Maths Higher Y10

Half Terms 1-6

Maths Year 10 Higher Autumn 1

Rearrange Formulae

Formula	A special type of **equation** that shows the relationship between **variables**	A = bh is the **formula** for the **area** of a rectangle (area = base x height) A is the **subject of the formula.**
Formulae	Plural of **formula**	
Subject	The **variable** that is being worked out. It is the letter on its own on one side of the equals sign	
Inverse Operation	The opposite **operation**	Multiply is the **inverse operation** to divide
Expression	Contains **numbers, operation**s and one or more **variables**	4x + 3y
Factorise	Rewrite an **expression** into **brackets**	6x + 3 = 3(2x + 1)
Rearrange	Move **terms** around using **inverse operations**	t + u = v → t = v - u
Change the subject of a formula	Isolate a **term** using **inverse operations, rearranging the formula**	Make y the subject of the formula: t = 3y + 4x
Rearrange complex formulae	Isolate a **term** using **inverse operations,** requires more steps	If the subject appears more than once you will need to **factorise**

Linear Graphs

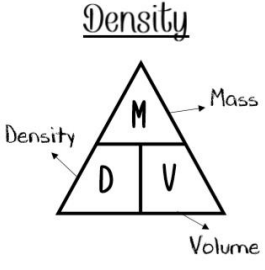
Equation	The rule for finding **coordinates** for your **graph**	y = 3x - 4
Plot linear graphs	Plot all points and join with a straight line	Remember to label **x and y axis**
Midpoint of a line	The middle of a **line segment**	Formula: Add **x coordinates** ÷ 2, Add **y coordinates** ÷2

y = mx + c

Gradient	How steep the line is	**m in y=mx+c**
Y intercept	**Where the graph crosses the y axis**	**c in y = mx + c**
Parallel	**Parallel lines** have the same **gradient**	**m in y=mx+c**
Perpendicular	**Perpendicular lines** cross at 90°	Their **gradients** multiplied together equal -1

Compound Measures

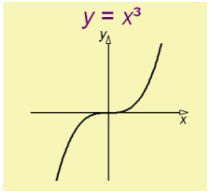
Standard Units	One **unit**	time, mass, length, money, volume, area
Compound Units	Made of two or more **units**	speed, rates of pay, prices
Speed	**Speed = distance ÷ time**	30 miles per hour
Density	**Density = mass ÷ volume**	6 g/litre
Pressure	**Pressure = force ÷ area**	N/m²

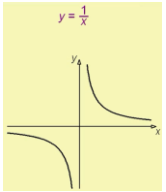


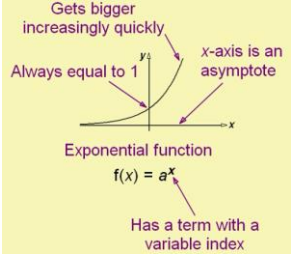
Maths Year 10 Higher Autumn 2

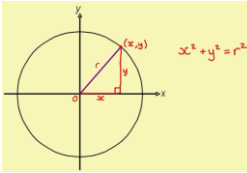
Quadratic Graphs, Turning Points and Roots	**Quadratic Graphs**	**Equations** in the form $y = ax^2 + bx + c$	The graphs are a U shape
	Roots	Where the graph crosses the **x axis**	
	Turning Points	The **coordinate** of where the graph turns	It is the bottom or the top of the graph
	Factorising	Rewrite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

Linear Simultaneous Equations	**Solve Simultaneous Equations**	**Simultaneous equations** are two **equations** with two unknowns. They are called simultaneous because they must both be solved at the same time. Use the **elimination method:** 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) Solve the equation** to find the **variable x or y** **4) Substitute** your known variable back into one of the equations to find the remaining variable.
Further Graphs	**Cubic**	An **equation** with the highest power of x is x^3
	Reciprocal	An **equation** where x is in the **denominator**
	Exponential	An **equation** where x is in the **index (power)**
	Circle	The **equation of a circle** with the **centre** at the **origin** is: $x^2 + y^2 = r^2$ The equation $(x - a)^2 + (y - b)^2 = r^2$ Where the **centre** is at (a, b) and r is the **radius**









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

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

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Surds	**Rational number**	A number that can be written as **a fraction** For example: 1.5 = 3/2
	Irrational number	A number that cannot be written as a **fraction** For example: Π = 3.14…. and does not repeat
	Surd	A **square root** that gives an **irrational answer.** A **surd** is an exact answer For example: √16 = 4 so is not a **surd** (it is **rational**) √2 = 1.4142… and never repeats so is a **surd** (it is **irrational**)
	Simplify surds	$\sqrt{a} \times \sqrt{a} = a$ $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$ $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$
	Expand Brackets with surds	**Multiply** each term in the first **bracket** by each term in the second **bracket**
	Rationalise the Denominator	Getting rid of any **surds** from the **denominator** of **fractions**
	Difference of two squares	**$a^2-b^2 = (a+b)(a-b)$**
Recurring Decimals	**Recurring decimal**	When a **decimal** number repeats forever $0.\dot{3}$ means 0.333333...
	Terminating decimal	A **decimal** that ends, it has a **finite** number of **digits, eg 0.25**
	Dot notation	Two dots show the beginning and end of a **recurring group** of numbers $0.\dot{3}1\dot{2}$ is equal to 0.312312312...

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

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Statistics

Mean	Add up your numbers and divide by how many numbers there are
Median	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
Mode	The most common number
Range	The difference between the smallest and largest numbers
Scatter Graphs	A graph of plotted points that compares two sets of information
Line of best fit	A line on your **scatter graph** that best describes the relationship between the two sets of data ● A straight line ● Goes roughly through the middle of the points on your **scatter graph** ● There should be an equal number of points above and below your line
Positive Correlation	As one variable increases so does the other variable
Negative Correlation	As one variable increases the other decreases
Trend	A pattern in a set of results
Outliers	A point that is far from the **line of best fit**
Time Series Graphs	**Frequencies** plotted over time. Points are joined with straight lines
The Product Rule	Used to find the **intersection** of 2 or more **probabilities, eg. PA and PB = PA x PB**

Simple Interest

VAT	**Value Added Tax** A tax that is added to goods that you buy
Income Tax	Tax that you pay from your wages
Simple Interest	Calculate the **percentage amount** and multiply it by the number of periods that the money will be invested for.

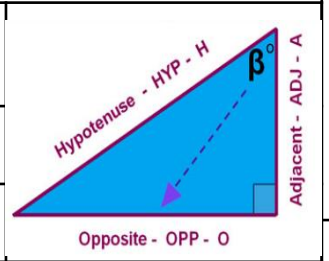
Ratio (Further)

Ratio	A way of comparing two or more quantities Eg. to make purple paint I mix red and blue in the **ratio** 3:4
Ratio to fraction	To find the **denominator** you add the **parts** together
HCF	**Highest Common Factor** The largest number that is a **factor** of two or more numbers
Simplify	**Divide** the numbers in your **ratio** by the **Highest Common Factor**
Share in a ratio	Steps to **share in a ratio** Share £40 in the ratio 3:7 ● Add the **parts** together 3+7=10 ● **Divide** the amount by the total £40÷10=£4 ● **Multiply** by the **parts** £4 x 3 = £12, £4 x 7 = £28 Answer: £12:£28

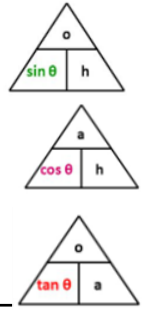
Maths Year 10 Higher Summer 2

Right angled Trigonometry

Hypotenuse	The longest side in a **right angled triangle,** across from the **right angle**
Adjacent	**The side next to the given angle** and the **right angle**
Opposite	**The side opposite the given angle**



Sine	**Sineθ = opposite ÷ hypotenuse**
Cosine	**Cosineθ = adjacent ÷ hypotenuse**
Tangent	**Tangenθ = opposite ÷ adjacent**



Exact Values

	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

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

Constructions and Loci

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

Similar Shapes

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