YEAR 11 Scheme of Learning 2020-21

GTS
DREAM
BELIEVE
ACHIEVE

	WA1 Fractions indices, surds bounds	WA2 expressions and formulae	WA4 Equations and proportionality		Wa3 surface area transformations and similarity	WA5 circles coordinate geometry area under curve
Year 11 Autumn	**Fractions** • By writing the denominator in terms of its prime factors, decide whether fractions can be converted to recurring or terminating decimals; • Convert a fraction to a recurring decimal and vice versa; **indices** • Estimate roots • Understand that the inverse operation of raising a positive number to a power • Use index laws to simplify and calculate the value of numerical expressions inc, fractional and negative powers, • Solve problems using index laws; **Surds** • Understand surd notation, • Simplify surd expressions • Rationalise the denominator	**Expanding and factorising** • Expand the product of any two linear expressions e.g. $(2x + 3y)(3x - y)$; • Expand triple brackets • Factorise quadratic expressions a ≠1; • Write quadratic expressions in the form $(x + a)^2 + b$ **Proof** • Solve 'Show that' and proof questions using consecutive integers $(n, n + 1)$, squares a^2, b^2, even numbers $2n$, odd numbers $2n +1$ including those that involve products; • **Algebraic fractions** • Simplify algebraic fractions; • Multiply and divide algebraic fractions; **Rearranging formulae** • Change the subject of a formula, including cases where the subject occurs on both sides of the formula, or where a power of the subject appears; • Change the subject of a formula where all variables are in the denominators;	**Quadratics including iteration** Factorise and solve quadratics (1) Factorise and solve quadratics (2) Solve quadratic (and cubic) equations using an iterative process • Solve quadratic inequalities algebraically • Solve linear and quadratic equations arising from algebraic fractions **Simultaneous equations** Simultaneous equations 1 Simultaneous equations 2 **CONT AFTER HALF TERM**	**Direct and inverse proportion** • Write statements of proportionality for quantities proportional to the square, cube or other power of another quantity; • Set up and use equations to solve word and other problems involving direct or inverse proportion; • Use $y = kx$ to solve direct proportion problems, including questions where students find k, and then use k to find another	**Bounds** • Calculate the upper and lowers bounds of numbers given to varying degrees of accuracy; • Calculate the upper and lower bounds of calculations, **Surface area and volume** • Convert between metric units of length, area and volume. • Calculate the maximum and minimum values of measurements and calculations; • Solve problems involving surface area and volume for more complex shapes • Find the surface area and volumes of compound solids • Form and solve equations. • Solve 'Show that' and proof questions in context including (but not limited to) area, perimeter and volume; **Similarity** • Understand similarity of triangles • Find missing lengths, areas and volumes in similar 3D solids; • Know the relationships between linear, area and volume scale factors of similar • Use formal geometric proof for the similarity of two given triangles; •	**Coordinate geometry** • Find the equation of a straight line from a graph in the form $ax + by = c$; • Plot and draw graphs of straight lines in the form $ax + by = c$; • Generate equations of lines parallel and perpendicular to a given line; • Recognise a linear, quadratic, cubic, reciprocal and circle • Draw circles, with equation $x^2 + y^2 = r^2$. **Sequences** • use the nth term to generate terms in a quadratic or geometric sequence • Find the nth term of quadratic sequences **Recognise and use simple geometric progressions** • Recognise and sketch and interpret the graph of and exponential function $y = k^x$ **Quadratics** • Sketch a graph of a quadratic function • Find approximate solutions to quadratic equations using a graph; • Sketch graphs of simple cubic functions, given as three linear expressions; • Solve simultaneous equations graphically: • Solve quadratic inequalities • Represent the solution set for inequalities using set notation • Solve linear inequalities graphically; **Graphs** • Interpret the area under a linear or non-linear graph in real-life contexts; • Interpret the rate of change of graphs of containers filling and emptying; **Circle geometry** • Find the equation of a tangent to a circle at a given point, • Solve problems involving eq'n of circle

	WA6 trigonometry and graphs	WA7 Further representing data	Wa8 Circle theorems	WA9 Functions and transformations	WA10 Proof
Year 11 Spring	**Graphs** • Recognise, sketch and interpret graphs of the trigonometric functions • Know the exact values of sin ϑ and cos ϑ for ϑ = 0°, 30°, 45° , 60° and 90° and exact value of tan ϑ for ϑ = 0°, 30°, 45° and 60° and find them from graphs. **Trigonometry** • Calculate the area, sides or angles of any triangle. • Know and use Use the sine and cosine rules to solve 2D abd 3D problems. • Give an answer to the use of Pythagoras' Theorem in surd form; • Calculate the length of a diagonal of a cuboid. • Solve trigonometric problems in 3D • Find the angle between a line and a plane **Congruence and proof** • Understand and derive the proof that the angle sum of a triangle is 180°, • Use SSS, SAS, ASA and RHS conditions to formally prove the congruence of triangles and other shapes • Solve angle problems by first proving congruence;	**Product rule for counting** • Use the product rule for counting **CF and box plots** • Construct/interpret cum. Freq. tables; • Compare the mean, mode and range/IQR of two distributions, • Construct and Interpret box plots to find median, quartiles, range and interquartile range and draw conclusions; **Histograms** • Construct and interpret histograms • From histograms complete a grouped frequency table; • Estimate the mean and median from a histogram; **Probability** • Construct/use a probability tree diagram • Calculate the probability of independent and dependent combined events including algebraic terms • Calculate conditional probability; • Compare experimental data and theoretical probabilities; • Compare relative frequencies from samples of different sizes.	**Circle theorems** • Recall the definition of a circle and identify (name) and draw parts of a circle, including sector, tangent, chord, segment; • Prove and use circle theorems: o the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference; the angle in a semicircle is a right angle; o the perpendicular from the centre of a circle to a chord bisects the chord; o angles in the same segment are equal; o alternate segment theorem; o opposite angles of a cyclic quadrilateral sum to 180°; • Understand and use the fact that the tangent at any point on a circle is perpendicular to the radius at that point; • Find and give reasons for missing angles on diagrams using: • circle theorems; • isosceles triangles (radius properties) in circles;	**Functions** • Write a ratio as a linear function; • Use function notation; • 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; • For two functions f(x) and g(x), find gf(x). **Transformations** • Describe and transform 2D shapes using combined transformations • Describe the changes and invariance achieved by combinations of transformations • Describe and transform 2D shapes using enlargements by negative/ fractional scale factor; • Interpret and analyse transformations of graphs of functions and write the functions algebraically, e.g. write the equation of f(x) + a, or f(x − a): • apply to the graph of y = f(x) the transformations y = −f(x), y = f(−x) for linear, quadratic, cubic functions; sine, cosine and tan functions f(x). • apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(x +a) for linear, quadratic, cubic functions; sine, cosine and tan functions f(x).	**Vectors and proof** • Understand and use vector notation, • Identify parallel vectors. • Represent vectors, combinations of vectors and scalar multiples in the plane pictorially. • Calculate the sum of two vectors, the difference of two vectors and a scalar multiple of a vector using column vectors (including algebraic terms). • Find the length of a vector • Calculate the resultant of two vectors. • Solve geometric problems in 2D where vectors are divided in a given ratio. • Produce geometrical proofs to prove points are collinear and vectors/lines are parallel.