Manchester Academy
The best in everyone™
Part of United Learning

KS4 Higher Mathematics Big Picture

Year 10 Higher Mathematics

Autumn 1 8 weeks	Autumn 2 7 weeks	Spring 1 6 weeks
Content H1 Rearranging formulae H2 Linear Graphs H3 Linear Simultaneous equations H4 Volume 2 H15 Similar shapes	**Content** H5 Compound Measures H6 Quadratics - graphical H7 Quadratics - algebraic H8 Further graphs	**Content** H9 Probability 2 H10 Statistics 2 H11 Cumulative frequency and Box Plots
Assessment Objectives This is the knowledge, application and skills assessed by the Big Test: • Rearrange formulae to change the subject in a geometrical context • Change the subject of a formula (including kinematic formulae) involving the use of square roots and squares • **Calculate the radius or diameter when Sector area or Arc length is given** • **Rearrangement complex formulae involving fractions, roots and powers and where the subject appears on both sides of the formula** • Plot and read coordinates in all four quadrants • Draw, label and scale axes • Plot straight line graphs • Recognise, sketch and interpret straight line graphs • Find approximate solutions using a graph • Find the coordinates of the midpoint of a line segment • Use real life graphs: ready reckoner graphs, conversion graphs, fuel bills graphs, fixed charge and cost per unit	**Assessment Objectives** This is the knowledge, application and skills assessed by the Big Test: • Interpret distance–time graphs, and calculate: the speed of individual sections, total distance and total time • Change between standard units e.g. time, mass, length, money, volume, area • Change between compound units e.g. speed, rates of pay, prices • Work out time intervals for graph scales • **Change between standard units and compound units e.g. density and pressure** • Recognise, sketch and interpret graphs of quadratic functions • **Identify roots, intercepts and turning points of a quadratic function** • **Find approximate solutions using a graph** • **Identify the line of symmetry of a quadratic graph** • **Find roots of a quadratic algebraically by factorisation - with rearrangement needed** • **Factorising quadratic expressions of the form ax2 + bx + c**	**Assessment Objectives** This is the knowledge, application and skills assessed by the Big Test: • Apply systematic listing strategies • Describe probability using the probability scale, tables and frequency trees • Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments • Calculate expected outcomes • Mutually exclusive events sum to one • Experimental and theoretical probability • Use Venn diagrams and appropriate notation • Probability space/sample space diagrams • Find a missing probability from a list or table including algebraic terms • **Unbiased samples and effects of increasing sample size** • **Probability tree diagrams for independent and dependent events** • **Calculate the probability of independent and dependent combined events**

Manchester Academy
The best in everyone™
Part of United Learning

KS4 Higher Mathematics Big Picture

- Identify and interpret gradients and intercepts of straight-line graphs
- Identify and interpret gradient from an equation y = mx + c
- **Plot and draw graphs of straight lines in the form ax + by = c**
- **Find the equation of a straight line from a graph**
- **Use y = mx + c to identify parallel lines**
- **Find the equation of a line through two given points or -through one point with a given gradient**
- **Know that the gradient of a straight line is interpreted as a rate of change**
- **Identify and interpret the gradient from an equation ax + by = c**
- **Use y = mx + c to identify perpendicular lines**
- **Generate equations of lines perpendicular to the given line**
- **Solve two simultaneous equations in two variables (linear/linear) algebraically**
- **Find approximate solutions using a graph**
- **Derive two simultaneous equations, solve the equation and interpret the solution**
- Know and apply formulae to calculate volume of cuboids and other right prisms (including cylinders)
- **Find the volume of spheres, pyramids, cones and composite solids**
- **Use formal geometric proof for the similarity of two given triangles**
- **Identify the scale factor of an enlargement of a similar shape as the ratio of the lengths of two corresponding sides, using integer or fraction scale factors**
- **Find missing lengths in similar 3D solids**
- **Relationships between areas and volumes in similar figures**

- **Deduce turning points by completing the square**
- **Simplify algebraic fractions**
- **Multiply, divide, add and subtract algebraic fractions**
- **Expand more than two brackets**
- **Recognise and sketch cubic graphs and the reciprocal graph**
- **Plot and interpret reciprocal graphs**
- **Recognise and interpret graphs that illustrate direct and inverse proportion**
- **Sketch and interpret graphs of exponential functions y = kx for positive values of k and integer values of x**
- **Draw circles, centre the origin, equation x2 + y2 = r2**
- **Sketch graphs of simple cubic functions, given as three linear expressions**

- **Sets and combinations of sets using Venn diagrams**
- **Calculate and interpret conditional probabilities: Use a two-way table to calculate conditional probability; Use a tree diagram to calculate conditional probability; Use a Venn diagram to calculate conditional probability**
- **Tree diagrams with algebraic expressions**
- Draw and Interpret frequency tables, bar charts, composite bar charts, pie charts, pictograms, vertical line charts, stem and leaf (including back-to-back stem and leaf)
- Mean, mode, median, modal class
- Range and outliers
- Compare the mean, median, mode and range (as appropriate) of two distributions using bar charts, dual bar charts, pictograms and back-to-back stem and leaf
- Recognise the advantages and disadvantages between measures of average
- Scatter graphs - recognise correlation
- Recognise types of data: primary secondary, quantitative and qualitative
- Understand sample and population
- Listing combinations
- **Sampling - infer properties of populations or distributions from a sample, while knowing the limitations of sampling**
- **Interpret and construct tables and line graphs for time series data**
- **Scatter graphs - draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of doing so**
- **Cumulative frequency graphs**
- **Draw, interpret and compare box plots**

KS4 Higher Mathematics Big Picture

• **Understand the effect of enlargement on angles, perimeter, area and volume of shapes and solids** • **Write the lengths, areas and volumes of two shapes as ratios in their simplest form** • **Find missing areas and volumes in similar 3D solids** • **Know the relationships between linear, area and volume scale factors of mathematically similar shapes and solids** • **Use the relationship between enlargement and areas and volumes of simple shapes and solids** • **Solve problems involving frustums of cones where you have to find missing lengths first using similar triangles** **Unit test (marked by teacher)** Unit test H2 **Unit tests (Self-assessment)** Unit tests H1, H3, H4 **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	**Unit test (marked by teacher)** Unit test H5 **Unit tests (Self-assessment)** Unit tests H6, H8 **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	• **Range, quartiles and inter-quartile range** **Big test PPE (marked by teacher)** PPE Big Test 1 **Unit tests (Self-assessment)** Unit tests H9, H10, H11* **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)
ATL Data capture	**PPE and ATL data**	**PPE data** **ATL Data capture**
Spring 2 **6 weeks**	**Summer 1** **5 weeks**	**Summer 2** **7 weeks**
Content H12 Growth & Decay H13 Ratio 2 H14 Ratio 3 H15 Similar shapes – moved to Autumn 1	**Content** H16 Algebraic proportion H17 Surds H18 Right angled Trigonometry	**Content** H19 Bounds H20 Bearings and scale drawing H21 Transformations 2
Assessment Objectives This is the knowledge, application and skills assessed by the Big Test:	**Assessment Objectives** This is the knowledge, application and skills assessed by the Big Test:	**Assessment Objectives** This is the knowledge, application and skills assessed by the Big Test:

Manchester Academy
The best in everyone™
Part of United Learning

KS4 Higher Mathematics Big Picture

- Simple interest
- **Set up, solve and interpret the answers in growth and decay problems, including compound interest**
- **Identify the interest rate in compound interest questions**
- **Set up, solve and interpret the answers in growth and decay problems**
- Simplify ratios
- Divide a quantity into a given ratio
- Write ratios as fractions
- Compare lengths, areas and volumes using ratio notation and scale factors
- **Solve ratio problems involving the change of a ratio within a question**
- **Relate ratios to fractions and to linear functions**
- **Solve complex multi-step problems involving fractions and probability**
- **Solve complex multi-step problems involving algebraic terms**

- **Recognise and interpret graphs that illustrate direct and inverse proportion**
- **Interpret equations and graphs that describe direct and inverse proportion**
- **Capture and recapture**
- **Identify direct proportion from a table of values, by comparing ratios of values, for x squared and x cubed relationships**
- **Write statements of proportionality for quantities proportional to the square, cube or other power of another quantity**
- **Set up and use equations to solve word and other problems involving direct proportion or inverse proportion**
- **Use y = kx to solve direct proportion problems, including questions where students find k, and then use k to find another value**
- **Solve problems involving inverse proportionality**
- **Simplify and manipulate algebraic expressions involving surds**
- Simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$)
- Understand surd notation, e.g. calculator gives answer to $\sqrt{8}$ as $2\sqrt{2}$
- Expand and simplify single and double brackets involving surd manipulation
- Rationalise denominators
- **Trigonometry in right angled triangles**
- **Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0°$, 30°, 45°, 60° and 90°. Know the exact value of $\tan\theta$ for $\theta = 0°$, 30°, 45° and 60°**
- **Use formal geometric proof for the similarity of two given triangles**

- Calculate the upper and lowers bounds of numbers given to varying degrees of accuracy
- Calculate the upper and lower bounds of an expression involving the four operations
- Find the upper and lower bounds in real-life situations using measurements given to appropriate degrees of accuracy
- Find the upper and lower bounds of calculations involving perimeters, areas and volumes of 2D and 3D shapes
- Calculate the upper and lower bounds of calculations, particularly when working with measurements
- Interpret maps and scale drawings
- Estimate lengths using a scale diagram
- Make an accurate scale drawing from a diagram
- Know and use compass directions
- Use three-figure bearings to specify direction
- Mark on a diagram the position of point B given its bearing from point A
- Give a bearing between the points on a map or scaled plan
- Given the bearing of a point A from point B, work out the bearing of B from A
- Use accurate drawing to solve bearings problems
- Solve locus problems including bearings
- Reflection and rotation symmetry
- Transformations - rotation, reflection, translation, enlargement (with a positive scale factor)
- Identify the equation of a line of symmetry
- Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides, simple integer scale factors, or simple fractions
- **Enlargements with a fractional scale factors**

KS4 Higher Mathematics Big Picture

Unit test (marked by teacher) Unit test H13 **Unit tests (Self-assessment)** Unit tests H12, H15 **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	**Unit test (marked by teacher)** Unit test H17 **Unit tests (Self-assessment)** Unit tests H16, H18 **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	• **Enlargements with negative scale factors** • **Describe the changes and invariance achieved by combinations of rotations, reflections and translations** • EOY Revision programme- Revision of key topics • Preparation for UL tests and exam papers **EOY PPE test (marked by teacher)** EOY PPE Paper 1 and Paper 2 **Unit tests (Self-assessment)** n/a **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)
ATL data	**ATL Data capture**	**PPE data** **PPE and ATL data**

Year 11 Higher Mathematics

Autumn 1 8 weeks	Autumn 2 7 weeks	Spring 1 6 weeks
Content H22 Recurring decimals H23 Quadratic sequences H24 Simultaneous equations 2 H25 Further Trigonometry H26 Inequalities 2 H27 Functions	**Content** H27 Functions H28 Iteration Mock PPE exams- revision and preparation Feedforward lessons based on QLAs	**Content** H28 Iteration H29 Algebraic proof H30 Circle theorems H31 Histograms

Manchester Academy
The best in everyone™
Part of United Learning

KS4 Higher Mathematics Big Picture

Assessment Objectives
This is the knowledge, application and skills assessed by the Big Test:

- Change recurring decimals into their corresponding fractions
- By writing the denominator in terms of its prime factors, decide whether fractions can be converted to recurring or terminating decimals (Recognise that every terminating decimal has its fraction with a 2 and/or 5 as a common factor in the denominator
- Continue a quadratic sequence and use the nth term to generate terms
- Find the nth term of quadratic sequences
- Solve quadratic equations algebraically by factorising (no rearrangement required)
- Find approximate solutions to quadratic equations using a graph
- Solve quadratic equations (that also require rearrangement) by factorising, completing the square and by using the quadratic formula
- Solve linear/quadratic simultaneous equations
- Solve quadratic equations arising from algebraic fraction equations
- Be able to identify from a graph if a quadratic equation has any real roots
- Solve linear/circles simultaneous equations
- Sine rule and cosine rule
- Area of a triangle using trigonometry. Also use to find sides or angles of any triangle
- Sketch and interpret graphs of the trigonometric functions y = sin x, y = cos x and y= tan x
- Apply sine and cosine rule to questions involving bearings
- Pythagoras in 3D configurations
- Trigonometry in 3D configurations

Assessment Objectives
This is the knowledge, application and skills assessed by the Big Test:

- Sine rule and cosine rule
- Area of a triangle using trigonometry. Also use to find sides or angles of any triangle
- Sketch and interpret graphs of the trigonometric functions y = sin x, y = cos x and y= tan x
- Apply sine and cosine rule to questions involving bearings
- Pythagoras in 3D configurations
- Trigonometry in 3D configurations
- Sketch a graph of a quadratic function, by factorising or by using the formula, identifying roots, y-intercept and turning point by completing the square
- Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values
- Represent the solution set for inequalities using set notation, i.e. curly brackets and 'is an element of' notation e.g. the solution set of $x^2 - 3x - 10 < 0$ as $\{x: x < -3\}$ $\{x: x > 5\}$
- Find f(x) + g(x) and f(x) – g(x), 2f(x), f(3x) etc. algebraically
- Find the inverse of a linear function
- Know that $f^{-1}(x)$ refers to the inverse function
- Composite functions - for two functions f(x) and g(x), find gf(x)

Mini test (marked by teacher)
PPE Papers 1, Paper 2 and Paper 3

UNIT tests (Self-assessment)
Unit tests H25, H26, H27

Assessment Objectives
This is the knowledge, application and skills assessed by the Big Test:

- Find approximate solutions to equations numerically using iteration
- Use iteration with simple converging sequences
- Language of proof: odd, even, product, sum, integer, consecutive, square, difference etc.
- Solve 'Show that' and proof questions using consecutive integers (n, n + 1), squares a2, b2, even numbers 2n, odd numbers 2n +1
- Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results:
  -the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference;
  -the angle in a semicircle is a right angle;
  -the perpendicular from the centre of a circle to a chord bisects the chord;
  -angles in the same segment are equal;
  -alternate segment theorem;
  -opposite angles of a cyclic quadrilateral sum to 180°;
  -understand and use the fact that the tangent at any point on a circle is perpendicular to the radius at that point;
- Draw and interpret Histograms

Mini test (marked by teacher)
Unit test H30

UNIT tests (Self-assessment)
Unit tests H28, H29, H31

KS4 Higher Mathematics Big Picture

• **Mini test (marked by teacher)** Unit test H22 **UNIT tests (Self-assessment)** Unit tests H23, H24 **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	**Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	**Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)
Assessment exams, fluency tests **ATL data**	**Assessment exams, fluency tests** **PPE exams, ATL data**	**Assessment exams, fluency tests** **ATL data**
Spring 2 **6 weeks**	**Summer 1** **5 weeks**	**Summer 2** **7 weeks**
Content H32 Vectors 2 H33 Gradients (further) and area under a graph H34 Graphical transformations H35 Congruence H36 Constructions and Loci	**Content** • Revision programme GCSE exams 2025 • GCSE exams	**Content** • Revision programme for GCSE exams 2025 • GCSE exams
Assessment Objectives This is the knowledge, application and skills assessed by the Big Test: • **Addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors** • **Be able to represent information graphically given column vectors** • **Identify two column vectors which are parallel** • **Solve geometric problems in 2D where vectors are divided in a given ratio**	**Assessment Objectives** This is the knowledge, application and skills assessed by the Big Test: • Revision of key topics - bespoke plan for each Year 11 Maths class • Preparation for GCSE exams- practice and exam papers	**Assessment Objectives** This is the knowledge, application and skills assessed by the Big Test: • Revision of key topics - bespoke plan for each Year 11 Maths class • Preparation for GCSE exams- practice and exam papers

Manchester Academy
The best in everyone™
Part of United Learning

KS4 Higher Mathematics Big Picture

• **Produce geometrical proofs to prove points are collinear and vectors/lines are parallel** • **Recognise and use the equation of a circle with centre at the origin** • **Find the equation of a tangent to a circle at a given point, by:** **-finding the gradient of the radius that meets the circle at that point (circles all centre the origin)** **-finding the gradient of the tangent perpendicular to it** **-using the given point** • **Estimate area under a quadratic or other graph by dividing it into trapezia. Interpret the results in cases such distance–time graphs, velocity–time graphs and graphs in financial contexts** • **Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient** • **Interpret the gradient of non-linear graph in curved distance–time and velocity–time graphs** • **Translations and reflections of functions:** **-apply to the graph of y = f(x) the transformations y = –f(x), y = f(–x) for linear, quadratic, cubic functions** **-apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(x + a) for linear, quadratic, cubic functions** **-apply to the graph of y = f(x) the transformations y = –f(x), y = f(–x) for sine, cosine and tan functions f(x)** **-apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(x + a) for sine, cosine and tan functions f(x)** • Identify congruent shapes by eye • Understand that distances and angles are preserved under reflections, so that any figure is congruent under this transformation • **Congruence criteria for triangles (SSS, SAS, ASA, RHS)** • **Solve angle problems involving congruence**		

Manchester Academy
The best in everyone™
Part of United Learning

KS4 Higher Mathematics Big Picture

• **Recognise and use the equation of a circle with centre at the origin** • **Find the equation of a tangent to a circle at a given point, by:** **-finding the gradient of the radius that meets the circle at that point (circles all centre the origin)** **-finding the gradient of the tangent perpendicular to it** **-using the given point** • **Estimate area under a quadratic or other graph by dividing it into trapezia. Interpret the results in cases such distance–time graphs, velocity–time graphs and graphs in financial contexts** • **Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient** • **Interpret the gradient of non-linear graph in curved distance–time and velocity–time graphs** • **Use kinematics formulae from the formulae sheet to calculate speed, acceleration, etc. (with variables defined in the question)** • **Translations and reflections of functions:** **-apply to the graph of y = f(x) the transformations y = –f(x), y = f(–x) for linear, quadratic, cubic functions** **-apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(x + a) for linear, quadratic, cubic functions** **-apply to the graph of y = f(x) the transformations y = –f(x), y = f(–x) for sine, cosine and tan functions f(x)** **-apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(x + a) for sine, cosine and tan functions f(x)** • Identify congruent shapes by eye • Understand that distances and angles are preserved under reflections, so that any figure is congruent under this transformation • **Congruence criteria for triangles (SSS, SAS, ASA, RHS)**		

KS4 Higher Mathematics Big Picture

• **Solve angle problems involving congruence** • Draw circles and arcs to a given radius or given the diameter • Measure and draw lines, to the nearest mm • Measure and draw angles, to the nearest degree • **Use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle)** • **Construct angles of 90°, 45°** • **Use constructions to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line** • **Construct: a region bounded by a circle and an intersecting line; a given distance from a point and a given distance from a line; equal distances from two points or two line segments; regions which may be defined by 'nearer to' or 'greater than'** **Mini test (marked by teacher)** PPE Papers 1, Paper 2 and Paper 3 GCSE practice papers **UNIT tests (Self-assessment)** GCSE practice papers **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	**Mini test (marked by teacher)** GCSE practice papers **UNIT tests (Self-assessment)** GCSE practice papers **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)	**Mini test (marked by teacher)** n/a **UNIT tests (Self-assessment)** n/a **Feedforward and Intervention** Students to complete the questions where they made errors (in purple pen)
Assessment exams, fluency tests **PPE exams, ATL data**	**GCSE exams 2025**	**GCSE exams 2025**