CURRICULUM OVERVIEW
Mathematics

A Lakelands Mathematics student should be fluent in number skills and an adaptable problem solver.

Lakelands Whole Academy Curriculum Intent:

Our aim is to provide a diverse, accessible, challenging and inspiring curriculum for the students of Lakelands, our core purpose to develop well-rounded, confident young people, with the integrity, resilience and high aspirations to thrive in the future. The curriculum is designed to provide them with the core knowledge they need to succeed in education, and to become successful members of society. We encourage them to be curious and open-minded, and develop the necessary critical, creative and problem-solving skills to be able to make a difference in their future lives. All students benefit from a culturally enriching curriculum that has depth, breadth and regular revisiting of knowledge to give them the confidence to succeed. It is a curriculum designed to encourage learners to step outside their comfort zone and embrace challenge. By drawing on the best that's been thought, said and done in each subject, we hope that our curriculum enables our young people to appreciate and participate in the full richness of the human experience.

Mathematics Curriculum Intent:

Mathematics is a wonderful subject which underpins so many other disciplines.

Our intention for our curriculum is:

By studying mathematics, students are aware of real-life opportunities and implications of number. Numbers are everywhere and our students will leave Lakelands knowing how they apply to a range of situations. The mathematics curriculum aims to equip students with the knowledge, ability, and functionality to solve, reason and justify problems by applying their mathematical skills to a variety of real-life applications. This is supported by embedding and regularly reinforcing cross curricular skills through the six strands of mathematics: Number, Algebra, Probability, Statistics, Geometry and Ratio and Proportion. The sequencing of our curriculum is designed to embed learning into the long-term memory by having a long spiral curriculum. Each time students revisit an area, they are exposed to more complex content, building on what they have already learnt. At Lakelands we challenge our students, whilst providing appropriate scaffolding, to ensure that all students develop a robust schema through the rigorous development of knowledge and skills across the curriculum. Using their knowledge of the strands, students will be able to simplify problems into a series of smaller steps that will enable them to solve, reason and justify their solution to any problem. Within lessons students are explicitly taught strategies to solve problems and are encouraged by teacher modelling to be able to express themselves in mathematical language. The keywords are introduced early in the lesson to allow this to happen. Throughout our curriculum we use diagnostic questions to underpin the knowledge of our students and use this to address common misconceptions. Our lessons are designed to allow students to discuss their thinking and articulate how they achieved their answers. This approach challenges our students to gain a deeper understanding of the mathematical skills we are embedding, and further enhances their use of mathematical language. We want the pupils of Lakelands to question what and why they are learning to gain a much deeper understanding and knowledge of mathematics. We aim to inspire our students to appreciate the power and beauty of mathematics and to gain a sense of enjoyment and curiosity from the mathematics that surrounds them in everyday life. We offer Level 2 certificate in Further Maths to stretch and challenge the most able and prepare them for A level Maths and other subjects with a high mathematical content. We have a fundamental belief that all students are able to succeed in Maths. Their achievement is enabled through the process of intelligent practice, effective curriculum sequencing, and instilling a love of mathematics which will inspire our students to believe in themselves, enjoy the subject and to succeed.

Implementation

Lessons are engaging because they are rigorous. Students want to succeed, and, through hard work and achievement, they want to learn more. Modelling is a key aspect of teaching in Mathematics. Through regular feedback and guided practice, students master key concepts, methods, processes and formulas. Teachers explicitly teach students how to learn and revise so that they can be successful in regular low stakes tests whilst reinforcing their knowledge for the larger end of module/term assessments and ultimately their GCSE examinations. This helps to ensure long-term retention of core principles from KS3 through to KS4 and beyond. Within lessons, teachers will use starters to revisit and reinforce previously taught topics to embed these into the long-term memory of our students. Our students will also have opportunities to apply problem solving skills, ensuring that they can apply the skills learnt throughout the modules to more functional style problems. The Maths GCSE, with its increased focus on real world problem solving, demands higher literacy skills, and we therefore aim to embed literacy throughout our curriculum. We focus on tier 2 and 3 vocabulary in all lessons and explicitly challenge students to apply this knowledge to be able to locate the maths within language rich lessons, where we require pupils to dissect and analyse key words to understand what the problem demands of us.

How the Mathematics curriculum links to our core Curriculum Principles:	
Lifelong Learning	Students are encouraged to be curious, independent, and critical thinkers whilst ensuring they have the required numeracy skills essential for lifelong learning.
Aspiration to succeed	Increasing challenge and complexity of knowledge/skills builds confidence and the aspiration to succeed.
Knowledge building	Regular assessment both formal and informal are an integral part of the curriculum delivery to enable learners to recall and then access the higher-level skills of analytical problem solving and evaluation.
Empathy for others	Values of compassion, tolerance, inclusion, and diversity are reinforced through the curriculum, strengthened by an understanding of the evolution of democracy and human rights.

IMPLEMENTATION

Year 7 Curriculum Implementation

In Year 7, our students are taught in forms before moving into broad banding to allow students to progress at the best pace for everyone. It builds upon the knowledge gained during KS2. It aims to accelerate their understanding of the applications of mathematics whilst continuing to ensure numeracy skills continue to improve. The depth of study and understanding of the core number, algebra, shape and data handling skills increases throughout Year 7 with a notable focus on problem solving and algebraic skills designed to prepare students for Year 8.

	Knowledge and skills	**Assessment**
1	Algebraic Thinking – Sequences – Rather than rushing to find rules for nth terms, we start by investigating sequences from both diagrams and lists of numbers. Graphs are drawn so students appreciate and understand the words 'linear' and 'non-linear' and see how this relates to the patterns they spot. Calculators are used as required so that number skills are not a barrier to progress.	We use low stakes questioning in every lesson. The use of mini-whiteboards enables us to identify individuals who have misconceptions which we can then rectify **Formal Assessments**
2	Algebraic Thinking – Understand and use algebraic notation- here the focus is on developing a deep understanding of the basic algebraic forms and more complex ones are introduced later and where appropriate to stretch and challenge. Function machines along with bar modelling and letter notation are used and time is invested looking at inverse operations through function machines.	
3	Algebraic Thinking – Equality and equivalence- Here students are introduced to forming and solving linear equations, building upon their understanding of reverse operations. The equations met will often require use of a calculator to solve to ensure understanding rather than spotting solutions via trial and improvement.	

4	Place Value and proportion – Place value & ordering integers & decimals – During this unit, students will explore numbers into billions as well as decimals with hundredths and thousandths. For some students, standard form will be introduced. Using and understanding numbers lines is focused on in preparation for working with coordinate axes.	Each students takes a 'Core' 20 mark unit assessment and then every two units, students take either a scaffolding assessment or an extension assessment. We use low stakes questioning in every lesson. The use of mini-whiteboards enables us to identify individuals who have misconceptions which we can then rectify **Formal Assessments** Each students takes a 'Core' 20 mark unit assessment and then every two units, students take either a scaffolding assessment or an extension assessment.
5	Place value and proportion – Fraction, decimal & percentage equivalence - Building on the recent work on decimals, the key focus for this next unit is students to gain an understanding of the links between fractions, decimals and percentages so they can convert fluently between those most commonly seen in real life. The foundation strand will focus on multiples of one tenth and one quarter whilst the highest strand will look at more complex conventions. Whilst looking at percentages, pie charts will be reintroduced and addition using various forms of representation of any fraction will be studied, focusing on equivalence in an appropriate depth to the current attainment of the students; this will be revisited later in the year. The focus is very much on a secure understanding of the most common fractions under one but fractions above 1 will be touched upon, particularly in the higher strand	
6	Application of number – Solving problems with addition and subtraction -The focus for the next couple of weeks is building on the formal methods of addition and subtractions students have developed at key stage 2. All students will look at this in the context of interpreting and solving problems. For those whom these skills are secured, problems will be drawn from context of perimeter money, interpreting bar charts and tables and looking at frequency trees. We believe all these are better studied alongside additions and subtraction rather than separately. Calculators will be used to check or support calculations with significant figures and equations explicitly revisited.	
7	Application of number – Solving problems with multiplication and division - The rest of this unit is dedicated to the study of multiplication and division. Therefore, allowing for the study of forming and solving 2 steps equations both with and without a calculator unit conversions will be the main context as multiplication by 10 100 and 1000 are explored. As well as distinguishing between multiples and factors, substitution and simplification can also be revised and extended. Again the emphasis will be on solving problems, particularly involving area of common shapes and the mean. Choosing the correct context to solve a problem will also be a focus. There will be some exploration of the order of operations which will be reinforced alongside much of this content next term when studying directed number.	
8	Application of number – Fractions & percentages of amounts - The short block focuses on the keys hot concepts of working out fractions and percentages of quantities and the links between the two. This will be studied in greater depth in Year 8.	
9	Directed number – operations with directed number - Students will only have had limited experience of directed number in primary school so this block is designed to extend and deepen their understanding of this. Multiple representations and context will be used to enable students to appreciate the meaning behind operations with negative integers rather than relying on a series of potentially confusing rules. As well as exploring directed number in its own right, this block provides valuable opportunities for revising number and extending earlier topics, notably outbreak areas such as substitution and the solution of equations in particular. Students will be introduced to 2 step equations for the first time.	
10	Fractional thinking – Addition and subtraction of fractions - This block builds on the autumn term of study of 'key' fractions, decimals and percentages. It will provide more experience of equivalence of fractions with any denominators and to introduce the addition and subtraction of fractions bar models. Concrete representations will be used extensively to support this. Adding fractions with the same denominators will lead to further explanation of fractions greater than one and for the core strand adding and subtracting with different denominators will be restricted to cases where one is a multiple of the other.	

11	Lines and Angles – Constructing, measuring, and using geometric notation - Students will build on their Key Stage 2 skills, using rulers protractors and other measuring equipment to construct and measure increasingly complex diagrams and using the correct mathematical notation. This will include three letter location for angles, the use of hatch marks to indicate equality and the use of arrows to indicate parallel lines. Pie charts will be studied here to gain further practice and drawing and measuring angles.	
12	Lines and Angles – Developing geometric reasoning - This continues the work from the previous unit and moves into basic geometric language names and properties of types of triangles and quadrilaterals and the names of other polygons angles will be introduced. Students will form short chains of reasoning. The highest rank will take this further, investigating and using parallel lines.	
13	Reasoning with number – developing number sense - Students will review and extend their mental strategies with a focus on using a known fact to find other facts. Strategies for simplifying complex calculations will also be explored. The skills gained in working with number facts will be extended to known algebraic facts. Previous work interwoven in this unit will be generating and describing sequences substitution into expressions and the order of operations.	
14	Reasoning with number – sets and probability - FDP equivalents will be revisited in the study of probability where students will also learn about set notation and systematic listing strategies. Other topics interwoven into this will be fractions, decimals, percentages forming and solving equations adding and subtracting with fractions.	
15	Reasoning with number – Prime numbers & proof - Factors and multiples will be revisited to introduce the contact of prime numbers and the higher strand will include using venn diagrams from the previous unit to solve more complex HCF and LCM problems. Odd, even, prime square and triangular numbers will be used as the basis of forming and testing conjectures. The use of counter examples will also be addressed. Generating and describing sequences will once again be recovered in this section.	
Cross-curricular links in Y7: **Most of the maths covered in this year is used throughout Science, Design Technology, Food Technology and Geography amongst others, e.g.** **Science – Sequences and Graphs, Standard form** **DT – Lines, Angles and Measuring** **Food – Ratio and proportion, FDP in Recipes**		
Careers: During unit 11 – construction of a box task, discuss the marketing/design/Packaging/Construction jobs.		

Year 8 Curriculum Implementation

In Year 8, our students build upon the content in Year 7. Number skills continue to be practiced throughout, and algebra becomes far more prevalent this year, building upon basics to allow students to understand generalisations rather than specific examples. Graphical methods for representing data is a focus to allow students to use graphs and charts to help them provide reasoned arguments in a data context. Geometry builds on the work covered in Year 7 and extends into the use of parallel lines and properties of shape, again to allow students to start to construct mathematical arguments.

	Knowledge and skills	**Assessment**
1	Proportional reasoning – Ratio & scale - This unit focuses initially on the meaning of ratio and the various models that can be used to represent ratios. Based on this understanding, it moves on to sharing in a ratio, given the whole or one of the parts and how to use them, for example the bar models are used to ensure the correct approach to solving a problem. After this, we look at simplifying ratios using previous answers to deepen the understanding of equivalent ratios rather than 'cancelling' purely as	We use low stakes questioning in every lesson.

	procedure. We also explore the links between ratio and fractions and understand the use of pi as the ratio of the circumference of a circle to its diameter students following the highest strand also look at gradient in preparation for next half term.	The use of mini-whiteboards enables us to identify individuals who have misconceptions which we can then rectify **Formal Assessments** Each students takes a 'Core' 20 mark unit assessment and then every two unit students take either a scaffolding assessment or an extension assessment. We use low stakes questioning in every lesson. The use of mini-whiteboards enables us to identify individuals who have misconceptions which we can then rectify **Formal Assessments** Each students takes a 'Core' 20 mark unit assessment and then every two unit students take
2	Proportional reasoning – Multiplicative change - Students now work with the link between ratio and scaling including the idea of direct proportion. This links with various forms including graphs and using contexts, such as conversion of currencies which provide rich opportunities for problem solving. Conversion graphs will be looked at in this block and could be revisited in the more formal graphical work later in the term, links are also made with maps and scales and the use of scale factors to find missing lengths in pairs of similar shapes.	
3	Proportional reasoning – Multiplying and dividing fractions - Students will have had little experience of multiplying and dividing fractions in Year 6, so here we seek to deepen understanding by looking at multiple representations to see what underpins the often-confusing algorithm. Multiplication and division by both integers and fractions are covered with an emphasis on understanding of the reciprocal and its uses links between fractions and decimals are once again revisited students following the higher strand will also cover multiply and dividing with mixed numbers and improper fractions.	
4	Representations – Working in the cartesian plane - Building on their knowledge of coordinates from key stage 2 students will look formally at rules for straight lines starting with lines parallel to the axes and then moving on to the more general form. They can explore the notions of gradient and intercepts, but the focus at this stage is using the equations to produce lines rather than the interpretation of M and C from a given equation (this gets covered in Year 9). Use of technology to illustrate graphs will be embedded. Appreciating the similarities and differences between sequences, lists of coordinates and lines is another key point. Students following the higher strand may also explore non-linear graphs and midpoints of line segments.	
5	Representations – Representing data - Students are introduced formally to bivariate data and the idea of linear correlation. They extend their knowledge of graphs and charts from Key Stage 2, to deal with both discrete and continuous data. Students will be able to construct and interpret appropriate tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line bar charts for ungrouped and group numerical data students. Students should be able to describe simple mathematical relationships between two variables in observations and experimental contexts and illustrate these using scatter graphs.	
6	Representations – Tables and Probability - Building from the Year 7 unit, this short block reminds students of the ideas of probability, in particular looking at sample spaces and the use of tables to represent these. A focus on the language and the properties to analyse probability and statistics is covered.	
7	Algebraic techniques – Brackets, equations and Inequalities - Building on their understanding of equivalence from Year 7, students will explore expanding over a single bracket and factorise by taking out common factors. The highest strand will also explore using and expanding to binomials. All students will revisit and extend their knowledge of solving equations, now to include those with brackets and for the higher strand with unknowns on both sides. Bar models will be recommended as a tool to help students make sense of the maths. Students will also learn to solve formal inequalities for the first time, learning the meaning of a solution set and exploring similarities and differences compared to solving equations. Emphasis is placed on both forming and solving equations rather than just looking at procedural methods of finding solutions.	
8	Algebraic techniques – Sequences - In the short block we reinforce students learning from the start of Year 7, extending to investigate sequences with more complex algebraic rules, now that the students are more familiar with a wider range of algebraic notation. The highest strand includes finding the rule for the nth term of a linear sequence. Using objects and images to	

	understand the meaning of the rule, students will understand arithmetic and geometric sequences and appreciate that there are other sequences which arise such as Fibonacci.	either a scaffolding assessment or an extension assessment.
9	Algebraic techniques – Indices - Before exploring the ideas behind addition and subtraction laws of indices (which will be revisited when we get to the standard form in the next term), the groundwork is laid by making sure students are comfortable with the expressions involving powers and simplifying, for example $3x^2 \times 5xy^3$. The highest strand also looks at finding powers of powers.	
10	Developing number – Fractions and Percentages - This block focuses on the relationships between fractions and percentages, including decimal equivalents, and using these to work out percentage increase and decrease. Students also explore expressing one number as a fraction and a percentage of another. Both calculator and non-calculator methods are developed throughout to support students to choose efficient methods. Financial Maths is developed through the context of profits, loss and interest. The highest strand also looks at finding the original value given a percentage or after a percentage change.	
11	Developing number -Standard index form - Higher students have briefly looked at standard form in Year 7 and now this knowledge is introduced to all students, building from their earlier work on indices last term. The use of context is important to help students make sense of the need for the notation and its uses. The highest strand includes a basic introduction to negative and fractional indices. Links are made to Science with regards to populations of bacteria and distances to the planets.	
12	Developing number -Number sense - This block provides a timely opportunity to revisit a lot of the basic skills in a wide variety of contexts. Estimation is a key focus, and the use of mental strategies will therefore be embedded throughout. We will also use conversion of metric units to revisit multiplying and dividing by 10, 100 and 1000 in context. The highest strand will extend this to look at the conversion of area and volume units, as well as having an extra step on the use of the error notation. We also look explicitly at solving problems using the time and calendar as this area is sometimes neglected, leaving gaps in student knowledge.	
13	Developing geometry -Angles in parallel lines and polygons - This unit builds on the Key Stage 2and Year 7 understanding of angle notation and relationships, extending all students to exploring angles in parallel lines and solving increasingly complex missing angle problems. There is a focus on closely connected properties of polygons and quadrilaterals. The use of dynamic geometry software to illustrate results is used and students following the highest strand will also develop their understanding of the idea of proof. They will also start to look at exploring constructions with rulers and pairs of compasses.	We use low stakes questioning in every lesson. The use of mini-whiteboards enables us to identify individuals who have misconceptions which we can then rectify **Formal Assessments** Each students takes a 'Core' 20 mark unit assessment and then every two unit students take
14	Developing geometry – Area of trapezia and circles - Students following the highest strand will have met the formula for the area of a trapezium in Year 7 and this knowledge is now extended to all students along with the formula for the area of the circle. A key aspect of the unit is choosing and using the correct formula for the correct shapes, reinforcing recognizing the shapes, their properties and names and looking explicitly at compound shapes.	
15	Developing geometry -line symmetry and reflection - The teaching of reflection is split from that of rotation and translation to try and ensure students gain a deeper understanding and avoid mixing up the different concepts. Whilst a short unit, time is invested building confidence with shapes and lines in different orientations. Students can revisit and enhance their knowledge of special triangles and quadrilaterals and focus on key vocabulary such as object, image, congruent etc.	
16	Reasoning with data -the data handling cycle - Much of the statistics content in Key Stage 3 is the continuation of that studied at primary school and many of the charts and graphs in this block have been used in Year 7 and earlier in Year 8. A particular focus is using charts to compare different distributions. We also explore where graphs may be misleading, an important real life consideration. Collection of data is also covered including designing and critiquing questionnaires. As we are covering the elements of the data handling cycle, we use this unit to investigate the average Year 8 student project.	

17	Reasoning with data – measures of location - Students have already met the median and the mean earlier at Key Stage 3. This unit introduces the mode and looks at when and why each average should be used. Students following the higher strand will look at the mean from grouped and ungrouped frequency tables, and these steps may well also be accessible to the vast majority of students following the core strand. The previous unit built on students having an opportunity to compare distributions, so they now use these averages along with the range. We also consider outliers, considering what effect these have on all the measures and whether they should be included or excluded from the calculation; again, this contributes to the average year of Year 8 student project	either a scaffolding assessment or an extension assessment.
Cross-curricular links in Y8: Number continues to be a focus and its use through most other subjects is a requirement. Ratio and scale relate to the practical subjects: DT, Food and Art Standard form specifically discusses Science aspects with all students this year, not just the more able. Data graphs relate to those in Geography, discussion of the difference between Science and Maths with regard to lines (or curves in science) of best fit. Symmetry and reflection bring in Rangoli patterns from RS.		
Careers During unit 5/6/16/17 Data units – discuss data jobs, why working within data is critical to so many industries, discuss which people would want to know about the 'Average 13 year old' and extrapolate to other age groups.		

Year 9 Curriculum Implementation – start GCSE – Unit in bold refer to the Edexcel units which we have broken down to avoid entire half terms just focused on one branch, as we feel an entire term of just number without studying and algebra, shape or data is not as beneficial.

In Year 9, our students build on the knowledge gained during Years 7 and 8 and we make a start on the GCSE curriculum. At this stage, students are placed into sets after consideration of their end of Year 8 exams and units assessments throughout the year. Groups aim for either higher tier or the foundation tier although we continue to move students between groups when required to ensure all students are being challenged to achieve their best grades.

	Knowledge and skills – Higher Tier Students	**Assessment**
1	**Calculations, checking and rounding:** In this first unit, we consolidate these skills from previous years and apply them to more complex multistep problems. Much of this unit will have been encountered by students in previous Key Stages, meaning that teaching time may focus on application or consolidation of prior learning.	**Informal Assessment** The nature of the subject means immediate feedback is critical and as such informal assessment is taking place continually through lessons, as we start GCSE we continue to use low stakes questioning in every lesson. We continue the use of mini-whiteboards as this enables us to identify individuals who have
2	**Algebra the basics:** Again, with this module we build on the knowledge of previous years. We place a greater emphasis on the use of the correct notation and build in writing and solving multi step algebra problems. We also liaise with Science and use the kinematics formulae to practise our substitution skills. We deepen our algebraic manipulation skills to include linear expansion and factorising.	
3	**Indices, roots, reciprocals, and hierarchy of operations:** here we take the opportunity to consolidate work covered in previous years and extend into algebraic indices.	
4	**Averages and Range -** Students during this unit will learn to calculate averages from both discrete and continuous data. We also introduce the notation of sampling and bias. Students will be required to use and create biased and non -biased samples and use these to predict trends of the whole population. This is extended further within Geography, being used to analyse data within their river investigation assessments.	

5	**Factors, Multiples and primes:** once again this unit will have been covered previously and this is an opportunity to consolidate understanding and students learning how to apply their understanding and formulate reasoned arguments. Students should be able to provide convincing counterarguments to statements concerning properties of stated numbers, e.g. *Sharon says 108 is a prime number. Is she correct?*	misconceptions which we can then rectify **Formal Assessments** Students take end of unit assessments consisting of past GCSE questions on the content covered. At the end of year 9 all students take the Edexcel baseline assessment at one of three tiers and this is used to inform the best set for each individual for year 10.
6	**Polygons, angles and parallel lines:** This unit uses the knowledge gained in previous years to further our understanding of angles in polygons and parallel lines. We use our knowledge of 2D shapes and their parallel lines to discover angle facts in polygons. We move away from the traditional "calculate the missing angle" problems and introduce more reasoning and justification style problems, such as: *My exterior angle is 30^o. How many sides does the polygon have?*	
7	**Setting up, rearranging, and solving equations:** We deepen our algebraic manipulation skills to include linear expansion and factorising. Within the module we strengthen the students' knowledge of solving equations and extend it to solving inequalities. Once students have mastered this, we deepen their understanding with the introduction to error bounds.	
8	**Fractions:** this unit consolidates the fractions work covered previously, extending into practical uses of fractions and for the more able, working with algebraic fractions.	
9	**Representing and interpreting data:** Here we reinforce the skills of drawing graphs and tables whilst developing the interpretation skills. Students will be able to produce and interpret a variety of graphs including composite bar charts, time series graphs, histograms (with equal and unequal bars) and stem and leaf diagrams. They will also be able to identify the mode from these charts and be able to recognise simple patterns and characteristics of these graphs. This is also used as an opportunity to consolidate the work on averages and range.	
10	**Standard form and surds:** We introduce the notation of surds as well. Students will be expected to cancel surds to their simplest form and use surds in exact solutions to multistep problems. With standard form we apply the rules of indices from standalone calculations to applying the four rules of numbers. We link with Science during this module.	
11	**Sequences:** Sequences are reintroduced in this module, as we extend from linear sequences and quadratics sequences into geometric and Fibonacci sequences, bringing in the opportunity for solving equations and inequalities once again.	
12	**Scatter graphs:** A very short unit that ensures students understand about correlation and that just because two variables show positive correlation, it doesn't necessarily mean one variable is causing the change in the other. The differences between Maths and Science are emphasized with the line of best fit verses a curve of best fit.	
13	**Percentages:** In this module, we revisit fraction and percentage of quantities whilst moving to converting between fractions, decimals, and percentages. Students will extend this knowledge to ordering FDP in ascending and descending order. Students' knowledge of percentages is deepened further with the introduction of simple interest problems and calculating reverse percentages. Students are taught the basics of income tax, mortgages, credit card payments and savings.	
14	**Graphs:** the basics and real-life graphs: We build upon students' knowledge of coordinates and graphs in Unit 6. Not only are students expected to plot and draw graphs, but they must also now be able to interpret graphs, calculate gradients, and find midpoints of coordinates. Students will also be expected to complete real-life graphs from the information provided. These graphs will also be extended into the negative axes. Students will also have to be aware of units now as it becomes more common for questions to contain a mixture of units that they will be expected to convert between.	
15	**Probability:** We use the knowledge of FDP and probability from previous years to distinguish the probabilities of various events happening, to calculate mutually exclusive outcomes and introduce tree diagrams. Students will be expected to list the outcomes of two or more events happening and calculate the associated probabilities. Probability can also draw on their knowledge of Venn	

	diagrams and use this to represent the outcomes of real-life situations. Our tree diagrams knowledge is extended to calculate probabilities of two or more events happening with replacement. Students are expected to calculate the different probabilities of events based on the occurrence of the first event	
	Knowledge and skills – Foundation Tier Students	
1	**Integers and place value:** In Unit 1, we consolidate these skills from previous years and apply them to more complex multistep problems. Much of this unit will have been encountered by students in previous key stages, meaning that teaching time may focus on application or consolidation of prior learning. Students should be able to provide convincing counter arguments to statements concerning properties of stated numbers, e.g. *Sharon says 108 is a prime number. Is she correct?*	**Informal Assessment** The nature of the subject means immediate feedback is critical and as such informal assessment is taking place continually through lessons, as we start GCSE we continue to use low stakes questioning in every lesson. We continue the use of mini-whiteboards as this enables us to identify individuals who have misconceptions which we can then rectify **Formal Assessments** Students take end of unit assessments consisting of past GCSE questions on the content covered. At the end of year 9 all students take the Edexcel baseline assessment at one of three tiers and this is used to inform the best set for each individual for year 10.
2	**Expressions and Substitution:** Within this module, we build on the knowledge of previous years. We place a greater emphasis on the use of the correct notation and build into writing and solving multi step algebra problems. We also liaise with Science and use the kinematics formulae to practise our substitution skills.	
3	**Tables and Charts:** In Unit 3a, we reinforce the skills of drawing and using tables whilst developing interpretation skills. They will also be able to recognise simple patterns and characteristics of these tables. We link with data from Geography and Science and the latest news throughout this module.	
4	**Decimals:** In this module we moving into converting between fractions, decimals and percentages. Students will extend this knowledge to ordering FDP in ascending and descending order. Students' knowledge of percentages is deepened further with the introduction of simple interest problems and calculating.	
5	**Drawing and Interpreting Graphs:** In this unit we revisit the tables and charts and reinforce the skills of drawing graphs whilst developing interpretation skills. Students will be able to produce and interpret a variety of graphs including composite bar charts, time series graphs, histograms, Venn diagrams and stem and leaf diagrams. They will also be able to identify the mode from these charts, and be able to recognise simple patterns and characteristics of these graphs.	
6	**Angles, Polygons and Parallel Lines:** Unit 6 uses the knowledge gained in previous years to further our understanding of angles in polygons and parallel lines. We use our knowledge of 2D shapes and their parallel lines to discover angle facts in polygons. We move away from the traditional "calculate the missing angle problems" and introduce more reasoning and justification style problems, such as: *My exterior angle is 30o how many sides does the polygon have?*	
7	**Indices, powers, and roots:** In this unit we revisit all the basic skills and calculations with integers and extend into the use of indices, powers and roots, extending into working with algebraic indices.	
8	**Pie Charts:** In this module we focus on pie charts and their construction. We revisit the practical skills of using protractors and pairs of compasses.	
9	**Factors, multiples, and primes:** In this unit we focus on challenge to ensure the understanding of these key definitions and the properties or each set of numbers. Venn diagrams are revisited to allow more complicated questions with big numbers to be included.	
10	**Statistics, Sampling and Bias:** Our statistical knowledge is built upon in Unit 7. We touch upon it in Unit 3; however, in this unit we calculate averages from both discrete and continuous data. We also introduce the notation of sampling and bias. Students will be required to use and create biased and non-biased samples and use these to predict trends of the whole population.	
11	**Expanding and factorising single brackets:** Within this module, we build on the knowledge Unit 2a. We increase the emphasis of using the correct notation. We deepen our algebraic manipulation skills to include linear expansion and factorising. These skills will be revisited throughout further units.	

12	**The Averages:** The unit is designed to consolidate and build upon all the statistics concepts covered so far. The focus is on averages from frequency tables and how problems can be reversed to increase the complexity of questions.	
13	**Fractions** - In this module we revisit fractions and extend into algebraic fractions where suitable for the group.	
14	**Expressions and substitution into formulae:** In this unit we recap the basic meaning of algebraic expressions before moving into substituting into formulae, we include a strong focus on the formulae used in Science. The basics of transforming formulae is started with the more able students.	
15	**Scatter graphs**: This unit is where we recap the Cartesian Plane before progressing into scatter graphs and their uses; frequently anonymised test results data from the group are used to ensure relevance.	
16	**Interior and exterior angles of polygons:** This unit uses the knowledge gained in previous years to further our understanding of angles in polygons and parallel lines. We use our knowledge of 2D shapes and their parallel lines to discover angle facts in polygons. We move away from the traditional "calculate the missing angle problems" and introduce more reasoning and justification style problems, such as *My exterior angle is 30o how many sides does the polygon have?*	
17	**Fractions, decimals, and percentages:** In this module, we revisit fraction and percentage of quantities whilst moving to converting between fractions, decimals and percentages. Students will extend this knowledge to ordering FDP in ascending and descending order. Students' knowledge of percentages is deepened further with the introduction of simple interest problems and calculating reverse percentages.	
18	**Probability:** This unit uses the knowledge of FDP and probability from previous years to distinguish the probabilities of various events happening, to calculate mutually exclusive outcomes and introduce tree diagrams. Students will be expected to list the outcomes of two or more events happening and calculate the associated probabilities. Probability can also draw on their knowledge of Venn diagrams and use this to represent the outcomes of real life situations.	

Cross-curricular links in Y9:
The maths covered features heavily in other subjects and by this stage we expect the majority of students to have confident number skills to access content required in Science, Geography and DT.

Careers: Higher – Unit 10 – standard form – importance to scientific jobs. Unit 15 – Probability – how it is used in Actuarial positions.
Foundation – Unit 5 – Drawing and interpreting graphs – who uses graphs, why do they use them, how do they help inform us, e.g. Time series graphs – global warming and temperature changes, interest rates, investment analysis, fuel cost changes, cost of living, etc. Unit 16 – Angles in polygons - use in the construction industries - Roof trusses, designing a lean to shed.

Year 10 Curriculum Implementation
In Year 10, our students build on the knowledge they gained in Year 9. Setting is considered again in light of their performance on Edexcel baseline assessments to ensure they are now following the most suitable tier for both their target grade and their current performance. The course content means that students recap much of Year 9 as we cycle around into harder topics using the skills gained during Year 9.

	Knowledge and skills – HIGHER tier students	**Assessment**
1	**Ratio and Proportion** - We deepen their understanding of multi operational problems with ratio, fractions and percentages. Students will also be expected to calculate unitary ratios and express ratios as 1:n. Students will also be familiar with direct	**We continue with same assessment methods used in**

	proportion from their work in previous years. We use this knowledge to introduce inverse proportion, for example: *If it takes 2 builders 10 days to build a wall, how long would it take 5 builders?*	**Year 9; students become familiar with the ways they are assessed and are supported with lessons on revision methods and strategies.** **During Year 10 we start introducing students to full GCSE papers to help them prepare for their end of year mock exams.** **Students take 3 papers, the same format as taken at GCSE so by Year 11 students have a full understanding of what is required for success at GCSE.** **We continue with same assessment methods used in Year 9; students become familiar with the ways they are assessed and are supported with lessons on revision methods and strategies.** **During Year 10 we start introducing students to full GCSE papers to help them**
2	**Solving Quadratics and simultaneous equations** - In this unit, we deepen our understanding of linear equations and develop our understanding of solving linear simultaneous equations. This builds upon solving linear equations, forming and solving equations, factorising and expanding brackets. Students will be expected to form and solve two linear equations to calculate two variables.	
3	**Perimeter, Area and Circles** - Students build upon their knowledge of area, perimeter and volume of regular shapes and extend this to compound shapes and problem solving questions. In this chapter, we extend our knowledge of perimeter, area to circles. Students are expected to learn the names for the parts of the circle and the formula associated with calculating area and circumference. Students will also be expected to calculate exact answers for these by leaving them in terms of π. We also introduce arcs and sectors.	
4	**Linear Graphs and coordinate geometry** - We build upon students' knowledge of coordinates and graphs in this unit. Not only are students expected to plot and draw graphs, they must now be able to interpret graphs, calculate gradients, and find midpoints of coordinates. Students will also be expected to complete real life graphs from the information provided. These graphs will also be extended into the negative axes. Students will also have to be aware of units now as it becomes more common for questions to contain a mixture of units that they will be expected to convert between.	
5	**3D forms and volume, cylinders, cones and spheres** - In this chapter, we extend our knowledge of volume to circles, cylinders, cones and spheres. When calculating surface area and volume of spheres and cones, the formula will no longer be provided in the exam, so practice in this chapter will be ensuring all students can recall, use and apply them.	
6	**Inequalities** - Within the module we strengthen the students' knowledge of solving equations and extend it to solving inequalities. Once students have mastered this, we deepen their understanding with the introduction to error bounds.	
7	**Quadratic, Cubics and other graphs** -in this unit we recap Linear graphs and extend into graphs of other functions. Students are expected to know the basic shapes of quadratics, cubics, exponential and reciprocal graphs. Students should be able to both plot but also the higher skill of sketching, marking important features.	
8	**Pythagoras' Theorem and trigonometry** - We build upon the knowledge of square numbers from Unit 1 and use this to understand Pythagoras Theorem. Students will use Pythagoras to calculate the hypotenuse, but will also be expected to rearrange the formula to calculate one of the shortened lengths. Students will also be introduced to surds, in order to calculate exact answers. Trigonometry builds on the skills learnt in Pythagoras Theorem and applies them to SOHCAHTOA. Students will be expected to calculate missing sides and angles using Trigonometry.	
9	**Transformations** - Whilst working through the four transformations (Reflection, Rotation, Enlargement and Translation) they will be introduced to both negative and fractional versions. Students will also be expected to solve multistep transformation problems, both drawing and interpreting. During the module, students will be introduced to the notation of proof, whilst demonstrating that two or more shapes are congruent.	
10	**Constructions, loci and bearings** - This chapter revisits the constructions of triangles and polygons from previous years and expands to perpendicular and angular bisectors. Once students have mastered these, we move to constructing the locus of a point or multistep loci problems. To finish the module, we use the angle knowledge gained in Unit 6 and apply this to bearing problems. Pupils will plot ship journeys and calculate position of objects based on the bearings from each other. To extend this further, we use scale drawing to accurately construct bearing journeys.	
11	**Accuracy and bounds** – this unit is a quick recap of accuracy, error bounds and the practical applications.	

12	**Similarity and congruence in 2D and 3D** – In this unit we fully define congruence and similarity. Students will be aware that congruency means shapes are identical and similarity means they are an enlargement of each other. Students will be aware that shapes do not need to be in the same orientation to be similar or congruent and will apply their knowledge of transformations from an earlier unit. Within the Higher scheme of learning, students are expected to prove similarity and congruency between triangles using SSS, SAS, ASA and RHS conditions. Within the unit of similarity, students will be expected to manipulate linear scale factors and apply them to area and volume problems.	**prepare for their end of year mock exams.** **Students take 3 papers, the same format as taken at GCSE so by Year 11 students have a full understanding of what is required for success at GCSE.**
13	**Collecting data** – Here we introduce the notation of sampling and bias. Students will be required to use and create biased and non -biased samples and use these to predict trends of the whole population. This can extended further within Geography, being used to analyse data within their river investigation assessments.	
14	**Solving quadratics, expanding 2 or more brackets, graphs of cubic's and circles** – This unit is an opportunity to revisit much of the algebra content covered in Years 9 and 10 to enable students to be confident with the skills required for their end of Year 10 examinations.	
15	**Circle theorems and circle geometry** - This unit extends pupils' current knowledge of parts of a circle and teaches them the circle theorems. They will be able to calculate missing angles by applying one or more circle theorem. They will also be able to calculate the gradient of a tangent to a circle, or equations of perpendicular.	
16	**Cumulative frequency, box plots and histograms.** – This unit extends on the data handling skills covered in previous years. Cumulative frequency curves and box plots are introduced and the effectiveness for being able to compare sets of data is highlighted by using class test data. Histograms and the reasons for unequal bar widths for practical purposes are discussed.	
	Knowledge and skills – Foundation tier students.	**Assessment**
1	**Interior and Exterior angles** – This unit uses the knowledge gained in previous years to further our understanding of angles in polygons and parallel lines. We use our knowledge of 2D shapes and their parallel lines to discover angle facts in polygons. We move away from the traditional "calculate the missing angle problems" and introduce more reasoning and justification style problems, such as: *My exterior angle is 30o how many sides does the polygon have?*	**We continue with same assessment methods used in Year 9; students become familiar with the ways they are assessed and are supported with lessons on revision methods and strategies.** **During Year 10 we start introducing students to full GCSE papers to help them prepare for their end of year mock exams.** **Students take 3 papers, the same format as taken at GCSE so by Year 11 students have a**
2	**Equations** – in this unit we extend students skills at solving equations, moving towards the balancing method for all students. Students are shown how to form equations from a variety of topics including angles in polygons, and the properties of a wide variety of 2D shapes.	
3	**Perimeter and Area** - Students build upon their knowledge of perimeter, area and surface area of regular shapes and extend this to compound shapes and problem-solving style questions. Students also extend their knowledge of unit conversions and apply these to area problems.	
4	**Real Life Graphs** - We build upon students' knowledge of coordinates and graphs in this unit. We focus on graphs from real life situations. Students are expected to plot and draw graphs, and they must now be able to interpret graphs.	
5	**3D forms and volume** - Here we revisit the area formulae and apply them to volume of prisms and compound prisms. Students also start to understand the implications of changing between units of measurement within a question.	
6	**Inequalitie**s - This unit is an opportunity to consolidate the balancing method for solving equations and then inequalities are introduced. Students must be able to represent inequalities on number lines, and give largest and smallest integer solutions to problems.	
7	**Straight line graphs**- We build upon students' knowledge of coordinates and graphs in this unit. Not only are students expected to plot and draw graphs, they must now be able to interpret graphs, calculate gradients, and find midpoints of coordinates. These	

	graphs will also be extended into the negative axes. Students will also have to be aware of units now as it becomes more common for questions to contain a mixture of units that they will be expected to convert between.	**full understanding of what is required for success at GCSE.**
8	**Sequences** - Sequences are reintroduced in this module. We extend from linear sequences and move onto quadratic and Fibonacci sequences. Links between linear graphs are explored, and it's an opportunity for students to extend into non-linear graphs.	
9	**Percentages** - Students will extend their knowledge of FDP into sorting ascending and descending order. Students' knowledge of percentages is deepened further with the introduction of simple interest problems and calculating reverse percentages. This unit is used to introduce many real-life skills such as income tax and compound interest on credit cards.	
10	**Transformations** - Whilst working through the four transformations (reflection, rotation, enlargement and translation) they will be introduced to both negative and fractional versions. Students will also be expected to solve multistep transformation problems both drawing and interpreting. During the module, students will be introduced to the notation of proof, whilst demonstrating that two or more shapes are congruent.	
11	**Ratio** - Students have encountered ratio earlier in their mathematical journey. We deepen their understanding to multi operational problems with ratio, fractions and percentages. Students will also be expected to calculate unitary ratios and express ratios as 1:n.	
12	**Proportion** - Students will also be familiar with direct proportion from their work in previous years. We use this knowledge to introduce inverse proportion, for example: *If it takes 2 builders 10 days to build a wall how long would it take 5 builders?*	
13	**Pythagoras and Trigonometry** - We build upon the knowledge of square numbers from unit 1 and use this to understand Pythagoras' theorem. Students will use Pythagoras' to calculate the hypotenuse, but will also be expected to rearrange the formula to calculate one of the shorter lengths. Students will also be introduced to surds, in order to calculate exact answers. Trigonometry builds on the skills learnt in Pythagoras' theorem and applies them to SOHCAHTOA. Students will be expected to calculate missing sides and angles using trigonometry.	
14	**Probability** - We use the knowledge of FDP and probability from previous years to distinguish the probabilities of various events happening, to calculate mutually exclusive outcomes and introduce tree diagrams. Students will be expected to list the outcomes of two or more events happening and calculate the associated probabilities. Probability can also draw on their knowledge of Venn diagrams and use this to represent the outcomes of real life situations.	
15	**Quadratic equations** - We deepen their knowledge of linear expanding and factorising and develop quadratic factorising and expanding multi bracket polynomials. Once mastered, we use factorising to solve quadratic equations. We finish the module by applying our knowledge of powers to drawing quadratic and cubic graphs.	
16	**Constructions, loci and Bearings** – This unit revisits the constructions of triangles and polygons from previous years and expands to perpendicular and angular bisectors. Once students have mastered these, we move to constructing the locus of a point or multistep loci problems. To finish the module, we use the angle knowledge gained at the start of the year and apply this to bearing problems. Pupils will plot ship journeys and calculate position of objects based on the bearings from each other. To extend this further, we use scale drawing to accurately construct bearing journeys.	
17	**Plans, elevations and nets** – This unit allows the opportunity to revise many topics covered this year, particularly, perimeter, area, surface area, volume and converting between units in a 'real world' way, whilst considering the construction and associated costs of a simple shed, using percentages to consider bulk discounts.	
Careers: Higher Unit 3/5 – Area and volume– Tiling/ flooring costings, Garden design and costing, efficient use of materials e.g. Max box task. Unit 8 – Trigonometry – talk about the vast uses; Unit - 10/12 Constructions & Scale Drawing – Architecture and planning application. Bearings – outward bounds instructors, navigation – ships, Planes – runway numbering is based on their bearing direction etc.		

Foundation – Unit 13 – Trigonometry – talk about the vast uses; Unit - 16/17 Constructions & Scale Drawing – Architecture and planning application. Bearings – outward bounds instructors, navigation – ships, Planes – runway numbering is based on their bearing direction etc.

Year 11 Curriculum Implementation

Year 11 is a synoptic year that will be largely based on the Mock Exams that the pupils will sit at the end of Term 1. Students take additional maths mock papers throughout February to April to aid revision and preparations for GCSE. They will be expected to recall and apply knowledge from the previous 4 years to functional and GCSE style problems, whilst preparing them to continue their mathematical journey after they leave. Our strongest students are offered the opportunity to take the AQA Further Maths Level 2 Certificate, which is studied in hourly sessions weekly afterschool.

	Knowledge and skills – Higher Tier students	**Assessment**
1	**Multiplicative reasoning –** This unit primarily focuses on compound measures such as speed, distance, time and density, mass, volume. Students should be aware of these through the work they have done in Science and Geography. Students are expected to be able to convert between metric and imperial units of distance. Students will also be expected to use decimal multipliers now to find percentages of quantities and apply this skill to compound interest.	**We continue with same assessment methods introduced in Year 9.** **Low stakes questions** **Use of mini-whiteboards.** **End of unit assessments.** **We start to increase exposure to GCSE papers by students completing one paper per fortnight either in class or as homework, which are then marked either together as a class to enable students to understand marking schemes or by staff.** **Students take a full set of GCSE papers for their mock exams and then further individual papers through February – April; these papers are all broken down by question to allow staff and students to be**
2	**Trigonometrical Graphs –** In this unit pupils will be introduced to the graphs of the trigonometric functions y = sin x, y = cos x or y = tan x and should be able to sketch these. Pupils are expected to know the exact values of sin x or cos x for x = 0o , 30 o , 45 o , 60 o and 90 o . Pupils will also learn to transform these graphs.	
3	**Reciprocal and Exponential graphs and Functions –** By this point students will be confident with a range of graphical functions, as we use this unit to investigate how to transform graphs, and to use compound functions and inverse functions. Students will learn how to find the area underneath graphs and the gradient of curves in context.	
4	**Further Trigonometry –** Students will extend their knowledge of Unit 7 by being able to calculate the area of triangles using the formula Area = ½(abSinC). They will also apply this to calculate sides or angles given the area. Their knowledge of Pythagoras from Unit 5 will also need to be applied to 3D problems, which is further extended to calculating the angle between a diagonal and plane using basic trigonometry. Students will be introduced to and expected to rearrange and apply the sine and cosine rules.	
5	**Vectors and Geometrical reasoning -** In unit 18 we introduce vector notation and pupils will understand and interpret vectors as displacements in a plane. Pupils will be able to represent vectors in a diagram, and manipulate vectors. By applying Pythagoras' theorem, pupils will be able to calculate the magnitude of vectors. Students will also be able to solve geometric problems in 2D using vectors and calculating resultant vectors. Using this knowledge, students will gain an understanding of geometric proofs involving vectors.	
6	**Mock revision – we spend 2 weeks focused on past papers in preparation for the mock papers and show a wide variety of revision techniques to enable students to revise effectively.**	
	Changing the subject – all of the skills in the unit have been introduced throughout year 9 and 10, this is an opportunity to revise a unit that students find challenging with the most demanding questions.	
	Direct and indirect proportion. The rate of change aspects of this module serve to deepen their understanding of direct and inverse proportion. Students will be expected to fully understand direct proportion; as x increases so does y, and inverse proportion; as x increases, y decreases.	

	Exam Preparation - The final 5 months of work are largely based on the QLA analysis from the previous exam papers, their year 11 mocks and the additional maths mock papers through Feb-April. Our teaching is tailored to individual groups of students in order to ensure they have full fluency in application of knowledge, ensuring confidence in themselves and the topics, and can establish links between maths and other subjects. Throughout the spring terms where resources allow, we run afternoon intervention sessions to allow students to achieve their potential.	**able to direct independent revision.**
	Knowledge and skills – Foundation Tier students	**Assessment**
1	**Multiplicative Reasoning** - This unit primarily focuses on compound measures such as speed, distance time and density, mass, volume. Students should be aware of these through the work they have done in Science and Geography. Students are expected to be able to convert between metric and imperial units of distance. The rate of change aspects of this module serve to deepen their understanding of direct and inverse proportion. Students will be expected to fully understand direct proportion; as x increases so does y, and inverse proportion; as x increases, y decreases. Students will also be expected to use decimal multipliers now to find percentages of quantities and apply this skill to compound interest.	**We continue with same assessment methods introduced in Year 9.** **Low stakes questions** **Use of mini-whiteboards.** **End of unit assessments.** **We start to increase exposure to GCSE papers by students completing one paper per fortnight either in class or as homework, which are then marked either together as a class to enable students to understand marking schemes or by staff.** **Students take a full set of GCSE papers for their mock exams and then further individual papers through February – April; these papers are all broken down by question to allow staff and students to be able to direct independent revision.**
2	**Circles, cones and spheres** – The study in Year 9 of area, volume and perimeter of polygons is extended to circles, cylinders, cones and spheres. Students are expected to learn the names for the parts of the circle and the formula associated with calculating area and circumference. Students will also be expected to calculate exact answers for these by leaving them in terms of π. When calculating surface area and volume of spheres and cones, the formula will no longer be provided in the exam, so practice in this chapter will be ensuring all students can recall, use and apply them.	
3	**Fractions and reciprocals** - Here we solidify our fraction knowledge and apply this to find reciprocals of fractions and integers. Once students are confident with the notation that the power of -1 is a reciprocal of a number, we extend this to all negative integers.	
4	**Similarity and Congruence** – In this unit we fully define congruence and similarity. Students will be aware that congruency means shapes are identical and similarity means they are an enlargement of each other. Students will be aware that shapes do not need to be in the same orientation to be similar or congruent and will apply their knowledge of transformations from an earlier unit.	
5	**Indices and Standard form**-. With standard form, we apply the rules of indices from standalone calculations to applying the four rules of numbers. We link with science during this module through size of molecules to interstellar travel	
6	**Mock Revision**	
7	**Vectors –** In this unit Vectors are used to builds upon their knowledge of Pythagoras' theorem in order to calculate magnitude. Students will also have to apply the four rules of number to vector calculations.	
8	**Rearranging equations, Graphs, and simultaneous equations -** During this final unit we master our solving linear equations and extend this to rearranging equations to change the subject of the formula. Building on prior knowledge, we apply our reciprocal knowledge in plot and draw reciprocal graphs, whilst exploring why the reciprocal of zero produces a math error on the calculator. Simultaneous equations finish the foundation scheme of learning. This builds upon solving linear equations, forming and solving equations, factorising and expanding brackets.	
9	**Exam Preparation** - The final 5 months of work are largely based on the QLA analysis from the previous exam papers, their Year 11 mocks and the additional maths mock papers through Feb-April. Our teaching is tailored to individual groups of students in order to ensure they have full fluency in application of knowledge, ensuring confidence in themselves and the topics, and can establish links between maths and other subjects. Throughout the spring terms, where resources allow, we run afternoon intervention sessions to allow students to achieve their potential.	

Careers:

Higher – Unit 3 Reciprocal/exponential graphs – biology and exponential growth of bacteria, exponential decay – Half life of radioactive substances; Unit 5 – Vectors – how they are used in computer programming for gaming and also their use in Traffic control; Use of graphs for Modelling situations and to make predications etc for the future.

Foundation – Unit 1 – Multiplicative reasoning – how indirect proportion can be used to help schedule a large project – e.g. Building a house etc – Build a Macdonald's restaurant in 24 hours video; Unit 7 – Vectors – how they are used in computer programming for gaming and also their use in traffic control.

IMPACT OF THE MATHEMATICS CURRICULUM

To ensure that all students make good progress, students are assessed through low stakes testing bi-termly and formally assessed at the end of each term. Key knowledge and vocabulary will be taught and assessed through knowledge organisers, whist Key Stage 4 focuses more on the fluency of mathematics. Pupils' engagement in homework will be monitored through Show My Homework and the use of MathsWatch.

Through the curriculum we aim to develop pupil's appreciation of the power and beauty of Mathematics. By the end of their mathematical journey at Lakelands all pupils will be able to:

Reason mathematically

- extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations
- extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically
- identify variables and express relations between variables algebraically and graphically
- make and test conjectures about patterns and relationships; look for proofs or counter-examples
- begin to reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative, or proportional reasoning
- explore what can and cannot be inferred in statistical and probabilistic settings and begin to express their arguments formally.

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
- begin to model situations mathematically and express the results using a range of formal mathematical representations
- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.

WIDER CURRICULUM OFFER

The following sections clarify how areas such as Personal development, Careers and Cultural Capital are woven into the intention, implementation and impact of the subject curriculum.

Personal Development within the Mathematics curriculum	
Personal Development	Mathematics is the means of looking at the patterns that make up our world and the intricate and beautiful ways in which they are constructed and realised. Numeracy is the means of making that knowledge useful. Mathematics contributes to the school curriculum by developing pupils' abilities to calculate; to reason logically, algebraically, and geometrically; to solve problems and to handle data. Mathematics is important for pupils in many other areas of study, particularly Science and Technology. It is also important in everyday living, in many forms of employment, and in public decision-making. As a subject, Maths presents frequent opportunities for creativity, and can stimulate moments of pleasure and wonder when a problem is solved for the first time, or a more elegant solution to a problem is discovered, or when hidden connections suddenly manifest. It enables pupils to build a secure framework of mathematical reasoning, which they can use and apply with confidence. The power of mathematical reasoning lies in its use of precise and concise forms of language, symbolism, and representation to reveal and explore general relationships. These mathematical forms are widely used for modelling situations; a trend accelerated by computational technologies. The subject transcends cultural boundaries, and its importance is universally recognized. Mathematics helps us to understand and change the world.
SMSC	The Mathematics department at Lakelands Academy supports the development of SMSC in the education of its students not only through specific topics in the curriculum but also how we teach and how we conduct ourselves as professionals. The development of critical thinking skills enables students to analyse, evaluate and reflect upon their solutions. Encouraging a positive mindset is essential when learning to cope with new mathematical methods and/or difficult problems to develop perseverance in our students. Mathematics is important in everyday life, and it is something we use all the time, often subconsciously: many jobs require being able to use and apply concepts and most subjects will use ideas encountered in Maths. Our aim is that opportunities for SMSC development are formally documented through the 5 year (all through years 7 to 11) scheme of work that is being developed and delivered on an ongoing basis. This involves identifying real world and problem-solving opportunities in addition to sourcing good quality resources that provide a variety of opportunities to vary the activity types when teaching a specific topic. **Spiritual development:** Developing a logical approach and the ability to recall and reason, along with questioning the way in which the world works promotes the spiritual growth of our students. In Maths lessons, pupils are always encouraged to delve deeper into their understanding of mathematics and how it relates and can be used to explain the world around them. We aim to be enthusiastic about the subject and to use a range of teaching strategies that allow pupils to be creative (i.e. tessellating shapes) or imaginative (i.e. designing exam questions) whilst offering opportunities for students to work through the "don't get it" moments and experience the satisfaction of that "eureka" when an idea is understood. Mathematics, as the Science of "Numbers" can be used to • explain naturally occurring patterns/sequences or symmetry such as is seen in a snowflake, or the seeds in a sunflower. • consider the concept of infinity (and beyond), the golden ratio and pi to convey the "beauty in the Maths".

Moral development:
The moral development of pupils is evident in much of the curriculum where Maths is used in real life contexts and the students are able to apply the skills required to solve various problems and understand how decisions are made, dependent upon the outcomes of the problem. Through these scenarios, students understand that certain choices may have different consequences and outcomes. We believe and hope to develop an awareness that Maths is not strictly limited to problems that result in right/wrong solutions.

An obvious topic for this theme will develop when looking at percentages, more specifically in comparing rates of interest on borrowing money where the role of "loan sharks" could be explored and discussed. Additionally, many "data handling" topics lend themselves to developing this theme further:

- The importance of understanding which "average" is used by different forms of media and why they may have made that choice.
- The use of misleading graphs and the interpretation of data to support or refute a claim.
- Stereotypical bias when teaching questionnaires and samples.

Social development
Using and applying mathematics involves being able to solve problems and being able to do this individually, as part of a team or pair when a task requires it, is fundamental. Students are encouraged to communicate mathematically when discussing, explaining, and presenting ideas, through which they are able to develop their mathematical reasoning skills.

Developing self-awareness and the ability to support other students allows effective use of self and peer reviewing to be used, which enables students to have an accurate understanding of their strengths and weaknesses. It is therefore essential that seating plans are used that support each other's learning and teachers use their professional judgment ensuring the most effective classroom layout is used to support different activities. We hope to enable our students to enjoy their success in Maths and will celebrate accordingly whilst supporting any short-term failure through interventions as and when required. Social development is aided further by fostering a problem-solving approach to any work set that encourages students to break tasks into smaller manageable parts, often with the assistance of other students.

Cultural development
Mathematics is the universal language of the world, and we aim to develop a realisation that many topics we learn today have travelled across the world and are used internationally. Inevitably when introducing many topics, discussions will take place about their origins and the cultural influences that steered the development of these topics e.g. Ancient Greece and the birth of geometry or tessellations in Rangoli patterns. This cultural and historic importance is encouraged through the use of bespoke topic homework that require students to research key historical figures in the development of mathematics through the ages.

Careers in the Mathematics curriculum

There is a demand for mathematicians and statisticians across a range of sectors. Mathematicians work in the petroleum and nuclear industries, medicine and health, IT, business consultancy and operational research, space science and astronomy, as well as many forms of engineering and different government departments. Typical employers include:

- local and central government
- the NHS
- educational establishments

- the pharmaceutical industry
- IT companies
- engineering companies
- insurance companies
- market research and marketing companies
- Finance, banking and accountancy firms.

Cultural Capital in the Mathematics curriculum

The essential knowledge that pupils need to be educated citizens, introducing them to the best that has been thought and said and helping to engender an appreciation of human creativity and achievement

Mathematics is a universal language with a myriad of cultural inputs through the ages. At Lakelands, we encourage the teaching of various approaches to Mathematics including the Chinese lattice method for multiplication. We also explore the mathematics applied in different cultures such as Rangoli patterns, symmetry, tessellations and Islamic geometric patterns. The ability to use exchange rates for foreign travel and the calculations of VAT are also important life skills pupils will be taught.

Examples of cultural development in maths include:

- Pupils investigating the different number sequences and where they occur in the real world
- Allowing discussions on the cultural and historical roots of mathematics, such as Pythagoras' theorem
- Pupils discussing the use of mathematics in cultural symbols and patterns
- Investigating who has the "best" mathematical mind throughout history.