**GCSE Mathematics**

**Exam Board: Edexcel**

|  |  |  |  |
| --- | --- | --- | --- |
| **Term** | **INTENT** | **IMPLEMENTATION** | **IMPACT** |
| **Substantive Knowledge**  This is the specific, factual content for the topic, which should be connected into a careful sequence of learning. | **Disciplinary Knowledge (Skills)**  This is the action taken within a particular topic in order to gain substantive knowledge. | **Assessment opportunities**  What assessments will be used to measure student progress?  Evidence of how well students have learned the intended content. |
| **Autumn Term**  **Y10**  **1A** | **Graphs**  Straight Line Graphs  Quadratic Graphs  Cubic Graphs  Reciprocal Graphs  Circle Graphs  Distance-Time Graphs  Velocity-Time Graphs  **Representations of data** Box Plots  Histograms | * Plot/draw graphs of the form y=mx+c * Recognise equations of the form y=mx+c corresponds to straight-line * Identify and interpret the gradient and y-intercept of a linear graph * Identify and interpret gradient from ax+by=c * Find equation of a line * Draw and interpret distance-time graphs * Draw and interpret velocity-time graphs * Recognise a linear, quadratic, cubic, reciprocal and circle graph from its shape * Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function * Interpret graphs from real-life problems * Recognise equation of the from x2+y2=r2 is a circle, centre (0,0) and radius r * Produce box plots from raw data and when given quartiles, median and identify any outliers * Interpret box plots to find median, quartiles, range and interquartile range and draw conclusions * Construct and interpret histograms from class intervals with unequal width * Use and understand frequency density * Complete grouped frequency tables from Histograms * Understand and define frequency density * Estimate the mean/median from a histogram | Knowledge recall starter activity  Homework to develop fluency, problem solving, reasoning and mastery  Teacher assessment during lesson  End of unit assessment via textbook |
| **Autumn Term**  **1B** | **Transformations** Translation  Reflection Rotation Enlargement  **Constructions** Plans and Elevations  Bearings  Constructing triangles  Perpendicular Bisector  Angle Bisector  Loci  **Quadratics**  Quadratic Equations  Quadratic Inequalities | * Translate a given shape by a vector * Recognise and describe single translations using column vectors on a coordinate grid * Enlarge a shape on a grid without a centre specified * Describe and transform 2D shapes using enlargements by a positive integer, positive fractional, and negative scale factor * Enlarge a given shape using a given centre as the centre of enlargement by counting distances from centre, and find the centre of enlargement by drawing * Recognise and describe rotations * Rotate 2D shapes using the origin or any other point * Identify the equation of a line of symmetry * Recognise and describe reflections on a coordinate grid * Reflect 2D shapes using specified mirror lines, including lines parallel to the axes and also y=x and y=-x * Describe and transform 2D shapes using combined rotations, reflections, translations or enlargements * Understand and draw front and side elevations and plans of shapes made from simple solids * Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid * Use and interpret maps and scale drawings, using a variety of scales and units * Calculate bearings and solve bearings problems, including on scaled maps, and find/mark and measure bearings * Construct Perpendicular bisector of a line segment * Bisect a given angle * Construct a region bounded by a circle and an intersecting line * Construct a given distance from a point and a given distance from a line * Construct equal distances from two points or two line segments * Construct regions which may be defined by ‘nearer to’ or ‘greater than * Use constructions to solve loci problems including with bearings * Know that the perpendicular distance from a point to a line is the shortest distance to the line * Find and describe regions satisfying a combination of loci, including in 3D * Solve quadratic equations by factorisation * Solve quadratic equations by completing the square * Solve quadratic equations by using the quadratic formula * Solve quadratic inequalities and display solution in set notation | Knowledge recall starter activity  Homework to develop fluency, problem solving, reasoning and mastery  Teacher assessment during lesson  End of unit assessments via textbook  End of term assessment |
| **Spring Term**  **2A** | **Trigonometry**  Exact Trig ValuesTrigonometric Graphs  Area of any triangle  Sine Rule  Cosine Rule  3D Trigonometry | * 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 using special triangles * Recognise properties, sketch and interpret graphs of sin, cos and tan * Apply to the graph of y = f(x) the transformations y = –f(x), y = f(–x) for 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 sine, cosine and tan functions f(x). * Know and apply Area = 1/2 ab sin C to calculate the area of any triangle * Know and apply Area = 1/2 ab sin C to calculate the sides or angles of any triangle * Know the sine rule, and use to solve 2D problems (including involving bearings) * Know the cosine rule, and use to solve 2D problems (including involving bearings) * Use a combination of the sine and cosine rules to find missing lengths and angles * Use the sine rule and cosine rule to solve 3D problems * Solve geometrical problems on coordinate axes | Knowledge recall starter activity  Homework to develop fluency, problem solving, reasoning and mastery  Teacher assessment during lesson  End of unit assessments via textbook |
| **Spring Term**  **2B** | **Probability**  Sample Space  Venn Diagrams  Two-Way Tables  Conditional Probabilities  Tree Diagrams  **Geometry**  Similarity  Congruence  **Equations and Graphs**  Sketching graphs  Simultaneous Equations graphically  Iteration | * Write probabilities using fractions, percentages or decimals * Know that sum of probabilities of all outcomes is 1 * List all outcomes for single events, and combined events * Compare experimental and theoretical probabilities * Estimate number of times an event will occur, given the probability and the number of trials * Find the probability of successive events, such as several throws of a single dice * Draw sample space diagrams and use them for adding simple probabilities * Work out probabilities from Venn diagrams to represent real-life situations * Use union and intersection notation * Use Venn Diagrams to calculate conditional probability * Find a missing probability from a list or two-way table * Use two-way table to calculate conditional probability * Understand conditional probabilities and decide if two events are independent * Draw probability tree diagram based on given information, and use this to find probability and expected number of outcome * Understand selection with or without replacement * Use a tree diagram to calculate conditional probability * Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles using formal arguments, and to verify standard ruler and pair of compasses constructions * Solve angle problems by first proving congruence * Understand similarity of triangles and of other plane shapes, and use this to make geometric inferences * Understand the effect of enlargement on angles, perimeter, area and volume of shapes and solids * Know the relationships between linear, area and volume scale factors of mathematically similar shapes and solids * Use the relationship between enlargement and areas and volumes of simple shapes and solids * Find missing lengths, areas and volumes in similar 3D solids * Use formal geometric proof for the similarity of two given triangles * Solve problems involving frustums of cones where you have to find missing lengths first using similar triangles * Sketch a graph of a quadratic function, by factorising or by using the formula, identifying roots, y-intercept and turning point by completing the square * Find approximate solutions to quadratic equations using a graph * Solve simultaneous equations graphically * Find graphically the intersection points of a given straight line with a circle * Solve simultaneous equations representing a real-life situation graphically, and interpret the solution in the context of the problem * Use iteration with simple converging sequences. | Knowledge recall starter activity  Homework to develop fluency, problem solving, reasoning and mastery  Teacher assessment during lesson  End of unit assessments via textbook |
| **Summer Term**  **3A** | **Circles** Circle Theorems Circle Geometry  **FDP** Fractions  Decimals  Percentages  Ratio  Proportion | * Recall the definition of a circle and identify (name) and draw parts of a circle, including sector, tangent, chord, segment * Understand and use the fact that the tangent at any point on a circle is perpendicular to the radius at that point * Prove and use the facts of all circle theorems * Recognise and construct the graph of a circle using x2 + y2 = r2 for radius r centred at the origin of coordinates * Find the equation of a tangent to a circle at a given point * Add, subtract, multiply and divide fractions * Convert a fraction to a recurring decimal and vice versa. * Convert between fractions, decimals and percentages * Work out a percentage increase or decrease, including: simple interest, income tax calculations, value of profit or loss, percentage profit or loss * Write ratios in their simplest form, including three-part ratios * Write a ratio as a fraction * Identify direct proportion from a table of values, by comparing ratios of values * Convert between currencies | Knowledge recall starter activity  Homework to develop fluency, problem solving, reasoning and mastery  Teacher assessment during lesson  End of unit assessments via textbook |
| **Summer Term**  **3B** | **Algebra**  Algebraic Fractions  Algebraic Proof  Functions  Rearranging formulae  **Surds**  Simplifying  Operations  Rationalising the denominator | * Simplify algebraic fractions * Multiply and divide algebraic fractions * Change the subject of a formula * Solve ‘Show that’ and proof questions using consecutive integers , squares, even numbers, odd numbers * Rationalise the denominator involving surds * Use function notation * Find the inverse of a function * Find composite functions | Knowledge recall starter activity  Homework to develop fluency, problem solving, reasoning and mastery  Teacher assessment during lesson  End of unit assessments via textbook  End of year assessments |