Topics in **bold** are Higher Tier only

Black topics are studied in Year 10

Blue topics are studied in Year 11

Note-taking planner - Maths

	Number		Number		Number
	Add, subtract, multiply and divide fractions.		**Decide whether fractions will terminate or recur when turned into decimal.**		Multiplying/Dividing decimals.
	Convert mixed fractions to improper fractions and vice versa				Rounding (dp and sf)
	Convert between fractions decimals and percentages		**Change recurring decimals into fractions and vice versa.**		Estimation
	Percentages – increase/decrease		Use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc).		Indices, powers, roots
	Use of multipliers				Index rules
	Reverse/compound percentages		Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimals where appropriate.		Multiples, Factors, Primes
	Reciprocals of fractions and decimals				Use of calculator in complex calculations
	Decide whether fractions will terminate or recur when turned into decimal		Change freely between related standard units (eg time, length, area, volume/capacity, mass) and compound units (eg speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts.		Lowest Common Multiples, Highest Common Factors
					Standard Form
	Change recurring decimals into fractions and vice versa.				Negative indices
	Write ratios in simplest form		Scale up recipes		**Fractional indices**
	Interpret ratios correctly				**Surds and rationalisation**
	Use ratio to solve problems including three part ratios, and in context				Add, subtract, multiply and divide fractions.
	Write ratios as a fraction and compare ratios.				Convert mixed fractions to improper fractions and vice versa
	Scale models - real life/map ratio				Convert between fractions decimals and percentages
	Use of scale factors and map scales				Percentages – increase/decrease
	Convert between currencies and units				Use of multipliers
	Direct and inverse proportion				Reverse/compound percentages
	Work out which product is a better buy				Reciprocals of fractions and decimals

✓	Excellent understanding	✓	Fair understanding
		✓	More revision needed

	Vector		Shape		Shape		Shape
	Understand and use vector notation.		**Prove that two shapes are similar.**		Identify the properties of the faces, surface, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones, spheres.		Pythagoras in 2D **and 3D**
	Find the length of a vector using Pythagoras		Apply angle facts, similarity, congruence, and properties of quadrilaterals to conjecture and derive results about angles and sides				(including leaving answers in surd form)
	Calculate the resultant of two vectors.				Volume and surface area of prisms, pyramids, cylinders, cones and spheres and other composite solids.		Right angled trigonometry in 2D **and 3D**
	Solve geometric problems in 2D where vectors are divided in a given ratio.		**Use formal geometric proof for the similarity of two given triangles**				Learn the exact values for sin/cos/tan values of 0˚, 30˚, 45˚, 60˚, 90˚
	Produce proofs to prove points are collinear/lines are parallel.				Convert between metric measures of volume and capacity eg 1ml =cm^3 Give answers in terms of Pi.		Angles in polygons
							Regular/irregular polygons
					Revision of SOHCAHTOA and Pythagoras.		Angle properties of parallel lines
	Use vectors to construct geometric argument and proof.				**Recognise, sketch and interpret trigonometric graphs Advanced Trigonometry**		Classify quadrilaterals
							Circle Theorems (including proofs)
					Know and apply Sine, Cosine and Area rules		Perimeter and area
					Solve SOHCAHTOA trigonometric 3D problems		Know and use formula for area of triangle, rectangle, trapezium, parallelogram.
					Compare lengths, areas and volumes using ratio notation and scale factors.		Area and circumference of circle
					Make links to similarity of shapes.		Compound area
					Understand the meaning of congruence.		Arc lengths and sectors
					Find missing lengths areas and volumes in similar 2D/3D shapes		Be able to give answers in terms of Pi
					Understand the effect of enlargement on angles, perimeter, area and volume.		Form equations involving more complex shapes and solve
							Accuracy and error intervals.
					Use SSS, SAS, ASA, and RHS to prove the congruence of triangles using formal arguments.		Significant figures and decimal places
							Calculate and understand upper and lower bounds

	Algebra		Algebra		Algebra
	Find the nth term of a quadratic sequence		Gradients, y-intercepts, parallel **perpendicular lines**		Simplification of expressions
	Distinguish between arithmetic and geometric sequences		Finding co-ordinates of midpoint of a line segment		Use index laws to simplify expressions
	Use finite/infinite and ascending/descending to describe sequences		Calculate length of line segment		Expand single brackets
	Recognise and use simple geometric progressions (**it could be a surd or a fraction**)		Calculate equation of line through given points.		Factorise single brackets
			y = mx + c (and rearrangements of this - plotting ax + by = c)		Substitution
	Find the term to term rule of a geometric sequence.		Sketch and plot linear functions		Expand two brackets
	Recognise a linear, quadratic, cubic, reciprocal, and exponential graphs from its shape.		**Expanding the product of two or more binomials. Eg (x+3)(x – 4)(x + 1)**		Factorise a quadratic expression of the form $x^2 + bx + c$
					Change the subject of an formula **(the subject may appear twice in higher tier)**
	Plot quadratic functions		**Simplify and manipulate algebraic fractions. Be able to multiply, divide, add and subtract algebraic fractions.**		Identify: Expressions/Identities/Formulae /Equations.
	Find solutions of quadratic equations from graphs				Solve linear equations, including those with brackets, fractional co-efficients, and negative/fractional solutions
	Revise straight line graphs, given in the form y = mx + c.		Solving quadratic equations by factorisation, in the form $x^2 + ax + b$ and $ax^2 + bx + c$, **including ones that need re-arranging first.**		
	Plot simple cubic and reciprocal graphs and **exponential graphs**				Solve equations in a context
	Calculate enclosed areas by counting squares or using trapezia.		Select an expression, identity, equation or formula from a list.		Derive equations from worded situations, solve and interpret.
			Changing the subject of a formula		Solve linear simultaneous equations
	Draw and recognise circles, centre origin, with equation $x^2 + y^2 = r^2$.		Factorise quadratics (only in the form $x^2 + ax + b$)		Speed
	Work out the equation of a tangent to a circle at a given point.		Recognise simple sequences including square, triangle, cube, and fibonacci-type.		Density
	Find the tangents at particular points of other curves, cubics, quadratics etc.				Plot points in four quadrants
			Generate sequences from diagrams		Real life graphs: conversion graphs, distance-time, velocity-time
	Interpret the gradient at a point as the instantaneous rate of change.		Find the nth term of an arithmetic sequence		Use graphs to calculate speed/acceleration
			Use of the nth term.		**Area under a velocity time graph is equal to distance travelled.**

	Algebra		Algebra		Algebra
	Graph transformations Sketch translations and reflections of a given function (including Trigonometric graphs).		Sketch a graph of a quadratic by factorising.		Direct and inverse proportion.
			Deduce roots algebraically.		Recognise and interpret graphs that illustrate direct and inverse proportion.
			Identify turning points by completing square.		
	Show Inequalities on number lines		Identify y-intercept.		**Construct** and interpret equations that describe direct and inverse proportion.
	Solve linear inequalities		Identify and interpret roots, intercepts and turning points of quadratic graphs.		
	Solve linear inequalities in two variables by finding solutions on a graph.				Solve word problems involving direct and inverse proportion.
			Solve simultaneous equations graphically, including two linear equations, linear/quadratic and **linear/circle**		Identify direct proportion from a table of values for x, x^2 and x^3 relationships.
	Solve two linear inequalities in x, find the solution sets and compare them to see which value of x satisfies both linear inequalities.		Finding approximate solutions to quadratic equations using a graph		**Solve quadratic equations by completing the square and using the formula**
	Use correct notation to show inclusive and exclusive inequalities.				
	Solve quadratic inequalities graphically.		Sketch graphs of simple reciprocal and exponential functions		**Solve linear/quadratic simultaneous equations, and linear/ $x^2+ y^2 = r^2$ type.**
	Be able to write the solution using set notation, curly brackets, solutions sets.		Sketch graphs of simple cubic functions given as three linear expressions		
					Set up and solve such equations within a context, and interpret the solutions.
			Express simple expressions as functions with inputs and outputs.		
					Argue mathematically to show algebraic expressions are equivalent. (**using identity sign)**
			Interpret the reverse process as the inverse function.		
			Interpret the succession of two functions as a composite function.		Use algebra to support and construct arguments and proofs
					Solving equations by iteration.
					Find approximate solutions to equations by using iteration.

	Probability		Probability		Statistics		Statistics
	Calculate and interpret conditional probabilities with two way tables, tree diagrams and Venn diagrams.		Basic probability, use of 0-1 scale, Use of AND/OR rules. Probabilities of a mutually exclusive set of exhaustive outcomes sum to 1.		**Histograms**		Frequency polygons
	Calculate the probability of independent and dependent combined events including using tree diagrams		Record, describe and analyse probability experiments using tables and frequency trees.		**Peterson capture/re-capture method.**		Frequency diagrams
							Pie Charts
							Line graphs, Time series graphs
			Apply ideas of randomness and fairness to calculate expected outcomes.				Types of data - Qualitative/Quantitative/Discrete/Continuous
							Two way tables
			Understand how relative frequencies and theoretical probabilities relate. Understand that larger sample sizes tend towards theoretical probability distributions				Averages, including from a frequency table.
							Stem and Leaf
							Scatter graphs (know to ignore/identify/explain outliers) & correlation
			Apply systematic listing strategies. Use of product rule for counting (eg if there are m ways of doing one task, and for each of these there are n ways of doing another task, then the total number of ways the two tasks can be done is m x n ways)				Collecting data: Decide what data to collect and how to analyse it
							Understand primary and, secondary sources.
							Understand a sample and a population and a census
							How to get a representative sample
			Understand, construct and use sample space diagrams and two way tables.				Explain why a sample may not be representative, know its limitations
							Understand how different sample sizes affect reliability
			Understand and use Tree diagrams				Identify possible bias, and how to minimise it.
			Understand and use Venn diagrams including union/intersection notation				Stratified sampling
							Understand quartiles
			Mutually exclusive/Independent events.				**Cumulative frequency**
							Box plots