Subject: Maths

Year: 11 (Foundation)

Autumn HT 1	Autumn HT 2	Spring HT 1	Spring HT 2	Summer HT 1
Pythagoras and Trigonometry By the end of the unit, students should be able to: · Understand, recall and use Pythagoras' Theorem in 2D, including leaving answers in surd form and being able to justify if a triangle is right-angled or not; · Calculate the length of the hypotenuse and of a shorter side in a right-angled triangle, including decimal lengths and a range of units; · Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid; · Calculate the length of a line segment AB given pairs of points; · Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures; · Use the trigonometric ratios to solve 2D problems	**Statistics, sampling and the averages** By the end of the sub-unit, students should be able to: · Specify the problem and: · plan an investigation; · decide what data to collect and what statistical analysis is needed; · consider fairness; · Recognise types of data: primary secondary, quantitative and qualitative; · Identify which primary data they need to collect and in what format, including grouped data; · Collect data from a variety of suitable primary and secondary sources; · Understand how sources of data may be biased and explain why a sample may not be representative of a whole population;	**Similarity and congruence in 2D** By the end of the sub-unit, students should be able to: · Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS); · Solve angle problems involving congruence; · Identify shapes which are similar; including all circles or all regular polygons with equal number of sides; · Understand similarity of triangles and of other plane shapes, use this to make geometric inferences, and solve angle problems using similarity;	Responsive teaching based upon February Mock exam question level analysis.	

including angles of elevation and depression; · 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; · Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°. **<u>Perimeter, Area and Volume</u>** By the end of the sub-unit, students should be able to: · Indicate given values on a scale, including decimal value; · Know that measurements using real numbers depend upon the choice of unit; · 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 = 1cm3; · Make sensible estimates of a range of measures in everyday settings;	· Understand sample and population. · Calculate the mean, mode, median and range for discrete data; · Interpret and find a range of averages as follows: · median, mean and range from a (discrete) frequency table; · range, modal class, interval containing the median, and estimate of the mean from a grouped data frequency table; · mode and range from a bar chart; · median, mode and range from stem and leaf diagrams; · mean from a bar chart; · Understand that the expression 'estimate' will be used where appropriate, when finding the mean of grouped data using mid-interval values; · Compare the mean, median, mode and range (as appropriate) of two distributions using bar charts, dual bar charts, pictograms and back-to-back stem and leaf; · Recognise the advantages and disadvantages between measures of average.	· Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides; · Understand the effect of enlargement on perimeter of shapes; · Solve problems to find missing lengths in similar shapes; · Know that scale diagrams, including bearings and maps are 'similar' to the real-life examples. **<u>Transformations</u>** By the end of the sub-unit, students should be able to: · Identify congruent shapes by eye; · Understand that rotations are specified by a centre, an angle and a direction of rotation; · Find the centre of rotation, angle and	

· Measure shapes to find perimeters and areas using a range of scales; · Find the perimeter of · rectangles and triangles; · parallelograms and trapezia; · compound shapes; · Recall and use the formulae for the area of a triangle and rectangle; · Find the area of a trapezium and recall the formula; · Find the area of a parallelogram; · Calculate areas and perimeters of compound shapes made from triangles and rectangles; · Estimate surface areas by rounding measurements to 1 significant figure; · Find the surface area of a prism; · Find surface area using rectangles and triangles; · Identify and name common solids: cube, cuboid, cylinder, prism, pyramid, sphere and cone; · Sketch nets of cuboids and prisms;	**Straight Line Graphs** · By the end of the sub-unit, students should be able to: · Use function machines to find coordinates (i.e. given the input x, find the output y); · Plot and draw graphs of y = a, x = a, y = x and y = –x; · Recognise straight-line graphs parallel to the axes; · Recognise that equations of the form y = mx + c correspond to straight-line graphs in the coordinate plane; · Plot and draw graphs of straight lines of the form y = mx + c using a table of values; · Sketch a graph of a linear function, using the gradient and y-intercept; · Identify and interpret gradient from an equation y = mx + c; · Identify parallel lines from their equations; · Plot and draw graphs of straight lines in the form ax + by = c; · Find the equation of a straight line from a graph; · Find the equation of the line through one point with a given gradient;	direction of rotation and describe rotations fully using the angle, direction of turn, and centre; · Rotate and draw the position of a shape after rotation about the origin or any other point including rotations on a coordinate grid; · Identify correct rotations from a choice of diagrams; · Understand that translations are specified by a distance and direction using a vector; · Translate a given shape by a vector; · Use column vectors to describe and transform 2D shapes using single translations on a coordinate grid; · Understand that distances and angles are preserved under rotations and translations, so that	

· Recall and use the formula for the volume of a cuboid; · Find the volume of a prism, including a triangular prism, cube and cuboid; · Calculate volumes of right prisms and shapes made from cubes and cuboids; · Estimate volumes etc by rounding measurements to 1 significant figure; **Circles, cylinders, cones and spheres** By the end of the unit, students should be able to: · Recall the definition of a circle and identify, name and draw parts of a circle including tangent, chord and segment; · Recall and use formulae for the circumference of a circle and the area enclosed by a circle circumference of a circle = 2πr = πd, area of a circle = πr2; · Use π ≈ 3.142 or use the π button on a calculator; · Give an answer to a question involving the circumference or area of a circle in terms of π;	· Find approximate solutions to a linear equation from a graph. **Multiplicative reasoning** By the end of the unit, students should be able to: · Understand and use compound measures: · density; · pressure; · speed: · convert between metric speed measures; · read values in km/h and mph from a speedometer; · calculate average speed, distance, time – in miles per hour as well as metric measures; · use kinematics formulae to calculate speed, acceleration (with formula provided and variables defined in the question); · change d/t in m/s to a formula in km/h, i.e. d/t × (60 × 60)/1000 – with support;	any figure is congruent under either of these transformations; · Understand that reflections are specified by a mirror line; · Identify correct reflections from a choice of diagrams; · Identify the equation of a line of symmetry; · Transform 2D shapes using single reflections (including those not on coordinate grids) with vertical, horizontal and diagonal mirror lines; · Describe reflections on a coordinate grid; · Scale a shape on a grid (without a centre specified); · Understand that an enlargement is specified by a centre and a scale factor; · Enlarge a given shape using (0, 0) as	

· Find radius or diameter, given area or perimeter of a circles; · Find the perimeters and areas of semicircles and quarter-circles; · Calculate perimeters and areas of composite shapes made from circles and parts of circles; · Calculate arc lengths, angles and areas of sectors of circles; · Find the surface area and volume of a cylinder; · Find the surface area and volume of spheres, pyramids, cones and composite solids; · Round answers to a given degree of accuracy.	· Express a given number as a percentage of another number in more complex situations; · Calculate percentage profit or loss; · Make calculations involving repeated percentage change, not using the formula; · Find the original amount given the final amount after a percentage increase or decrease; · Use compound interest; · Use a variety of measures in ratio and proportion problems: · currency conversion; · rates of pay; · best value; · Set up, solve and interpret the answers in growth and decay problems; · Understand that X is inversely proportional to Y is equivalent to X is proportional to Interpret equations that describe direct and inverse proportion. **<u>Real Life Graphs</u>** By the end of the sub-unit, students should be able to:	the centre of enlargement, and enlarge shapes with a centre other than (0, 0); · Find the centre of enlargement by drawing; · Describe and transform 2D shapes using enlargements by: · a positive integer scale factor; · a fractional scale factor; · Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides, simple integer scale factors, or simple fractions; · Understand that distances and angles are preserved under reflections, so that any figure is congruent under this transformation; · Understand that similar shapes are	

	· Use input/output diagrams; · Draw, label and scale axes; · Use axes and coordinates to specify points in all four quadrants in 2D; · Identify points with given coordinates and coordinates of a given point in all four quadrants; · Find the coordinates of points identified by geometrical information in 2D (all four quadrants); · Find the coordinates of the midpoint of a line segment; Read values from straight-line graphs for real-life situations; · Draw straight line graphs for real-life situations, including ready reckoner graphs, conversion graphs, fuel bills graphs, fixed charge and cost per unit; · Draw distance–time graphs and velocity–time graphs; · Work out time intervals for graph scales; · Interpret distance–time graphs, and calculate: the speed of individual sections, total distance and total time;	enlargements of each other and angles are preserved – define similar in this unit.	

	· Interpret information presented in a range of linear and non-linear graphs; · Interpret graphs with negative values on axes; · Find the gradient of a straight line from real-life graphs; · Interpret gradient as the rate of change in distance–time and speed–time graphs, graphs of containers filling and emptying, and unit price graphs.		