Mathematics at Key Stage 3 at Cottenham Village College aims to ensure that all students are fluent in the key skills that underpin mathematics and are developing a deep understanding of the key concepts. We encourage students to make connections between different topics and apply their skills to tackle complex and unfamiliar problems.

At Cottenham Village College we routinely use a range of strategies to formatively assess and give feedback to students about their progress. In mathematics these strategies include the use of questioning within the classroom, analysis of students' homework on Sparx maths and half termly assessments which assess both current and prior learning. Students will receive whole an analysis sheet from their assessment and will receive feedback in lessons following the assessment.

Autumn Term (first half)	Angles and Polygons	Algebraic Shape	Sequences
Key subject knowledge	Know the conventions for labelling and referring to the sides of angles and triangles. Understand angles at a point, on a straight line, vertically opposite, alternate and corresponding angles in parallel lines. Know the sum of angles in a triangle. Be able to work out the sum of angles in an n sided polygon. Know that the interior angle and exterior angle always sums to 180^o.	Be able to use the geometric properties of polygons to solve problems using mathematical reasoning. Be able to translate simple situations or procedures into algebraic expressions or formulae.	Be able to work out sequences from term-to-term or position-to-term rules, including from patterns and diagrams. Recognise triangular, square and cube numbers. Recognise simple arithmetic progressions, and be able to work out the nth term rule. Be able to use the nth term rule to identify if a term is in a sequence. *Recognise quadratic sequences, and work out the nth term rule of a quadratic sequence.
Summative assessment strategies	Will be assessed via a written assessment in lessons before October half term.		
How does this unit prepare students for future study?	Angles and polygons build on students' work on angles and shapes in Years 7 and 8, developing their understanding to tackle more complex problems which involve multiple angle rules. Algebraic shape develops and consolidates students' understanding of both 2D shape and forming and solving linear equations, bringing together their skills and knowledge from several topics across Years 7 and 8. The sequences module builds on prior work on sequences and solving linear equations.		

Autumn Term (second half)	Pythagoras	Introduction to Proof	Transformations
Key subject knowledge	Understand and recall Pythagoras' theorem as a property of areas. Know that in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the two shorter sides. Be able to apply Pythagoras' theorem to work out a missing side length in right-angled triangles, given two other side lengths.	Be able to prove something is false by giving a counter-example. Be able to construct basic algebraic proofs, by representing numbers algebraically and manipulating algebraic expressions.	Be able to complete all four transformations of 2D shapes: reflections, rotations, translations and enlargements. Be able to describe all four transformations, using key vocabulary. Be able to complete and describe combined transformations. *Be able to enlarge shapes given a negative scale factor. *Be able to fully describe the image following an enlargement by a negative scale factor.
Summative assessment strategies	Will be assessed via a written assessment in lessons before the Christmas holiday.		
How does this unit prepare students for future study?	Studying Pythagoras' theorem will develop students' understanding of 2D shape and allow them to complete more complex mathematical problems concerning right-angled triangles. An introduction to proof will enable students to build on their understanding of representing numbers algebraically, and give them the skills to develop more complex proofs as they move in to Key Stage 4. Transformations develops the work students have done in Year 7 and 8, giving them the opportunity to tackle combined transformations and more complex situations.		

Spring Term (first half)	Right Angled Trigonometry	Number Theory	Algebraic Manipulation
Key subject knowledge	Be able to use the trigonometric ratios (sine, cosine and tangent) to find missing sides and angles in right-angled triangles.	Be able to identify the factors and multiples of a number, and the highest common factor and lowest common multiple of a pair of numbers. Understand the difference between a prime and composite number and be able to write a composite number as the product of its prime factors. Know the square numbers up to 15 x 15. Be able to write both large and small numbers in standard form, with and without a calculator. *Be able to multiply and divide numbers in standard form. *Recognise a surd and be able to simplify a surd.	Use and interpret algebraic notation, including: • ab in place of a x b • 3y in place of y + y + y • a^2 in place of a x a • coefficients written as fractions rather than decimals Substitute numerical values into formulae and expressions, including scientific and worded formulae. Understand the vocabulary of expressions, equations, formulae, inequalities, terms and identities. Be able to simplify an expression by collecting like terms. Be able to multiply a single term over a bracket. Be able to factorise an expression into a single bracket. Be able to expand double brackets. Be able to factorise monic quadratic expressions into double brackets, including the difference of two squares. Be able to factorise non-monic quadratics into double brackets. Be able to rearrange simple formulae to change the subject.
Summative assessment strategies	Will be assessed via a written assessment in lessons after February half term.		

How does this unit prepare students for future study?	Trigonometry in right-angled triangles develops students' understanding of the properties of right-angled triangles, building on their understanding of Pythagoras' theorem. They will use their knowledge of rearranging formulae to solve problems. In number theory, students will use their knowledge from Year 7 and 8 to answer worded problems on highest common factor and lowest common multiple and begin to work with standard form to be able to manipulate very large and very small numbers. In algebraic manipulations, students will develop their ability to manipulate algebraic expressions, extending their knowledge of linear expressions to quadratic expressions.

Spring Term (second half)	Data Handling	Functions and Graphs	Equations and Inequalities
Key subject knowledge	Plan how to collect and organise small sets of data from surveys and experiments. Be able to construct graphs and diagrams to represent data, including bar-line graphs, frequency diagrams and simple pie charts. Interpret simple diagrams and graphs, and draw simple conclusions based on the shape of graphs and simple statistics. Be able to describe different types of data, including quantitative and qualitative data, primary and secondary data, and discrete and continuous data.	Plot coordinates in all four quadrants. Recognise that equations of the form y = mx + c correspond to straight line graphs. Use y = mx + c to identify parallel lines. Be able to find the equation of a line given two points, or through one point given a gradient. *Use y = mx + c to identify perpendicular lines. *Identify and interpret roots, intercepts and turning points of quadratic functions graphically.	Be able solve a pair of linear simultaneous equations using elimination. Be able to solve a pair of linear simultaneous equations using substitution. Be able to solve a pair of linear simultaneous equations using a graph. Solve linear inequalities and represent the solution on a number line.
Summative assessment strategies	Will be assessed via a written assessment in lessons before the Easter holiday.		
How does this unit prepare students for future study?	Data handling builds on students' understanding of data in Year 8, focusing on how to represent graphically different types of data, and the advantages and disadvantages of different representations. Functions and graphs, and equations and inequalities, develops students' algebra skills. It focuses on graphical representations of algebra.		

Summer Term (first half)	Circles	Fractions, Decimals and Percentages	Ratio and Proportion
Key subject knowledge	Knowing the key terminology of centre, radius, chord, diameter, circumference, tangent, arc, sector and segment. Know, and be able to apply, the formulae for the area and circumference of a circle. *Know, and be able to apply, the formulae to work out arc lengths and the area of sectors.	Be proficient in converting between fractions, decimals, and percentages. Be able to complete the four operations with fractions and decimals. *Be able to complete the four operations with algebraic fractions.	Use ratio notation and be able to simplify rations. Be able to divide a given quantity into two parts in part: part or part: whole ratio. Express a multiplicative relationship between two quantities as a ratio or a fraction. Solve problems involving direct and inverse proportion. Use compound units such as speed, density, and pressure. Interpret the gradient of a straight-line graph as a rate of change.
Summative assessment strategies	Will be assessed via a written assessment in lessons before October half term.		
How does this unit prepare students for future study?	This half term starts with exploring circles and building on students' knowledge from Year 8. This will be extended and developed by applying it to part circles. Ensuring students are secure in fractions, decimals and percentages, and ratio and proportional reasoning enables students to build on this in future units, such as more complex direct and inverse proportion in Key Stage 4.		

Summer Term (second half)	Perimeter, Area and Volume	Probability
Key subject knowledge	Understanding of 3D shapes, including faces, edges and vertices. Be able to draw plans and elevations of 3D shapes. Be able to work out the perimeter of a range of 2D Be able to work out the area of any 2D shape, including triangles, parallelograms, trazezia, circles and part circles, and composite shapes. Be able to work out the volume of prisms and cylinders. Be able to work out the surface area and volume of spheres, pyramids, cones and composite solids including frustums.	Interpret the results of an experiment using the language of probability. Know that if the probability of an event occurring is *p,* the probability of it not occurring is *1 – p.* Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees. Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments. Relate relative expected frequencies to theoretical probability, using appropriate language and the 0 to 1 probability scale.
Summative assessment strategies	Will be assessed via a written assessment in lessons before May half term.	
How does this unit prepare students for future study?	The study of perimeter, area and volume secures students' knowledge to allow them to tackle more complex problems as they move into Key Stage Four, including being able to rearrange formulae to find missing lengths, given the surface area or volume of a 3D shape, for example. Studying probability builds on students' prior work on fractions, decimals and percentages, and allows them to access more complex probability questions, such as the probability of multiple events occurring, as they move into the GCSE curriculum.	