

**Year 10F Scheme of Work**

<b>Unit</b>	<b>Key Objectives</b>
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. $1\text{ml} = 1\text{cm}^3$
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

Representing Data	<p>Produce and interpret line graphs for time-series data;</p> <p>Produce and interpret stem and leaf (including back-to-back) diagrams;</p> <p>Interpret stem and leaf diagrams by finding the mode, median and range;</p> <p>Draw a pie chart;</p> <p>Interpret simple pie charts using simple fractions and percentages and multiples of 10% sections;</p> <p>From a pie chart, find the mode and the total frequency;</p> <p>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.</p> <p>Produce and interpret frequency polygons for grouped data:</p> <p>from frequency polygons, read off frequency values, compare distributions, calculate total population, mean, estimate greatest and least possible values (and range);</p> <p>Identify outliers and ignore them on scatter graphs;</p> <p>Draw the line of best fit on a scatter diagram by eye, and understand what it represents;</p> <p>Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing;</p> <p>Use a line of best fit to predict values of a variable given values of the other variable;</p> <p>Understand that correlation does not imply causality;</p> <p>State how reliable their predictions are, i.e. not reliable if extrapolated.</p>
Algebraic Manipulation	<p>Argue mathematically to show algebraic expressions are equivalent</p> <p>Write expressions to solve problems representing a situation</p> <p>Derive a simple formula, including those with squares, cubes and roots</p> <p>Substitute numbers into a (word) formula</p> <p>Define a 'quadratic' expression</p> <p>Multiply together two algebraic expressions with brackets</p> <p>Square a linear expression, e.g. <math>(x + 1)^2</math></p> <p>Factorise quadratic expressions of the form <math>x^2 + bx + c</math></p> <p>Factorise a quadratic expression <math>x^2 - a^2</math> using the difference of two squares</p>

<p>Properties of Shape, Angle Facts and Angles in Parallel Lines</p>	<p>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</p>
<p>Sequences</p>	<p>Find the <math>n</math>th term for a pattern sequence, a linear sequence or an arithmetic sequence Use the <math>n</math>th 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 <math>n</math>th term to generate terms Distinguish between arithmetic and geometric sequences</p>
<p>Plans and Elevations</p>	<p>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</p>
<p>Quadratic Equations and Graphs</p>	<p>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</p>

Percentage Change	<p>Express a given number as a percentage of another number;</p> <p>Use percentages in real-life situations, including percentages greater than 100%: Price after VAT (not price before VAT); Value of profit or loss; Simple interest; Income tax calculations;</p> <p>Use a multiplier to increase or decrease by a percentage in any scenario where percentages are used;</p> <p>Calculate percentage profit or loss;</p> <p>Make calculations involving repeated percentage change, not using the formula;</p> <p>Find the original amount given the final amount after a percentage increase or decrease;</p> <p>Use compound interest;</p> <p>Set up, solve and interpret the answers in growth and decay problems;</p>
Changing The Subject	<p>Change the subject of a formula involving the use of square roots and squares</p> <p>Change the subject of a formula where the subject appears on both sides</p>
Right Angled Triangles	<p>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</p> <p>Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid</p> <p>Use and recall the trigonometric ratios (sine, cosine and tangent) and apply them to find angles and lengths in right-angled triangles</p> <p>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</p>
Linear Graphs	<p>Plot and draw graphs of straight lines of the form <math>y = mx + c</math> using a table of values</p> <p>Plot and draw graphs of straight lines in the form <math>ax + by = c</math></p> <p>Sketch a graph of a linear function, using the gradient and y-intercept</p> <p>Find the equation of a straight line from a graph</p> <p>Find the equation of the line through one point with a given gradient</p> <p>Rearrange equations into the form <math>y=mx+c</math> to identify the gradient and y-intercept</p> <p>Interpret and analyse information presented in a range of linear graphs</p> <p>Find approximate solutions to a linear equation from a graph</p>

<p>Linear Equations and Simultaneous Equations</p>	<p>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 (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</p>
<p>Standard Form</p>	<p>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</p>
<p>Proportion 1</p>	<p>Convert between metric speed measures            Calculate average speed, distance, time – in miles per hour as well as metric measures            Change <math>d/t</math> in m/s to a formula in km/h, i.e. <math>d/t \times (60 \times 60)/1000</math> – with support            Solve problems involving density and pressure            Understand that X is inversely proportional to Y is equivalent to X is proportional to <math>1/Y</math>            Solve problems involving inverse proportion e.g. number of workers            Interpret equations that describe direct and inverse proportion</p>
<p>Column Vectors</p>	<p>Understand and use column notation in relation to vectors            Be able to represent information graphically given column vectors            Identify two column vectors which are parallel;            Calculate using column vectors, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector</p>

<p>Transformations</p>	<p>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          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          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</p>
<p>Similarity</p>	<p>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 the ratio of the lengths of corresponding sides          Write the lengths as ratios in their simplest form</p>
<p>Ordering FDP</p>	<p>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 <math>\frac{2}{3}</math> and <math>\frac{1}{7}</math> 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</p>