Long Term Curriculum Map

Subject and Year: 11F Mathematics

Specification (KS4/5 only): https://ocr.org.uk/Images/168982-specification-gcse-mathematics.pdf

VOCABULARY

Dates taught / curriculum time	PRIOR KNOWLEDGE What should they already know / when was this last visited	CORE KNOWLEDGE What will they know at the end of this topic		MISCONCEPTIONS/ THRESHOLD CONCEPTS	AMBITION FOR ALL QUESTIONS	FORMAL ASSESSMENT
		Learn that…	Learn how to…			
HT1 Number	• Powers and Roots • Standard Form • Negative Numbers • Order of Operations • Primes/HCF/LCM • Fraction Recap • Y8 GEOGRAPHY HT2	• Integers are a whole number with no decimal part • Factors are numbers that divide into a given number exactly with no remainder • Multiples are the result of multiplying a number by an integer • Prime numbers only have two factors – 1 and itself • Square numbers are the result of multiplying a number by itself • Cube numbers are the result of multiplying a number by itself twice • The inverse squaring/cubing is the square/cube root • The highest common factor is the largest factor common to a set of numbers • The lowest common multiple is the smallest multiple common to a set of numbers • Every fraction has a decimal and percentage equivalent and vice versa • Percentages are expressed out of 100 • Original amount x multiplier = new amount • Interest is money paid on a bank account • There are two types of interest – simple and compound	• Express a number as a product of its prime factors using a factor tree • Express a number as a product of its prime factors using the 'FACT' function on a calculator • Find the highest common factor of a set of numbers through listing • Find the lowest common multiple of a set of numbers through listing • Find the highest common factor of a set of numbers through the Venn diagram method • Find the lowest common multiple of a set of numbers through the Venn diagram method • Solve HCF and LCM problems in context • Recognise key equivalents of fractions, decimals and percentages • Convert between fractions, decimals and percentages both with and without a calculator • Order fractions, decimals and percentages • Order fractions with different denominators • Find fractions of an amount • Convert between improper fractions and mixed numbers • Add and subtract fractions • Multiply and divide fractions • Compare the size of decimals using the symbols =, ≠, <, >, ≤, ≥ • Order decimal numbers including negatives • Calculate with decimals (including money problems • Calculate percentage of amount without using a calculator (finding 50%, 10%, 5% etc) • Increasing by a percentage without a calculator	• Not putting a common factor in the middle of the Venn diagram if it's not in the same position in your prime factorisation • Confusing the definitions for factor and multiple • Multiplying a number by 2 for squaring, by 3 for cubing etc • Adding fractions by adding the numerator and adding the denominator • Mixing up formulae for simple and compound interest • Rounding "down" (e.g. 4627 is 4500 to the nearest 100)	• What is a prime number? • What are the first five prime numbers? • What is a factor? • Can you give a factor of (e.g. 50)? • What is a multiple? • Can you give the first 5 multiples of (e.g. 7)? • What is a square number? • Can you give the first 12 square numbers? • What is a square root? • What is the square root of (eg 49)? • Can you give the first 5 cube numbers? • How would you find the prime factorisation of a number? • What is the highest common factor? • What is the lowest common multiple? • How would convert from a (fraction, decimal or percentage) to a (fraction, decimal or percentage)? • Any key equivalent (e.g. what is half as a percentage?) • How would you add fractions with different denominators? • How would you find (50%, 10%, 5% or 1%) of a number? • What is the difference between simple and compound interest? • Can you round (e.g. 467) to the nearest 10? • Can you round (e.g. 6.5578) to (e.g. 2 decimal places)?	Number 25% Ratio 25% Algebra 20% Geometry 15% Probability and Stats 15%

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		Learn that…	Learn how to…			
			• Decreasing by a percentage without a calculator • Find a percentage multiplier for any given percentage • Use a multiplier to find a percentage of an amount • Use a multiplier to increase/decrease an amount by a percentage • Calculate simple interest, including final amount in bank account • Calculate the interest rate for a given simple interest problem • Calculate compound interest • Solve problems involving interest • Calculate a reverse percentage • Round a number to any degree of accuracy, including significant figures • Truncate a number • Give the error interval for a rounded vale • Give the maximum and minimum values a rounded value could have been • Convert big numbers into standard form • Convert big numbers into ordinary form • Convert small numbers into standard form • Convert small numbers into ordinary form • Order standard form • Multiply and divide with standard form • Add and subtract with standard form • Order directed numbers using lines and appropriate symbols • Use the four operations with directed numbers • Calculate order of operations with directed numbers •			

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HT1 Ratio and proportion	• Simplifying ratio • 1:n and n:1 • Dividing into a ratio • Combining ratio • Proportional reasoning • Unitary method • Recipes • Best buys	• Ratio is the comparison of size of two or more values • The unitary method scales quantities by reducing to one part and then multiplying up • Two quantities are in direct proportion when they both increase at the same rate • Two quantities are in inverse proportion when one increases at the same rate the other decreases	• Simplify ratios • Give a ratio in the form 1:n and n:1 • Express a ratio as a fraction • Express a ratio as a percentage • Share into a ratio given the total • Share into a ratio given one quantity • Share into a ratio given the difference • Solve ratio word problems • Combine two ratios • Use the unitary method • Scale recipes for a given number of portions • Calculate the number of portions of a given recipe can be made with a given quantity of an ingredient • Identify best value for money • Convert between standard units of measure • Convert between currencies when the conversion rate is given • Draw a conversion graph • Use a conversation graph • Scale two quantities in direct proportion • Derive and use the formula linking two quantities in direct proportion • Scale two quantities in inverse proportion • Derive and use the formula linking two quantities in inverse proportion	• Only dividing by 2 when simplifying ratio • Not adding up the parts for the denominator when expressing ratio as a fraction (e.g. 3:4 -> ¾ not 3/7) • Not dividing every ingredient of a recipe down to 1 part • Not dividing both sides by the same common factor • Making the wrong side into one (in form n:1) • Not multiplying/dividing all parts by the same value when combining ratios • Mixing up the order of a ratio from a worded problem	• What is a ratio? • What's the ratio of boys to girls in your family/friends etc.? • When expressing ratio as a fraction how would I work out the denominator? • Simplify a ratio (e.g. simplify 12:36) • Unitary method questions (e.g. if 3 pens cost me £3.60 how much would 1 pen cost? • What's another word for divide? • What form does the unitary method take? • What's an exchange rate? • Unit conversions (e.g. convert 1km to metres)	
HT2 Algebra basics	• Manipulating algebraic expressions • Expanding and factorising single and double brackets • Solving linear equations • Substituting into formulae • Rearranging formulae	• We represent an unknown or a variable with a letter • A term is a variable, a number or the product of variables and numbers • An expression is at least two terms added together • An equation is a statement that the values of two mathematical expressions are equal • Inequalities are used to compare the size of numbers or variables • That the symbols >, <, ≥, and ≤ represent inequalities (and how to use them).	• Simplify expressions by collecting like terms • Simplify expressions by multiplying or dividing terms • Expand a single bracket • Factorise a single bracket • Solve simple 1 and 2 step equations (including positive and negative integers and decimals) • Solve linear equations with unknowns on both sides • Solve linear equations involving fractions • Solve any linear inequality • Plot inequalities on number lines	• Not multiplying by the coefficient when substituting in (e.g. when x=2, 5x = 52) • Adding terms which are not like, e.g. 4x + 3 = 7x • Misconceptions around adding negative numbers, e.g. 4x + -3x = 7x • "Answers" always need to be on the right hand side of the equals	• What is a term? • Can you give me an example of a term? • What is an expression? • Can you give me an example of an expression? • What is an equation? • Can you give me an example of an equation? • What is the difference between an expression and an equation? • What is the inverse of (e.g. adding)? • How would you expand a single bracket?	

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		Learn that…	Learn how to…			
			• Expand double brackets by grid, FOIL or any other method • Factorise a quadratic expression with x^2 coefficient of 1 • Solve a quadratic by factorising • Substitute into an expression (including positive and negative integers, decimals and fractions) • Rearrange formulae • Form equations from a worded problem and solve • Solve simultaneous equations by elimination and substitution	• Dividing by a coefficient before moving a constant to the other side of the equation •	• What is meant by 'highest common factor'? • What is the highest common factor of (e.g. $2x^2$ and 4x)? • What does 'substitution' mean in algebra? • What makes an equation "quadratic"? What form does it take? • If I'm multiplying two terms with the same base that have powers, what should I do with the powers? • If I'm subtracting two terms with the same base that have powers, what should I do with the powers? • What does reciprocal mean? • What is an inequality? • What are the three steps to plotting an inequality on a number line?	
HT2 Graphing	• Plotting coordinates • Substituting into formulae • Plotting a straight line • Plotting a quadratic	• A Cartesian grid is split into four quadrants by an x axis and a y axis • The x axis is horizontal and the y axis is vertical • Co-ordinates are given in the format (x,y) • Straight lines can all be described in the form y=mx+c where m represents gradient and c represents the y intercept • Gradient can be calculated by dividing the change in y co-ordinates by the change in x co-ordinates • Parallel lines have the same gradient • Perpendicular lines have gradients that are the negative reciprocal of each other • Quadratic graphs are a parabola	• Plot co-ordinates in all four quadrants • Generate pairs of co-ordinates for a given straight line using substitution • Generate pairs of co-ordinates for a given straight line using table function • Plot a linear equation • Verify if a point lies on a line • Find the gradient of a line on a graph by counting squares • Calculate gradient from a pair of co-ordinates using change in y divided by change in x • Derive the equation of a line from a line given on a graph • Derive the equation of a line given the gradient and intercept • Calculate perpendicular gradients • Find the midpoint of a line • Find where two lines intersect • Generate pairs of co-ordinates for a quadratic function • Plot quadratic graphs	• Plotting x and y the wrong way round • Not multiplying by the coefficient when substituting in (e.g. when x=2, 5x = 52)	• What are the axes of a graph? • What order do co-ordinates come in? • Can you name a co-ordinate that is in the (e.g. first) quadrant? • What form does a straight line come in? • In y = mx + c, what does x stand for and what does y stand for? • What is gradient? • How would you calculate gradient of a straight line? • What shape is a quadratic graph?	

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		Learn that…	Learn how to…			
HT2 Sequences	• Continuing sequences • Identifying the term to term rule • Generating sequences	• An arithmetic sequence has a common difference • A geometric sequence has a common ratio • The term-to-term rule is the operation to go from one term to the next • The nth term rule is the rule that links the position in the sequence to the term	• Identify if a sequence is arithmetic or geometric • Find the term to term rule for a sequence • Continue a sequence • Find missing terms in a sequence • Generate sequences from the nth term rule • Generate a given term (e.g. 50th) of a sequence • Derive the nth term rule for a linear sequence • Verify if a term is in a sequence • Continue Fibonacci sequences • Give missing terms of a Fibonacci sequence	• Mixing up term-to-term and position to term rules • Not doing the inverse operation to find the 0th term	• What is a term to term rule? • Can you give me the term to term rule for (e.g. 1, 5, 9, 13,…)? • What form does the nth term rule take? • How do you generate a sequence? • Can you give me the (e.g. 50th) term of (e.g. 2n + 3)?	

HT3
Geometry - angles
	• Measuring and drawing angles
	• Classifying angles
	• Finding missing angles in rectilinear shapes
		• Angles are the space (measured in degrees) between two intersecting lines at the point where they meet
		• Angles can be classified as acute, right, obtuse, straight, reflex or a full turn
		• Angles on a straight-line sum to 180°
		• Angles around a point sum to 360°
		• Angles in a triangle sum to 180°
		• Angles in a quadrilateral sum to 360°
		• Vertically opposite angles are equal
		  • Alternate angles on parallel lines are equal
		  • Corresponding angles on parallel lines are equal.
		  • Cointerior angles on parallel lines sum to 180°
		• The sum of exterior angles in a polygon is 360°
		• The sum of interior angles in a polygon can be found using the formula (n-2)x180° where n is the number of sides
		• Bearings are a three digit representation of an angle measured clockwise from a north line
			• Identify types of angles
			• Draw and measure acute and obtuse angles using a protractor
			• Draw and measure reflex angles by finding the 'missing' angle
			• Apply angle facts to find missing angles in rectilinear figures
			• Calculate interior and exterior angles of polygons
			• Work with bearings
				•	• What is an angle?
					• Name a type of angle
					• What is a right angle?
					• What is an acute angle?
					• What is an obtuse angle?
					• What is a reflex angle?
					• What do angles on a straight-line sum to?
					• What do angles around a point sum to?
					• What do angles in a triangle sum to?
					• What do angles in a quadrilateral sum to?
					• What do we know about vertically opposite angles?
					• What do exterior angles in a polygon sum to?
					• In parallel lines, which types of angles are equal?
					• What do co-interior angles sum to?	

HT3 Geometry - mensuration	Understanding of • Perimeter • Area • Surface area • Volume	• Perimeter is the distance around the boundary of a 2D object • Circle nomenclature includes terms such as centre, radius, chord, diameter, circumference, tangent, arc, sector, and segment	• Use and convert standard units of measurement for length, area, volume/capacity, mass, time and money.	• Mixing up area and perimeter • Only adding two given sides for perimeter of rectangle	• What is perimeter? • What is area? • Why might we use area in real life? • What is surface area?	

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		Learn that…	Learn how to…			
	Y10 PHYSICS HT5	• Area is the amount of space inside the boundary of a 2D shape • Surface area is the sum of the areas of all faces of a shape • Volume is the amount of three dimensional space taken up by a solid	• Use and convert simple compound units (e.g. for speed, rates of pay, unit pricing). • Apply speed = distance ÷ time • Use the scale of a map, • Calculate the perimeter of a rectilinear shape • Calculate the perimeter of compound shapes • Calculate the circumference of a circle • Calculate the arc length of a sector of a circle given its angle and radius • Calculate the area of a triangle • Calculate the area of a parallelogram • Calculate the area of a trapezium • Calculate the area of a circle • Calculate the area of composite shapes • Calculate the surface area of cuboids and other right prisms • Calculate the volume of cuboids and other right prisms • Use Pythagoras' theorem to find missing sides in right-angled triangles • Use trigonometric ratios to find missing sides and angles	• Multiplying all four sides for area of a rectangle • Not 'chopping up' compound shapes to find area, just multiplying • Not working out missing sides to add on for perimeter • Mixing up names of circle parts	• What is the name for the perimeter of a circle? • What is a radius/ chord/ diameter/ circumference/ tangent/ arc/ sector/ segment? • How do you calculate the area of a rectangle? • How do you calculate the area of a triangle? • How do you calculate the area of a parallelogram? • How do you calculate the area of a trapezium? • How do you calculate the area of a circle? • What is surface area? • What is volume? • How do you calculate the volume of a cube? • How do you calculate the volume of a cuboid? • How do you calculate the volume of a prism?	
HT3 Geometry – Transformations and constructions	Understanding of • Basic transformations • Lines of symmetry and rotational symmetry • Use of compass and ruler to create basic constructions (perpendicular bisector, angle bisector) Y10 PHYSICS HT4	• Vectors are a way of expressing direction and magnitude • Objects can be transformed via either reflection, rotation, translation or enlargement. • Compass and ruler constructions can be used to model various scenarios • Similar shapes	• Complete translations of objects (using vectors) to find the image • Describe translations as a vector • Complete rotations of objects to find the image • Describe rotations with a centre, degree of rotation and direction • Complete reflections given a line of reflection (or equation of) • Describe reflections, giving their line of reflection as an equation • Complete enlargements (positive, negative and fractional) • Describe all types of enlargements, giving the centre and scale factor • Combining transformations and describing combined • Construct a perpendicular bisector	• Mixing up the transformations • Not giving the full description with a transformation (ie centre of rotation or enlargement)	• Can you draw a Cartesian grid and label the x and y axis? • How many degrees are there in a full turn? • Describe the process of a rotating a shape 90 degrees anticlockwise about the origin. • How would you reflect a square in the x-axis? • Describe what the column vector $\begin{bmatrix} 2 \\ -3 \end{bmatrix}$ represents. • A square with length 3cm is enlarged by a scale factor of 4, what will the length of the enlarged shape be? • An enlargement always makes a shape bigger- true or false?	

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		Learn that…	Learn how to…			
			• Construct an angle bisector • Construct varied perpendicular bisectors (from a point etc) • Construct Loci (distance from a point or line) • Use knowledge of enlargements to calculate side lengths in similar shapes (discussion around similarity and congruence)		• How would you perform a perpendicular bisector? • How would you perform an angle bisector? • If you wanted to give the locus of all points 4cm from A, what shape would you create?	
HT4 Probability	Understanding of • The probability scale • Calculating basic probabilities • Sample space diagrams • Tree diagrams • Venn diagrams	• Experimental probability is the relative frequency of an event (the number of successes out of the number of trials) • Theoretical probability is the relative frequency we would expect for an event • Likelihood is a description of the probability of an event (likely, evens etc) • Probability is a number between 0 and 1 • Relative frequencies approach the theoretical probability as the number of trials increases. • To work out the probability of both of two events happening, we multiply their individual probabilities • To work out the probability of either of two events happening, we add their individual probabilities	• Use the 0-1 probability scale • Describe the likelihood of an event • Record, describe and analyse the relative frequency of outcomes of repeated experiments using tables • Record, describe and analyse the relative frequency of outcomes of repeated experiments using frequency trees • Use relative frequency as an estimate of probability • Calculate probabilities, expressed as fractions or decimals, in simple experiments with equally likely outcomes, for example flipping coins, rolling dice, etc • Use a table to record the probabilities of single events • Apply ideas of randomness and fairness in simple experiments. • Calculate probabilities of simple combined events, for example rolling two dice and looking at the totals. • Use sample space diagrams to find the probability of combined events • Use systematic listing strategies and find associated probabilities • Use a two-circle Venn diagram to enumerate sets • Use simple set notation to describe simple sets of numbers or objects • Construct a Venn diagram to classify outcomes • Use a Venn diagram to calculate probabilities	• Having a probability greater than 1 • Mixing up probability and likelihood • Issues with multiplying fractions (e.g. only multiplying numerator and not denominator)	• If you flipped a coin, what is the probability you would get a tails? • If you rolled a dice, what is the probability you would get a 3? • What is the probability if an event is certain? • What is the probability if an event is impossible? • What scale is probability always between? • What is relative frequency? • How do you calculate relative frequency? • What should all frequencies add up to? • What are tree diagrams used for? • How do you work out the probability of both of two events happening? • How do you work out the probability of either of two events happening? • What is a Venn diagram and what is it used for?	

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		Learn that…	Learn how to…			
			• Complete partially completed tree diagrams, both with replacement and without • Construct tree diagrams from worded problems, both with replacement and without • Calculate probabilities using tree diagrams			
HT4 Statistics	Understanding of • Mean, median mode and range • Estimating mean for grouped frequency • Displaying data • Interpreting data	• Data can be expressed in different ways depending on the type of data and the context • Presentation of data can be misleading • Mean, median and mode are measures of central tendency • Range and IQR are measures of spread • Grouped data is sorted into categories	• Calculate mean, median, mode and range for a set of data • Describe a population using statistics • Calculate mean, median, mode and range for a frequency table • Calculate an estimate for the mean of a grouped frequency table • Calculate an estimate for the range of a grouped frequency table • Calculate an estimate for the median of a grouped frequency table • Give the modal class of a grouped frequency table • Use information about averages to give the original data set • Compare data sets • Use tally charts • Draw and interpret a pictogram • Draw and interpret a bar chart • Draw and interpret compound and dual bar charts • Calculate angle size for a pie chart • Draw and interpret a pie chart • Recognise graphical misrepresentation through incorrect scales, labels, etc. • Draw and interpret a scatter graph • Draw a line of best fit by eye and use to interpolate • Identify correlation • Identify outliers	• Confusing data types • Confusing measures of central tendency • Assuming that range is an average • Not counting the cross in a tally chart as the fifth time • Using an unrelated key for the displayed data • Not drawing a key • Missing labels/titles etc. on graphs • Not putting gaps in a bar chart	• How would you calculate mean? • How would you calculate median? • How would you calculate mode? • How would you calculate range? • What is grouped data? • How would you estimate the mean of a grouped frequency table? • What are the key features of a pictogram? • What are the key features of a bar chart? • What are the key features of a pie chart? • What is a key? • What type of data is displayed on a scatter graph? • Explain how to draw a line of best fit? • What is an outlier? • Describe the shape of (positive/negative) correlation on a scatter graph • What is an outlier	
HT5 QLA driven feedback	• All content has been taught	• Past papers within mathematics are a good revision tool	• Ask teachers for good revision materials • Identify own areas of weakness and prioritise these for revision • Plan time effectively to maximise revision	• Re-writing tasks is revision • You only should revise the topics that you already know	• What are you using to revise? • What topic do you always perform well in? • What topic do you always struggle with?	GCSE GCSE A01 – 50% A02 – 25% A03 – 25%

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		Learn that…	Learn how to…			
			• Search independently videos to watch and worksheets to use • Answer exam type questions • Use a logical step by step guide for worded long mark questions. An example is RULER (Read, Underline, Layout, Evaluate, Review).	• If you don't know something you never will		

Long Term Curriculum Map

Subject and Year: 11H Mathematics

Specification (KS4/5 only): https://ocr.org.uk/Images/168982-specification-gcse-mathematics.pdf

VOCABULARY

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		Learn that…	Learn how to…			
HT1 Number	Understanding of ratios, sharing into etc Use of percentages, multipliers for increase decrease etc Y8 GEOGRAPHY HT2 Operating with fractions Indices (laws) Use of all operations Operating with negatives HCF/LCM/Primes Using surds	• Index laws can be manipulated following rules, including changing the base number • Values can be expressed in standard form • Standard form can be operated with, as with ordinary form • All positive integers can be expressed as a product of their prime factors • HCF/LCM can be used to solve problems • Ratios can be used flexibly, including through combination • Values can be linked by either direct or inverse proportion • Multipliers can be used for increase, decrease, change, reverse and combined percentage questions • Fractions can be used in problem solving and operating • Decimal values can be used with all operations • Fractions and recurring decimals can be converted to each other • Rounding and truncating can be used in context with a margin of error • Estimation requires rounding to 1 s.f • Bounds are different for discrete and continuous quantities • Surds can be used to express and calculate with irrational numbers •	• Use all laws of indices, including fractional and negatives • Prove a given result using index laws • Express numbers as powers of a given value (as a power of 2…) • Convert into and out of standard form for large and small numbers • Adjust powers to write numbers in standard form • Use all four operations with standard form • Use standard form to compare magnitude • Express a number as the product of its prime factors, giving the answer in index form • Use a Venn diagram to find the highest common factor and lowest common multiple of a set of numbers • Find the HCF and LCM in context from worded questions • Share into ratios given the total, one value or difference • Convert from a ratio to a fraction • Combine two ratios to give in the form a:b:c when given a:b and b:c • Proportionality • Direct proportion • Inverse proportion • Proportion graphs • Use % multipliers • Calculate % change • Reverse % questions • Use multipliers for combining % changes (e.g house price question) • Simple interest • Compound interest • Fractions basics (operating, of an amount etc) • Mixed/Improper conversions	• Mixing up multiplication and addition in index laws • Difficulty around operating with coefficients with indices • Not multiplying with power-power rule, particularly when giving values as a power of 2, 3 etc • Using values >10 as a in standard form • Moving the power in the wrong direction when adjusting standard form • Confusing HCF and LCM • Using original x multiplier=new incorrectly • Mistakes with truncation error intervals •	• When we multiply numbers with indices, what happens to the powers? • When we divide with numbers with indices, what happens to the powers? • What are the rules for standard form? • What is HCF? • What is LCM? • What formula do we usually use for % exam questions? • What does truncate mean? • What is an error interval? • What is the rule to help us divide fractions? • What is the % multiplier for an increase of 20%? • What is the % multiplier for a decrease of 15%?	Number 15% Ratio 20% Algebra 30% Geometry 20% Probability and Stats 15%

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		Learn that…	Learn how to…			
			• Convert between recurring fractions and decimals (algebraic method) • Round/Truncate to all degrees of accuracy (including significant figures) • Use rounding to complete estimations • Express rounding as error intervals • Use error intervals to calculate minimum and maximum values (exam q on plank length etc) • Simplify surds • Operate with surds • Rationalise the denominator • Use surds in context (Pythagoras' Theorem etc)			
HT2 Algebra	Knowledge of expressions and equations (solving) Drawing and interpreting graphs Working with sequences	• Algebraic expressions can be manipulated at will, as long as the rules are followed. • Quadratic equations can have two solutions, this can possibly be one repeated solution • Algebraic fractions follow the same rules as numerical fractions • Quadratic equations can have no real solutions/roots if they don't touch the x axis • Linear equations are always solved by following a process of inverse operations, no matter how difficult they appear • Rearrange formula to change the subject fluently • Understand how to solve equations (multiple steps, including brackets and fractions) • Expand a single bracket with a constant or constant*variable term as the coefficient • Expand two binomials to form a quadratic, including negative terms • Understand how to divide by the highest common factor to factorise an expression, into a single bracket • Understand how to factorise a quadratic into two binomial factors (applying the TEAM method)	• Rearrange formula to change the subject fluently • Understand how to solve equations (multiple steps, including brackets and fractions) • Form and solve equations in various contexts • Expand a single bracket with a constant or constant*variable term as the coefficient • Expand two binomials to form a quadratic, including negative terms • Understand how to divide by the highest common factor to factorise an expression, into a single bracket • Understand how to factorise a quadratic into two binomial factors (applying the TEAM method) • Factorise and solve quadratics • Factorise with a coefficient of x squared to solve • Solve quadratics with formula • Be able to eliminate from an algebraic fraction (including through factorising quadratics) • Add and subtract algebraic fractions (by finding a common denominator) • Work with algebraic fractions with a coefficient of x squared	• Not performing the inverse operation to solve (e.g to remove a +6, you should -6) • Not multiplying the coefficient by all terms when expanding brackets • Making mistakes with negatives when expanding and factorising • Squaring a binomial by just squaring each term rather than squaring as a whole • Eliminating values which aren't coefficients for the full denominator and numerator (when cancelling in fractions) • Forgetting to multiply the x squared coefficient by the constant before factorising a quadratic with coefficient •	• What is a term? • How is an expression different to an equation? • What is the name of the method we use to factorise a quadratic (a 4 letter word)? • What do we need in order to add/subtract two algebraic fractions? • What is the quadratic formula? • What is a solution to a quadratic? What does it look like on a graph • How many solutions can a quadratic have?	GCSE Exams at the end of Y11

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		Learn that…	Learn how to…			
		• Be able to eliminate from an algebraic fraction (including through factorising quadratics) • Add and subtract algebraic fractions (by finding a common denominator)				
HT2 Algebra	Knowledge of expressions and equations (solving) Drawing and interpreting graphs Working with sequences	• Quadratic graphs can be drawn by solving the equation in a variety of ways • Quadratic nth terms are based on the second difference of the sequence • The completed square of a quadratic equation gives the turning point • Geometric sequences have their own form of nth term • A straight line is given by y=mx+c • Parallel lines have equal gradients • Perpendicular lines have gradients that are the inverse reciprocal of one another • To derive the equation of a line from a given line on a graph • To derive the equation of a line given gradient and intercept • To derive the equation of a line given the line crosses a set of co-ordinates • To calculate gradients from a line graph • To calculate gradients from a set of co-ordinates • To calculate perpendicular gradients • • To know properties of perpendicular lines • To calculate midpoint of a line • To calculate where 2 lines instersect • Apply algebraic rules to rearrange formulae into format of y=mx+c	• Complete the square with even x coefficients • Complete the square with odd x coefficients • Solve from a completed square • Sketch curves from completed square using turning point and solutions and y intercept • Express transformations from a given graph to a completed square • Revisit of straight line graphs basics • Calculate and plot Parallel and Perpendicular lines (graphing) • Plot quadratic graphs • Transform quadratic graphs • Sketch Trig graphs (+ transforming) • Recognise different graphs (exponential, cubic, circle etc) • Use all links from quadratic equations to graphs (roots, turning points, y intercepts) • Calculate area under a curve • Use the Equation of a circle (centre 0,0) • Solve inequalities • Solve quadratic inequalities • Plot inequalities with shaded regions • Complete linear programming • Work with Linear sequences (nth term) • Work with Geometric sequences (nth term) • Work with Quadratic sequences (nth term) • Work out Special sequences • Present Algebraic proof	• Mistakes in using (-a, b) for turning points • Not subtracting the square of the value in the bracket • Conflating parallel and perpendicular • Mixing up different graphs (cubic, trig etc) • Forgetting the direction of shading in linear programming	• What is the turning point given by in a completed square? • What do solutions to an equation look like on a graph? • How do you calculate a perpendicular gradient? • What is the form of the nth term of a geometric sequence?	
HT3 Geometry	Mensuration Volume Similar shapes	• Volume and area require various formula	• Calculate the area of shapes, including trapezium, regular hexagons etc. • Calculate perimeter (including interleaving with form/solve) • Calculate area/circumference of circles	• Conflating area and perimeter • Forgetting formula for circles	• How do we calculate the area of a trapezium? • What is the formula for the interior angle sum of a polygon?	

Dates taught / curriculum time	PRIOR KNOWLEDGE What should they already know / when was this last visited	CORE KNOWLEDGE What will they know at the end of this topic		MISCONCEPTIONS/ THRESHOLD CONCEPTS	AMBITION FOR ALL QUESTIONS	FORMAL ASSESSMENT
		Learn that…	Learn how to…			
	Congruence definition Pythagoras SOHCAHTOA Construction Basic bearings Y10 PHYSICS HT5 Y10 PHYSICS HT4	• Perimeter can be calculated numerically and algebraically • Sectors of circles can be calculated using proportion • Pythagoras can be used in 2D or 3D • Different polygons have set angle sums • SOHCAHTOA can be used with any right angled triangle • Sine rule can be used when SOHCAHTOA cannot (or when it can) • Cosine rule is used in non-right angled triangles, in specific situations • Area of triangles can be calculated without a perpendicular height, using 1/2abSinC • Vectors are a way of expressing direction and magnitude • Objects can be transformed via either reflection, rotation, translation or enlargement. • Compass and ruler constructions can be used to model various scenarios • Bearings express direction measured from North • Circle theorems can be used to calculate various angles and lengths in circles	• Calculate the area of sectors in pi and decimal values • Calculate arcs • Combine arcs/sectors in exam questions • Calculate sides in 2D using Pythagoras' Theorem • Calculate sides in 3D using Pythagoras' Theorem • Calculate angle sums (numeric and algebraic) • Calculate missing angles, including in irregular polygons • Calculate angles in polygons (including exam questions) • Calculate angles/sides using trigonometric ratios without a calculator for exact trigonometric values • Calculate angles/sides using trigonometric ratios with a calculator for any trigonometric values • Use Sine rule for sides • Use Sine rule for angles • Use Cosine rule for sides • Use Cosine rule for angles • Use 1/2absinC to calculate area of non- right angled triangles • Add and subtract vectors • Use vectors with scalars • Use vector geometry to path find • Use vector geometry to prove lines are parallel • Complete translations of objects (using vectors) to find the image • Describe translations as a vector • Complete rotations of objects to find the image • Describe rotations with a centre, degree of rotation and direction • Complete reflections given a line of reflection (or equation of) • Describe reflections, giving their line of reflection as an equation • Complete enlargements (positive, negative and fractional)	• Trying to use Pythagoras' Theorem in non right angled triangles • Forgetting rule to calculate polygon angle sum (n-2)x180 • Misunderstandings around when to use Sine or Cosine rule • Calculating area of triangles without a perpendicular height using 1/2bxh • Conflating vectors and fractions • Getting the sides inverted when using SOHCAHTOA • Mixing up the transformations • Not giving the full description with a transformation (i.e. centre of rotation or enlargement) • Bearings not measured from North • Bearings not given as 3 digits • Back bearings being calculated incorrectly • Conflating circle theorems with one another • Trying to use circle theorems with wrong part (i.e. chord being used as diameter etc) • Accuracy errors with constructions	• What is Pythagoras' Theorem? • When can Pythagoras' Theorem be used? • What does SOHCAHTOA stand for? • What is the formula for area of a circle? • What is the formula for the circumference of a circle? • How do we calculate an arc length, given the angle? • How do we calculate a sector area, given the angle and total area? • What is the Sine rule? • What is the Cosine rule? • What is a vector? • Can you calculate the area of a triangle without the perpendicular height? • What are the key rules for bearings? • When might a bearing be used in real life? • What does a perpendicular bisector look like? • What does an angle bisector look like? • What does bisect mean? • What does perpendicular mean? • Tell me a circle theorem	

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		Learn that…	Learn how to…			
			• Describe all types of enlargements, giving the centre and scale factor • Combining transformations and describing combined • Construct a perpendicular bisector • Construct an angle bisector • Construct varied perpendicular bisectors (from a point etc) • Construct Loci (distance from a point or line) • Complete exam questions – combining constructions • Calculate and express bearings – simple • Calculate back bearings • Combine bearings with trig questions • Show and prove circle theorems • Apply circle theorems to find values within a circle • Apply circle theorems to exam questions			
HT4 Probability and Statistics	Charts and tables Line graphs Probability definitions Tree diagrams Sample space Frequency trees Histograms Estimate mean Venn diagrams Scatter graphs	• Data can be expressed in different ways depending on the type of data and the context • Presentation of data can be misleading • Probability can be applied to real life situations • Probability always falls between 0 and 1 • Tree diagrams can be used to show conditional and non-conditional probability • Sample space diagrams can be used to show the probability of varied outcomes • Frequency trees show the frequency of outcomes as a form of relative frequency (convertible to probability) • Histograms are a plot of relative frequency and a second variable • Relative frequency is frequency/classwidth • Values can be estimated from a histogram using interpolation • A mean can be calculated from a frequency table	• Plot a pie chart • Interpret from a pie chart • Plot a scatter graph • Interpolate from a scatter graph • Describe a correlation • Complete a frequency tree • Take values from a frequency tree to use as probability • Complete a two-way table • Plot a histogram accurately • Calculate frequency from a histogram using the area of the bars • Interpolate with a histogram to estimate values and median/mean • Complete missing axis on a histogram • Draw frequency polygons • Complete stem and leaf diagrams • Interpret stem and leaf diagrams • Complete Cumulative frequency tables from frequency tables • Plot cumulative frequency graphs accurately • Interpret CF graphs to complete tables • Draw a box plot from a set of data	• Lack of accuracy with protractors • Lack of accuracy in plotting points • Mixing up the axis • Not drawing the line of interpolation on the scatter graph • Forgetting the terminology for correlation, positive, negative etc • Conflating frequency trees and probability trees • Plotting the Y axis on histograms as frequency not frequency density • Misusing the key on a stem and leaf (e.g hundreds or tens column being the separate digit)	• Which axis is which? • What are the different types of correlation? • What is the Y axis on a histogram? • How do you calculate frequency density? • How do you calculate frequency from a histogram? • What does the key on a stem and leaf diagram show you? • What is the difference between frequency and cumulative frequency? • Where should the point be plotted on a cumulative frequency graph, the start, middle, or end of the interval? • How much of the data is contained within each quartile of the boxplot? •	

Dates taught / curriculum time	PRIOR KNOWLEDGE What should they already know / when was this last visited	CORE KNOWLEDGE What will they know at the end of this topic		MISCONCEPTIONS/ THRESHOLD CONCEPTS	AMBITION FOR ALL QUESTIONS	FORMAL ASSESSMENT
		Learn that…	Learn how to…			
		• A mean can be estimated from a grouped frequency table • Venn diagrams can be used to calculate probabilities • Scattergraphs show bivariate data and can be used to estimate • Box plots show the spread of data, median, max, min and quartiles • Cumulative frequency is a measure of frequency added together over time	• Calculate quartiles from a set of data • Interpret a box plot to explain trends (2 statement questions) • Calculate the mean from a frequency table • Estimate the mean from a grouped frequency table • Complete tree diagrams (fraction and decimal) • Multiply across tree diagrams to find the outcome • Use Venn diagrams when given the intersection to calculate probabilities • Use Venn diagrams when given the A and B values to calculate the intersection and probabilities •	• Conflating frequency and cumulative frequency • Not plotting cumulative frequency at the end of the interval • Attempting to make all quartiles of the boxplot look the same size • Misunderstanding that each quartile contains ¼ of the data, despite showing different spread • Box plot explanations not including one comment on the IQR and one on the median • Not taking midpoints to estimate the mean • Forgetting that branches on a tree diagram must sum to 1 • Forgetting to multiply across a tree diagram • Lots of mistakes in calculating the intersection of a Venn when not given		
HT5 QLA driven feedback	All content has been taught	• Past papers within mathematics are a good revision tool	• Ask teachers for good revision materials • Identify own areas of weakness and prioritise these for revision • Plan time effectively to maximise revision • Search independently videos to watch and worksheets to use • Answer exam type questions • Use a logical step by step guide for worded long mark questions. An example is RULER (Read, Underline, Layout, Evaluate, Review).	• Re-writing tasks is revision • You only should revise the topics that you already know • If you don't know something you never will •	• What are you using to revise? • What topic do you always perform well in? • What topic do you always struggle with?	GCSE A01 – 40% A02 – 30% A03 – 30%