MATHEMATICS

Year 11

What are the aims and intentions of this curriculum?

The aim of our Key Stage 4 Curriculum is to ensure that all pupils: i)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. ii) reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language iii) 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.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	**Handling Data** • Charts and Diagrams **Probability**	• Frequency Polygon • Histogram • Scatter Graph (Respectful Relationships Cyberbullying and Performance) Career Integration- Economists, Scientists, Researchers and Data Journalists **Key Words:** Frequency, correlation, extrapolation, interpolation, causation, line of best fit, estimate. cumulative frequency, median, lower quartile, upper quartile, interquartile range, box plot, consistent, average, frequency density, class width	• Draw and Interpret Frequency Polygons • Calculate frequency density • Draw a histogram with bars of unequal widths. • Interpret a scatter diagram. • Draw a line of best fit. • Use the line of best fit to make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing. Draw and interpret a cumulative Frequency Graph • Draw and interpret a box plot.	Differentiated worksheets Topic Based Exam Questions Mini Whiteboard Activities Teacher and Peer Assessment Targeted Questioning Evaluating Statements about Probability Maths Assessment Project Summative Tests Kahoot

	• Sampling • Systematic Listing • Sample Space Diagrams • Two-way tables • Frequency Tree • Tree Diagrams • Venn Diagrams • Conditional Probability	• Sampling • Frequency of outcomes of probability experiments using tables and frequency trees. PSHE -Families • Randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments. • Relate relative expected frequencies to theoretical probability, using appropriate language and the 0–1 probability scale. • Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams. **Key Words:** Certain, Unlikely, Likely, Impossible, Probability Scale, Equally Likely, Biased, Fair, Relative Frequency, Expected Frequency, Trial, Outcome, Event, Probability, Dependent, Independent, Conditional, Tree Diagrams, Sample Space, Outcomes, Union, Intersection, Sets, Universal, Abstract, Notation, Probability, Outcomes, Complement Career Integration: Meteorologist, Insurance agents, researchers, etc. **Intervention Session**: Construction and Loci	• Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling • Construct sample space tables and using them to calculate probabilities. • Using frequency trees to show probabilities of two events and calculate the probability of independent and dependent events. • Calculate theoretical probabilities and expected frequencies. • Recognising mutually exclusive events and know that the probabilities of mutually exclusive exhaustive events sum to 1. • Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions. • Construct and identify relationships amongst sets in Venn diagrams. • Find probability from frequency trees, tree diagrams and Venn diagrams. • Calculate and interpret conditional probabilities through representation using expected frequencies with two-	

			way tables, tree diagrams and Venn diagrams.	
Autumn 2	**Ratio, Proportion and Rates of Change and Graph** • Ratio • Exchange Currency • Direct and Inverse Proportion • Compound Units • Real life Graphs	• Writing and using ratio Basic first aid- CPR Use a variety of measures in ratio and proportion problems: currency conversion, rates of pay. • Direct and Inverse Proportion • Compound units-speed, acceleration, density, Pressure • Distance-time Graphs and Velocity Time Graphs (Career Integration – Employers, Accountants) **Key Words:** Ratio, more than, less than, direct proportion, inverse proportion, Distance, Speed, Acceleration, trapezium, Gradient, rate, Tangent, Force, Density, Pressure, Equivalent, Newton, Area, Square units, Metres, volume, mass.	• Write ratios in their simplest form. • Share a quantity in a given ratio including three-part ratios. • Write ratios in form 1 : m or m : 1. • Convert currency from one to another. • Solving problems involving direct and inverse proportion, including graphical and algebraic representations. • Performing calculations with distance, speed and acceleration. • Using compound units such as speed, density and pressure. • Estimate the speed at one point in time, from the tangent, and the average speed over several seconds by finding the gradient of the chord for a non-linear distance–time graph. • Estimate the acceleration at one point in time, from the tangent, and the average acceleration over several seconds by finding the gradient of the chord for a non-linear velocity–time graph. • Calculate the distance under a speed time graph.	Treasure Hunt 'Detect and correct the error' Differentiated Worksheets True/False Card Activity KWL Give me Five Exit Ticket Find someone who knows…. MathsWatch/ Transum Online activities Traffic Light Cards Summative Test

Spring 1	**Vectors** **Surds** **Circle Theorems**	• Calculations with vectors. • Representing vectors on graphs. • Vector Geometry • Simplifying surds • Rationalising the denominator • Circle theorems (Revision of Congruency) **Key words:** vectors, scalar, parallel, prove, surds, rationalise Career Integration- CAD Engineer, Researcher, Interior Designer	• Applying addition, subtraction and multiplication of vectors (by a scalar) and diagrammatic and column representations of vectors. • Use vectors to construct geometric arguments and proof • Simplify surds including those involving squares. • Rationalise the denominator involving surds. • Apply the circle theorems	Vectors Message Summative Test Mini Whiteboard Activity Student Portfolio Practice Workbook activities Traffic Light Cards Talk it through 3-2-1 Prove it Exit Card Exam Questions Pair Carousel
Spring 2	• Limits of Accuracy- Upper and Lower Bounds (Review) • Functions • Pythagoras in 3D • Trigonometric Graphs • Transformation of Graphs	• Limits of Accuracy • Composite functions • Inverse of a Function • Pythagoras in 3D **Career Integration- Computer Programming** Family- Mapping • Trigonometric Graphs • Transformation of Graphs • Equation of a circle	• Find the upper and lower bounds in real-life situations using measurements given to appropriate degrees of accuracy. • Interpret the reverse process as the 'inverse function'. • Interpret the succession of two functions as a 'composite function' • Understand, recall and use trigonometric relationships and Pythagoras' Theorem in right-angled triangles, and use	Mini Whiteboard Activity Student Portfolio Practice Workbook activities Traffic Light Cards Talk it through 3-2-1 Prove it Exit Card

	• Equation of Tangent to a circle • Surface Area and Volume (Review)	**Career Integration- Engineers, Photographers, Mathematics Teachers, etc.** • Surface Area and Volume (Review) **Career Integration- Architectural Engineers, Painters, Chemist, etc.** **Key Words**: radius, radii, circumference, arc, bisect, chord, tangent, isosceles, segment, angles, cyclic quadrilateral, sine, cosine, tangent, shift, vertical, horizontal, stretch, reflection, x-axis, y-axis, gradient, perpendicular, error interval, upper bound, lower bound, significant figure, decimal places, degree of accuracy, function, substitute, composite, inverse, angle, diagonal	these to solve problems in 3D configurations. • Interpret and analyse transformations of graphs of functions and write the functions algebraically. • Recognise, sketch and interpret graphs of the trigonometric functions (in degrees) y = sin *x*, *y* = cos *x* and *y* = tan *x* for angles of any size. • Apply to the graph of *y* = f(*x*) the transformations *y* = –f(*x*), *y* = f(–*x*), *y* = f(*x*) + *a*, *y* = f(*x* + *a*) for sine, cosine and tan functions f(*x*). • Write the equation of a circle for radius *r* centred at the origin of coordinates. • Draw a circle given the equation. • Calculate surface areas and volumes of spheres, pyramids, cones and composite solids	Exam Questions Pair Carousel Dr Austin Math Worksheets
Summer 1	**Exam Revision**	• Revise concepts for GCSE and close gaps identified.	• Selecting and applying mathematical and exam techniques to solve problems. • Making deductions and inferences and drawing conclusions.	Practice Grids Exam questions carousel Exam Style Questions Peer and Self-Assessment Teacher Assessment