



Mathematics Faculty Curriculum Overview

The Mathematics Faculty foundational principle ‘Threshold Topics’ are both defined on page 2 below and split between the core subject content strands of:

- Number (N)
- Algebra (A)
- Ratio and Proportion (R)
- Geometry and Measures (G)
- Probability and Statistics (P)

These Threshold Concepts are interwoven, interleaved and index-referenced throughout the curriculum plan to make explicit the ‘conceptual gateways’ and ‘portals’ which must be negotiated to arrive at important new mathematical understanding.

Additionally, the curriculum plan also categorises each unit by core subject content strand to show how new knowledge consolidates and builds upon prior knowledge. These core subject content strands are outlined below and illustrate how each unit is sequenced over the 5-year curriculum:

	Number	Algebra	Ratio and Proportion	Geometry and Measures	Probability and Statistics
1	Place Value and Proportion	Algebraic Thinking	Proportional Reasoning	Lines and Angles	Representation
2	Application of Number	Algebraic Techniques	Proportional Reasoning	Developing Geometry	Reasoning with Data
3	Directed Number and Fractional Thinking	Developing Algebra	Reasoning with Proportion	Constructing in 2 and 3 Dimensions	Representation
4	Reasoning with Number	Graphs	Similarity	Reasoning with Geometry	Delving into Data
5	Developing Number	Algebra	Proportions and Proportional Change	Geometry	
6	Reasoning with Number				
7	Using Number				
8	Reasoning				
9	Revision and Communication				

<u>Threshold Concepts in Mathematics</u>	<u>Number</u>	<u>Algebra</u>
<p>The foundational principle of threshold concepts is that there are ‘conceptual gateways’ or ‘portals’ that must be negotiated to arrive at important new mathematical understanding.</p> <p>In crossing the portal, transformation occurs, both in new knowledge and subjectivity.</p> <p>Threshold concepts open a door into a new way of thinking about mathematics and therefore enhance the ability of learners to master the subject.</p> <p>Teachers will address, consolidate and reinforce these cornerstone topics in the following ways:</p> <ul style="list-style-type: none"> • Retrieval practice starter activities • Warm-up activities prior to the main teaching • Retrieval practice formative assessments • Hegarty Maths homework assignments <p>The Mathematics Curriculum Plan clearly references these Threshold Concepts below using the following codes.</p>	<p>N1 – Place Value</p> <p>N2 – Inverse operations</p> <p>N3 – Directed numbers</p> <p>N4 – Number bonds and basic calculations</p> <p>N5 – BODMAS</p> <p>N6 – Powers and roots</p> <p>N7 – Fraction, decimal and percentage equivalence</p> <p>N8 – Fluency of calculations (written and mental) N9</p> <p>– Proficiency using a calculator</p> <p>N10 – Rounding</p>	<p>A1 – Basic algebra (simplifying, substitution etc.)</p> <p>A2 – Algebraic conventions ($3n = 3 \times n$ etc.)</p> <p>A3 – Using scientific formulae ($S=D/T$ etc.) A4</p> <p>– Algebraic manipulation (balancing etc.)</p>

<u>Geometry and Measures</u>	<u>Probability and Statistics</u>	<u>Miscellaneous</u>
G1 – Angle rules G2 – Names and properties of shapes G3 – Units and unit conversions G4 – Use of mathematical equipment (ruler, compass, protractor etc.) G5 – Coordinates	P1 – Fractions, decimals and percentages fluency P2 – Ratio and proportion	M1 – Breaking down problems M2 – Use of key information M3 – Mathematical terminology M4 – Application of other Threshold Concepts and mathematical knowledge

Maths Faculty Assessment Timeline

Year	Method	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 7	Online Homework	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics	Summer 2 Topics
	Paper Homework	KS2 QLA Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Formative	KS2 QLA Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Summative	Baseline		End of Term	End of Term		End of Term
Year 8	Online Homework	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics	Summer 2 Topics
	Paper Homework	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Formative	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Summative		End of Term		End of Term		End of Term
Year 9	Online Homework	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics	Summer 2 Topics
	Paper Homework	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Formative	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Summative		Past Paper		Past Paper		
Year 10	Online Homework	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics	Summer 2 Topics
	Paper Homework	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Formative	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Summative		Past Paper	Past Paper			Mock Exam
Year 11	Online Homework	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics	Summer 2 Topics
	Paper Homework	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Formative	Summer 2 Topics	Autumn 1 Topics	Autumn 2 Topics	Spring 1 Topics	Spring 2 Topics	Summer 1 Topics
	Summative		Mock Exam		Mock Exam	GCSE Exam	

- Online and paper homework assignments alternate weekly
- Online homework assignments are set and completed on Hegarty Maths based upon work currently being studied in class at the time
- Paper homework assignments are set and completed based upon work studied in the previous half-term (retrieval practice) and mirror the upcoming formative assessment
- Formative assessments are completed in class on a fortnightly basis and are based upon work studied in the previous half-term (retrieval practice) and mirror the paper homework assigned the week prior
- End of Block assessments in years 7 and 8 contain a 'core' assessment which all students sit followed by either a 'foundation' or a 'higher' tier assessment dependent upon ability set
- Past Papers in years 9 and 10 include all three GCSE papers (one non-calculator and two calculator papers)
- Mock Exams in years 10 and 11 include all three GCSE papers from the most recent up-to-date examination series (one non-calculator and two calculator papers)

Autumn Term 1 – Ratio and Proportion 4: Similarity

Congruence, Similarity and Enlargement (G125, P2, M3):

- Understand the difference between congruence and similarity
- Enlarge a shape about a given point ; understand and use similarity
- Find missing sides in similar shapes including pairs of similar triangles

Trigonometry (N910, A1234, G123, P2, M13):

- Find lengths and angles in right-angled triangles
- Know the exact values of key angles

Autumn Term 2 – Algebra 3: Developing Algebra

Equations and Inequalities (N24, A1234, M12):

- Form and solve equations and inequalities in a variety of contexts

Representing Solutions (N1, A124, G5):

- Plot and use linear graphs
- Use number lines

Simultaneous Equations (N24, A1234, G5):

- Form and solve linear simultaneous equations both graphically and algebraically

Spring Term 1 – Geometry and Measures 5: Geometry

Angles and Bearings (N4, G1, M4):

- Review of Key Stage 3 angle rules
- Understand and use bearings

Working with Circles (N910, A1234, G23, M3):

- Review area and circumference
- Name and calculate the different parts of a circle
- Work out circle-related areas and volumes (cylinder, sphere etc.)

Vectors (N4, A124, G5, P2, M34):

- Understand vector notations
- Work with vector arithmetic
- Understand vectors and translations

Spring Term 2 – Ratio and Proportion 5: Proportions and Proportional Change

Ratio and Fractions (N7, G3, P2):

- Use ratios (including with mixed units)
- Work with fractions in ratios
- Write down fractions from ratios

Percentages and Interest (N679):

- Convert between fractions, decimals and percentages
- Find percentages
- Write a number as a percentage
- Calculate simple and compound interest
- Calculate depreciation

Probability (P12):

- Review single-event probability
- Work out the probability of independent events
- Draw, complete, use and interpret probability trees

Summer Term 1 – Probability and Statistics 4: Delving Into Data

Collecting, Representing and Interpreting Data (N7, G5, M12):

- Sample a population
- Discuss limitations
- Draw, use and interpret tables and line graphs for time-series data
- Deal with grouped data
- Infer correlation
- Draw lines of best fit and discuss the dangers of extrapolation
- Draw, use and interpret frequency polygons
- Measure location and dispersion
- Compare distributions

Summer Term 2 – Number 7: Using Number

Non-Calculator Methods (N2347):

- Calculate using four operations with integers, decimals and fractions with and without context – contexts to include previous mathematical study
- Calculate using directed numbers
- Calculate using percentages

Types of Number Sequences (N46, A124):

- Identify factors, multiples and primes
- Express a number as the product of its prime factors
- Work with arithmetic and geometric sequences
- Work with other sequences

Indices and Roots (N610):

- Work out powers and roots
- Use standard index form
- Write down exact answers

Autumn Term 1 – Ratio and Proportion 4: Similarity

Congruence, Similarity and Enlargement (G125, P2, M3):

- ☐ Understand the difference between congruence and similarity
- ☐ Enlarge a shape about a given point ; understand and use similarity
- ☐ Find missing sides in similar shapes including pairs of similar triangles

Trigonometry (N910, A1234, G123, P2, M13):

- ☐ Find lengths and angles in right-angled triangles
- ☐ Know the exact values of key angles

Additional Higher Content (N8910, A1234, G123, M12):

- ☐ Formally prove congruency of triangles
- ☐ Find missing lengths and angles using trigonometry in 3D shapes
- ☐ Know and use the Sine and Cosine rules
- ☐ Use the Sine rule for area of non-right-angled triangles

Autumn Term 2 – Algebra 3: Developing Algebra

Equations and Inequalities (N24, A1234, M12):

- ☐ Form and solve equations and inequalities in a variety of contexts

Representing Solutions (N1, A124, G5):

- ☐ Plot and use linear graphs
- ☐ Use number lines

Simultaneous Equations (N24, A1234, G5):

- ☐ Form and solve linear simultaneous equations both graphically and algebraically

Additional Higher Content (N48910, A124, G5, M3):

- ☐ Use set notation for solutions
- ☐ Work with inequalities with two variables and identify regions
- ☐ Solve quadratic equations and inequalities using factorisation
- ☐ Solve simultaneous equations where one is linear and one is quadratic

Spring Term 1 – Geometry and Measures 5: Geometry

Angles and Bearings (N4, G1, M4):

- ☐ Review of Key Stage 3 angle rules
- ☐ Understand and use bearings

Working with Circles (N910, A1234, G23, M3):

- ☐ Review area and circumference
- ☐ Name and calculate the different parts of a circle
- ☐ Work out circle-related areas and volumes (cylinder, sphere etc.)

Vectors (N4, A124, G5, P2, M34):

- ☐ Understand vector notations
- ☐ Work with vector arithmetic
- ☐ Understand vectors and translations

Additional Higher Content (N9, A1234, G12, P2, M234):

- ☐ Use and prove circle theorems
- ☐ Calculate with area and volume ratios
- ☐ Know the equation of a circle
- ☐ Geometrically prove with vectors

Spring Term 2 – Ratio and Proportion 5: Proportions and Proportional Change

Ratio and Fractions (N7, G3, P2):

- ☐ Use ratios (including with mixed units)
- ☐ Work with fractions in ratios
- ☐ Write down fractions from ratios

Percentages and Interest (N679):

- ☐ Convert between fractions, decimals and percentages
- ☐ Find percentages
- ☐ Write a number as a percentage
- ☐ Calculate simple and compound interest
- ☐ Calculate depreciation

Probability (P12):

- ☐ Review single-event probability
- ☐ Work out the probability of independent events
- ☐ Draw, complete, use and interpret probability trees

Additional Higher Content (N78910, A123, P12):

- ☐ Work with iterative processes
- ☐ Work out the probability of conditional events

Summer Term 1 – Probability and Statistics 4: Delving Into Data

Collecting, Representing and Interpreting Data (N7, G5, M12):

- ☐ Sample a population
- ☐ Discuss limitations
- ☐ Draw, use and interpret tables and line graphs for time-series data
- ☐ Deal with grouped data
- ☐ Infer correlation
- ☐ Draw lines of best fit and discuss the dangers of extrapolation
- ☐ Draw, use and interpret frequency polygons
- ☐ Measure location and dispersion
- ☐ Compare distributions

Additional Higher Content (N489, A1234, G5, M12):

- ☐ Draw, use and interpret cumulative frequency graphs and boxplots
- ☐ Draw, use and interpret histograms

Summer Term 2 – Number 7: Using Number

Non-Calculator Methods (N2347):

- ☐ Calculate using four operations with integers, decimals and fractions with and without context – contexts to include previous mathematical study
- ☐ Calculate using directed numbers
- ☐ Calculate using percentages

Types of Number Sequences (N46, A124):

- ☐ Identify factors, multiples and primes
- ☐ Express a number as the product of its prime factors
- ☐ Work with arithmetic and geometric sequences
- ☐ Work with other sequences

Indices and Roots (N610):

- ☐ Work out powers and roots
- ☐ Use standard index form
- ☐ Write down exact answers

Additional Higher Content (N678910, A124):

- ☐ Find the nth term of a quadratic sequence
- ☐ Work with fractional indices
- ☐ Work with rational and irrational numbers
- ☐ Convert recurring decimals to fractions
- ☐ Identify the limits of accuracy
- ☐ Write down and calculate with upper and lower bounds

11	Foundation LPAs to MPAS	<p>Autumn Term 1 – Algebra 4: Graphs</p> <p>Gradients and Lines (N48, A124):</p> <ul style="list-style-type: none"> • Find and use the equations of lines <p>Non-Linear Graphs (N6, A124, G5, M2):</p> <ul style="list-style-type: none"> • Plot quadratic curves • Understand roots • Draw, use and interpret cubic and reciprocal graphs • Draw, use and interpret real-life graphs <p>Using Graphs (A3, G35, M2):</p> <ul style="list-style-type: none"> • Reflect a graph in a line • Draw, use and interpret speed, distance, time graphs <p>Autumn Term 2 – Algebra 5: Algebra</p> <p>Expanding and Factorising (N48910, A124):</p> <ul style="list-style-type: none"> • Expand a single brackets and binomials • Factorise an expression into a single bracket • Factorise quadratics in the form ax^2+bx+c • Solve quadratic equations <p>Changing the Subject (N2, A1234):</p> <ul style="list-style-type: none"> • Review of solving linear equations • Change the subject of a formula where the subject appears once <p>Functions (N24, G3, A1234):</p> <ul style="list-style-type: none"> • Work out inputs and outputs • Work with equations and identities • Use kinematic equations 	<p>Spring Term 1 – Reasoning</p> <p>Multiplicative Reasoning (N18910, A1234, G3, P2):</p> <ul style="list-style-type: none"> • Review of scale and enlargement • Calculate direct and inverse proportion • Calculate pressure and density <p>Geometric Reasoning (N8910, A1234, G12, M3) :</p> <ul style="list-style-type: none"> • Review of angle facts, focusing on language of reasons • Review of Pythagoras' Theorem and Trigonometry <p>Algebraic Reasoning (N26, A124):</p> <ul style="list-style-type: none"> • Work with complex indices • Review of simplification of complex expressions, finding the nth term rule • Justify why a number is/is not in a given sequence <p>Spring Term 2 – Revision and Communication</p> <p>Transformations and Constructions (G45):</p> <ul style="list-style-type: none"> • Revisit transformations • Construct using a ruler and a compass • Construct using a ruler and a protractor <p>Listing and Describing (G2, P12):</p> <ul style="list-style-type: none"> • Organise lists • Use Venn Diagrams • Draw and interpret plans and elevations <p>Show That (G12, M23):</p> <ul style="list-style-type: none"> • Illustrate equivalence • Justify answers • Use language of angle rules • Know the conditions for congruent triangles 	<u>Revision</u>
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Autumn Term 1 – Algebra 4: Graphs

Gradients and Lines (N48, A124):

- ☐ Find and use the equations of lines

Non-Linear Graphs (N6, A124, G5, M2):

- ☐ Plot quadratic curves
- ☐ Understand roots
- ☐ Draw, use and interpret cubic and reciprocal graphs
- ☐ Draw, use and interpret real-life graphs

Using Graphs (A3, G35, M2):

- ☐ Reflect a graph in a line
- ☐ Draw, use and interpret speed, distance, time graphs

Additional Higher Content (N2910, A1234, G12345, M23):

- ☐ Draw, use and interpret exponential graphs
- ☐ Complete the square and use the quadratic formula
- ☐ Work out the equations of perpendicular lines
- ☐ Work out the equations of tangents to a curve
- ☐ Work out the area underneath a curve

Autumn Term 2 – Algebra 5: Algebra

Expanding and Factorising (N48910, A124):

- ☐ Expand a single brackets and binomials
- ☐ Factorise an expression into a single bracket
- ☐ Factorise quadratics in the form ax^2+bx+c
- ☐ Solve quadratic equations

Changing the Subject (N2, A1234):

- ☐ Review of solving linear equations
- ☐ Change the subject of a formula where the subject appears once

Functions (N24, G3, A1234):

- ☐ Work out inputs and outputs
- ☐ Work with equations and identities
- ☐ Use kinematic equations

Additional Higher Content (N2, A1234):

- ☐ Change the subject of a formula where the subject appears more than once
- ☐ Work with and use composite and inverse functions

Reasoning

Multiplicative Reasoning (N18910, A1234, G3, P2):

- ☐ Review of scale and enlargement
- ☐ Calculate direct and inverse proportion
- ☐ Calculate pressure and density

Geometric Reasoning (N8910, A1234, G12, M3):

- ☐ Review of angle facts, focusing on language of reasons
- ☐ Review of Pythagoras' Theorem and Trigonometry

Algebraic Reasoning (N26, A124):

- ☐ Work with complex indices
- ☐ Review of simplification of complex expressions, finding the nth term rule
- ☐ Justify why a number is/is not in a given sequence

Additional Higher Content (N6, A124, M24):

- ☐ Vary powers
- ☐ Prove algebraically

Revision and Communication

Transformations and Constructions (G45):

- ☐ Revisit transformations
- ☐ Construct using a ruler and a compass
- ☐ Construct using a ruler and a protractor

Listing and Describing (G2, P12):

- ☐ Organise lists
- ☐ Use Venn Diagrams
- ☐ Draw and interpret plans and elevations

Show That (G12, M23):

- ☐ Illustrate equivalence
- ☐ Justify answers
- ☐ Use language of angle rules
- ☐ Know the conditions for congruent triangles

Additional Higher Content (G15, M12):

- ☐ Draw, use, interpret, transform and understand trigonometric graphs
- ☐ Transform graphs

Revision