

KS4 Long Term Curriculum Plan: **Mathematics - Year 10 Higher**

Curriculum Aim: The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Link to prior learning: See KS3 National Curriculum for Mathematics

Rationale of sequencing: In mathematics, students follow a spiral curriculum that allows them to study requisite skills before moving onto more complex concepts. Students will revisit topics in subsequent years and build on prior knowledge and connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. Decisions about progression should be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems.

In the Autumn term, the students start with a more advanced study of probability which builds on the previous study of probability at Key Stage 3. Students then move onto the more complex number skills of bounds, indices and surds in module 13 which support the study of more complex linear and quadratic equations in modules 15 and 16. Students then extend their understanding of representing data from Key Stage 3 in the module of sampling and more complex diagrams. Students also build on their previous geometry study with the module on circle theorems which builds on all geometry prior learning and finally finish with the module of further Pythagoras and trigonometry which combines students earlier work on algebra and geometry.

Term	Focus / Topic	Knowledge & Skills (from NC/Programmes of Study)	Assessment
Autumn 1	<ul style="list-style-type: none"> • know the exact values of sine and cosine for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ • exact value of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ Module 11 - Probability Module 12 - Combined events Module 13 - Accuracy, powers & surds	Students should be able to: <ul style="list-style-type: none"> • use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size • Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one • calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions • calculate exactly with fractions, {surds} and multiples of π; {simplify surd expressions involving squares [for example $12\sqrt{4}3\sqrt{4}3\sqrt{2}3 = x\sqrt{x} = x$] and rationalise denominators} • apply and interpret limits of accuracy when rounding or truncating, {including upper and lower bounds} 	Half-term assessment on all topics covered since the start of year 10.
Autumn 2	Module 14 - Congruence & similarity Module 15 - Linear	Students should be able to: <ul style="list-style-type: none"> • Apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures • solve linear inequalities in one {or two} variable{s}, {and quadratic inequalities in one variable}; represent the solution set on a number line, {using set notation and on a graph} 	Year 10 assessment week

	equations & inequalities		
Spring 1	Module 16 - Quadratic equations	<p>Students should be able to:</p> <ul style="list-style-type: none"> Factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; {factorising quadratic expressions of the form $a x^2 + bx + c$} solve quadratic equations {including those that require rearrangement} algebraically by factorising, {by completing the square and by using the quadratic formula}; find approximate solutions using a graph infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling Solve two simultaneous equations in two variables (linear/linear {or linear/quadratic}) algebraically; find approximate solutions using a graph. 	Half-term assessment on all topics covered since the start of year 10.
Spring 2	<p>Module 17 - Sampling & more complex diagrams</p> <p>Module 18 - Properties of circles</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: appropriate graphical representation involving discrete, continuous and grouped data, {including box plots} appropriate measures of central tendency (including modal class) and spread {including quartiles and inter-quartile range} identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment {apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results} 	Half-term assessment on all topics covered since the start of year 10.
Summer 1	<p>Module 19 - Proportionality</p> <p>Module 20 - Further Pythagoras & trigonometry</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$; {construct and} interpret equations that describe direct and inverse proportion interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles {and, where possible, general triangles} in two {and three} dimensional figures {know and apply to calculate the area, sides or angles of any triangle} 	Half-term assessment on all topics covered since the start of year 10.
Summer 2	<p>Revision</p> <p>End of year exams</p> <p>Recapping and re-teaching</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> Revise all year 10 topics for the end of year assessments Following on from the assessments teachers will re-teach gaps from the weak areas in the assessments This will be personalised based on each class and their results analysis from the end of year exams 	End of year assessment on all topics covered since the start of year 10.

Further Information

The exam board used for Mathematics is **Edexcel** - <http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics2015.html>

Sparx Maths - <https://sparxmaths.com/> (All students have individual logins and passwords to support with classwork, homework and revision)

Equipment - All students must attend lessons with pens (including a green pen), pencil, long ruler, rubber, protractor, pair of compasses, scientific calculator, exercise book and home learning book.

KS3 Long Term Curriculum Plan: **Mathematics - Year 10 Foundation**

Curriculum Aim: The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Link to prior learning: See KS3 National Curriculum for Mathematics

Rationale of sequencing: In mathematics, students follow a spiral curriculum that allows them to study requisite skills before moving onto more complex concepts. Students will revisit topics in subsequent years and build on prior knowledge and connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. Decisions about progression should be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems.

In the Autumn term, students build on their previous study of geometry and probability. Students then develop their algebra work and begin to solve more complex equations in module 14 which links to the content required in the next module on numbers and sequences. Later in the year, students move on to develop their statistics and ratio and proportion knowledge from Key Stage 3. Students finish the year with a more complex study of geometry with a focus on constructions and then more complicated 3D shapes.

Term	Focus / Topic	Knowledge & Skills (from NC/Programmes of Study)	Assessment
Autumn 1	Module 10 - Linear equations Module 11 - Perimeter & Area	Students should be able to: <ul style="list-style-type: none">• know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments• where appropriate, interpret simple expressions as functions with inputs and outputs• Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment.	Half-term assessment on all topics covered since the start of year 10.

Autumn 2	Module 12 - Probability Module 13 - Volume & surface area	Students should be able to: <ul style="list-style-type: none"> ● use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size ● Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one ● calculate surface areas and volumes of spheres, pyramids, cones and composite solids 	Year 10 assessment week
Spring 1	Module 14 - Numbers & sequences Module 15 - Transformations & vectors	Students should be able to: <ul style="list-style-type: none"> ● recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a positive rational number ● deduce expressions to calculate the nth term of linear sequences. ● Describe translations as 2D vectors ● Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; ● Interpret and use scale factors for enlargements 	Half-term assessment on all topics covered since the start of year 10.
Spring 2	Module 16 - Statistics Module 17 - Plans, elevations & scale drawings	Students should be able to: <ul style="list-style-type: none"> ● use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing ● interpret equations that describe direct and inverse proportion ● interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion ● construct and interpret plans and elevations of 3D shapes 	Half-term assessment on all topics covered since the start of year 10.
Summer 1	Module 18 - Compound measures & variations Module 19 - Curved shapes & pyramids	Students should be able to: <ul style="list-style-type: none"> ● convert between related compound units (speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts ● find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration ● identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment ● calculate arc lengths, angles and areas of sectors of circles ● calculate surface areas and volumes of spheres, pyramids, cones and composite solids 	Half-term assessment on all topics covered since the start of year 10.
Summer 2	Revision End of year exams Recapping and re-teaching	Students should be able to: <ul style="list-style-type: none"> ● Revise all year 10 topics for the end of year assessments ● Following on from the assessments teachers will re-teach gaps from the weak areas in the assessments ● This will be personalised based on each class and their results analysis from the end of year exams 	End of year assessment on all topics covered since the start of year 10.

	Module 20 - Constructions & loci	<ul style="list-style-type: none">● derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment● constructing a perpendicular to a given line from/at a given point, bisecting a given angle); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line	
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