Long Term Curriculum Map

Subject and Year: Year 8 Mathematics

Specification (KS4/5 only):

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 Ratio and proportion	• Represent a quantity as a fraction • Sharing means divide • Units of measure	• Ratio is a relationship between two or more values • Ratio is a comparison of size between two or more values • There is a proportional relationship between one item and an amount • The unitary method takes the form 1: n • There is a relationship between ratio and a linear function	• Use ratio notation • Represent ratios as fractions • Reduce a ratio to its simplest form • Write ratio in the form 1:n and n:1 • Combine ratios to find a:b:c given a:b and b:c • Divide a quantity into two or more parts • Share into a ratio given one quantity • Share into a ratio given the difference between quantities • Use unitary method to reduce an amount for multiple items into an amount for one item • 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 • Apply the unitary method to real life scenarios (e.g. exchange rates and map scaling) • Use proportional reasoning when working with exchange rates • Find a new distance when scaling amounts	• Choosing the wrong part of the ratio to be the denominator of a fraction rather than the total number of parts (e.g. for the ratio 2:3 they might express as 2/3 rather than 2/5) • Only simplifying a ratio by dividing by 2 and not other integers	• 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)	Formal assessment at the end of HT1 X:\Teaching Departments \Maths\Resources 2021-2022\Assessments\HT1 50 marks – mixture of AO1, AO2 and AO3
HT1 Powers and Roots	• Squares, cubes, roots in Y7 • Able to multiply by powers of 10	• When multiplying by 10, 100, and 1000 we are using place value •	• Multiply by powers of 10 • Divide by powers of 10 • Square, cubes, powers to evaluate • Use the basic laws of indices, multiplication, division, brackets	• You multiply the number by the power not by itself • You multiply the powers when you multiply the terms • You divide the powers when you divide the terms	• Calculate X to the power	
HT1 Standard Form	• Place value • Multiplying by 10, 100 and 1000 • Index laws	• When multiplying by 10, 100, and 1000 we are using place value	• Convert between standard form to ordinary form for large and small numbers	• When multiplying and dividing by 10, 100, 1000 etc. you move the decimal point	• Why do we use standard form? • What form does standard form always have?	

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		Learn that…	Learn how to…			
		• We use standard form to represent very large or very small numbers without having to write lots of digits • Standard form always has the form A x 10^n where $1 \leq A < 10$	• Convert between ordinary form to standard form for large and small numbers • Order standard form, given both standard form and ordinary form	• When multiplying and dividing you add or take away a zero • Ordering numbers by the amount of digits rather than the place value (e.g. thinking 4.1046 x 10^2 is larger than 4.11 x 10^2)	• Give me a number in standard form • Convert this to an ordinary number • Give me an ordinary number • Convert this to standard form • Which is larger (give two numbers in standard form)?	
HT2 Algebra	• Negative and positive number multiplication rules • Understanding of HCF	• Understand factorise means take out the common factor and leave the remaining factors in a bracket • Expand means multiply out brackets • Equations represent two equal expressions • Solving an equation is to find what an unknown value is equal to • The inverse of multiplication is division • The inverse of addition is subtraction • The inverse of squaring is a square root	• Expand single brackets with a number outside the bracket • Expand single brackets with a variable outside the bracket • Expanding single brackets with a term outside the bracket • Expanding double brackets using a variety of methods • Expanding single and double brackets including negative values • Expand three binomials • Find the highest common factor between 2 coefficients, 2 variables and 2 terms • Factorise linear expressions • Solving equations to find an unknown • Solving equations involving brackets • Solving equations involving fractions • Solving equations with unknowns on both sides • Form an equation given worded questions • Recall and use standard formulae • Change the subject of a formula through inverse operations, link w	• Only multiplying one term inside the bracket • Not understanding that expansion is multiplication • Not understanding that 2x is 2 multiplied by x or 2 lots of x • Confusing multiples with factors • When multiplying to cancel a division only multiplying one side of the equation/term	• What is solving? • What does expand mean? • What is a term? • What is a variable? • What is a coefficient? • What does solve mean? • What is a highest common factor? • Expand …. • What is an inverse operation? • What is the inverse of multiplication? • What is the inverse of division? • What is the inverse of addition? • What is the inverse of subtraction? • What is the inverse of squaring? • What is the inverse of square rooting?	Formal assessment at the end of HT2 X:\Teaching Departments \Maths\Resources 2021-2022\Assessments\HT2 50 marks – mixture of AO1, AO2 and AO3
HT2 Area and Perimeter	• Understanding of area and perimeter of rectangles and triangles	• The area of a rectangle is base x height • The area of a triangle is 0.5 x base x height •	• Calculate the area of a rectangle • Calculate the area of a triangle • Calculate missing lengths to be able to work out the perimeter and area •	• Not using the perpendicular height when calculating area •	• What Is the formula for calculating the area of a rectangle? • What Is the formula for calculating the area of a triangle? • What Is the formula for calculating the area of a trapezium? •	

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HT2 Circles	•	• The circumference is the distance around the whole circle (the perimeter) • The diameter is the distance across the circle that goes through the centre • The radius is halfway across the circle that goes to the centre • A sector of a circle is section enclosed by two radii • The area of a circle = πr^2 • The circumference of a circle = πd or $2\pi r$ • The area of a sector = $\frac{\theta}{360} \times \pi r^2$ • Trapeziums have two parallel lines • The area of a trapezium = $\frac{a+b}{2} \times h$	• Calculate the area of a circle • Calculate the circumference of a circle • Calculate the arc length and area of sector • Calculate the area of a trapezium • Calculate the area of compound shapes by dividing them into shapes that we do know how to calculate the area for • Apply knowledge of area and perimeter of a circle when dealing with semi-circles, and quadrants of circles •	• Confusing radius and diameter • Using the wrong formula to calculate the circumference • Using $\frac{360}{\theta}$ when calculating the area of a sector • Not thinking of the circumference as the perimeter •	• What is a diameter of circle? (draw to help) • What is a radius of circle? (draw to help) • What is a circumference of circle? (draw to help) • What is pi? • What Is the formula for calculating the area of a circle? •	Formal assessment at the end of HT3 50 marks – mixture of AO1, AO2 and AO3
HT3 Compound units	Inverse operations Converting between different length, area, volume/capacity, mass, time and money • Terminal Velocity and pressure in fluids – science HT1	• Speed = distance/time • Density = mass/volume • Pressure = force/area • Speed is how fast something moves • Velocity is speed with a direction	• Multiply and divide by powers of 10 • Basic unit conversions, cm, mm, m, km, tonne, time, hours, ml, l • Apply Speed = distance/time • Apply Density = mass/volume • Apply Pressure = force/area • Rearrange formulae to find a new subject • Substitute values into a given formula • Convert compound units in algebraic contexts	• Speed and velocity are the same thing • Dividing by the wrong value • Converting units when using area and volume e.g. converting $10m^2$ to cm^2 you would multiply by 100	• How would you calculate the speed of an item given the distance and time? • How would you calculate the density of an item given the mass and volume? • How would you calculate the pressure of an item given the force and area? • What is speed? • What is velocity? • What is the inverse of (insert operation)? •	
HT3 Fractions	• Fraction representations • Simplifying and equivalent • Improper to mixed conversions • Multiplying fractions • Fractions of amounts • Fractions in context	• Numerator is top number • Denominator is bottom number • Fractions represent division • To add/subtract fractions you need a common denominator • The order of operations follow brackets, indices, multiplication and division, addition and subtraction	• Simplify fractions by dividing by common factors • Find equivalent fractions • Convert between improper fractions and mixed numbers	• Dividing makes smaller • Multiplying makes bigger • Fractions cannot have decimals	• What is the numerator? • What is the denominator? • What does it mean by having a common denominator? • What is a factor? • What is a multiple? • What is the order of operations? •	

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HT3 Real life graphing Graphing	Plotting and reading coordinates on all 4 quadrants Plotting coordinates to complete polygon • Reflection in lines parallel to the axis	• 4 quadrants • X and y axis are horizontal and vertical respectively • Equation of a line is y = mx + c • (x, y) are coordinates • M = gradient • C = y-intercept • Gradient means steepness • Velocity is the speed of something in a given direction	• Plot and read coordinates in all quadrants • Read data from graphs – e.g. (not limited to) cost vs time/distance, petrol vs distance, water flow vs time • Read off graphs with information on them have a real life meaning • Cost vs days, if y intercept is at 7, this would be £7 for 0 days • Calculate the gradient from a graph • Apply gradient to speed • Calculate from speed distance time graphs • Recognise the general equation of a straight line • Generating coordinates given the equation of a straight line • Plot coordinate from table of values • Velocity time graphs	• A gradient of -3 is steeper than a gradient of 2 regardless of the negative • X and y coordinates/axis are reversed • mx is the gradient not m • Gradient = change in x/ change in y • Thinking the reciprocal of 3 is 3	• On a graph which is the x axis? • On a graph which is the y axis? • What is the general equation of a line? • What does gradient represent in terms of a distance time graph? • What does a flat line mean on a distance time graph? • What is speed?	
HT4 Probability	• Basic probabilities Flipping a coin will have a 50% chance of landing on heads	• Event means something that can happen • Outcome means all the possibilities occurring from an outcome • Certain means the probability is 1 • Impossible means the probability is 0 • The probability scale is between 0 and 1 • Probability can only go up to 100% • Relative frequency is how often something happens divided by all outcomes • Theoretical probability and experimental probability are different things	• Estimate where the probability of an event would lie on the probability scale • Convert between fraction, decimal, or percentages • Calculate the relative frequency of an event happening ○ Actual/total = RF • Check that all frequencies total 1	• The number you are working the probability of is not the numerator out of the fraction (e.g. rolling a 3 on the dice does not have a probability of 3/6)	• 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?	Formal assessment at the end of HT4 50 marks – mixture of AO1, AO2 and AO3
HT4 Rounding	• Y7 HT1	• 5 or above round up • 4 or less stays the same • We round after the first non-zero digit • Rounding to the nearest significant figures is used in real life • Rounding to decimal points and significant figures are different things	• Round to the nearest 10,100,1000 • Round to the nearest integer • Round to the nearest decimal place • round to the nearest significant figure • Truncate a number	•	•	

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		Learn that…	Learn how to…			
		• Truncating and rounding are different				
HT4 Upper and Lower bounds	• Rounding to 10, 100, 1000 • Rounding to decimal places • Rounding to integers	• This symbol ≈ means approximate • There is a difference between bounds of discrete data and continuous quantities • Error intervals and bounds are rounding backwards	• Write inequalities in words • Show inequalities on a number line • Use inequality notation to write down an error interval for a number or measurement rounded or truncated to a given degree of accuracy • Apply and interpret limits of accuracy • Calculate upper and lower bounds of a calculation using numbers rounded to a known degree of accuracy • Apply upper and lower bounds in problems (e.g. area of rectangle) • Read if a question has whole numbers for the answer or whether it can be a decimal • Estimate or check without a calculator, the result of a calculation by using a suitable approximation. • Choose what a sensible degree of accuracy is to round to when estimating • Estimate or check, without a calculator the result of more complex questions (including roots) • Decipher a question to see if it is asking for an actual answer or an approximation • Use reasoning to explain why the answer is not an exact answer. • Make logical estimations of real life scenarios (e.g. proportionality between objects)	• We round a number down • We just stop at the digit we are after (truncating) • Estimating means exact number • When rounding to an integer this means 1 significant figure • That the upper bound will include the number	• What is the rule for rounding numbers? • Round (insert integer) to the nearest 10 • Round (insert integer) to the nearest 100 • Round (insert integer) to the nearest 1000 • Round (insert decimal) to the nearest integer • Round (insert decimal) to 1 decimal place • Round (insert decimal) to 2 decimal places • Round (insert decimal) to 3 significant figures • What does it mean by significant figures? • What does ≈ mean? • What is an upper and lower bound? • What is the difference between truncating and rounding? • What is estimation? •	

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		Learn that…	Learn how to…			
HT5 Percentages	• Percentages in diagrams • Percentages as fractions or decimals • Convert between fraction, decimal, and percentages • Calculate percentages of amounts	• Percentages means 'number of parts per 100' • Percentages can be expressed as fractions or decimals • Interest means increase • Depreciate means decrease • Percentage of amount starts at 100 • Multipliers are the decimal equivalent • Simple interest and compound interest are different things • Compound interest uses the previous amount • We pay an interest rate on mortgages • We pay a deposit on mortgages •	• Convert between percentages to decimals and fractions • Calculate percentages of amounts non calculator • Calculate the percentage increase or decrease of an amount non calculator • Change a percentage to a multiplier • Calculate percentage of amounts with a multiplier • Calculate percentage increase or decrease of an amount with multipliers (increase 100 +, decrease 100-) • Calculate simple interest (amount x multiplier x year) • Calculate compound interest (amount x multiplier^{time}) • Rearrange the formula to work backwards to find either the original amount, the percentage increase or decrease, the time	• Percentages cannot be greater than 100 • To find a percentage you divide by that number, e.g. to find 20%, divide by 20 • If you decrease an amount by a percentage you find that percentage of the number and that is the new amount	• What is a percentage? • What forms can percentages be expressed as? • What is interest? • What does it mean when something depreciates? • What is a multiplier? • What is simple interest? • How do you calculate simple interest? • What is compound interest? • How do you calculate compound interest? • What is the inverse of (insert operation)?	Formal assessment at the end of HT5 50 marks – mixture of AO1, AO2 and AO3
HT5 3D Shapes	• Perimeter is 1D • Area is 2D, length x width • Area of rectangles, parallelograms, triangles, trapeziums	• 3D means 3-dimensions, length, width, and depth. • A 3D shape can be a 2D shape with depth • 3D shapes have the units cubed (because of the 3 dimensions) • Faces are the flat side • Vertices are the lines connecting • Edges are the corners • We use the plan views for houses etc • Prisms are 2D shapes with depth • Pyramids are 1/3 of a 3D shape • Surface area is 2D	• Label vertices, edges, and faces • Calculate how many vertices, edges, and faces a shape has • Draw a plan view, side view, and front elevation of a 3D shape • Calculate area of squares, rectangles, parallelogram, and triangles • Calculate the volume of a cube, volume of a cuboid, volume of prisms • Calculate volume of pyramids • Draw a net of a 3D shape • Calculate the surface area of a 3D shape	• Perimeter can be calculated for a 3D shape • Converting units when using area and volume e.g. converting $10m^2$ to cm^2 you would multiply by 100	• What does 3D mean? • What are faces of a shape? • What are vertices of a shape? • What are edges of a shape? • How do you calculate the volume of a cube? • How do you calculate the volume of a prism? • What is a net? • What is surface area?	
HT6 Angles	• Types of angles • Drawing and measuring angles • Angles around a point, angles in a line • Angles in a triangle and quadrilaterals • Use the formula (n-2) x 180 to find the total sum	• An angle is a way of describing the space between two lines that begin at the same point • An angle is measured in degrees • Angles can be measured between 0° to 360° • Acute angles are between 0° and 90° • Obtuse angles are between 90° and 180° • Reflex angles are between 180° and 360°	• Apply angle facts to find missing angles • Justify results from for missing angles • Derive and use the sum of the interior angles of a triangle is 180 • Derive and use the sum of the exterior angles of a polygon is 360 • Find the sum of the interior angles of a polygon (n-2) x 180 • Find the interior angle of regular polygon	• Angles around a point are a circle • Measuring from the wrong side of the protractor • Mixing up angle rules • Only subtracting given angle in a rectilinear figure, not all given angles	• What is an angle? • Name the four types of angle • How many degrees are there in a right angle? • What is the range in the size of an acute angle? • What is the range in the size of an obtuse angle? • What is the range in the size of a reflex angle? • Why is it more difficult to draw reflex angles using a protractor?	Formal assessment at the end of HT6 50 marks – mixture of AO1, AO2 and AO3

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		Learn that…	Learn how to…			
	• Use combined angle facts (eg triangle with extended straight line) • Forming and solving equations	• Right angles are 90° • Straight lines are 180 ° • A full turn/around a point are 360° • We label a line as AB and an angle as <ABC • a is the side opposite to angle A • vertically opposite angles are equal • alternate angles are equal • Corresponding angles are equal • Co-interior angles sum to 180	• Choose which parallel line fact to use when working with parallel lines • Think systematically about how to find missing angles when given multiple angle facts • Form and solve equations using angle facts	• Obtuse is the largest angle	• How many degrees are in a full turn? • What do angles around a point sum to? • What do angles on a straight-line sum to? • How does this relate to the angles around a point? • Why do exterior angles in polygons sum to 360°? • What formula is used to calculate the sum of the interior angles in a polygon? • What do co-interior angles sum to? • Alternate angles are…? • Vertically opposite angles are…? • Corresponding angles are…?	
HT6 Statistics	• Types of data • Collecting data • Tally charts and frequency tables • Drawing and interpreting bar charts and pictograms	• Averages are a central value/tendency • Mean, median, and mode are averages • Measure of spread is the dispersion of data • Range is measure of spread • In grouped frequency tables we have an estimated mean because we cannot know the exact value due to frequency • Discrete data can only take certain values • Continuous data can take any value • Bivariate data means two variables • Line graphs are graphs that show information that is connected in some way (such as a change over time) • Interpolate means within the data • Extrapolate means outside the data • Correlation and causation are different	• Calculate mean, median, and mode • Calculate the range • Problem solve with a range of averages and spread • Calculate a missing value given an average or range • Calculate the mode group from a grouped frequency table • Calculate the median group from a grouped frequency table • Calculate the estimated mean from a grouped frequency table • Decide whether data is discrete or continuous • Draw a line graph given different information by joining each point • Draw a time series graph • Plot a scatter graph without joining any of the points • Draw a line of best fit • Interpolate and extrapolate the data • Describe correlation of a graph and whether it is strong or week	• Confusing data types • Quantitative and qualitative data are the same • Primary and secondary data are the same • Not counting the cross in a tally chart as the fifth time • Confusing bar charts and histograms and when each is best used • Using an unrelated key for the displayed data	• Name a type of average? • How do you calculate the mean? • How do you calculate the median? • How do you calculate the mode? • What is the range of a data set? • Name a type of data? • What is discrete data? • What is continuous data? • What is bivariate data? • What does interpolate mean? • What does extrapolate mean? • What is a correlation?	