GCSE Mathematics Curriculum Intent 2023-2024

"Mathematics expresses values that reflect the cosmos, including orderliness, balance, harmony, logic, and abstract beauty." Deepak Chopra

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.

Our curriculum in mathematics aims to develop fluency in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that students develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. We are also striving to allow students to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, develop mathematical arguments and proofs and make conclusions based on logical inferences. Our intention is also for students to solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions; as such resilience is a crucial skill that we will be cultivating in students. Students also need to be able to utilise technology effectively, such as scientific calculators, to perform increasingly complex problems (as well having strong written and mental mathematical skills, not instead of). As the repertoire of mathematical skills that a student possesses grows increasingly more complex, so should the ability of students to use their mathematics to model real life situations.

At key stage 3, we promote equality by working through the breadth of the curriculum at the same pace for all students so that all students can achieve regardless of their starting point. There are a number of lunchtime clubs in mathematics that are currently under review (Countdown club, 24 club, TT Rockstars club). We extend our highest attaining students through depth and more challenging problem solving, rather than an acceleration of content. At key stage 4, all students continue their mathematical studies on an appropriate GCSE pathway determined by their prior attainment and performance across key stages 2 and 3 to give them the best chance of achieving well in the subject. In all key stages we enter our most able students into the annual UKMT maths challenge competition. We intend for a high proportion of our students to go on and study or use mathematics in some form post-16; this means that our key stage 4 curriculum needs to be broad enough to cater for students who will go on to study maths at the highest level in our Further Mathematics and STEP preparation classes to those who will study Core Mathematics to complement their A Level choices.

In addition to the obvious intention of preparing students for more advanced mathematical studies, mathematics also prepares students for future learning in other disciplines and improves the cognitive ability in general of students and, as such, is essential for their personal development. The study of mathematics conditions the brain to see connections and builds neural pathways that make the brain stronger for

all other things. Mathematical study enhances students' general intelligence and supports the life-long learning of students by: creating a framework in the brain for systematic thinking, developing the ability to solve and analyse problems, stretching the mind to work on unfamiliar tasks with confidence, developing the sequencing skills critical to arriving at accurate results or logical conclusions, promoting caution and care in thinking and deciphering complex mathematical problems to arrive at an accurate answer and learning through trial and error to integrate different principles to arrive at a logical conclusion.

In addition to these disciplinary aspects of the mathematics curriculum, the actual mathematical knowledge and skills that students learn are also vitally important in allowing students to achieve elsewhere in school. Topics studied in mathematics are prerequisite for several disciplines across key stages 3, 4 and 5 such as geography, psychology and economics (to name only a few). Mathematics also provides a theoretical springboard for the ever-evolving STEM sector. Nationally, there are huge shortfalls in job applicants with strong STEM skills and reports estimate that the cost of this shortfall is £1.5 billion each year. Furthermore, occupations in the STEM sector are growing at a rate that nearly is nearly double other sectors which could see this shortfall exacerbated. Our intention is to develop students' abilities sufficiently so that they are able to rise to the challenging opportunities this sector has to offer. In the 21st century science, technology and engineering are constantly changing and have become increasingly important for society. The mathematical principles that govern these areas, however, have not changed and consequently the breadth and depth of our curriculum aims to future-proof our students in this field. This is all in addition to the inspirational and motivating research that claims that candidates with strong maths skills earn on average 11% more in their lifetime.

Mathematics is a discipline which is universal; transcending language and cultural differences. Throughout its rich history, mathematics has adopted elements from around the world and gives students the opportunity to appreciate fundamental truths and create water-tight arguments based on logic and reasoning; as such it helps contribute to the student's spiritual, moral, spiritual and cultural development.

Ultimately, the intention of the maths curriculum is to provide students with the necessary thinking skills and content to be successful in their next stage of life or education.

Assessment

The key principles of feedback in the mathematics department are that feedback should:

- 1. Be specific, accurate and crystal-clear to students.
- 2. Look forwards not backwards
- 3. Inform teachers' planning to secure and further students' learning
- 4. Place the responsibility on the student to forge their next steps
- 5. Allow students to feel pride

In addition, the maths department assessment and feedback policy should be manageable in terms of staff workload and allow for the prioritisation of planning ahead of marking.

During mathematics lessons

During a student's mathematics lesson is where they will receive the most feedback about their performance in the subject. Feedback will be given each lesson to students by the teacher, who has the expert knowledge to do so. This may happen in a variety of ways, which include (but are not restricted to):

- Questioning by the class teacher as part of whole class teaching
- Questioning by the class teacher as part of a conversation with individuals or small groups
- Use of mini whiteboards
- Use of Plickers
- Low stakes quizzes
- Teacher circulating the classroom and correcting mathematical and spelling errors
- Use of exit tickets

In addition, feedback is given to students automatically by several online platforms: Sparx Maths and Method Maths. Information gathered by these forms of assessment should always be used by the class teacher to help decide how best to ensure that students move forward mathematically.

Due to the right/ wrong nature of mathematics, classwork should be self-assessed (or peer-assessed if the teacher deems appropriate). The quality and quantity of student work should be monitored by teachers; this may take place during the lesson or the class teacher may choose to collect student books and monitor this outside of the lesson. In either case, there is no expectation to see written comments from teachers in student books.

Testing is a key component of assessment in mathematics. Each unit of work has a test that accompanies it. Wherever possible, there will be a delay between finishing the unit of work and taking the relevant test. This is to give teachers further insight into what students have *learnt* rather than what they were able to *perform* in lesson. Tests are marked by class teachers and written feedback provided. This may be simply be in the form of ticks, crosses and an overall score or if a key error or misconception has been identified then more detailed feedback would be given (if enough students have made the same error or misconception then this may be addressed with the whole class in lesson time rather than giving written feedback to each student). Records of student scores are stored by class teachers and progress is tracked internally using Edexcel steps. Additional feedback is provided for mock exams in key stage 4 to make these assessments as meaningful as possible for the students. Students are provided with individualised question level analysis from their mock exams which is cross-referenced against Sparx Maths clips to allow students to work independently to address their targets.

Homework

Sparx Maths homework – a weekly Sparx Maths homework is set which contains a combination of questions linked to recent classwork and questions on topics covered earlier in the year. The homework is completed through the website sparxmaths.uk and students are expected to write down their answers and show workings as they would do in lessons. Sparx Maths uses an algorithm to ensure the level of difficulty is appropriate for each individual student. Each student should be aiming to score 100% in their Sparx Maths homework as the pitch of the homework is individualised and there is video support for every question on the task.

Pupils should also be using Sparx Maths for revision purposes. They are provided with a list of appropriate clips to facilitate this.

In Year 11, Method Maths or other forms of exam revision may be used as homework in place of Sparx Maths.

Clubs and/or intervention

The following clubs are under review for Key Stage 4 Mathematics:

- Drop-in clinic for homework help
- UKMT Mentoring

Parental/Carer support

Parents/ carer are able to support their child by monitoring the standard of homework tasks as mentioned above. Parents can also promote use of Method Maths as a useful tool to practise past exam papers.

Helpful sources of information https://sparxmaths.com/ https://corbettmaths.com/ https://www.mathsgenie.co.uk/gcse.html https://www.ukmt.org.uk/ https://www.drfrostmaths.com/ https://www.mathscareers.org.uk/ https://www.methodmaths.info/ https://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html

Connections to Learning

Mathematics is a highly inter-connected discipline. From years 7 to 11 the mathematics curriculum focuses on four strands: number (at GCSE we split this into number and ratio and proportion as two separate strands), algebra, geometry and statistics. These strands can be thought of as symbiotic; advances in one strand allow for further development of the others. Consequently, the connections between the various strands of the mathematics curriculum are myriad and one of the most enjoyable aspects of mathematics is studying seemingly separate areas of study and then making links between them and seeing how these areas interact. In mathematics lessons, depth of understanding is prioritised. This involves taking the time to see how a particular topic links to the other topics that have already been studied. As a consequence of the need to understand all of these various connections within mathematics, students should expect to be given regular opportunity to review prior learning as students will struggle with new concepts if they have not developed fluency with previous concepts.

Below shows the progression of the different strands of key stages 3 and 4. While these topic areas have been presented as four separate strands they should definitely not be viewed as mutually exclusive. As mentioned above each topic area in a given strand links to topics in the

other strands. In key stage four, there is an increased emphasis on problem solving and students need to be prepared to link topic areas together in unusual and interesting ways.

Number:

Number 1: Place Value for integers and decimals, ordering, rounding, upper and lower bounds, use estimation to replace values in calculation, powers of ten, multiplying and dividing by powers of ten

Number 2: Special Numbers: Squares, cubes, roots primes, multiples, factors, prime factor decomposition, LCM, HCF, Venn diagrams, standard form, higher powers, index rules, Number 3: Calculations,(3a) addition, subtraction (including time differences, perimeter) (3b) multiplication and division, problem solving, product rule for counting(3c) calculating with negatives, order of operations Number 4: Fractions and Decimals, (use bar diagrams) equivalencies (fractions to decimals), equivalent fractions and cancelling, adding and subtraction, mixed numbers and improper fractions. Multiplication and fractions of amounts.

Number 5: Revise fractions, addition, subtraction, multiplication and revision, percentages (equivalence and percentage change) and decimals including x and ÷ by 0.1, 0.01, multiplicative reasoning.

Number 6: Ratio and Proportion know and use notation, simplify, share in given ratio, include bar model and problem solving including combining ratios.

Number 7: Consolidate powers and roots if required. Indices including fractional indices and simple surds. Estimating powers and roots of any given number.

Algebra: Algebra 1: Notation, expressions, simplifying, substituting, expanding and factorising Algebra 2: Solving equations linear, brackets, unknowns both sides Algebra 3: Sequences: continuing, term to term, nth term, recognition of arithmetic, geometric, Fibonacci Algebra 4: Algebraic manipulation including index laws, expanding and factorising guadratics, solving quadratics by factorisation. Algebra 5: Coordinate geometry, linear graphs, real life graphs including rates of change and compound measures. Quadratic graphs. Algebra 6: Consolidate solving linear and quadratic equations if required; simultaneous equations and inequalities including inequations, number lines and graphical representations, rearranging formulae

Geometry:

Geometry 1: Properties of 2D shapes, lines and angles including parallel lines, angle sums and polygons, geometric reasoning (proof) **Geometry 2:** Units of measurement, perimeter of compound shapes, area of any 2D shape, names and properties of 3D shapes, volume prisms and cylinders.

Geometry 3: Axes and

Coordinates, basic lines (y=a, x = a). Symmetry and rotation, transformations: reflection, rotation, translation, enlargement including fractional and negative, congruency and tessellations including why some shapes don't tessellate.

Geometry 4: Constructions and Loci Constructing line and angle bisectors, triangles including equilateral triangles, perpendicular from and to a point, angles of 60°, 45°, loci and scale drawing problems **Geometry 5:** Consolidate angles including those in triangles if

required. Pythagoras and trig in right angled triangles. Area of any triangle using sine.

Statistics:

Statistics 1: Types of data, averages and range: Mean, median, mode and range, mean from frequency tables, estimated mean, extend into geometric mean Statistics 2:

Probability including and/or laws, sample spaces, frequency trees, probability trees, two way tables and Venn diagrams, conditional probability, probability using algebraic terms. Statistics 3: Recap averages and range. Collecting and representing data, sampling, pie charts, line graphs, stem and leaf, dual and composite bar charts extending into reverse mean. cumulative frequency, box plots, quartiles and IQR

GCSE Unit 10: Probability **Number 8**: Consolidate percentages, ratio and proportion compound measures. Direct and indirect proportion, percentage change, reverse percentages and growth and decay.

GCSE Unit 4: Fractions, Decimals and Percentages **GCSE Unit 11:** Multiplicative Reasoning

This strand is particularly important for subsequent study in Core Mathematics.

GCSE Unit 9: Equations and inequalities GCSE Unit 15: Equations and Graphs GCSE Unit 6: Further Graphs GCSE Unit 17: Further Algebra GCSE Unit 19: Proportions and Graphs

This strand is particularly important for subsequent study in A Level Mathematics and A Level Further Mathematics. GCSE Unit 16: Circle Theorems GCSE Unit 18: Vectors GCSE Unit 13: Further Trigonometry GCSE Unit 7: Area and Volume GCSE Unit 16: Similarity and Congruence

This strand is particularly important for subsequent study in A Level Mathematics and A Level Further Mathematics. **GCSE Unit 14:** Further Statistics

This strand is particularly important for subsequent study in Core Mathematics.

Connections to Future Pathways

Studying maths helps to develop skills in logical thinking, analysis, problem-solving, decision-making and communication, which are valued by employers across many job sectors. Furthermore, mathematical careers are in every business and industry throughout every sector of the economy. Mathematics may not be the central focus of all professions, but it can serve as critical building blocks of a larger and more meaningful whole. Mechanical engineers, for example, work with numbers for the design and production of all types of simple and complex machines. Actuaries use numbers to calculate and assess the consequences of financial risk. And economists analyse and interpret quantitative data to discern macro- and micro-economic patterns. Banking is a world of numbers and mathematics is used in the way accounts are handled, for calculating interest rates and for determining credit scores.

Data - Again, big data plays a major role in the increased demand for skilled data scientists. It is the job of data scientists to immerse themselves in the ocean of big data, bringing structure to it that, in turn, allows for effective analysis of that data. Many employers rate the ability to handle data very highly.

Number – Banking, Accountancy and Finance. For example, Accountants examine financial records and prepare financial documents for businesses, nonprofits, firms and individuals. They are responsible for the accuracy of the documents they create and for making sure that taxes are paid on time.

Geometry – Architecture, Civil Engineering and Astronomers. Geometry is used in astronomy in many, many ways. One of the most common uses, however, is the use of geometry to find the distance between celestial objects, such as stars and planets. ... But other uses of geometry include measuring the speed and velocity of planets orbiting other stars.

Algebra – Air Traffic Controllers, Video Game Designers and Economists. Air traffic controller uses math in order to be able to understand distances and measurements at a moment's notice. They also must be able to do mental math quickly and accurately. Part of their job is

directing aircraft at what altitude and speed to fly. For example, air traffic controllers frequently need to calculate the minimum safe level for planes to fly at. To do this they use the equation:

Minimum safe level (measured in feet) = $30 \times (1013 - pa)$ (*pa* is the atmospheric pressure. This value can change daily, depending on weather systems.)

Many employers will ask for a good grade in mathematics, even if their daily business does not involve maths. Mathematics is of central importance in numerous careers including: accountancy, actuary, air traffic controllers, architecture, astronomer, banking, big data analyst, business metrics analyst, civil engineering, claims adjuster, control statistician, cryptographer, database administrator, economist, finance, financial analyst, Insurance underwriter, logistics specialist, marketing consultant, operations research analyst, robotics analyst, systems operation analyst, technical mathematical modeller, video game designers

Future learning: A level mathematics, further mathematics, biology, chemistry, physics, geography, psychology, statistics, economics, business studies, computer science; Level 3 BTEC qualifications in engineering, agriculture BTEC level 3; T-levels in building services engineering for construction, design, surveying and planning for construction, digital business services, digital production design and development, digital support services, education and childcare, health, healthcare science onsite construction and science.

Year 10						
	HT1	HT2	HT3	HT4	HT5	HT6
Higher	Unit 18 Vectors	Unit 6 Graphs	Unit 13 Further	Unit 16 Circle	Unit 14 Statistics	Unit 12 Similarity
	Unit 2 Algebra	Unit 9 Inequalities	Trigonometry	Theorems	Unit 7 Perimeter,	and congruence
	Basics	Unit 5	Unit 15 Equations	Unit 6 Non-linear	area and volume	
	Unit 9 Equations	Trigonometry	and graphs	graphs		
Foundation*			Geometric	Percentage	Compound units	Transformations
			constructions and	change	(Topic 5)	Similarity (Topic
			calculations	Fractions and	2D and 3D	9)
			(Topic 8)	decimals (Topic	Representations	
			Direct and	2)	(Topic 8)	
			Inverse	Bivariate data	Probability (Topic	
			proportion Topic	(Topic 12)	11)	
			5)	Indices and		
				standard form		
				(Topic 3)		

	Year 11					
	HT1	HT2	HT3	HT4	HT5	HT6
Higher	Unit 17 Further Algebra Unit 19 Proportion and graphs	Unit 19 Proportion and graphs	Unit 8 Transformations	Assessment preparation	Assessment preparation	Assessment
Foundation*	Sequences (Topic 6) Functions and graphs (Topic 7)	Assessment preparation	Assessment preparation	Assessment preparation	Assessment preparation	Assessment

Term	Knowledge	Assessment	Connections to Learning
	Higher Unit 1 – Number Basics		
Unit 1	 Four operations Rounding Types of number Negative numbers Decimals Order of operations Square and cube roots Indices Prime numbers Factors and multiples Standard form Simplifying surds Rationalising surds Arithmetic with surds 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of these units between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 7 – Perimeter, area and volume Higher Unit 10 – Probability Higher Unit 11 – Multiplicative reasoning Higher Unit 19 – Proportion and graphs 1. Personal Development – being numerate
	Higher Unit 2 – Algebra Basics		

Unit 2	 Expanding brackets Factorising quadratics Laws of indices Forming expressions Collecting like terms Simplifying expressions involving multiplication and division Substitution Rearranging formulae Solving linear equations Linear sequences nth term Geometric sequences Fibonacci sequence Quadratic sequences 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 1 – Number Basics Higher Unit 2 – Algebra Basics Higher Unit 6 – Linear and non- linear graphs Higher Unit 7 – Perimeter, area and volume Higher Unit 9 – Equations and inequalities Higher Unit 15 – Equations and graphs Higher Unit 17 – Further algebra Higher Unit 18 – Vectors and geometric proof Higher Unit 19 – Proportion and graphs 6. Cultural development – mathematics as a universal language which transcends
	Higher Unit 3 – Representing and Interpreting Data	·	
Unit 3	 Averages and range Frequency tables Grouped frequency tables Two way tables Bar charts Pictograms Stem and leaf diagrams Frequency polygons 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular;

	 Time series graphs Pie charts Types of data Scatter diagrams 		Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 6 – Linear and non- linear graphs Higher Unit 10 – Probability Higher Unit 14 – Further statistics 1. Personal development – being data literate
	Higher Unit 4 – Fractions, decimals, percentages and ratio	S	
Unit 4	 Compare fractions, decimals, percentages and faile Compare fractions Simplify fractions Convert between mixed numbers and improper fractions Add and subtract fractions Multiply and divide fractions Reciprocals Convert between fractions, decimals and percentages Convert recurring decimals to fractions Find percentages of amounts Percentage increase and decrease Compound interest (and simple interest) Simplify ratios Unit ratios Share into a ratio Problem solving with ratio Direct and inverse proportion 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 1 – Number Basics Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 5 – Trigonometry and Angles Higher Unit 10 – Probability Higher Unit 11 – Multiplicative reasoning Higher Unit 12 – Similarity and Congruence Higher Unit 19 – Proportion and graphs 1. Personal development – being numerate 1. Personal development – understanding interest rates, Joans, mortgages

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	Higher Unit 5 – Trigonometry and Angles		
Unit 5	 Types of angles Angles on straight lines Angles in a triangle Angles in a full turn Angles on parallel lines Problem solving with angles Angles in polygons Angles properties of 2D shape Symmetry Pythagoras' Theorem Pythagoras' Theorem in 3D. Sine ratio Cosine ratio Tangent ratio Exact trigonometric values 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 9 – Equations and inequalities Higher Unit 12 – Similarity and Congruence Higher Unit 13 – Further trigonometry Higher Unit 16 – Circle theorems
			 Personal development – creating a chain of logical reasoning Cultural development – understanding mathematics' rich history with contributions from across the globe
	Higher Unit 6 – Linear and non-linear graphs		
Unit 6	 Coordinates and axes Midpoints 	Assessment in this half term follows the marking and feedback policy in	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5

	 Gradient of a line segment Plotting linear graphs y=mx+c Parallel and perpendicular graidents Graphical simultaneous equations Quadratic graphs Cubic graphs Reciprocal graphs Equation of a circle Problem solving with non-linear graphs 	the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 2 – Algebra Basics Higher Unit 3 – Representing and Interpreting Data Higher Unit 8 – Transformations Higher Unit 9 – Equations and inequalities Higher Unit 13 – Further trigonometry Higher Unit 15 – Equations and graphs Higher Unit 19 – Proportion and graphs 6. Cultural development – mathematics as a universal
			language which transcends
	Higher Unit 7 – Perimeter, Area and Volume		
Unit 7	 Perimeter Area of rectangles Area of parallelograms Area of triangles Compound area Volume of cuboids Volume of prisms Surface area Circumference of a circle Area of a circle Area of a sector Volume of a cylinder 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of these units between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 1 – Number Basics Higher Unit 2 – Algebra Basics Higher Unit 9 – Equations and inequalities Higher Unit 12 – Similarity and Congruence

	 Volume and surface area of a cone Volume of a frustum Volume of a pyramid Volume and surface area of a sphere Accuracy and bounds Error intervals 		6. Cultural development – understanding mathematics' rich history with contributions from across the globe
	Higher Unit 8 - Transformations		
Unit 8	 Translation Reflection Rotation Enlargement Describing transformations Invariant points Combining transformations Bearings Constructing triangles Constructing angle bisectors Constructing line bisectors Constructing 90°, 45° 60°, 30° or 120° angles Loci Scale diagrams 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 5 – Trigonometry and Angles Higher Unit 18 – Vectors and geometric proof
	Higher Unit 9 – Equations and Inequalities		
Unit 9	 Simultaneous equations by elimination Solving quadratic equations by factorising Solving quadratic equations by completing the square Solving quadratic equations using the quadratic formula Simultaneous equations in context Quadratic equations in context Representing inequalities on a number line Solving linear inequalities Combining solutions to inequalities 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 2 – Algebra Basics Higher Unit 6 – Linear and non- linear graphs Higher Unit 15 – Equations and graphs

	Higher Unit 10 – Probability		Higher Unit 17 – Further algebra Higher Unit 19 – Proportion and graphs 6. Cultural development – mathematics as a universal language which transcends
Unit 10	 Vocabulary of probability Probability scale Probability of single events Mutually exclusive events Expected values Independent events Probability tree diagrams Conditional probability Frequency trees Set notation Venn diagrams Probability using Venn diagrams Systematic listing Product rule for counting 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 1 – Number Basics Higher Unit 3 – Representing and Interpreting Data Higher Unit 4 – Fractions, decimals, percentages and ratio 5. Moral development – ethics of gambling
	Higher Unit 11 – Multiplicative Reasoning		
Unit 11	 Metric units of measure Converting metric units Converting currency Converting time Conversion graphs Speed Density Pressure 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular;

	 Compound units Value for money 		Higher Unit 1 – Number Basics Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 6 – Linear and non- linear graphs Higher Unit 9 – Equations and inequalities
			 Personal development – being numerate Personal development – understanding finances, value for money Cultural development – awareness of other countries currencies with exchange rates
	Higher Unit 12 – Similarity and Congruence		
Unit 12	 Similarity Area and volume scale factors Congruence Congruent triangles Problem solving with congruent and similar triangles 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 5 – Trigonometry and Angles Higher Unit 7 – Perimeter, area and volume Higher Unit 16 – Circle theorems

			1. Personal development – creating a chain of logical reasoning
	Higher Unit 13 – Further Trigonometry	·	
Unit 13	 Sine graph Cosine graph Tangent graph Transforming trigonometric graphs Area of a triangle using sine Sine rule for missing lengths and angles Cosine rule for missing lengths and angles Bearings problems using sine and cosine rule 3D trigonometry 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of these units between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 5 – Trigonometry and Angles Higher Unit 6 – Linear and non- linear graphs Higher Unit 13 – Further trigonometry Higher Unit 17 – Further algebra
	Higher Unit 14 – Further Statistics		
Unit 14	 Census and sampling Stratified sampling Surveys and questionnaires Quartiles Interquartile range Box plots Cumulative frequency diagrams Histograms 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 3 – Representing and Interpreting Data Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 7 – Perimeter, area and volume

			 Higher Unit 10 – Probability 1. Personal development – being data literate
	Higher Unit 15 – Equations and Graphs		
Unit 15	 Simultaneous equations with quadratics Turning point of a quadratic Discriminant and quadratic graph Simultaneous equations graphically Linear inequalities as regions on graphs Quadratic inequalities Iteration 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 2 – Algebra Basics Higher Unit 6 – Linear and non- linear graphs Higher Unit 9 – Equations and inequalities Higher Unit 17 – Further algebra
			6. Cultural development – mathematics as a universal language which transcends
	Higher Unit 16 – Circle Theorems		
Unit 16	 Vocabulary of the circle Angle at the centre is twice the angle at the circumference Angle in a semicircle is 90 Angles in the same segment are equal Opposite angles in a cyclic quadrilateral Alternate segment theorem Tangent meets a radius at 90 Perpendicular bisector of a chord 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 2 – Algebra Basics

	 Problem solving with circle theorems Proof of circle theorems Equation of a circle 		 Higher Unit 5 – Trigonometry and Angles Higher Unit 12 – Similarity and Congruence 1. Personal development – creating a chain of logical reasoning
	Higher Unit 17 – Further Algebra		
Unit 17	 Function notation Composite functions Inverse functions Proof Proof and counter examples Simplifying algebraic fractions Arithmetic with algebraic fractions Solving equations with algebraic fractions 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 2 – Algebra Basics Higher Unit 6 – Linear and non-linear graphs Higher Unit 8 – Transformations Higher Unit 9 – Equations and inequalities Higher Unit 15 – Equations and graphs Higher Unit 19 – Proportion and graphs

			6. Cultural development – mathematics as a universal language which transcends
	Higher Unit 18 – Vectors and Geometric Proof		
Unit 18	 Vectors and scalars Column vectors Multiplying by a scalar Magnitude of a vector Problem solving using vectors 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 2 – Algebra Basics Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 8 – Transformations 1. Personal development – creating a chain of logical reasoning
	Higher Unit 19 – Proportion and Graphs		ł
Unit 19	 Exponential graphs Exponential equations Exponential growth and decay Points on exponential graphs Real life exponential graphs Algebraic direct proportion Algebraic inverse proportion Graph transformations 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of these units between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Higher Unit 2 – Algebra Basics

Higher Unit 4 – Fractions, decimals, percentages and ratio Higher Unit 6 – Linear and non-linear graphs Higher Unit 8 – Transformations Higher Unit 11 – Multiplicative reasoning Higher Unit 13 – Further trigonometry Higher Unit 15 – Equations and graphs Higher Unit 17 – Further algebra Higher Unit 19 – Proportion and graphs
 Social development – understanding exponential spread of viruses Cultural development – mathematics as a universal language which transcends

Term	Knowledge	Assessment	Connections to Learning
	Foundation Unit 1 – Number operations with integers		
Unit 1	 Calculations with integers Whole number theory Combining number operations Inverse operations 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document.	Links to units Number 1 to 7 from key stage 3 and all GCSE units.

		Students will be assessed on the content of these units between 1 and 2 weeks after finishing the unit	Links to all GCSE Mathematics content; Foundation Unit 2 – Fractions, decimals and percentages Foundation Unit 3 – Indices and Surds Foundation Unit 4 – Approximation and estimation Foundation Unit 5 – Ratio, proportion and rates of change Foundation Unit 6 – Algebra Foundation Unit 6 – Algebra Foundation Unit 7 – Graphs of equations and functions Foundation Unit 8 – Basic geometry Foundation Unit 9 – Congruence and similarity Foundation Unit 10 – Mensuration Foundation Unit 11 – Probability Foundation Unit 12 - Statistics
			 Personal Development – being numerate
	Foundation Unit 2 – Fractions, decimals and percentages		
Unit 2	 Fractions Decimal fractions Percentages Ordering fractions, decimals and percentages 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers

			Foundation Unit 5 – Ratio, proportion and rates of change Foundation Unit 11 – Probability 1. Personal development – being numerate
			understanding interest rates, loans, mortgages
	Foundation Unit 3 – Indices and Surds		
Unit 3	 Powers and roots Standard form Exact calculations 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 6 – Algebra Foundation Unit 10 – Mensuration
			being numerate
	Foundation Unit 4 – Approximation and estimation		
Unit 4	Approximation	Assessment in this half term follows	Links to units Number 1 to 7,
	Estimation	the marking and feedback policy in the assessment section at the top of this document.	Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum.
			Links to all GCSE Mathematics content, in particular;

		Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Foundation Unit 1 – Number operations with integers Foundation Unit 2 – Fractions, decimals and percentages Foundation Unit 10 – Mensuration 1. Personal development – being numerate
	Foundation Unit 5 - Ratio, proportion and rates of change		
Unit 5	 Calculation with ratio Direct and inverse proportion Discrete growth and decay 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 2 – Fractions, decimals and percentages Foundation Unit 9 – Congruence and similarity 1. Personal development – being numerate 2. Social development – understanding exponential spread of viruses
	Foundation Unit 6 - Algebra		

Unit 6	 Algebraic expressions Algebraic formulae Algebraic equations Algebraic inequalities Language of functions Sequences 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 7 – Graphs of equations and functions Foundation Unit 8 – Basic geometry Mensuration 6. Cultural development – algebra as a universal language which transcends
	Foundation Unit 7 – Graphs of equations and functions		
Unit 7	 Graphs of equations and functions Straight line graphs Transformations of curves and their equations Interpreting graphs 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of these units between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 6 – Algebra 6. Cultural development – algebra as a universal language
	Foundation Unit 8 – Basic geometry		which transcends

Unit 8	 Conventions, notation and terms Ruler and compass constructions Angles Properties of polygons Circles Three-dimensional shapes 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 4 – Approximation and estimation Foundation Unit 6 – Algebra Foundation Unit 9 – Congruence and similarity Foundation Unit 10 – Mensuration 1. Personal development – creating a chain of logical reasoning 6. Cultural development – understanding mathematics' rich history with contributions from across the globe
	Foundation Unit 9 – Congruence and similarity		
Unit 9	 Plane isometric transformations Congruence Plane vector geometry Similarity 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers

	Foundation Unit 10 - Mensuration		Foundation Unit 8 – Basic geometry Foundation Unit 10 – Mensuration 1. Personal development – creating a chain of logical reasoning
Unit 10	 Units and measurement Perimeter calculations Area calculations Volume and surface area calculations Triangle mensuration 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 4 – Approximation and estimation Foundation Unit 6 – Algebra Foundation Unit 8 – Basic geometry Foundation Unit 9 – Congruence and similarity 6. Cultural development – understanding mathematics' rich history with contributions from across the globe
	Foundation Unit 11 – Probability		
Unit 11	 Basic probability and experiments Combined events and probability diagrams 	Assessment in this half term follows the marking and feedback policy in	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5

		the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 2 – Fractions, decimals and percentages Foundation Unit 4 – Approximation and estimation Foundation Unit 12 - Statistics
			5. Moral development – ethics of gambling
	Foundation Unit 12 - Statistics		
Unit 12	 Sampling Interpreting and representing data Analysing data 	Assessment in this half term follows the marking and feedback policy in the assessment section at the top of this document. Students will be assessed on the content of this unit between 1 and 2 weeks after finishing the unit	Links to units Number 1 to 7, Algebra 1 to 6, Geometry 1 to 5 and Statistics 1 to 3 from key stage 3 curriculum. Links to all GCSE Mathematics content, in particular; Foundation Unit 1 – Number operations with integers Foundation Unit 11 – Probability
			 Personal development – being data literate

*A small number of students follow a different curriculum involving sitting the Edexcel Awards but over the course of the two years they will still have covered the required content for foundation tier mathematics.