Curriculum Overview – Maths

Howden School

THE CONSORTIUM ACADEMY TRUST

Shaping Positive Futures

Introduction

This document outlines the curriculum and key considerations including:

- Aims and purpose
- Alignment with the whole school provision and curriculum intent
- A summary programme of study which includes sequencing of taught content

We use the National Curriculum as our statutory foundation and broadly share its principles and aims including:

- 'To provide pupils with an introduction to the essential knowledge that they need to be educated citizens. To introduce pupils to the best that has been thought and said; and help engender an appreciation of human creativity and achievement'.
- To prepare students to be confident in themselves, to have a fulfilled and successful life beyond our school – one where they contribute positively to society.
- Our statutory curriculum is just one element in the education of every child. There is time and space in the school day and in each week, term and year to range beyond statutory specifications.
- Provision of a framework of core knowledge around which teachers can develop exciting and stimulating lessons to promote the development of pupils' knowledge, understanding and skills as part of the wider school curriculum.
- The wider school curriculum includes an extensive range of opportunities and activities that are routinely available to students, are inclusive and reflect our diverse community.

Numeracy and literacy

Teachers should take opportunities to develop pupils' mathematical fluency, spoken language, reading, writing and vocabulary within their specific discipline and in line with the expectations laid out in our school curriculum statement.

Purpose of study

'Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.' Adapted from National Curriculum, DfE, 2021.

Curriculum Aims

"**Mathematics for understanding and preparation for life"**

The Howden School curriculum for mathematics aims to ensure that all our pupils:

- Are equipped with the numeracy and mathematical skills they need for life
- Develop secure knowledge and understanding why methods work
- Develop transferable skills such as logical thinking, problem solving and constructing arguments
- Are inspired to develop a love and inquisitiveness of Mathematics, to progress onto further Mathematical study for their career.

Curriculum Structure

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. Although the programme of study is organised into distinct domains, pupils are taught to make connections across mathematical ideas to develop fluency, mathematical reasoning and competence to solve increasingly sophisticated problems.

Disciplinary Strand	Knowledge Domains	Subject Skills
Number	**Operations** Place value, using the 4 operations, ordering positive and negative integers. Using prime numbers, factors, multiples, HCF and LCM. BIDMAS, inverse operations, Integer Powers, Standard Form **Fractions, Decimals and Percentages** Converting between Mixed Numbers and Improper Fractions, Ordering Fractions and Decimals, Finding Percentages, Increasing or decreasing by a Percentage, **Rounding** To round answers to specified decimal places or significant figures and to use estimation to check if an answer seems sensible **Comparisons** Conversion of units and currency, fractions and multiples, expressing quantities as a percentage of another, use standard units of mass, length, time, money. **Ratio and Proportion** Convert Units, Multiplicative change, similar shapes, scale drawing, map scales, direct and indirect proportion Ratio and fractions, Compound measures	**Numeracy** The ability to understand, reason with and apply simple numerical concepts to various areas of maths. **Literacy** The knowledge, ability and confidence to use subject specific language to acquire, construct and communicate meaning in all aspects of daily living. **Problem Solving** The use of maths and everyday life - students must be able to apply their knowledge to come up with sensible solutions to problems **Experimental and Investigative Skills** Understanding how to apply previous knowledge to new problems

Algebra	use and interpret algebraic notation use the vocabulary of expressions, equations, inequalities, terms and factors **Simplify and manipulate algebra** Collecting like terms, expand brackets, take common factors Rearrange formulae to change the subject **Solving** Form equations, Solve equations **Substitution** Substitute numbers into expressions and formulae Work with coordinates, recognise, sketch and produce graphs, y = mx + c, Simultaneous Equations **Sequences** term-to-term rules or position-to-term rules, arithmetic sequences and the nth term, geometric and other sequences	**Written Communication** The ability to communicate via the written words is essential, students need to be able to sure clear, coherent workings to problems **Resilience** The ability to keep going and not give up will serve students well in both maths lessons and their futures **Collaboration** Working together to develop and share ideas, discuss misconceptions, and how topics relate to real-life situations
Geometry & Measures	**Angles** Find missing angles, properties of shapes, transects and other angle facts **Volume, Area and Perimeter** Find volumes, areas and perimeters of shapes and composite shapes **Transformations** To reflect, rotate, translate and enlarge shapes **Constructions** Standard ruler and compass constructions, draw and measure line segments and angles, interpreting scale drawings Symmetry, Congruence Pythagoras' Theorem	
Handling Data	**Averages** Find Mean, Mode, Median and Range from a list of numbers, a frequency table and a grouped data table **Charts and Graphs** Describe, interpret and compare with appropriate graphical representation involving discrete, continuous and grouped data; Bivariate data Plot and Interpret Bar Charts, Scatter Graphs, Pie Charts and Line Graphs **Probability** Understanding that probability sums to 1, and using this to find missing probabilities, Venn diagrams, frequency and probability trees, probability	

	experiments, tables, grids and Venn diagrams, sample space, mutually exclusive events	

Subject Knowledge Progression

Strand	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Number - addition, subtraction, multiplication and division	Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	Use the 4 operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers.	Ordering decimals. Rounding numbers and measures to an appropriate degree of accuracy	Write numbers of any size in standard form A x 10^n, where 1 <A<10 and n is an integer.	Converting between normal numbers and standard form.	Calculate with and interpret standard form
	Divide numbers up to 4 digits by a two-digit number using the formal written method of long and short division where appropriate, interpreting remainders according to the context	Compare and order numbers. Use four operations with directed numbers	Calculations with money		Apply and interpret limits of accuracy . Change freely between related standard units. Use compound units such as speed, rates of pay, unit pricing, density and pressure.	Plotting and interpreting graphs in real contexts to find approximate solutions to problems such as simple kinematic problems
		Explore powers, prime factorisation, Highest Common Factor (HCF) and Lowest Common Multiple (LCM)	Use positive integer powers and associated real roots. Recognise powers of 2, 3, 4, 5.	Use positive integer powers and associated real roots. Recognise powers of 2, 3, 4, 5. Estimate powers and roots of any given positive number	Calculate exactly with surds. Simplify surd expressions involving squares	Calculating with roots and with integer indices. Calculating with fractional indices
	Identify common factors, common multiples and prime numbers	Use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples property	Divisibility, prime factors, including using product notation and the unique factorisation	Fraction arithmetic including exact values	Change recurring decimals into their corresponding fractions and vice versa	Using inequality notation to specify simple error intervals
	Use knowledge of the order of operations to carry out calculations involving the four operations	BIDMAS	Powers and roots			

Strand	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Number – fractions decimals and percentages	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination	Represent any fraction as a diagram or on a number line	Find the product of a pair of fractions	Define percentage as 'number of parts per hundred'	Expressing one quantity as a fraction of another	
	Compare and order fractions, including fractions > 1	Understand fractions as division. Identify and use simple equivalent fractions		Compare two quantities using percentages	Expressing a multiplicative relationship between two quantities as a ratio or a fraction	
	Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions	Add and subtract fractions mixed numbers	Multiply and divide fractions and mixed numbers	Express one quantity as a percentage of another	Finding percentages and percentage changes	
	Multiply simple pairs of proper fractions, writing the answer in its simplest form	Represent tenths and hundreths on number lines and in diagrams. Interchange between fractional and decimal number lines	Multiply a fraction by an integer			
	Divide proper fractions by whole numbers	Convert between fractions and decimals - tenths and hundreths, fifths and quarters, eigths and thousandths	Divide an integer by a fraction/ a fraction by a unit fraction	Interpret percentages and percentage changes as a fraction or decimal and interpret these multiplicatively	Finding percentages and percentage changes multiplicatively using decimals	
	Associate a fraction with division and calculate decimal fraction equivalents	Convert fluently between fractions, decimals and percentages			Converting between fractions, decimals and percentages	
	Multiply one-digit numbers with up to two decimal places by whole numbers	Multiply and divide by powers 10.	Write numbers of any size in standard form			

Strand	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Number – fractions decimals and percentages	Solve problems which require answers to be rounded to specified degrees of accuracy	Round numbers and measures to an appropriate degree of accuracy.	Understand and use the reciprocal			
	Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.	Order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers; use the symbols =, ≠, <, >, ≤, ≥				
	Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000.	Understand and use place value for decimals, measures and integers of any size	Use positive integer powers and associated real roots (square, cube and higher).	Estimate powers and roots of any given positive number.	Calculate exactly with surds. Simplify surd expressions involving squares	Calculating with roots and with integer indices . Calculating with fractional indices
Algebra	Use Simple Formulae	Use function Machines, form and solve one abnd two step equations	Solve inequalities, form and solve equations with brackets	Form and solve equations and inequalities with unknowns on both sides	Solving two linear simultaneous equations algebraically by elimination. Solving two linear simultaneous equations graphically or algebraically by substitution	Using inequality notation to specify simple error intervals
	Generate and describe linear number sequences	Recognise linear and non linear sequences, generate sequences	Find the nth term for a linear sequence	Testing conjectures about sequences. Representing sequences. Fnding the rule for the nth term of a linear sequence	Recognise and use: sequences of triangular, square and cube numbers; simple arithmetic progression; Fibonacci type sequences; quadratic sequences, and simple geometric progressions	*Further Maths - Pascals triangle*

Strand	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Algebra	Find pairs of numbers that satisfy and equation with two unknowns	Algebraic notation	Indentify formulae, expression, identities and equations	Change the subject of a formula.	Solve linear equations in one unknown algebraically including those with the unknown on both sides of the equation	
	Express missing number problems algebraically.	Substitute into expressions, collecting like terms, simple algebraic frations	Expanding brackets, simplify expressions			
	Find positions on a coordinates grid (positive quadrant)	Represent functions graphically	Explore gradient, linear and non linear graphs	Use the form y = mx + c to identify parallel and perpendicular lines , find the equation of the line through given points, or through one point with a given gradient	Identify and interpret gradients and intercepts of linear functions graphically and algebraically	Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions and the reciprocal function. Plotting and interpreting graphs in real contexts to find approximate solutions to problems such as simple kinematic problems
			Conversion graphs, direct proportion graphs, y=mx+c		Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions and the reciprocal function	Calculating or estimating gradients of graphs. Calculating or estimating the area under a graph. Interpreting gradients of graphs and areas under graphs in the context of kinematics
Geometry and measurements	Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius	Know properties of triangles and quadrilaterals, name and construct polygons	Explore diagonals of quadrilaterals	Surface area of cuboids. Volume of cuboids and prisms. Surface area of prisms	Derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus	Perimeter of polygons. Surface area of trapeziums.

Strand	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Geometry and measurements	Draw 2-D shapes using given dimensions and angles, recognise, describe and build simple 3-D shapes, including making nets	Geometric notation	Translations and enlargement	Explore volumes of cones, spheres and compound shapes.	Standard ruler and compass constructions. Know that the perpendicular distance from a point to a line is the shortest distance to the line. Use these to construct given figures and solve loci problems.	Mixed loci problems
	Identify regular polygons, including equilateral triangles and squares, as those in which the side-lengths are equal and the angles are equal. Find the perimeter of regular and irregular polygons	Simple angle proofs	Find and prove simple geometric facts	Recognise rotational symmetry,rotate points about a given point. Perform a series of transformations.	Apply and use the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures	Congruence criteria for triangles. Simple geometric proofs
	Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.	Draw lines, angles and simple shapes	Recognise line symmetry, reflect shapes in a given line			
	Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.	Parallel and perpendicular lines	Interior and exterior angles of a polygon, angles in parallel lines	Apply angle facts, congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides including the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs	Know the formula for Pythagoras' Theorem. Apply it to find angles and lengths in right angled triangles and, where possible, general triangles in two and three dimensional figures.	The sine rule. The cosine rule. Area of a triangle using sine. Mixed problems using trigonometric formulas. Graphs of trigonometric functions.
	Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons	Angles at a point, vertically opposite, quadrilaterals			Constructions, bearings, scale drawings, plans and elevations	Vector Geometry. Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representation of vectors Use vectors to construct geometric arguments and proofs

Strand	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Geometry and measurements	Convert units of measure, using decimal notation up to three decimal places where appropriate	Solve perimeter problems	Circumference of a circle	Surface are and volume cylinders	Surface area and volume cones, spheres and frustrums	Calculate exactly with multiples of `pi`. Circle Theorems
	Recognise that shapes with the same areas can have different perimeters and vice verse					
	Recognise when it is possible to use formulae for area and volume of shapes, inc. parallelograms and triangles	Area rectangles, parallelograms, triangles, trapezium	Area circle, and compound shapes			
Handling Data	Construct line graphs and pie charts	Solve problems with line charts, bar charts and pie charts	Recognise different types of data. Construct and interprete frequency tables grouped and ungrouped and two way tables	Interpret analyse and compare distributions of data sets from inivariate empirical distributions through appropriate graphical representations involving discrete, continous and grouped data	Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling	
	Calculate and interpret mean as an average	Find median, range and mean. Determine mean from a frequency table.	Find the mode, identify outliers, find distribution using statistical measures	Find the modal class. Compare distributions. Find the median and quartiles from cumulative frequency diagrams	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency and spread	Applying statistics to describe a population

Strand	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Handling Data		Language of probability, calculate probabilities, probability scales.	Recording data. Construct sample space for more than one event and find probabilities, use tables and venn diagrams	Compare experimental and theoretical probability.Use frequency trees to find probabilities.Simple tree diagrams	Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes or multiple future experiments. Relate relative expected frequencies to theoretical probability.	Expected value. Properties of probability. Tree diagrams. Conditional probability
Ratio and Proportion	Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts		Convert area and volume measurements	Ratios in the context of area and volume; gradients as a rate of change	Compare lengths using ratio notation; make links to trigonometric ratios.	.
	Solve problems involving the calculation of percentages and use percentages for comparison	Convert metric units	Currency conversion	Scale drawings - Revisit conversion graphs - solve direct proportion problems - inverse proportion		
	Solve problems involving similar shapes where the scale factor is known or can be found	Use multiplicative relationships between known facts	Scale factors, scale diagrams, similar shapes	Working with ratios and fractions. Reverse percentages. Financial maths. Express one quantity as a percentage of another. Repeated percentage change.	Interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively. Compare two quantities using percentages. Work with percentages greater than 100%	Solve problems involving percentage change, including percentage increase / decrease and original value problems, and simple interest including in financial mathematics
	Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.		Ratio notation, divide into given ratio, work parts and whole, link gradient and ratio and 1:n			

Vocabulary

Having a rich, ambitious, broad vocabulary is vital for learners to succeed, both in school and throughout their lives.

Tier 1 vocabulary is the simplest. These are the words we use in everyday conversation, such as “put”, “get”, “walk”, etc. On the other side of the spectrum, Tier 3 vocabulary is the subject-specific vocabulary of a particular discipline. These are words that aren’t used outside of the context of a specific subject, or have a different meaning in one subject versus another. In the middle of these two tiers is Tier 2 vocabulary. Tier 2 vocabulary are challenging, ambitious words that don’t usually crop up in day-to-day conversation. These are the words that allow us to access academic texts, such as high-level literature, newspaper articles and exam papers.

At Howden School, tier 3 and tier 2 vocabulary is explicitly taught across our school curriculum. Our tier 2 vocabulary includes selected words from Coxhead’s High-incidence Academic Word List - this list provides a concise list of the most important academic words learners need to succeed in school and later life.

Curriculum Sequencing

Key Stage 3: Year 7 – Long Term Planning

	Autumn term	Spring term	Summer term
Knowledge	**Transition unit** • Consolidate and revisit key knowledge to prepare for KS3 **Fractions, Decimals and Percentages** • Equivalent fractions, percentages, fractions of amounts, ordering FDP, add and subtract, multiply and divide **Units of measure** • Types of units, converting units of length, convert mass and volume units **Coordinates** • Plotting coordinates • Equations of lines • Connections in coordinates **Operations and place value** • Place value, 4 operations, rounding **Transformations** • Lines of symmetry, rotational symmetry • Translations, rotations, reflections	**Lines and angles** • Reading scales, measuring, triangles, quadrilaterals **Expressions and conventions in algebra** • Collect like terms • Expand bracket • Substitution • Function machines, functions • Generating coordinates **Averages and Charts** • Recording data, Mean, Mode, Range • Mean from a frequency table • Pie charts • Scatter graphs **Fractions, Decimals, Percentages and Ratio** • Fractions of amounts • Equivalent fractions, • FDP equivalents • Percentages of amounts • Ratio and proportion	**Negative Numbers and BIDMAS** • Multiples • Divisibility tests • Squares, cubes and roots • HCF, LCM, prime factors • Negative numbers • Order of operations, BIDMAS **Sequences and equations** • Solving equations • Practical sequences • Term to term rules, • Position to term rules • nth term **Perimeter, Area, Volume** • Measure and draw angles, lines and angles • SAS, ASA, SSS, • Classify quadrilaterals **Key skills – transition to Year 8** • Perimeter and area • Composite shapes • Volume of a cuboid

			• Surface area
Tier 3 Vocabulary Tier 3 words are low-frequency, subject-specific words.	Coordinate Transformation Symmetry Rotation Reflection	Coefficient Expression Equation Formula Mode Mean Median	Quadrilateral Cuboid Geometry Perimeter Circumference Factor Multiple
Tier 2 Vocabulary Tier 2 words are academic words used in multiple contexts	Translation **Sum** **Prime**	**Statistics** **Ratio** Percentage Proportion Scales **Data** Range	Surface **Area** Composite Volume Sequence

Key Stage 3: Year 8 – Long Term Planning

	Autumn term	Spring term	Summer term
Knowledge	**Tables chart and graphs** • Frequency diagrams • Pie charts • Two-way tables • Scatter graphs • Cumulative frequency **Operations and place value** • Multiplication • Division, dividing with decimals • Multiply and divide 10,100 etc., • Rounding, estimation, real life applications **Expressions and substitution** • Simplifying, substitution	**Angles and parallel lines** • Measuring and drawing angles • Calculating missing angles and angles in triangles • Properties of quadrilaterals, polygons, intersecting lines **Sequences** • Term to term rules • Generating sequences, • nth terms, • Finding nth terms • Term to term rules • Quadratic sequences **Probability**	**Linear equations** • Two step equations • Unknown appears twice • Brackets • Forming equations • Substitution and formulae • Changing the subject **Averages** • MMMR, • Mean from tables • Estimated mean • Stem and leaf diagrams • Comparing data • Time series

	• Expand brackets, expand and factorize, brackets **Perimeter, Area and Volume** • Area and perimeter • Parallelogram, kite, trapezia • Surface area of cuboids and prisms • Circumference, circle area • Volume of prisms **Fractions Decimals and Percentages** • Number fluency • Equivalent FDP • Percentages • Appreciation and depreciation • Fluency with fractions • Fraction calculations	• Probability scale • Sample space • AND & OR rules **Ratio and proportion** • Ratio • Sharing • Best buys • Recipes • Exchange rates	**Factors and Multiples** • Divisibility • Prime numbers and factors • Lowest Common Multiple (LCM) • Powers and roots **Graphs** • Straight line graphs, functions, travel graphs. • Lines parallel to the axes, coordinates, straight line graphs, functions, y=mx + c, ax + by = c, gradients and intercepts **Standard constructions** • Construct triangles, bisectors, bearings, scale, isometric drawings • Lines of symmetry, • Rotations, reflections, translations, enlargements
Tier 3 Vocabulary Tier 3 words are low-frequency, subject-specific words.	Expression Depreciation Prism Trapezium Parallelogram	Polygon Intersect Quadratic	Isometric Bisect Bearing Enlargement
Tier 2 Vocabulary Tier 2 words are academic words used in multiple contexts	**Approximate** **Substitute** Solve Expand Cumulative **Volume** **Estimate** Fluency Application **Revenue**	**Parallel** **Minimum** Share Corresponding Interior Exterior	**Formula** **Range** Coordinate Scale Show Stem and Leaf

	Autumn term	Spring term	Summer term
Knowledge	**Perimeter, Area Volume** • Perimeter • Circles • Compound shapes • Volume, • Area and surface area **Simplify, Expand, Factorise, Rearrange** • Simplifying, • Expand brackets, • Factorizing • Substitution • Rearranging **Probability** • Describing probability, • Mutually exclusive events • 2-way tables, frequency trees • Experimental probability • Venn diagrams • Probability trees **Inequalities, Rounding and Estimation** • Inequalities, decimals • Rounding, estimation • Powers, cubes and roots • Calculator skills • Product rule for counting **Fractions** • Equivalent fractions • Simplifying • Ordering • Improper & mixed • 4 operations • BIDMAS	**Charts Pie charts Stem and Leaf and Tables** • Equivalent fractions • Simplifying fractions • Ordering, improper & mixed • 4 operations • BIDMAS • Ratios • Recurring decimals • Equivalents **Handling Data** Bar Charts Two-way tables Pie Charts 1 Stem and Leaf Averages from a table Scatter graphs Time series Frequency Polygons **Rearranging, forming, and solving equations** • Single Brackets • Solve 2 step • Unknown Both Sides Form and Solve Equations Substitution • Changing the subject • Inequalities	**Angles in shapes** • Angles Rules • Measure and Draw Angles • Angles in Parallel lines • Angles in Polygons (no trig) • Coordinates and Shapes **Sequences** • Sequences • Nth Term • Non- Linear Sequences • Fibonacci sequences • Sequences in Real Life • Triangle numbers (basic proofs) **Pythagoras and Trigonometry** • Pythagoras • Pythagoras Applications • 3D Pythagoras • Trigonometry (triangle, area, perimeter) SOH CAH TOA

	• Ratios • Recurring decimals • Equivalents		
Skills			
Tier 3 Vocabulary Tier 3 words are low-frequency, subject-specific words.	Perimeter Inequality Factorise	Improper Algebraically	Fibonacci Pythagoras Trigonometry Sine Cosine
Tier 2 Vocabulary Tier 2 words are academic words used in multiple contexts	**Dimension** **Compound** **Sphere** **Equivalent** Recurring Simplify **Expand** Frequency	Order Ratio Recurring Equivalent Simplify	**Sequence** **Trend** Corresponding Alternate Co-interior Tangent

Key Stage 4 Year 10 – Long Term Planning Edexcel GCSE Maths

	Autumn term	Spring term	Summer term
Knowledge	**G3 – Pythagoras and Trigonometry** • Pythagoras • Pythagoras Applications • 3D Pythagoras • Trigonometry (triangle, area, perimeter) SOH CAH TOA **N3 Fractions percentages and ratio FDPR** • Add and Subtract Fractions • Mult and Divide Fractions • Simple Interest • Compound Interest • Reverse % • Ratio	**G5 – Constructions Loci and Bearings** • Constructions • Loci • Bearings • Scale drawings • Isometric • Plans/elevations 3D **N5 – Rounding, Estimates, Prime Factors, Standard form, Surds** • Expand Binomials • Factorise Quadratics • Roots and Turning Points • Completing the Square • Sketch Quadratics • Quadratic Formula • Repeat Percentage Change	**HD 3 – Populations sampling** • Probability Trees • Conditional Events • AND/OR Rules • Capture – Recapture Method • Limitations and Assumptions • Stratified Sampling • Venn Diagrams • Set Theory **G6 – Vector Geometry** • Vectors • Vectors Ratio and Mid-Points • Parallel Vectors • Colinear Vectors

	• Combined Ratio • Best Value • Decimals • Exchange Rates **A4 - Straight line graphs, DT and Conversion Graphs** • Generate and plot linear graphs • Gradient and intercept • Find the equations of the line from 2 points • The equation of parallel and perpendicular lines • DT graph problems **N4 - Compound Measures** • Converting Units • SDT • Density • PFA • SUVAT • Conversion Graphs • Equation of Real Life Graphs • Rates of Change • VT Graphs **G4 – Transformations** • TERRy • Similarity congruence including area volume scale • Linear, area vol • N&A – Percentages and Interest (F) Quadratic Equations (H) • (F) Applied FDPR • (H) Quadratics including a>1, complete square, turning points	Reverse Percentages • 10 Ratio **A5 – Solving Equations**, • Quadratics, Simultaneous Equations, Algebraic Fractions Inequalities • Solving equations, 2 step unknowns both sides, Form + Solve (Quadratics) • Simultaneous, iteration, algebraic fractions	**G7 – Pythagoras and Trigonometry** • 3D Pythagoras • 3D Trigonometry • Exact Trig Values • Area of any triangle • Cosine Rule – multiple triangles • Sine Rule – Multiple Triangles • Trigonometric Graphs • Transformation of Trig Graphs • Transformations of other Graphs

Tier 3 Vocabulary Tier 3 words are low-frequency, subject-specific words.	Congruent Quotient Compound Interest Simple Interest	Locus Prime Factor Iteration	Algebraic Trigonometry Theorem Vector Venn
Tier 2 Vocabulary Tier 2 words are academic words used in multiple contexts	Conversion Simultaneous Corresponding Alternate Co-interior Gradient Intercept Density Acceleration	Sampling Population Simultaneous	Proof Justify Composite Substitution Identity

Key Stage 4: Year 11 – Long Term Planning Edexcel GCSE Maths

	Autumn term	Spring term	Summer term
Knowledge	**G5 – Constructions Loci and Bearings** • Constructions • Loci • Bearings • Scale drawings • Isometric • Plans/elevations 3D **N5 – Rounding, Estimates, Prime Factors, Standard form, Surds** • Expand Binomials • Factorise Quadratics • Roots and Turning Points • Completing the Square • Sketch Quadratics • Quadratic Formula • Repeat Percentage Change Reverse Percentages	**A6 – Proportion and Graphs** • Direct Proportion • Inverse Proportion • Proportion problem Solving • Equation of a Straight Line and Proportion • Graphical Inequalities • Quadratic Inequalities **G8 – Area, Circumference, Volume of Cylinders, Trapeziums, Circle Theorems** • Circle Theorems • Tangents • Alternate Segments • Geometric Proofs • Truncated Shapes • Area of Segments • Surface Area – Spheres and Cones	Revision

	• 10 Ratio **A5 – Solving Equations**, • Quadratics, Simultaneous Equations, Algebraic Fractions Inequalities • Solving equations, 2 step unknowns both sides, Form + Solve (Quadratics) • Simultaneous, iteration, algebraic fractions **HD 3 – Populations sampling** • Probability Trees • Conditional Events • AND/OR Rules • Capture – Recapture Method • Limitations and Assumptions • Stratified Sampling • Venn Diagrams • Set Theory **G6 – Vector Geometry** • Vectors • Vectors Ratio and Mid-Points • Parallel Vectors • Colinear Vectors **G7 – Pythagoras and Trigonometry** • 3D Pythagoras • 3D Trigonometry • Exact Trig Values • Area of any triangle • Cosine Rule – multiple triangles • Sine Rule – Multiple Triangles • Trigonometric Graphs • Transformation of Trig Graphs • Transformations of other Graphs	• Frustums **A7 – Equation of a Circle (H)** • Equation of a Circle • Quadratic Simultaneous Equations • Functions • Inverse Functions • Composite Functions • Transformations • Algebraic Proofs	

Tier 3 Vocabulary Tier 3 words are low-frequency, subject-specific words.	Loci Surd Standard Form Inequalities Iteration Sine Cosine	Y-Intercept Frustum	
Tier 2 Vocabulary Tier 2 words are academic words used in multiple contexts	Sampling Tangent	Gradient Radius Diameter Composite Substitution Proportion Inequalities Simultaneous Proof	

Appendix – Vocabulary and Key Terms - Definitions

ALGEBRA - A branch of mathematics that substitutes numbers for letters

AVERAGE - The sums of data divided by the number of items in the data will give an average

ACUTE ANGLE - An angle less than 90°

AREA - The amount of space inside the boundary of a flat shape (2- dimensional) object

APPROXIMATE - An Approximation is close to a value, but not completely accurate or exact

ASYMMETRICAL - A shape which has no lines of symmetry

ARC - Part of the circumference (edge) of a circle

AVERAGE - A value to best represent a set of data. There are three type of average – the mean, the median and the mode

AXIS - An axis is one of the lines used to locate a point in a coordinate system

BEARING - A three-digit angle measured from north in a clockwise direction

BIDMAS - The order in which calculations should be carried out :(B)rackets (I)ndices (D)ivision (M)ultiplication (A)ddition (S)ubtraction

BRACKETS - A pair of symbols used to enclose sections of a mathematical expression

BISECT - To divide an angle or shape exactly in half.

CALCULATE - To work out an answer, usually by adding, dividing, subtracting or adding.

COEFFICIENT - The number in front of an algebraic symbol. The coefficient of 6x is 6.

CONSTANT - A letter or symbol whose value always stays the same. Example: in “x + 6 = 8”, 6 and 8 are constants x is variable.

CONGRUENT - Two shapes are congruent when you can Turn, Flip and/or Slide one so it fits exactly on the other.

CHORDA straight line drawn from one point on the edge of a circle to another.

CIRCUMFERENCE - The perimeter, around, of a circle.

CROSS SECTION - The end section created when you slice a 3D shape along its length.

CUBE NUMBER - The product when an integer is multiplied by itself three times. For example, 2 cubed = 2 x 2 x 2 = 16

CUBOID - A 3D shape with all sides made from rectangles. Like a cereal box.

CUMULATIVE FREQUENCY - A running total of the frequencies, added up as you go along

DENOMINATOR - The Downstairs part of a fraction (bottom) part of a fraction.

DECAGON - A ten-sided polygon.

DIAMETER - The distance across a circle which passes through the centre.

DIFFERENCE - Subtract the smaller value from the larger value to find the difference between two numbers.

DISTRIBUTION - How data is shared or spread out.

ESTIMATE - Roughly calculate or judge the value, number, quantity, or extent of a quantity.

EXPAND - To multiply out brackets in an expression. For example, 2(4x + 10) = 8x + 20

EXPRESSION - Numbers, symbols and operators (such as + and ×) grouped together that show the value of something. Example: 2×3 is an expression

FORMULA - An equation used to describe a relationship between two or more variables.

FACTORISE - To put an expression into brackets by taking out a common factor. For example, 2y+6 = 2(y+3)

FACTOR - A number that divides (fits) into another number exactly. E.g. 5 is a factor of 20.

FREQUENCY - How many often something happens.

FREQUENCY DENSITY - The frequency divided by the class width.

GRADIENT - How steep a line is. Found by Rise divided by Run.

HISTOGRAM - A diagram drawn with rectangles where the area is proportional to the frequency and the width is equal to the class interval.

HYPOTENUSE - The longest side on a right-angled triangle.

INDICES - Another name for powers such as ^{2} or ^{3}.

INTEGER - A whole number.

INTER-QUARTILE RANGE (IQR) - The difference between the upper and lower quartile.

IRRATIONAL - A decimal which is never ending. It must also not be a recurring decimal.

JUSTIFY - This just means that you have to explain step by step.

LOCI - The plural of locus.

LOCUS - A collection of points which are the same distance from another point or line.

MEAN - A type of average found by adding up a list of numbers and dividing by how many numbers are in the list.

MEDIAN - The middle value when a list of numbers is put in order from smallest to largest. A type of average.

MODE - The most common value. For example, 5, 6, 7,7, 4, 7, 3. This most common value is 7.

MULTIPLE - Found at the end of the times table. For example, 6 x 3 = 18. So 18 is the multiple.

NUMERATOR - The top part of a fraction.

OBTUSE ANGLE - An angle between 90 and 180.

OPERATION - An operation is an action or procedure which produces a new value. For example, addition, subtraction, division and multiplication are all operations.

PARALLEL - Two or more lines which are always the same distance apart.

PARALLELOGRAM - A quadrilateral with two pairs of parallel sides.

PERIMETER - The distance around a shape.

PERPENDICULAR - Two or more lines which meet at right angles.

PI (Π) - An irrational constant used when calculating the area and circumference of circles. It is approximately equal to 3.14.

POLYGON - A many-sided figure, with sides that are line segments. Examples are, triangles, pentagon and hexagon.

PRIME - number which has exactly two factors. The number one and itself. Such as 5, 13, 23

PRISM - 3D shape with the same cross section all along its length.

PROBABILITY - A measure of how likely an event is to occur.

PRODUCT - The answer when two values are multiplied together.

RADIUS - The distance from the centre of a circle to its circumference.

RANGE - The largest number take away the smallest value in a set of data.

RATIONAL - A decimal number which ends or is recurring.

RECIPROCAL - The reciprocal of any number is 1 divided by the number. E.g. the reciprocal of 3 is 1/3, the reciprocal of 3/4 is 4/3.

RECURRING - A decimal number that has digits that repeat forever. Examples: 1/3 = 0.333… 1/7 = 0.142857142857…

REFLEX ANGLE - An angle greater than 180.

REGULAR - A shape with all sides and angles the same size.

ROTATION - To turn a shape using an angle, direction and centre of rotation.

SEGMENT - An area of a circle enclosed by a chord.

SEQUENCE - A list of numbers which follows a pattern. For example 5, 7, 9, 11, …

SIMPLIFY - Simplify means to make simpler by cancellation of common factors, regrouping of terms in the same variable

SOLVE - To find the missing value in an equation.

SQUARE NUMBER - The product when an integer is multiplied by itself. For example, 2×2 =4, 3×3 =6

SUM -The answer when two or more values are added together.

SURFACE AREA - To total area of all sides on a 3D shape.

SYMMETRICAL - A shape which has at least one line of symmetry.

TANGENT - A straight line that just touches a point on a curve. A tangent to a circle is perpendicular to the radius which meets the tangent.

TERM - A number, variable or combination of both which forms part of an expression.

TRANSFORMATION - The name for reflections, rotations, translations and enlargements.

TRANSLATION - To move a shape from one position to another by sliding in the x-axis followed by the y-axis.

TRIANGULAR NUMBER - A sequence of numbers generated by adding one more than was added to find the previous term. For example, 1, 3, 6, 10, 15, 21, …

VALUE - A numerical amount or quantity.

VARIABLE - A letter which we don’t know the value of.

WIDTH - The measurement or extent of something from side to side

Y-INTERCEPT - The value of the y-coordinate when a graph crosses the y-axis.