# Mathematics Year 10 Foundation

| Term | 1 | | | 2 | | | 3 | | 4 | 5 | | 6 |
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| **Topic** | **Statistics** | **Geometry** | **Algebra** | **Geometry** | **Ratio** | **Geometry** | **Statistics** | **Ratio** | **Geometry** | **Algebra** | **Geometry** | |
| **Detail** | Finding and using the averages and range from a variety of data representations. | Finding and using perimeter, area, surface area and volume of 2D and 3D shapes. | Drawing, finding and using the equation of straight line. Constructing and interpreting real-life graphs. | Perform and describe all four transformations. | Know and apply aspects of ratio into contexts. | *Know and apply Pythagoras' Theorem* and right-angled trigonometry including knowing and using some exact values. | Calculate probabilities from a variety of representations including probability tree diagrams and Venn diagrams. | Calculating with percentages extended to include growth and decay. Working with compound measures in a scientific context. | Constructing and calculating 2D shapes and scale diagram using bearings. **Students will need pencil, ruler, rubber, protractor, coloured pencils or pens** | Know and use expanding and factorising expressions. Explore the links between graphs and factorising expressions. | Recall and use the formulae for area and circumference of a circle and how it connects to finding the volume and surface area of a cylinder. Recall and use the formulae for calculating the surface area and volume of spheres, cones and pyramids. | |
| **Grade 8-9** | | | | | | | | | | | | |
| **Grade 6-7** | | | | | | | | | | | | |
| **Grade 5** | | | Find the gradient given by the equation of a straight line. Understand y = mx + c; to find the equation of a straight line. | | | Recall and apply trigonometric ratios to right angled triangles. Recall and use some exact trigonometric values. | Create and use probability tree diagrams with dependent events. | Use multiplier for repeated percentage change such as compound interest, growth and decay. Use direct and inverse proportion algebraically. | Construct loci to solve problems. | Use quadratic graphs to identify turning points and roots. Factorise and solve a quadratic expression in the form x^2 ± bx ± c. Find the difference of two squares in algebra. | Use and calculate the perimeter and area of sectors. Calculate and solve problems with the area of composite shapes including circles. Find and use the surface and volume of pyramids, spheres and cones. Find the volume and surface area of composite 3D shapes | |
| **Grade 4** | | | Draw and interpret real life graphs include variables when given a ratio to connect them. | Perform and describe combined transformations of 2D shapes. | | Investigate, explore and apply Pythagoras' Theorem in context including on graphs. | Create and use simple probability tree diagrams to work out the probability of different outcomes. | Recall and use compound measures such as speed, distance and time. Convert compound units. Use Kinematic formulae in a scientific context. | Accurately construct triangles and other 2D shapes using a ruler and pair of compasses. Construct a polygon inside a circle. Construct a perpendicular bisector of a line and a perpendicular from a point to a line. Construct an angle bisector. | Expand and simplify with more than one single bracket. Expand two binomial brackets. Prove and reason with expanding brackets. | | |
| **Grade 2-3** | Find and use the mode, median, mean and range from a set of data. Calculate the mean, modal class and median from a frequency table. Create and use a Stem and Leaf Diagram. Find the estimated mean from a grouped data table. Understand the need for different types of sampling and how to avoid bias. Analyse data sets by comparing averages and range. | Find the perimeter and area of a variety of shapes including trapezia. Calculate the volume and surface area of prisms. Convert between metric units of measurement for length, area and volume. | Revise coordinates in all four quadrants including creating 2D shape and finding midpoints. Recognise the graphs of x = a, y = b, y = x, y = -x. Plot straight line graphs with and without a table of values. Draw and find the gradient of a straight line, graphically and numerically. Understand that parallel lines have the same gradient. Draw and interpret a distance-time graph. Understand whether predictions on real life graphs are reliable. Draw and interpret graphs of linear functions. | Perform and describe reflections, rotations, translations and enlargements (by a positive and fractional scale factor including a centre of enlargement). | Writing and simplifying ratios. Divide an amount into a ratio. Compare quantities using a ratio. Know, use and apply direct proportion. Apply ratio and proportion to graphs. | | Create and use two tables to calculate probabilities. Create and use sample space diagrams to list outcomes and find probabilities. Represent information in a Venn diagram and use the diagrams to find probabilities. Create and use frequency tree diagrams. | Find an amount as a percentage of another amount. Increase or decrease an amount by a percentage. Find an original amount using reverse percentages. Calculate percentage change. Identify and recognise direct proportion represented graphically. | Recognise 3D shapes and their properties. Identify and sketch planes of symmetry. Understand and draw plans and elevations. Accurately construct triangles using a protractor. Draw and interpret scale diagrams. Use scales on maps and diagrams to work out lengths and distances. Accurately draw and measure angles. Draw and use bearings. Use angles in parallel lines to calculate bearings. Solve problems involving bearings and scale diagrams. Create nets of 3D shapes. | Simplify algebraic terms by adding, subtracting or multiplying. Expand single brackets. Plot straight line graphs and quadratic functions using a table of values. Factorise an expression into one bracket. | Use and calculate the circumference and area of a circle. Find and use the surface area and volume of cylinders and prisms. | |

| **Keywords** | average, spread, consistency, mean, median, mode, range, statistic, | Perimeter, area, volume, capacity, square, rectangle, parallelogram, triangle, composite, rectilinear, polygon, cube, cuboid, millimetre, centimetre, metre, kilometre, square millimetre, square | Plot, equation, function, formula, linear, coordinate plane, gradient, y-intercept, substitute, quadratic, piece-wise linear, model, kinematic, speed, distance, time | scale factor, congruence, invariance, transformation, rotation, reflection, translation, enlargement, solid, sphere, pyramid, cone, perpendicular, slant, surface area, volume | ratio, proportion, compare, comparison, part, simplify, common factor, cancel, lowest terms, unit | similar, opposite, adjacent, hypotenuse, trigonometry, function, ratio, sine, cosine, tangent, angle of elevation, angle of depression | outcome, equally likely outcomes, event, independent event, dependent event, tree diagrams, theoretical probability, experimental probability, random, bias, unbiased, fair, relative | direct proportion, inverse proportion, multiplier, fraction, percentage changem percentage increase, percentage decrease, compound interest, simple interest, growth, decay, | Compasses, arc, line segment, perpendicular, bisect, perpendicular bisector, locus, loci, bearings, clockwise, corresponding, alternate, angles, protractor | function, equation, linear, non-linear, quadratic, cubic, reciprocal, parabola, asymptote, gradient, y-intercept, x-intercept, root | composite, solid, sphere, pyramid, cone, perpendicular, slant, height, surface area, volume | |
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| **Resource Links** | KM: Stick on the Maths HD3: Working with grouped data | KM: Dotty activities | KM: Plotting graphs | KM: Enlargement 2 | KM: Division in a ratio and checking spreadsheet | KM: From set squares to trigonometry | KM: Stick on the Maths: Tree diagrams | KM: Graphing proportion | KM: Construction instruction | NRICH: What's that graph? | NRICH: Surface Area and Volume | |
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| | KM: Swillions | KM: Fibonacci's disappearing squares | KM: Matching graphs | KM: Stick on the Maths SSM3: Enlargement (fractional scale factor) | KM: Maths to Infinity: FDPRP | KM: Trigonometry flowchart | KM: Stick on the Maths: Relative frequency | KM: Investigating proportionality 2 | KM: Construction challenges | NRICH: How old am I? | Hwb: Summerhouse and Radiators | |
| | KM: Lottery project | KM: Dissections deductions | KM: Autograph 1 | NRICH: Growing Rectangles | KM: Stick on the Maths: Ratio and proportion | NRICH: Trigonometric protractor | KM: The drawing pin experiment | KM: Stick on the Maths NNS1: Understanding Proportionality | KM: Napoleonic challenge | NRICH: Golden thoughts | | |
| | | KM: Stick on the Maths SSM9: Area and volume | KM: Autograph 2 | | NRICH: Toad in the hole | NRICH: Sine and cosine | KM: Stick on the Maths HD2: Frequency polygons and scatter | KM: Stick on the Maths CALC1: Proportional Change and | KM: Circumcentre etcetera | Hwb: Algebra Fails | | |
| | | KM: Maths to Infinity Area and Volume | KM: The hare and the tortoise | | NRICH: Mixing lemonade | | | KM: Convinced: NNS1: Understanding Proportionality | KM: Locus hocus pocus | | | |
| | | NCETM: Activity C: Through the window | | | NRICH: Food chains | | | KM: Convinced: CALC1: Proportional Change and multiplicative methods | KM: The perpendicular bisector | | | |
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| **Career Opportunities** | Why Math is important 2 | STEM Careers | Operations Research | Aircraft Engineering | Marketing Analytics | Bioinfomatician | Astrophysics / Aircraft Wing Design | Genetics | Accident Research / Sport Statistician / Geoscience | Weather Forecasting / Medicine with Maths | Sports Scientist | Research engineering – Lightning / Scientific Instrument Designer / Maths in Carpentry |
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