Year 10F Scheme of Work

Unit	Key Objectives
Rounding, Estimation and Error intervals	Estimate answers to calculations by rounding numbers to 1 significant figure; Truncate a number to a given degree of accuracy Use inequality notation to specify simple error intervals due to truncation or rounding
Perimeter, Area and Volume	Recall and use the formulae for the area of a parallelogram and trapezium; Calculate areas and perimeters of compound shapes made from triangles and rectangles; Find radius or diameter, given area or perimeter of a circle; Find the perimeters and areas of semicircles, quarter-circles and areas of composite shapes made from circles and parts of circles; Find the volume of composite solids; Estimate volumes etc by rounding measurements to 1 significant figure; Convert between units of measure within one system, including time and metric units to metric units of length, area and volume and capacity e.g. 1ml = 1cm^3;
Algebraic Manipulation	***Algebraic Fluency:*** Argue mathematically to show algebraic expressions are equivalent; Write expressions to solve problems representing a situation; Derive a simple formula, including those with squares, cubes and roots; Substitute numbers into a (word) formula; Define a 'quadratic' expression; ***Expand, Factorise and Solve:*** Multiply together two algebraic expressions with brackets; Square a linear expression, e.g. $(x + 1)^2$; Factorise quadratic expressions of the form $x^2 + bx + c$; Factorise a quadratic expression $x^2 - a^2$ using the difference of two squares;
Standard Form	Convert large and small numbers into standard form and vice versa; Add, subtract, multiply and divide numbers in standard form; Interpret a calculator display using standard form and know how to enter numbers in standard form.

Algebraic Manipulation	Argue mathematically to show algebraic expressions are equivalent Write expressions to solve problems representing a situation Derive a simple formula, including those with squares, cubes and roots Substitute numbers into a (word) formula Define a 'quadratic' expression Multiply together two algebraic expressions with brackets Square a linear expression, e.g. $(x + 1)^2$ Factorise quadratic expressions of the form $x^2 + bx + c$ Factorise a quadratic expression $x^2 - a^2$ using the difference of two squares
Properties of Shape, Angle Facts and Angles in Parallel Lines	Use geometric language appropriately; Identify a line perpendicular to a given line on a diagram and use their properties; Understand a proof that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices; Use geometrical language appropriately, give reasons for angle calculations and show step-by-step deduction when solving problems. Identify parallel lines on a diagram and use their properties; Understand and use the angle properties of parallel lines;
Indices	Use index notation for powers of 10, including negative powers; Use the laws of indices to multiply and divide numbers written in index notation; Use brackets and the hierarchy of operations with powers inside the brackets, or raising brackets to powers; Use calculators for all calculations: positive and negative numbers, brackets, square, cube, powers and roots, and all four operations. Use numbers raised to the power zero, including the zero power of 10;

Sequences	Find the nth term for a pattern sequence, a linear sequence or an arithmetic sequence; Use the nth term of an arithmetic sequence to generate terms, decide if a given number is a term in the sequence, or find the first term over a certain number; Find the first term greater/less than a certain number; Continue a geometric progression and find the term-to-term rule, including negatives, fraction and decimal terms; Continue a quadratic sequence and use the nth term to generate terms; Distinguish between arithmetic and geometric sequences. Recognise and work with Fibonacci-type sequences
Ordering FDP	Recall the fraction-to-decimal conversion and convert fractions to decimals; Convert a fraction to a decimal to make a calculation easier; Recognise recurring decimals and convert fractions such as $\frac{2}{3}$ and $\frac{1}{7}$ into recurring decimals; Compare and order fractions, decimals and integers, using inequality signs; Convert between fractions, decimals and percentages; Order fractions, decimals and percentages, including use of inequality signs.
Quadratic Equations and Graphs	Find the roots of a quadratic function algebraically Identify the line of symmetry of a quadratic graph Find approximate solutions to quadratic equations using a graph Interpret graphs of quadratic functions from real-life problems Identify and interpret roots, intercepts and turning points of quadratic graphs

Representing Data	***Time Series*** Produce and interpret line graphs for time–series data; ***Stem and Leaf Diagrams*** Produce and interpret stem and leaf (including back-to-back) diagrams; Interpret stem and leaf diagrams by finding the mode, median and range; ***Pie charts*** Draw a pie chart; Interpret simple pie charts using simple fractions and percentages and multiples of 10% sections; From a pie chart, find the mode and the total frequency; Understand that the frequency represented by corresponding sectors in two pie charts is dependent upon the total populations represented by each of the pie charts. ***Frequency Polygons*** Produce and interpret frequency polygons for grouped data: from frequency polygons, read off frequency values, compare distributions, calculate total population, mean, estimate greatest and least possible values (and range); ***Scatter Graphs*** Identify outliers and ignore them on scatter graphs; Draw the line of best fit on a scatter diagram by eye, and understand what it represents; Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing; Use a line of best fit to predict values of a variable given values of the other variable; Understand that correlation does not imply causality; State how reliable their predictions are, i.e. not reliable if extrapolated.
Changing The Subject	Change the subject of a formula involving the use of square roots and squares Change the subject of a formula where the subject appears on both sides
Proportion 1: Direct and Inverse Proportion	Understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y; Solve problems involving inverse proportion e.g. number of workers Interpret equations that describe direct and inverse proportion.
Careers Week: Plans and Elevations	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;

Linear Graphs	***Plotting*** Plot and draw graphs of straight lines of the form y = mx + c using a table of values; Plot and draw graphs of straight lines in the form ax + by = c; Sketch a graph of a linear function, using the gradient and y-intercept; ***Equation*** Find the equation of a straight line from a graph; Find the equation of the line through one point with a given gradient; Rearrange equations into the form y=mx+c to identify the gradient and y-intercept; Interpret and analyse information presented in a range of linear graphs; Find approximate solutions to a linear equation from a graph.
Proportion 2: Compound Measures	Convert between metric speed measures; Calculate average speed, distance, time – in miles per hour as well as metric measures; Change d/t in m/s to a formula in km/h, i.e. d/t × (60 × 60)/1000 – with support; Solve problems involving density and pressure;
Right Angled Triangles	Calculate the length of the hypotenuse and of a shorter side in a right-angled triangle, including decimal lengths, a range of units and leaving answers in surd form; Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid; Use and recall the trigonometric ratios (sine, cosine and tangent) and apply them to find angles and lengths in right-angled triangles; Round answers to appropriate degree of accuracy, either to a given number of significant figures or decimal places, or make a sensible decision on rounding in context of question;

Linear Equations and Simultaneous Equations	***Solve Equations*** Solve linear equations in which the unknown appears on both sides of the equation; Solve linear equations which contain brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution; Write and solve simultaneous equations to represent a situation; ***Solve Simultaneous Equations Graphically*** Solve simultaneous equations (linear/linear) algebraically and graphically; Solve simultaneous equations (linear/quadratic given) algebraically and graphically; Solve simultaneous equations representing a real-life situation, graphically and algebraically, and interpret the solution in the context of the problem;
Similarity	Understand similarity of triangles and of other plane shapes, use this to make geometric inferences, and solve angle problems using similarity; Solve problems to find missing lengths in similar shapes; Solve similarity problems involving similar triangles, such as "bow tie" and triangles within triangles; Understand the effect of enlargement on angles and perimeter of shapes; Identify the scale factor of an enlargement of a similar shape as ratio of the lengths of two corresponding sides; Write the lengths as ratios in their simplest form;
Percentage Change	***Part 1*** Express a given number as a percentage of another number; Use a multiplier to increase or decrease by a percentage in any scenario where percentages are used;, including percentages greater than 100%; Find the original amount given the final amount after a percentage increase or decrease; Make calculations involving repeated percentage change, not using the formula; ***Part 2: My Money Week*** Calculate percentage profit or loss; Use percentages in real life situations such as price after and before VAT; value of profit or loss; simple interest; income tax calculations; Use compound interest; Set up, solve and interpret the answers in growth and decay problems, such as depreciation;

Transformations	**Transformations**
	Translate a shape given a column vector;
	Reflect a shape in a given mirror line;
	Rotate a shape given a centre, an angle and a direction;
	Enlarge a shape given a scale factor (positive or fractional) and a centre;
	Describing Transformations
	Identify the equation of a line of symmetry;
	Describe reflections on a coordinate grid;
	Find the centre of rotation, angle and direction of rotation and describe rotations fully using the angle, direction of turn, and centre;
	Use column vectors to describe and transform 2D shapes using single translations on a coordinate grid;
	Find the centre of enlargement by drawing;
	Describe enlargements by a positive integer scale factor and a fractional scale factor;
	Properties of Transformations
	Understand that distances and angles are preserved under rotations and translations, so that any figure is congruent under either of these transformations;
	Understand that distances and angles are preserved under reflections, so that any figure is congruent under this transformation;
	Understand that an enlargement results in a similar shape;