Key Stage 4 Higher Curriculum Overview

Year 10			

Autumn Term 1A	**Autumn Term 1A**	**Autumn Term 1A**	**Autumn Term 1B**
TOPIC TITLE: Number	**TOPIC TITLE: Algebra**	**TOPIC TITLE: Interpreting and representing data**	**TOPIC TITLE: Fractions, ratio and percentages**

Number

Topics
- Identify and use the prime factorisation of a number

Understand and use standard form

Domains (Core knowledge and skills)
- use the concepts and vocabulary of prime numbers, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem
- round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)

interpret standard form $A \times 10^n$, where $1 \le A < 10$ and n is an integer

Algebra

Topics
- Understand equations and identities
- Manipulate algebraic expressions

Construct algebraic statements

Domains (Core knowledge and skills)
- understand and use the concepts and vocabulary of identities
- know the difference between an equation and an identity
- simplify and manipulate algebraic expressions by expanding products of two binomials and factorising quadratic expressions of the form $x^2 + bx + c$
- argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments

translate simple situations or procedures into algebraic expressions or formulae

Interpreting and representing data

Topics
- Construct and interpret graphs of time series
- Interpret a range of charts and graphs
- Interpret scatter diagrams

Explore correlation

Domains (Core knowledge and skills)
- interpret and construct tables, charts and diagrams, including tables and line graphs for time series data and know their appropriate use
- draw estimated lines of best fit; make predictions

know correlation does not indicate causation; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing

Fractions, ratio and percentages

Topics
- Calculate with fractions
- Calculate with percentages
- Explore the uses of ratio
- Investigate the connection between ratio and proportion
- Solve problems involving proportional reasoning

Domains (Core knowledge and skills)
- interpret fractions and percentages as operators
- work with percentages greater than 100%
- solve problems involving percentage change, including original value problems, and simple interest including in financial mathematics
- calculate exactly with fractions
- express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)
- identify and work with fractions in ratio problems
- understand and use proportion as equality of ratios
- express a multiplicative relationship between two quantities as a ratio or a fraction

Prior Domains:

- Know the meaning of a prime number
- Recall prime numbers up to 50
- Understand the use of notation for powers
- Know how to round to the nearest whole number, 10, 100, 1000 and to decimal places
- Multiply and divide numbers by powers of 10
- Know how to identify the first significant figure in any number

Approximate by rounding to the first significant figure in any number

Prior Domains:
- Manipulate expressions by collecting like terms
- Know that $x \times x = x^2$
- Calculate with negative numbers
- Know the grid method for multiplying two two-digit numbers

Know the difference between an expression, an equation and a formula

Prior Domains:
- Know the meaning of discrete and continuous data
- Interpret and construct frequency tables
- Construct and interpret pictograms, bar charts, pie charts, tables, vertical line charts, histograms (equal class widths) and scatter diagrams

Prior Domains:
- Apply the four operations to proper fractions, improper fractions and mixed numbers
- Use calculators to find a percentage of an amount using multiplicative methods
- Identify the multiplier for a percentage increase or decrease
- Use calculators to increase (decrease) an amount by a percentage using multiplicative methods
- Know that percentage change = actual change ÷ original amount
- Understand and use ratio notation
- Divide an amount in a given ratio

Autumn Term 1B	**Spring Term 2A**	**Spring Term 2A**	**Spring Term 2A**
TOPIC TITLE: Angles and trigonometry	**TOPIC TITLE: Graphs**	**TOPIC TITLE: Area and Volume**	**TOPIC TITLE: Transformations and constructions**

Angles and trigonometry

Topics
- Develop knowledge of angles

Explore geometrical situations involving parallel lines
- Investigate right-angled triangles
- Solve problems involving Pythagoras' theorem
- know the trigonometric ratios, $\sin\theta$ = opposite/hypotenuse, $\cos\theta$ = adjacent/hypotenuse, $\tan\theta$ = opposite/adjacent
- apply it to find angles and lengths in right-angled triangles in two dimensional figures

Domains (Core knowledge and skills)
- understand and use alternate and corresponding angles on parallel lines
- derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)
- know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and apply it to find lengths in right-angled triangles in two dimensional figures
- Investigate similar triangles
- Explore trigonometry in right-angled triangles
- Set up and solve trigonometric equations
- Use trigonometry to solve practical problems

Graphs

Topics
- Investigate features of straight line graphs
- Explore graphs of quadratic functions
- Explore graphs of other standard non-linear functions
- Create and use graphs of non-standard functions

Solve kinematic problems

Domains (Core knowledge and skills)
- identify and interpret gradients and intercepts of linear functions algebraically
- use the form $y = mx + c$ to identify parallel lines
- find the equation of the line through two given points, or through one point with a given gradient
- interpret the gradient of a straight line graph as a rate of change
- recognise, sketch and interpret graphs of quadratic functions
- recognise, sketch and interpret graphs of simple cubic functions and the reciprocal function $y = 1/x$ with $x \ne 0$
- plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts, to find approximate solutions to

Area and Volume

Topics
- Investigate circles
- Discover pi
- Solve problems involving circles
- Explore prisms and cylinders

Domains (Core knowledge and skills)
- compare lengths, areas and volumes using ratio notation
- calculate perimeters of 2D shapes, including circles
- identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference
- know the formulae: circumference of a circle = $2\pi r = \pi d$, area of a circle = πr^2
- calculate areas of circles and composite shapes

know and apply formulae to calculate volume of right prisms (including cylinders)

Transformations and constructions

Topics
- Explore lines on the coordinate grid
- Use transformations to move shapes
- Describe transformations
- Know standard mathematical constructions
- Apply standard mathematical constructions
- Explore ways of representing 3D shapes

Domains (Core knowledge and skills)
- work with coordinates in all four quadrants
- *understand and use lines parallel to the axes, $y = x$ and $y = -x$*
- solve geometrical problems on coordinate axes
- identify, describe and construct congruent shapes including on coordinate axes, by considering rotation, reflection and translation
- describe translations as 2D vectors
- 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)
- use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line

		problems such as simple kinematic problems involving distance, speed and acceleration			• construct plans and elevations of 3D shapes

Prior Domains:
- Use angles at a point, angles at a point on a line and vertically opposite angles to calculate missing angles in geometrical diagrams
- Know that the angles in a triangle total 180°
- Know how to use formulae to find the area of rectangles, parallelograms, triangles and trapezia
- Know how to find the area of compound shapes
- Understand and work with similar shapes
- Solve linear equations, including those with the unknown in the denominator of a fraction

Prior Domains:
- Plot straight-line graphs
- Interpret gradients and intercepts of linear functions graphically and algebraically
- Recognise, sketch and interpret graphs of linear functions
- Recognise graphs of simple quadratic functions

Plot and interpret graphs of kinematic problems involving distance and speed

Prior Domains:
- Know how to use formulae to find the area of rectangles, parallelograms, triangles and trapezia
- Know how to find the area of compound shapes

Prior Domains:
- Work with coordinates in all four quadrants
- Carry out a reflection in a given vertical or horizontal mirror line
- Carry out a translation
- Measure distances to the nearest millimetre
- Create and interpret scale diagrams
- Use compasses to draw circles
- Interpret plan and elevations

Spring Term 2B		Spring Term 2B		Summer Term 3A		Summer Term 3A	
TOPIC TITLE: Equations and inequalities		**TOPIC TITLE: Probability**		**TOPIC TITLE: Multiplicative reasoning**		**TOPIC TITLE: Similarity and congruence**	

Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)
• Explore the meaning of an inequality Solve linear inequalities	• understand and use the concepts and vocabulary of inequalities • solve linear inequalities in one variable • represent the solution set to an inequality on a number line	• calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions • enumerate sets and combinations of sets systematically, using tree diagrams understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size	• List outcomes of combined events using a tree diagram • Know and use the multiplication law of probability • Now and use the addition law of probability • Use a tree diagram to solve simple problems involving independent combined events • Use a tree diagram to solve complex problems involving independent combined events • Use a tree diagram to solve simple problems involving dependent combined events • Use a tree diagram to solve complex problems involving dependent combined events Understand that relative frequency tends towards theoretical probability as sample size increases	• Solve problems involving proportional reasoning • Solve problems involving compound units	• express a multiplicative relationship between two quantities as a ratio or a fraction • use compound units (such as speed, rates of pay, unit pricing) • change freely between compound units (e.g. speed, rates of pay, prices) in numerical contexts relate ratios to fractions and to linear functions	• Explore the congruence of triangles • Investigate geometrical situations • Form conjectures Create a mathematical proof	• use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) • apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' Theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs

Prior Domains:
- Understand the meaning of the four inequality symbols
- Solve linear equations including those with unknowns on both sides

Prior Domains:
- Add fractions (decimals)
- Multiply fractions (decimals)
- Convert between fractions, decimals and percentages
- Use frequency trees to record outcomes of probability experiments

Use experimental and theoretical probability to calculate expected outcomes

Prior Domains:
- Find a relevant multiplier in a situation involving proportion
- Plot the graph of a linear function
- Understand the meaning of a compound unit

Convert between units of length, capacity, mass and time

Prior Domains:
- Know angle facts including angles at a point, on a line and in a triangle
- Know angle facts involving parallel lines and vertically opposite angles
- Know the properties of special quadrilaterals

Know Pythagoras' theorem

Summer Term 3A		Summer Term 3B		Summer Term 3B	
TOPIC TITLE: More trigonometry		**TOPIC TITLE: Further statistics**		**TOPIC TITLE: Equations and graphs**	

Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)
• Explore three-dimensional shapes • Apply Pythagoras' theorem in three dimensions • Apply trigonometry in three dimensions • Know and use the sine rule • Know and use the cosine rule	• know the formulae for Pythagoras' theorem, $a^2 + b^2 = c^2$, and apply it to find lengths in three dimensional figures • know the trigonometric ratios, $\sin\theta$ = opposite/hypotenuse, $\cos\theta$ = adjacent/hypotenuse, $\tan\theta$ = opposite/adjacent and apply them to find angles and lengths in three dimensional figures • know and apply the sine rule, $a/\sin A = b/\sin B = c/\sin C$, and the cosine rule, $a^2 = b^2 + c^2 - 2bc \cos A$, to find unknown lengths and angles	• Construct and interpret histograms • Analyse distributions of data sets • Solve problems involving histograms	construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and know their appropriate use	• Manipulate quadratic functions • Solve problems involving graphs of quadratic functions • Explore rates of change	apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts

• know and apply area = ½ab sinC to calculate the area, sides or angles of any triangle					

Prior Domains:
- Apply Pythagoras' theorem in two dimensions
- Know the trigonometric ratios, sinθ = opp/hyp, cosθ = adj/hyp, tanθ = opp/adj
- Choose an appropriate trigonometric ratio that can be used in a given two-dimensional situation
- Set up and solve a trigonometric equation to find a missing side or angle in a right-angled triangle

Prior Domains:
- Know the meaning of continuous data
- Understand and use grouped frequency tables
- Interpret histograms for grouped data with equal class intervals

Prior Domains:
- Complete the square for a given quadratic expression
- Know the meaning of roots, intercepts and turning points
- Identify and interpret roots, intercepts, turning points of quadratic functions graphically
- Interpret the gradient at a point on a curve as the instantaneous rate of change
- Know the effects of transforming the graph y = f(x): f(x) + a and f(x + a)

Year 11			
Autumn Term 1A	**Autumn Term 1A**	**Autumn Term 1B**	**Autumn Term 1B**
TOPIC TITLE: Circle Theorems	**TOPIC TITLE: More Algebra**	**TOPIC TITLE: Vectors and geometric proof**	**TOPIC TITLE: Proportion and graphs**

Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)	Topics	Domains (Core knowledge and skills)
• Investigate geometric patterns using circles • Explore circle theorems • Make and prove conjectures	apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	• Manipulate algebraic fractions Manipulate algebraic expressions	• simplify and manipulate algebraic expressions involving algebraic fractions • manipulate algebraic expressions by expanding products of more than two binomials • simplify and manipulate algebraic expressions (including those involving surds) by expanding products of two binomials and factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares manipulate algebraic expressions by factorising quadratic expressions of the form $ax^2 + bx + c$	• Explore the concept of a vector Solve problems involving vectors	apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors	• Explore differences between direct and inverse proportion • Investigate ways of representing proportion in situation • Solve problems involving proportion	• interpret equations that describe direct and inverse proportion • recognise and interpret graphs that illustrate direct and inverse proportion understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y

Prior Domains:
- Know the vocabulary of circles
- Know angle facts including angles at a point, on a line and in a triangle
- Know angle facts involving parallel lines and vertically opposite angles

Know the properties of special quadrilaterals

Prior Domains:
- Calculate with negative numbers
- Multiply two linear expressions of the form (x ± a)(x ± b)
- Factorise a quadratic expression of the form x² + bx + c
- Add, subtract, multiply and divide proper fractions
- Change the subject of a formula when two steps are required

Prior Domains:
Understand column vector notation

Prior Domains:
- Know the difference between direct and inverse proportion
- Recognise direct or inverse proportion in a situation
- Know the features of a graph that represents a direct or inverse proportion situation
- Know the features of an expression (or formula) that represents a direct or inverse proportion situation

Understand the connection between the multiplier, the expression and the graph

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In Spring Term, individual class teachers will identify priority topics based on both summative and formative assessment