AQA Specification Alignment GCSE 2015 / 2016 Exams

Higher

This alignment document lists all Mathletics curriculum activities associated with the 'GCSE Higher 2015 & 2016 Exam' course, and demonstrates how these fit with the AQA specification for the higher tier GCSE being taken in 2015 and 2016.

As new activities are developed, this document will be updated. You can download the latest version from the training and support portal:

www.3plearning.com/uk/mathleticsalignment/england

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Expectation	Topic	Activity
Number and Algebra		
N1 Working with numbers and the number system		
N1.1 Understand integers and place value to deal with arbrarily large positive numbers.	Number - Multiplication & Division	Multiplying by 10, 100, 1000
		Dividing by 10, 100, 1000
N1.2 Add, subtract, multiply and divide any number.	Number - Addition & Subtraction	Add Integers
		Subtract Integers
		More with Integers
		Problems: Add and Subtract 2
		Column Addition 1
		Adding Colossal Columns
		Subtracting Colossal Columns
		Bar Model Problems 1
		Bar Model Problems 2
	Number - Multiplication & Division	Multiplying by 10, 100, 1000
		Dividing by 10, 100, 1000
		Mental Methods Multiplication
		Problems: Multiply and Divide 1
		Long Multiplication
		Short Multiplication
		Mental Methods Division
		Long Division
		Short Division
N1.3 Understand and use number operations and the relationships between them, including inverse operations and hierarchy of operations.	Number - Multiplication & Division	Order of Operations 1
		Order of Operations 2
N1.4 Approximate to a given power of 10, up to three decimal places and one significant figure.	Number - Estimation and Accuracy	Rounding Significant Figures
		Rounding Decimals
N1.4h Approximate to specified or appropriate degrees of accuracy including a given number of decimal places and significant figures.	Number - Estimation and Accuracy	Rounding Significant Figures
		Rounding Decimals

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Expectation	Topic	Activity
N1.5 Order rational numbers.	Number - Fractions	Ordering Fractions
	Number - Decimals	Decimal Order
N1.6 The concepts and vocabulary of factor (divisor), multiple, common factor, highest common factor, least common multiple, prime number and prime factor decomposition.	Number - Properties	Multiples
		Lowest Common Multiple
		Factors
		Highest Common Factor
		Prime or Composite?
		Product of Prime Factors
N1.7 The terms square, positive and negative square root, cube and cube root.	Number - Indices	Square and Cube Roots
N1.8 Index notation for squares, cubes and powers of 10.	Number - Indices	Square and Cube Roots
N1.9 Index laws for multiplication and division of integer powers.	Number - Indices	Multiplication with Indices
		Index Laws and Algebra
N1.9h Fractional and negative powers	Number - Indices	Negative Indices
		Fractional Indices
N1.10h Interpret, order and calculate numbers written in standard index form.	Number - Estimation and Accuracy	Scientific Notation
N1.11h Surds and π in exact calculations.		
N1.12h Rules of arithmetic applied to calculations and manipulations with surds.	Number - Surds	Multiplying Surds
		Dividing Surds
		Adding and Subtracting Surds
		Expanding Surd Expressions
		Expanding Binomial Surds
		Rationalising the Denominator
N1.13h Calculate and use upper and lower bounds.	Number - Estimation and Accuracy	Error in Measurement
N1.14 Use calculators effectively and efficiently, including statistical functions.		
N1.14h Including trigonometrical functions.		
N2 Fractions, Decimals and Percentages		
N2.1 Understand equivalent fractions, simplifying a fraction by cancelling all common factors.	Number - Fractions	Simplifying Fractions
		Equivalent Fractions

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Expectation	Topic	Activity
N2.2 Add and subtract fractions.	Number - Fractions	Common Denominator
		No Common Denominator
		Add Like Mixed Numbers
		Subtract Like Mixed Numbers
		Add Unlike Mixed Numbers
		Subtract Unlike Mixed Numbers
N2.3 Use decimal notation and recognise that each terminating decimal is a fraction.	Number - Fractions	Fraction to Terminating Decimal
	Number - Decimals	Decimals from Words to Digits 1
		Decimal Place Value
N2.4 Recognise that recurring decimals are exact fractions, and that some exact fractions are recurring decimals.	Number - Decimals	Recurring Decimals
N2.5 Understand that 'percentage' means 'number of parts per 100' and use this to compare proportions.	Number - Percentages	Modelling Percentages
		Percentage Composition
N2.6 Interpret fractions, decimals, percentages as operators.	Number - Percentages	Percentage of a Quantity
		Calculating Percentages
	Number - Fractions	Fraction of an Amount
N2.7 Calculate with fractions, decimals and percentages.	Number - Fractions	Fraction Word Problems
	Number - Percentages	Percentage Word Problems
		Solve Percent Equations
		Profit and Loss
		Simple Interest
		Percentage Increase and Decrease
N2.7h Including reverse percentage calculations.	Number - Percentages	Depreciation
N3 Ratio and Proportion		
N3.1 Use ratio notation, including reduction to its simplest form and its various links to fraction notation.	Number - Ratio & Proportion	Ratio
		Equivalent Ratios
		Ratio and Proportion
N3.2 Divide a quantity in a given ratio.	Number - Ratio & Proportion	Dividing a Quantity in a Ratio
		Ratio and Proportion
		Ratio Word Problems

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Expectation	Topic	Activity
N3.3h Repeated proportional change. Direct and indirect proportion and exponential growth.	Number - Ratio & Proportion	Rates
		Rates Calculations
		Rates Word Problems
		Direct Variation
		Indirect Variation
	Number - Percentages	Compound Interest
		Compound Interest by Formula
		Comparing Loans
		Comparing Home Loans
		Depreciation
	Algebra - Non-linear Graphs	Graphing Exponentials
N4 The Language of Algebra		
N4.1 Distinguish the different roles played by letter symbols in algebra, using the correct notation.		
N4.2 Distinguish in meaning between the words 'equation' 'formula', and 'expression'.	Algebra - Expressions	Writing Algebraic Expressions
	Algebra - Formulae & Substitution	Real Formulae
	Algebra - Linear Equations	Writing Equations
N4.2h And 'identity'.		
N5 Expressions and Equations		
N5.1 Manipulate algebraic expressions by collecting like terms, by multiplying a single term over a bracket, and by taking out common factors.	Algebra - Expressions	Like Terms: Add and Subtract
		Simplifying Expressions
		Algebraic Multiplication
	Algebra - Expanding & Factorising	Expanding with Negatives
		Expand then Simplify
		Factorising
		Factorising Expressions
		Factorising with Negatives
		Factorising with Indices
N5.1h Multiply two linear expressions.	Algebra - Expanding & Factorising	Expanding Binomial Products
N5.2h Factorise quadratic expressions including the difference of two squares.	Algebra - Expanding & Factorising	Special Binomial Products
	Algebra - Quadratic Equations	Factorising Quadratics 1
		Factorising Quadratics 2
N5.3h Simplify rational expressions.	Algebra - Expressions	Algebraic Fractions 1
		Algebraic Fractions 2
	Algebra - Expanding & Factorising	Factorising and Fractions 1
		Factorising and Fractions 2
N5.4 Set up and solve simple linear equations.	Algebra - Linear Equations	Equations to Solve Problems
		Writing Equations
		Write an Equation: Word Problems

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N5.4h Including simultaneous equations in two unknowns.	Algebra - Simultaneous Equations	Simultaneous Equations 1
		Simultaneous Equations 2
N5.5h Solve quadratic equations.	Algebra - Quadratic Equations	Quadratic Equations 1
		Quadratic Equations 2
		Quadratic Formula
		Completing the Square
		Checking Quadratic Solutions
		The Discriminant
N5.6 Derive a formula, substitute numbers into a formula and change the subject of a formula.	Algebra - Formulae & Substitution	Changing the Subject
		Substitution in Formulae
		More Substitution in Formulae
		Real Formulae
N5.7 Solve linear inequalities in one variable and represent the solution set on a number line.	Algebra - Inequalities	Solving Inequalities 1
		Solving Inequalities 2
		Solving Inequalities 3
		Graphing Inequalities 1
		Graphing Inequalities 2
		Graphing Inequalities 3
N5.7h Solve linear inequalities in two variables, and represent the solution set on a suitable diagram.	Algebra - Inequalities	Linear Regions
N5.8 Use systematic trial and improvement to find approximate solutions of equations where there is no simple analytical method of solving them.	Algebra - Linear Equations	Checking Solutions
N5.9 Use algebra to support and construct arguments.		
N5.9h Use algebra to construct simple proofs.		
N6 Sequences, Functions and Graphs		
N6.1 Generate terms of a sequence using term-to-term and position-to-term definitions of the sequence.	Algebra - Sequences	Increasing Patterns
		Decreasing Patterns
		Describing Patterns
N6.2 Use linear expressions to describe the nth term of an arithmetic sequence.	Algebra - Sequences	Find the Function Rule
		Linear Expressions for the Nth Term
		Terms: Arithmetic Progressions
N6.3 Use the conventions for coordinates in the plane and plot points in all four quadrants, including using geometric information.	Algebra - Linear Graphs	Graphing from a Table of Values
		Reading Values from a Line

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Expectation	Topic	Activity
N6.4 Recognise and plot equations that correspond to straight-line graphs in the coordinate plane, including finding their gradients.	Algebra - Linear Graphs	Determining a Rule for a Line
		Which Straight Line?
		Equation of a Line 1
		Gradient
N6.5h Understand that the form y = mx + c represents a straight line and that m is the gradient of the line and c is the value of the y- intercept.	Algebra - Linear Graphs	Determining a Rule for a Line
		Which Straight Line?
		Equation of a Line 1
		General Form of a Line
		Gradient
		Intercepts
		Modelling Linear Relationships
N6.6h Understand the gradients of parallel and perpendicular lines.	Algebra - Linear Graphs	Are they Parallel?
		Are they Perpendicular?
		Perpendicular and Parallel Lines
N6.7h Find the intersection points of the graphs of a linear and quadratic function, knowing that these are the approximate solutions of the corresponding simultaneous equations representing the linear and quadratic functions.	Algebra - Simultaneous Equations	Simultaneous Equations 3
	Algebra - Non-linear Graphs	Intersection: Line & Parabola
N6.8h Draw, sketch, recognise graphs of simple cubic functions, the reciprocal function $y = 1/x$ with $x \neq 0$, the function $y = k^x$ for integer values of x and simple positive values of k, the circular functions y = sin x and y = cos x.	Algebra - Non-linear Graphs	Graphing Cubics
		Graphing Hyperbolas
		Graphing Exponentials
		Sine and Cosine Curves
		Identifying Graphs
N6.9h Transformation of functions.	Algebra - Non-linear Graphs	Symmetries of Graphs 1
N6.10h Construct the graphs of simple loci.		
N6.11h Construct quadratic and other functions from real life problems and plot their corresponding graphs.		
N6.11 Construct linear functions from real-life problems and plot their corresponding graphs.	Algebra - Linear Graphs	Modelling Linear Relationships
N6.12 Discuss, plot and interpret graphs (which may be non-linear) modelling real situations, including statistics contexts.		
N6.13 Generate points and plot graphs of simple quadratic functions, and use these to find approximate solutions.	Algebra - Non-linear Graphs	Graphing Parabolas

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Expectation	Topic	Activity
Geometry and Measures		
G1 Properties of angles and shapes		
G1.1 Recall and use properties of angles at a point, angles at a point on a straight line (including right angles), perpendicular lines, and opposite angles at a vertex.	Geometry - Shape & Angle Properties	Angles in a Revolution Parallel Lines Angles and Parallel Lines
G1.2 Understand and use the angle properties of parallel and intersecting lines, triangles and quadrilaterals.	Geometry - Shape & Angle Properties	Angle Sum of a Triangle Exterior Angles of a Triangle Angle Sum of a Quadrilateral
G1.3 Calculate and use the sums of the interior and exterior angles of polygons.	Geometry - Shape & Angle Properties	Interior and Exterior Angles
G1.4 Recall the properties and definitions of special types of quadrilateral, including square, rectangle, parallelogram, trapezium, kite and rhombus.	Geometry - Shape & Angle Properties	Plane Figure Terms Plane Figure Theorems
G1.5 Distinguish between centre, radius, chord, diameter, circumference, tangent, arc, sector and segment.	Geometry - Shape & Angle Properties	Circle Terms
G1.5h Know and use circle theorems.	Geometry - Shape & Angle Properties	Circle Theorem
G1.6 Recognise reflection and rotation symmetry of 2D shapes.	Geometry - Transformations	Rotational Symmetry Symmetry or Not?
G1.7 Describe and transform 2D shapes using single or combined rotations, reflections, translations, or enlargements by a positive scale factor and distinguish properties that are preserved under particular transformations.	Geometry - Transformations	Rotations: Coordinate Plane Transformations: Coordinate Plane Scale Factor
G1.8 Understand congruence and similarity.	Geometry - Transformations	Similar Figures Using Similar Triangles Scale Factor Congruent Triangles Congruent Figures (Grid) Congruent Figures: Find Values
G1.8h Use similarity. Understand and use conditions for congruent triangles.	Geometry - Transformations	Congruent Triangles Using Similar Triangles Similarity Proofs
G2 Geometrical reasoning and calculation		
G2.1 Use Pythagoras' theorem.	Geometry - Trigonometry	Pythagoras' Theorem Pythagorean Triads
G2.1h Extend to use in 3D.	Geometry - Volume & Surface Area	Volume: Triangular Prisms

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Expectation	Topic	Activity
G2.2h Use the trigonometrical ratios and the sine and cosine rules to solve 2D and 3D problems.	Geometry - Trigonometry	Hypotenuse, Adjacent, Opposite
		Sin A
		Cos A
		Tan A
		Find Unknown Sides
		Find Unknown Angles
		Elevation and Depression
		Bearings
		Sine Rule 1
		Cosine Rule 1
		Sine Rule 2
		Cosine Rule 2
		3D Trigonometry
G2.3 Justify simple geometrical properties.	Geometry - Shape & Angle Properties	Plane Figure Theorems
G2.3h Simple geometrical proofs.	Geometry - Shape & Angle Properties	Circle Theorem
G2.4 Use 2D representations of 3D shapes.		
G3 Measures and Construction		
G3.1 Use and interpret maps and scale drawings.	Measure - Scales & Conversions	Scale
G3.2 Understand the effect of enlargement for perimeter, area and volume of shapes and solids.	Measure - Scales & Conversions	Perimeter, Area, Dimension Change
G3.2h Use the effect of enlargement for perimeter, area and volume in calculations.	Measure - Scales & Conversions	Similar Areas and Volumes
G3.3 Interpret scales on a range of measuring instruments and recognise the inaccuracy of measurements.	Number - Estimation and Accuracy	Error in Measurement
G3.4 Convert measurements from one unit to another.	Measure - Scales & Conversions	Grams and Milligrams
		Grams and Kilograms
		Converting Units of Mass
		Centimetres and Metres
		Converting Units of Length
		Converting Units of Area
		Converting Volume
G3.5 Make sensible estimates of a range of measures.		
G3.6 Understand and use bearings.	Geometry - Trigonometry	Bearings

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Expectation	Topic	Activity
G3.7 Understand and use compound measures.	Number - Ratio & Proportion	Average Speed
		Time Taken
		Distance Travelled
G3.8 Measure and draw lines and angles.	Geometry - Shape & Angle Properties	Measuring Angles
G3.9 Draw triangles and other 2D shapes using a ruler and protractor.		
G3.10 Use straight edge and a pair of compasses to do constructions.		
G3.11 Construct loci.		
G4 Mensuration		
G4.1 Calculate perimeters and areas of shapes made from triangles and rectangles.	Geometry - Perimeter & Area	Perimeter: Composite Shapes
		Area: Composite Shapes
G4.1h Extend to other compound shapes.		
G4.2h Calculate the area of a triangle using ½ab sin C.	Geometry - Trigonometry	Area Rule 1
		Area Rule 2
		Area Problems
G4.3 Calculate circumferences and areas of circles.	Geometry - Perimeter & Area	Circumference: Circles
		Area: Circles
G4.3h Calculate lengths of arcs and areas of sectors.	Geometry - Perimeter & Area	Perimeter and Circles
		Area: Sectors
G4.4 Calculate volumes of right prisms and of shapes made from cubes and cuboids.	Geometry - Volume & Surface Area	Volume: Prisms
		Volume: Rectangular Prisms 1
		Volume: Triangular Prisms
		Volume: Cylinders
G4.5h Solve mensuration problems involving more complex shapes and solids.		
G5 Vectors		
G5.1 Understand and use vector notation for translations.		
G5.1h Understand and use vector notation; calculate, and represent graphically the sum of two vectors, the difference of two vectors and a scalar multiple of a vector; calculate the resultant of two vectors; understand and use the commutative and associative properties of vector addition; solve simple geometrical problems in 2D using vector methods.	Geometry - Transformations	Vector Magnitude (Column)
		Vector Operations 1 (Column)
		Scalar Product (Vector Form)

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Expectation	Topic	Activity
Statistics and Probability		
S1 The Handling Data Cycle		
S1 Understand and use the statistical problem solving process which involves - specifying the problem and planning - collecting data processing and presenting the data - interpreting and discussing the results.		
S2 Data Collection		
S2.1 Types of data: qualitative, discrete, continuous. Use of grouped and ungrouped data.	Statistics - Interpretation	Data Types
S2.2 Identify possible sources of bias.		
S2.3 Design an experiment or survey.		
S2.4 Design data-collection sheets distinguishing between different types of data.		
S2.5 Extract data from printed tables and lists.	Statistics - Interpretation	Mean
		Median
		Mode
		Mean from Frequency Table
		Median from Frequency
		Mode from Frequency Table
	Statistics - Presentation	Tally Charts
S3 Data presentation and analysis		
S3.1 Design and use two-way tables for grouped and ungrouped data.	Probability	Probability Tables
		Two-way Table Probability
		Dice and Coins
S3.2 Produce charts and diagrams for various data types. Scatter graphs, stem-and-leaf, tally charts, pictograms, bar charts, dual bar charts, pie charts, line graphs, frequency polygons, histograms with equal class intervals.	Statistics - Presentation	Scatter Plots
		Stem and Leaf Introduction
		Tally Charts
		Pie Charts
		Pie Chart Calculations
		Histograms
		Frequency Histograms
S3.2h Histograms with unequal class intervals, box plots, cumulative frequency diagrams, relative frequency diagrams.	Statistics - Presentation	Box-and-Whisker Plots 1
		Box-and-Whisker Plots 2
		Cumulative Frequency Table
		Cumulative Frequency Histogram
		Histogram or Polygon?

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Expectation	Topic	Activity
S3.3 Calculate median, mean, range, mode and modal class.	Statistics - Interpretation	Mean
		Median
		Mode
		Data Extremes and Range
		Mean from Frequency Table
		Median from Frequency
		Mode from Frequency Table
		Median from Stem and Leaf Plot
		Mode from Stem and Leaf Plot
		Data Extremes and Range
		Grouping Data and Modal Class
S3.3h Quartiles and inter-quartile range.	Statistics - Interpretation	Calculating Interquartile Range
S4 Data Interpretation		
S4.1 Interpret a wide range of graphs and diagrams and draw conclusions.		
S4.2 Look at data to find patterns and exceptions.		
S4.3 Recognise correlation and draw and/or use lines of best fit by eye, understanding what these represent.	Statistics - Interpretation	Correlation
	Statistics - Presentation	Scatter Plots
S4.4 Compare distributions and make inferences.		
S5 Probability		
S5.1 Understand and use the vocabulary of probability and the probability scale.	Probability	Probability Scale
S5.2 Understand and use estimates or measures of probability from theoretical models (including equally likely outcomes), or from relative frequency.	Probability	Relative Frequency
		Simple Probability
		Find the Probability
		Probability Tables
S5.3 List all outcomes for single events, and for two successive events, in a systematic way and derive related probabilities.	Probability	How Many Combinations?
		Counting Techniques 1
S5.4 Identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1.	Probability	Complementary Events

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Expectation	Topic	Activity
S5.5h Know when to add or multiply two probabilities: if A and B are mutually exclusive, then the probability of A or B occurring is P(A) + P(B), whereas if A and B are independent events, the probability of A and B occurring is P(A) × P(B).		
S5.6h Use tree diagrams to represent outcomes of compound events, recognising when events are independent.	Probability	Tree Diagrams
S5.7 Compare experimental data and theoretical probabilities.		
S5.8 Understand that if an experiment is repeated, this may – and usually will – result in different outcomes.		
S5.9 Understand that increasing sample size generally leads to better estimates of probability and population characteristics.		