leq y$ x is <b>less than or equal to</b> y $x \geq y$ x is <b>greater than or equal to</b> y
	<b>Estimate</b>	Round all numbers to 1 <b>significant figure</b>
	<b>Truncate</b>	To shorten a number, you do not <b>round</b> Eg. $4.7685$ <b>truncated</b> to 1dp is just $4.7$
	<b>Upper bound</b>	The largest number that would <b>round</b> to a given value
	<b>Lower bound</b>	The smallest number that would <b>round</b> to a given value
	<b>Error Interval</b>	The <b>range</b> of values between the <b>upper and lower bounds</b> that the precise answer could be
<b>Growth and Decay</b>	<b>Growth</b>	Getting bigger
	<b>Decay</b>	Getting smaller
	<b>Appreciation</b>	The value of something <b>increasing</b>
	<b>Depreciation</b>	The value of something <b>decreasing</b>
	<b>Interest Rate</b>	Money that is paid regularly as a <b>percentage</b> , this is usually by a bank when money is saved or borrowed.
	<b>Compound Interest</b>	<b>Interest</b> that gets added regularly (eg. monthly, annually), changes the value of money each time so a new calculation has to be completed.

# Maths Year 10 Higher Summer 1

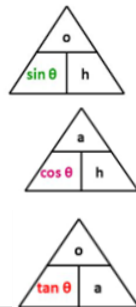
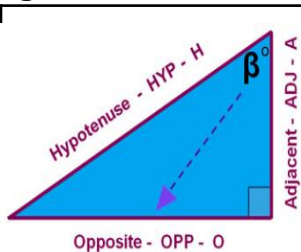
Statistics	<b>Mean</b>	Add up your numbers and divide by how many numbers there are
	<b>Median</b>	Put your numbers in order from smallest to largest, the median is the middle number. If there are two middle numbers then the answer is halfway between them
	<b>Mode</b>	The most common number
	<b>Range</b>	The difference between the smallest and largest numbers
	<b>Scatter Graphs</b>	A graph of plotted points that compares two sets of information
	<b>Line of best fit</b>	A line on your <b>scatter graph</b> that best describes the relationship between the two sets of data <ul style="list-style-type: none"> <li>• A straight line</li> <li>• Goes roughly through the middle of the points on your <b>scatter graph</b></li> <li>• There should be an equal number of points above and below your line</li> </ul>
	<b>Positive Correlation</b>	As one variable increases so does the other variable
	<b>Negative Correlation</b>	As one variable increases the other decreases
	<b>Trend</b>	A pattern in a set of results
	<b>Outliers</b>	A point that is far from the <b>line of best fit</b>
	<b>Time Series Graphs</b>	<b>Frequencies</b> plotted over time. Points are joined with straight lines
	<b>The Product Rule</b>	Used to find the <b>intersection</b> of 2 or more <b>probabilities</b> , eg. <b>PA and PB = PA x PB</b>

Simple Interest	<b>VAT</b>	<b>Value Added Tax</b> A tax that is added to goods that you buy
	<b>Income Tax</b>	Tax that you pay from your wages
	<b>Simple Interest</b>	Calculate the <b>percentage amount</b> and multiply it by the number of periods that the money will be invested for.
Ratio (Further)	<b>Ratio</b>	A way of comparing two or more quantities  Eg. to make purple paint I mix red and blue in the <b>ratio</b> 3:4
	<b>Ratio to fraction</b>	To find the <b>denominator</b> you add the <b>parts</b> together
	<b>HCF</b>	<b>Highest Common Factor</b>  The largest number that is a <b>factor</b> of two or more numbers
	<b>Simplify</b>	<b>Divide</b> the numbers in your <b>ratio</b> by the <b>Highest Common Factor</b>
	<b>Share in a ratio</b>	Steps to <b>share in a ratio</b>  Share £40 in the ratio 3:7 <ul style="list-style-type: none"> <li>• Add the <b>parts</b> together <math>3+7=10</math></li> <li>• <b>Divide</b> the amount by the total <math>£40 \div 10 = £4</math></li> <li>• <b>Multiply</b> by the <b>parts</b></li> </ul> <p style="text-align: center;"><math>£4 \times 3 = £12, £4 \times 7 = £28</math></p> <p style="text-align: center;">Answer: £12:£28</p>

# Maths Year 10 Higher Summer 2

## Right angled Trigonometry

<b>Hypotenuse</b>	The longest side in a <b>right angled triangle</b> , across from the <b>right angle</b>
<b>Adjacent</b>	<b>The side next to the given angle and the right angle</b>
<b>Opposite</b>	<b>The side opposite the given angle</b>
<b>Sine</b>	<b>Sine<math>\theta</math> = opposite <math>\div</math> hypotenuse</b>
<b>Cosine</b>	<b>Cosine<math>\theta</math> = adjacent <math>\div</math> hypotenuse</b>
<b>Tangent</b>	<b>Tangen<math>\theta</math> = opposite <math>\div</math> adjacent</b>



<b>Exact Values</b>		0°	30°	45°	60°	90°
	sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
	cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
	tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	Undefined

## Plans and Elevations

<b>Plan</b>	The view from directly above a <b>3D shape</b> . You will see a <b>2D shape</b> .
<b>Elevation</b>	The view from the front and side of a <b>3D shape</b> . You will see a <b>2D shape</b> .
<b>Sketch</b>	To roughly draw a shape. Always label the sides and write any <b>measurements</b> on.

## Constructions and Loci

<b>Perpendicular</b>	Two lines that meet at <b>90° (right angle)</b>
<b>Bisect</b>	To cut something equally in two parts
<b>Line Segment</b>	Part of a line that connects 2 points, it is the shortest distance between 2 points
<b>Locus</b>	A path that is formed by a rule, eg. 2cm from a point. Plural is <b>loci</b> .
<b>Region</b>	The <b>area</b> you shade in, defined in your question
<b>Construction</b>	An accurate diagram using a <b>compass</b> and <b>ruler</b> .

## Similar Shapes

<b>Similar Shapes</b>	Two <b>triangles</b> are <b>similar</b> if the <b>angles</b> are the same size or the corresponding sides are in the same <b>ratio</b> .
<b>Enlargement</b>	A <b>transformation</b> which changes the size of the original shape
<b>Scale Factor</b>	How much the shape has been <b>enlarged</b> , this is the <b>multiplier</b>
<b>Scale factor of a line</b>	<b>The multiplier</b>
<b>Scale factor of an area</b>	<b>The multiplier <sup>2</sup></b>
<b>Scale factor of a volume</b>	<b>The multiplier <sup>3</sup></b>