Programme of study for Year 11 Higher Maths 24-2025

Autumn (1st term)	Autumn (2nd term)	Spring (1st term)	Spring (2nd Term)	Summer (1st term)	Summer (2nd term)
Topic / Big Question: -**Difficult algebra:** **recurring decimals, simplifying surds, rationalise surds, add and subtract algebraic fractions, multiply and divide algebraic fractions, solve algebraic equations (leading to quadratics)** -**Further trigonometry:** **sine Rule, cosine Rule, area of triangle, pythagoras in 3D, sine and cosine rule in 3D** -**Vectors:** -**Graphs of trigonometric functions:**	Topic / Big Question: **Revision will focus on topics in which students have generally underperformed in their exams.** .	Topic / Big Question: **Revision will focus on topics in which students have generally underperformed in their exams.**	Topic / Big Question: **Revision will focus on topics in which students have generally underperformed in their exams.**	Topic / Big Question: **Revision will be focused around topics the class have generally underperformed in their final mocks**	Topic / Big Question: Examination period: Yr 11 are on study leave

Skills (students should be able to do): A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills (students should be able to do): A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills (students should be able to do): A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills (students should be able to do): A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills (students should be able to do): A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills (students should be able to do):
Key Learning Outcomes (students should know): Building understanding: Rationale / breakdown for your sequence of lessons: Rationalise the denominator involving surds. Simplify algebraic fractions. Multiply and divide algebraic fractions.	Key Learning Outcomes (Students should know):	Key Learning Outcomes (Students should know):	Key Learning Outcomes (Students should know):	Key Learning Outcomes (Students should know):	Key Learning Outcomes (Students should know):

Solve quadratic equations arising from algebraic fraction equations. Change the subject of a formula, including cases where the subject occurs on both sides, and where a power of a subject appears. Change the subject of a formula, where all the variables appear in the denominator. 'Show that' and prove questions using consecutive integers (n, n+1) squares a^2,b^2 even numbers (2n) and odd numbers (2n+1) Use function notation to find: f(x)+ g(x) and f(x)-g(x). 2f(x), f(3x) etc algebraically. Find the inverse of a linear function. Know that f^(-1) (x)refers to the inverse function.					

Find composite functions for 2 functions f(x) and g(x) find fg(x) or gf(x) etc. Understand and use vector notation, including column notation. Understand and interpret vectors as displacement in the plane with an associated direction. Understand that 2a is parallel to a and twice its length, and that a is parallel to –a in the opposite direction. Represent vectors, combination of vectors and scalar multiples in the plane pictorially. Calculate the sum or difference of 2 vectors and a scalar multiple of a vector using column vectors. Find the length of a vector using Pythagoras Theorem.					

Calculate the resultant of 2 vectors. Solve problems where vectors are divided in a given ratio with the use of scalar identity properties. Produce geometrical proofs to prove points are collinear and vectors/lines are parallel. Recognise, sketch and interpret graphs of trigonometric functions (in degrees) $y = \sin x,\ y = \cos x,\ y = \tan x$ Know the exact values of $\sin\theta,\ \cos\theta\ ,\ \tan\theta$ for $\Theta = 0^0, 30^0, 45^0, 60^0$ and find them from graphs Apply the graph of y = f(x) and the transformations y = -f(x), y = f(-x) for sine, cosine and tan functions f(x).					

Apply to the graph y = f(x) the transformations y = f(x) + a, y = f(x + a) for sine, cosine & tan functions f(x). Know and apply Area = $\frac{1}{2}ab\sin C$ to the area, sides or angles of any triangle. Know the sine and cosine rules, and use to solve. 2D problems (including bearings). Use the sine and cosine rules to solve 3D problems. Understand the language of planes, and recognise the diagonals of a cuboid. Solve geometrical problems on coordinate axes. Understand, recall and use trigonometric relationships and Pythagoras' theorem in right angled triangles, and use these to solve					

problems in 3D configurations. Calculate the length of a diagonal of a cuboid. Find the angle between a line and a plane.					
Autumn Term – centrally planned, standardised and teacher marked piece(s) of work Mock series 1 Progress check as per assessment calendar		Spring Term – centrally planned, standardised and teacher marked piece(s) of work Mock series 2 Progress check as per assessment calendar		Summer Term – centrally planned, standardised and teacher marked piece(s) of work Progress check as per assessment calendar	
Building understanding: Rationale / breakdown for your sequence of lessons: **Simplifying surds** and **rationalizing surds** are essential for dealing with exact forms of trigonometric expressions, especially when these involve square roots (like in the sine and cosine rules, which include square root expressions for side lengths). **Algebraic fractions** (addition, subtraction, multiplication, and division) are useful in manipulating equations in	**Building understanding: Rationale / breakdown for your sequence of lessons:**	**Building understanding: Rationale / breakdown for your sequence of lessons:**	**Building understanding: Rationale / breakdown for your sequence of lessons:**	**Building understanding: Rationale / breakdown for your sequence of lessons:**	**Building understanding: Rationale / breakdown for your sequence of lessons:**

trigonometry, as many trigonometric identities and formulas involve fraction forms. **Quadratic equations** emerge when applying the **cosine rule**, which often leads to quadratic equations in terms of side lengths or angles in a triangle. Mastery of quadratic solving is, therefore, necessary for many trigonometric calculations. **Graphs of trigonometric functions** (sine, cosine, and tangent) are crucial for understanding the behavior of these functions in trigonometry. Knowing the graphs helps to visualize solutions to trigonometric equations and analyze periodic behaviors. When working with the **sine rule** and **cosine rule**, the function values correspond directly to angles and side ratios, which are foundational concepts in the graphs of trigonometric functions. **3D trigonometry** applications (Pythagoras					

in 3D, sine and cosine rule in 3D) also benefit from understanding these graphs, as they can help to visualize the projection of lengths and angles in three dimensions. **Vectors** are often involved in solving 3D trigonometry problems. They can be used to represent sides of triangles or lines in space, and operations with vectors (like dot products) relate directly to trigonometric concepts, such as angles between vectors. **3D Pythagoras** and **trigonometric rules in 3D** rely on vector representations to calculate distances and angles, which are often simplified by understanding vector projections and their trigonometric counterparts. Vector operations sometimes require algebraic manipulation, including the use of surds and fractions, particularly when calculating magnitudes (often					

resulting in square roots) or when performing division of components. Solving **vector equations** may also lead to **quadratic equations**, especially when working with distances or magnitudes in three-dimensional space. Simplifying expressions involving trigonometric functions often leads to rational and irrational algebraic expressions. Proficiency in working with these (such as simplifying and rationalizing surds) is helpful. When analyzing the properties of trigonometric graphs, understanding the periodicity and symmetry requires familiarity with algebraic manipulation, especially in solving trigonometric equations that involve algebraic fractions.					
Home – Learning: Homework is assigned on Sparx Maths for students to complete once a week.	Home – Learning: Homework is assigned on Sparx Maths for students to complete once a week.	Home – Learning: Homework is assigned on Sparx Maths for students to complete once a week.	Home – Learning: Homework is assigned on Sparx Maths for students to complete once a week.	Home – Learning: Homework is assigned on Sparx Maths for students to complete once a week.	Home – Learning: Homework is assigned on Sparx Maths for students to complete once a week.

Reading / High Quality Text: Elements of literacy will be incorporated through key words and worded questions	Reading / High Quality Text: Elements of literacy will be incorporated through key words and worded questions	Reading / High Quality Text: Elements of literacy will be incorporated through key words and worded questions	Reading / High Quality Text: Elements of literacy will be incorporated through key words and worded questions	Reading / High Quality Text: Elements of literacy will be incorporated through key words and worded questions	Reading / High Quality Text: Elements of literacy will be incorporated through key words and worded questions
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Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):

During the lesson a discussion will take place on the real-life scenarios the topic at hand students have come across or will face later in life when making decisions. These regular discussions allow teachers into an insight into the knowledge students have about life and how we can inform them further.

Graphs of trigonometric functions:

Trigonometric functions and their graphs are extensively used in engineering and architecture for designing structures, calculating forces, determining angles, and creating blueprints.

Trigonometry:

It is crucial in navigation, whether it's in the form of GPS systems, maritime navigation, or aviation. Trigonometric functions help in determining distances, angles, and positions of objects relative to each other.

Trigonometry is used in various aspects of personal health and fitness, such as calculating body measurements, designing workout routines, and understanding biomechanics.

Trigonometric functions are used in finance and economics for analysing trends, modelling data, and making predictions. They are particularly useful in fields like investment analysis and financial modelling.

Quadratics:

Social: Medicine and Biology: Quadratic equations can be applied in pharmacokinetics to model the concentration of drugs in the body over time or to analyse the growth patterns of populations or organisms.

Moral: Optimization Problems: Quadratic equations often arise in optimization problems, where one seeks to maximize or minimize a certain quantity, such as cost, profit, or efficiency.

Spiritual: Psychology and Sociology: Quadratic equations can be utilized in statistical analysis to model relationships between variables or to study phenomena like learning curves or population dynamics.

Cultural: Art and Music: Quadratic equations can be used in art to create visually appealing shapes and patterns or in music to model sound waves and frequencies.

Personal Development: While not directly applicable in everyday life, understanding quadratic equations and problem-solving skills related to them can contribute to personal development by enhancing critical thinking and analytical abilities

Vectors:

Vectors are used to represent transportation networks, flow of traffic, and movement patterns in urban areas. City planners utilize vector analysis to optimize infrastructure and improve transportation systems. Vectors are used in biomechanics to analyse movement patterns, forces, and trajectories in sports activities. Coaches and athletes utilize vector analysis to optimize performance and prevent injuries. Vectors represent forces, velocities, and directions in structural analysis and design. Engineers use vector calculus to ensure the stability and efficiency of buildings, bridges, and other infrastructure projects.