Mathematics Unit Overview
Year 11

Students in year 11 will continue to follow a Higher or Foundation scheme of learning in preparation for the tier of entry they are likely to be entered for at GCSE. This builds on the work they have completed in years 7 through to 10 in addition to introducing them to some new topics not previously seen. Students continue in their sets with some scope for movement which enables us to work at a pace right for individual students, focusing on key knowledge and possible misconceptions while ensuring all students are challenged.

Our curriculum gives frequent opportunities for discussion of methods and deep thinking, both as a class and in small groups. Exam style question practice is embedded within each unit at all levels and ensures students achieve fluency in both familiar and unfamiliar contexts. Skills practice is pitched at the right level for individual student with opportunity for stretch and challenge.

Students regularly practice key skills and previously seen material through weekly Maths Box starters. They are encouraged to assess their own success in these starters and to be proactive about topics they are less confident with.

Half termly tests enable staff to identify misconceptions once topics have been covered and address these in lessons. These also allow students to reflect on previous learning throughout the year. A full mock exam paper will also be sat in the first term of year 11 as well as in the second, followed by question level analysis to enable staff to target homework tasks and give bespoke revision lists on the build up to their final examinations.

Students are given opportunities to explore a variety of revision and memorisation techniques prior to formal assessments.

Formal assessments are followed by test-audits which enable students to identify areas for improvement and resources are provided through which they can make the improvements.

Year 11 Mathematics Curriculum Statement

Year 11 Foundation will begin with a recall of Unit 11 – Right Angled Triangles: Pythagoras' Theorem and Trigonometry. Although previously covered, it is a new concept and with trigonometry being new to the foundation curriculum, it is important that students develop a deeper understanding and are able to apply in real life context.

Higher tier will start with Unit 12 – Circle Theorems. Although prior knowledge is needed for particular rules, on its own, it is a new topic. Set 1, will have started to look at this at the end of year 10, and therefore it provides consolidation and support as well as deeper understanding on proofs.

Students understanding will be determined through low stakes quizzes, multi topic starters, mini-whiteboard work and questioning, together with past paper practice. Time to re-discover revision techniques will also form part of the re-introduction to formal testing.

The spiraling nature of the curriculum will give us opportunities to re-visit the topics students experienced during school closure as well as re-visit skills that are required across a range of topics as well as revision strategies pre mock and public examinations.

Topics which we will bridge any gaps of understanding in year 11 include:

Foundation B
Compound units
Direct proportion
Types of data, surveys, questionnaires
Pie charts, scatter graphs, mean from a frequency table
Sequences and nth term
Venn diagrams and sample space diagrams

Foundation A
Types of data, census, sampling
Pie charts, scatter diagrams
Mean from a frequency table
Sequences and nth term
Pythagoras' Theorem
Trigonometry

Higher
Probability trees
Conditional probability
Circle Theorems
Direct, inverse proportion
Sine and Cosine rule

Mathematics - Year 11 Foundation Unit 11 (recap)				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Right- angled triangles	Knowledge: The names of different sides on a right-angled triangle when relating to Pythagoras and Trigonometry Pythagoras' theorem in right-angled triangles Trigonometric ratios in right-angled triangles Understanding: Rearranging Pythagoras' theorem to find either a short or long missing side Use Pythagoras' theorem to solve worded problems and problems relating to everyday life Selecting the correct trigonometric ratio to solve a missing angle or side problem. Use trigonometry to solve worded problems and problems relating to everyday life Skills: Recognise or determine if a triangle is right-angled Use and apply squares and square roots Operate a calculator efficiently	Students can: Consistently apply Pythagoras' theorem to any right-angled triangle to find either a shorter side or the hypotenuse Recognise 'Pythagoras in disguise' questions such as finding the length between two points on a co-ordinate grid, or the diagonal of a rectangle Use minimum number of steps on a calculator to solve a triangle Begin to apply the theorem to problems in 3D by using a two-step approach (solving one triangle then another) Recall SOHCAHTOA instantly and choose the correct ratio	Y7 Unit 1: Define and find square roots (including using the √ symbol) Y7 Unit 14: Solve two-step equations (including the use of brackets) when the solution is a whole number Y10 Fdn Unit 5: Solve linear equations	• Collins Foundation textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Higher Unit 10 (recap)				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Properties of circles	Knowledge: Identify parts of a circle: radius, diameter, tangent, chord, sector, segment, circumference, arc, centre and semi-circle Know the nine circle theorems Understanding: Apply circle theorems to work out angles in circles and cyclic quadrilaterals Skills: Prove circle theorems Apply circle theorems to problem solving	Students can Use tangents and chords to work out angles in circles Calculate angles in cyclical quadrilaterals Use the alternate segment theorem to calculate angles in circles Prove circle theorems and use them to prove geometrical results Use the fewest steps possible to calculate a missing angle linked to circle theorems Combined knowledge of circle theorems with Pythagoras and Trigonometry to solve any problem relating to circles and triangles	Y9 Unit 9: Angles and constructions Y9 Unit 12: Parts of a circle; area and circumference of a circle Y10 Higher Unit 2: Similarity	• Collins Higher textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Foundation Unit 12				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Algebra: Number and Sequence	Knowledge: What different types of number patterns look like (arithmetic vs geometric) What a 'term to term' rule is What an 'nth term' is The Fibonacci sequence That odd/even/square/cube/triangular numbers are all types of sequence Understanding: Understanding how number sequences are built up Understanding how an nth term links to the sequence it came from/creates Being able to continue a recognised sequence of numbers Skills: Recognising and continuing patterns in number sequences Generating sequences from the nth term Finding the nth term of a linear sequence Using the properties of odd/even/prime numbers to make generalisations about when the 4 operations are applied to them Utilising nth terms in worded/pictured problem solving questions Using the nth term to determine when a sequence goes above/below a given amount	Students can: Explain where the nth term for a linear sequence comes from and how it relates to the pattern in the sequence Determine the nth term when it is non-linear having been given the non-linear pattern it relates to Recognise when and how to use the nth term in practical problems	Primary National Curriculum – Number Properties of even numbers Properties of odd numbers Y7 Unit 10: recognise simple arithmetic progressions and use a term-to-term rule to generate a non-linear sequence Y8 Unit 8: generate terms of a sequence from either a term- to-term or a position-to-term rule and deduce expressions to calculate the nth term of linear sequences Y9 Unit 4: Substituting numbers into algebraic expressions. Manipulating algebraic expressions. Y9 Unit 1: Properties of prime numbers. Square numbers.	• Collins Higher textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics – Year 11 Higher Unit 12				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Triangles	Knowledge: Knowing that Pythagoras' Theorem and the 2 trig ratios can be used in 3D problems. Knowing that there are 2 angles between 0 and 360 that have the same value for the sine/cosine/tangent ratios How to label the sides and angles of a non-right-angled triangle The sine rule, the cosine rule, the formula for the area of a non-right- angled triangle Understanding: Able to draw a 2D triangle for a 3D problem Able to find the 2 angles with the same value for sin/cos/tan Correctly labelling the sides and angles of a non-right-angles triangle for the problem they are trying to solve Able to use the sine rule to find missing sides and angles Able to use the cosine rule to find missing sides and angles Able to correctly select the sine/cosine rule depending on the problem Able to use the formula to find the area of a non-right-angled triangle Able to find a missing side or angle given the area of a non-right-angled triangle Skills: Combine knowledge of Pythagoras and trig ratios to solve challenging 2D problems. Select the appropriate 2D shapes from a 3D image to solve a 3D problem using Pythagoras and Trig Finding the sin/cos/tan value of an angle and vice versa. Using this to find both angles with the same sin/cos/tan value Finding a missing side or angle in any triangle Finding the area	Students can: Consistently and accurately select the correct rule to use when finding missing sides and angles in any triangle. Rearrange the cosine, sine and area of a non- right-angled triangle formulae to find the correct missing value. Confidently drawing the correct 2D shape(s) from a 3D shape in order to solve a given problem in the fewest number of steps. Recognise and use a combination of skills linked to Pythagoras and trigonometry in order to solve a multi-step problem Utilise and leave in exact form, the exact trig values and surds when solving a problem involving any triangles in 2D and 3D	Y9 Unit 9: Properties of triangles; Angle facts and angles in triangles; scale drawings and bearings Y10 Higher Unit 1: Right-angled triangles Y10 Higher Unit 10: Properties of circles	• Collins Higher textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

	of any triangle Combining the knowledge of bearings, angles of depression and elevation, right-angled and non-right-angled triangles to solve problems.			

Mathematics - Year 11 Foundation Unit 13				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Congruence and Similarity	Knowledge: the 4 conditions for congruent triangles; geometric notation; definition of similarity regarding any two (or more) shapes; what a scale factor is Understanding: how to use the 4 conditions of congruent triangles to show congruency; show two shapes are similar; identify corresponding sides and angles between two shapes; Skills: work out the scale factor between similar shapes; able to give a reason why two shapes are not congruent or similar; use a scale factor to calculate the length of unknown sides;	Students can Use similar triangles to solve increasingly complex problems that may involve Pythagoras, Trigonometry, and other known geometrical facts/methods Prove two shapes are congruent by using any of the 4 conditions, possibly in combination with other known geometrical facts/methods Solve problems using similar shapes (not just triangles) redraw diagrams so the two shapes are in the same orientation and can therefore accurately identify corresponding sides and angles	Y9 Unit 10: Angles and constructions Y9 Unit 1: Rounding to a given degree of accuracy Y10 Foundation Unit 1: Perimeter and area Y10 Foundation Unit 2: Enlarging shapes by a scale factor Y10 Foundation Unit 5: Solving equations Y10 Foundation Unit 11: Right-angled triangles	• Collins Foundation textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Higher Unit 13				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Graphs	Knowledge: The gradient of a distance-time graph is the speed. A distance-time graph can be adjusted to show how a container might fill/empty over time. What velocity is. The area under a velocity-time graph represents the distance travelled. The gradient of a velocity-time graph represents acceleration/deceleration. You can use polygons to estimate the area under a curved graph. You can use a tangent to estimate the gradient of a curved line. You can use the circle theorem that tells you a tangent to a circle will be at a right- angle to the radius of the circle at the same point on the circumference to find the equation of the tangent. What cubic, reciprocal and exponential graphs look like. You can see how a graph will be transformed by looking at its' equation and comparing it to another equation of the same type. Understanding: Finding the requested value from a distance- time graph or velocity-time graph. Drawing/interpreting a graph showing a container filling/emptying and being able to match such a graph to the shape of a container it represents. Selecting the appropriate polygons and associated formula to estimate the area under a curved graph. Drawing an appropriate tangent to find an estimate for the gradient of a curved line. Following the appropriate steps to find the equation of a tangent to a circle. Matching the appropriate graphs to the type of equation given. Transforming graphs in the appropriate way given an equation.	Students can: Consistently and accurately select the correct interpretation between distance-time and velocity-time graphs Consistently and accurately interpret distance-time graphs, including when given non-standard questions and questions requiring creating algebraic statements Consistently and accurately interpret velocity-time graphs, including when given non-standard questions and questions requiring creating algebraic statements Find missing values within a question that requires utilising the equation of a tangent to a circle when the problem is non-standard or requires additional skills in combination with this. Consistently and accurately apply transformations to graphs and being able to identify the original graph from a given transformation. Understand why the transformations previously learned move the graph in the way described.	Y9 Unit 5: How speed/distance/time are related Y9 Unit 11: Transformations Y9 Unit 13: Equations of lines	• Collins Higher textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum • Desmos online graph tool

	Skills: Interpreting and drawing distance-time graphs; Interpreting and drawing velocity-time graphs; Estimating the area under a curved graph; Estimating the gradient of a curved line at a given point; Finding the equation of a tangent to a circle; Transforming graphs.			

Mathematics - Year 11 Foundation Unit 14				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Probability: Combined Events	Knowledge: probability notation; set notation and key terminology Understanding: draw and use a sample space diagram; how to create and use two-way tables, frequency tree diagrams, probability trees and Venn diagrams Skills: calculate probabilities from sample space diagrams; calculate probabilities from two-way tables; complete missing information and calculate probabilities from a Venn diagram; draw and complete missing information on a frequency tree diagram; complete missing information and use probability tree diagrams to calculate probabilities of combined events	Students can: Calculate probabilities when two events happen at the same time Read, create, and use two-way tables to accurately calculate probabilities Thoroughly understand set notation Read, create, and use Venn diagrams to accurately calculate probabilities Use frequency tree diagrams to solve problems Construct and use probability tree diagrams to calculate probabilities fluently Use algebraic techniques in conjunction with problems that require probability tree diagrams or Venn diagrams to solve.	Y8 Unit 4: Understanding risk – 1 Y8 Unit 13: Understanding risk - 2 Y9 Unit 7: Calculations with integers, decimals and fractions using written methods and a calculator. Y10 Foundation Unit 3: Probability and events Y10 Foundation Unit 5: Solving equations	• Collins Foundation textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Higher Unit 14				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Algebraic fractions and functions	Knowledge: That the 4 operations can be applied to algebraic fractions in the same manner they are applied to numerical fractions Simplifying algebraic fractions can be done by factorising the numerator and/or denominator Factorisation is required to change the subject of a formula when the subject appears in more than one term Function notation The meaning of 'iteration' Understanding: Able to apply the appropriate methods for the four operations to a range of algebraic fractions Able to identify the factorisation needed to simplify an algebraic fraction Able to select the appropriate method for changing the subject of any formula given at GCSE Finding the value of a function when given the input Using an appropriate method for inverse functions Able to recognise and find the value of a composite function Recognise and use the appropriate method for iteration Skills: Apply the four operations to algebraic fractions Simplify any algebraic fraction, including those with quadratic or semi-factorised cubic expressions Changing the subject of any given formula Using and understanding function notation Solving equations by iteration when given an input.	Students can: Consistently and accurately apply the four operations to algebraic fractions, including in problem- solving contexts Simplifying algebraic fractions as a matter of course Consistently and accurately changing the subject of a formula, including where it may require factorisation and simplification Interpret and apply function notation to problems consistently and accurately Understand and applying the key steps involved in an iteration problem	Y9 Unit 4: Substitution; Factorise linear and quadratic expressions; Expanding brackets; Changing the subject of a formula	• Collins Higher textbook • BBC bitesize • Mymaths.co. uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Foundation Unit 15				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Powers and standard form	Knowledge: Recap of the multiplication, division, power and power of 0 index laws The rules of standard form Numbers in standard form can be used in calculations with the four operations Where the standard form button is on a calculator Understanding: Accurately simplify terms using the multiplication, division, power and power of 0 index laws Move the digits of a number an appropriate amount of place value spaces when multiplying and dividing by powers of 10 Write any number in standard form Write any standard form number in digits Select and follow the appropriate method for calculating with standard form Skills: Simplify expressions using the basic index laws Writing numbers in standard form Writing standard form numbers with digits Calculating with numbers in standard form	Students can: Consistently and accurately apply the index laws to simplification problems, including where there are multiple steps involved Confidently swapping between numbers in standard form and numbers not in standard form, including recognising where a number may be written with a power of 10, but not in standard form Identifying and correcting mistakes in others' workings writing in standard form Calculating with numbers in standard form accurately including where this involves problem contexts such as substituting into an algebraic equation or combined with other skills	Y7 Unit 1: Powers and roots Y7 Unit 2: Multiplying and dividing by powers of 10 Y8 Unit 1: Use standard form to write big and small numbers Y8 Unit 5: Simplifying by using the multiplication and division laws of indices	• Collins Foundation textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Higher 15				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Vector Geometry	Knowledge: Vectors can be added and subtracted Vectors can be multiplied by a number Vector notation Pictorial representations of vectors Properties of vectors Understanding: Accurately using vector notation to describe movement across a 2D plane Accurately representing a vector on a diagram Adding, subtracting and multiplying vectors Using vectors to solve a geometrical problem Using vectors for a geometric proof Understanding the implications of a point being a midpoint for a vector problem Understanding that parallel lines are multiples of each other in terms of their vectors Skills: Manipulating vectors in their different forms of notation Using vectors to solve geometrical problems Using vectors to create geometric proofs	Students can: Confidently use all forms of vector notation within a question to clearly demonstrate their workings Select appropriate vectors to provide a clear and accurate geometric proof Use vectors to solve geometric problems, including when other skills are also required.	Y9 Unit 11: Vectors used to translate 2D shapes Y9 Unit 4: Simplification of algebra	• Collins Higher textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Foundation Unit 16				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Simultaneous equations and linear inequalities	Knowledge: A method for solving simultaneous equations when a variable has the same coefficient called elimination A method for solving simultaneous equations when given one variable in terms of the other called substitution We can use the elimination method for more complex problems when coefficients don't match We can solve linear inequalities using the same steps as linear equations with one unknown The rules for representing inequalities on a number line Understanding: Able to use the method of elimination when a variable's coefficient matches Able to use the substitution method when a variable is given in terms of another variable Able to select whether to use the elimination or substitution method for solving simultaneous equations Multiplying equations by an appropriate whole number to match coefficients and therefore use the elimination method Able to solve linear inequalities Able to represent an inequality on a number line Skills: Solving simultaneous equations Selecting the appropriate method for solving simultaneous equations Solving inequalities Representing inequalities on a number line	Students can: Consistently and accurately select an appropriate method to solve a simultaneous equation Select the appropriate whole number to multiply an equation by in order to solve simultaneously Write a set of simultaneous equations from a worded question and then solve it accurately Consistently and accurately solve linear inequalities including where there are brackets and fractions involved, and where there are two inequalities within the question. Then accurately represent this on a number line	Y9 Unit 4: Simplifying algebraic expressions; Solving linear equations; Substituting into formulae Y10 Unit 5: Linear equations	• Collins Foundation textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum

Mathematics - Year 11 Foundation Unit 17				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Algebra: Non-linear graphs	Knowledge: Speed is represented by the gradient of a distance-time graph We can use an adapted distance-time graph to show a container being filled What 'velocity', 'acceleration' and 'deceleration' mean Acceleration and deceleration are represented by the gradient of a velocity-time graph Distance travelled is represented by the area underneath a distance time graph Quadratic graphs can be plotted using a table, similar to a linear graph Quadratic equations can be solved by factorising them The terms 'roots', 'turning point', 'y-intercept' and how they relate to a quadratic graph What cubic and reciprocal graphs look like Understanding: Interpreting a distance-time graph by reading from the graph and finding the gradient Interpreting a velocity-time graph by reading off the speed and finding the acceleration/deceleration via the gradient; or distance travelled using appropriate 2D shapes Plotting a quadratic graph from its equation Accurately identifying key points from a quadratic graph Accurately matching different types of graph to their equations Skills: Interpreting distance-time graphs Interpreting velocity-time graphs Plotting non-linear graphs Identifying key points on a quadratic graph Matching equations to graphs	Students can: Consistently and accurately interpret distance-time graphs and be able to link the equation for speed/distance/time to the interpretation of a distance-time graph Consistently and accurately interpret velocity-time graphs and be able to explain where their interpretation comes from Consistently and accurately plot quadratic graphs and be able to spot and rectify mistakes in this activity Solve quadratic equations in the form $x^2+bx+c=0$ by factorising, and be able to spot and explain common mistakes in this process Consistently and accurately identify key points on a quadratic graph and link this to other types of graph Consistently and accurately identify what the graphs of linear, quadratic, reciprocal and cubic graphs will look like	Y9 Unit 4: Substituting into algebraic functions; Simplifying algebraic expressions; Expanding and factorising into double brackets Y9 Unit 13: Plotting straight line graphs Finding the equation of a line Y10 Foundation Unit 5: Linear equations	• Collins Foundation textbook • BBC bitesize • Mymaths.co.uk • Hegarty Maths lessons • Method Maths online papers • Maths Genie Examination Style questions with videos and worked solutions • Corbett Maths with videos and answers • Transum