Mathematics Progression Pathway

Core Skills	Progression Steps				
	Beginning less than 3	**Emerging 3-4**	**Developed 5-6**	**Sophisticated 7-8**	**Excellence 8+/9**
Number	Use standard column procedures to add and subtract whole numbers Add, subtract multiply and divide integers - positive and negative Know and use the order of operations Round numbers to decimal places Recognise and use multiples and factors (divisors) and use simple tests of divisibility	Use the order of operations with brackets, including in more complex calculations Use inverse operations Simplify fractions by cancelling all common factors Add and subtract simple fractions with denominators of any size Use division to convert a fraction to a decimal Know all the squares of numbers less than 16 and be able to know the square root given the square number Extend the patterns by using the index law for division established for positive power answers, to show that any number to the power of zero is 1 Order fractions, decimals and percentages Check a result by considering if it is of the right order of magnitude	Find the reciprocal of simple numbers/fractions mentally, e.g. 10 and 1/10, 1/3 and 3 etc. Use prime factorisation to represent a number as a product of its primes using index notation Recall that $n^0 = 1$ and $n^{-1} = 1/n$ for positive integers n as well as $n^{1/2} = \sqrt{n}$ and $n^{1/3} = \sqrt[3]{n}$ for any positive number n	Simplify surd expressions involving squares Know that a line perpendicular to the line y = mx + c, will have a gradient of -1/m	

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Algebra	Read x and y coordinate in the first quadrant Read values from straight-line graphs for real-life situations Draw, label and scale axes Generate and describe simple integer sequences – square and triangle numbers	Construct expressions from worded descriptions, using addition and subtraction Solve simple two-step linear equations with integer coefficients Simplify algebraic expressions by collecting like terms Generate four quadrant coordinate pairs of simple linear functions Plot the graphs of simple linear functions in the form y = mx + c in four quadrants	Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as $x^3 = 29$ Solve quadratic equations algebraically by factorising Multiply out brackets involving positive terms and collect like terms Expand double brackets Rearrange simple equations Know that the gradient of a line is the change in y over change in x. Generate points and plot graphs of simple quadratic functions, then more general functions Identify the line of symmetry of a quadratic graph Identify and interpret roots, intercepts and turning points of a quadratic graph	Use function notation	Use iteration with simple converging sequences Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient
Ratio, proportion and rates of change		Convert one metric unit to another, including decimals Set up equations to show direct proportion Find a percentage of a quantity using a multiplier Use a multiplier to increase or decrease by a percentage Use ratio notation	Use compound interest Express a multiplicative relationship between two quantities as a ratio or a fraction Know that enlargements of 2D shapes produce similar shapes Understand that the ratio of any two sides is constant in similar right-angled triangles		

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Geometry & Measures	Identify parallel lines Identify and name common solids: cube, cuboid, cylinder, prism, pyramid, sphere and cone Know the terms face, edge and vertex Record readings from scales to a suitable degree of accuracy Use correct notation for labelling lines Understand and use the language associated with translations Scale a shape on a grid (without a centre specified) Distinguish between acute, obtuse and reflex angles Use the formula for the area of a rectangle/square	Use the sum of the exterior angles of any polygon is 360° Know the formulae for the circumference and area of a circle Use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) Identify congruent shapes Use straight edge and compasses to construct the midpoint and perpendicular bisector of a line segment	Solve problems involving angles, triangles and circles Draw the locus equidistant between 2 points or from a point Produce shapes and paths by using descriptions of loci Use and apply Pythagoras' theorem to solve problems Use the sine, cosine and tangent ratios to find the lengths of unknown sides in a right-angled triangle Know that the perpendicular distance from a point to a line is the shortest distance to the line Understand the language of planes, and recognise the diagonals of a cuboid Recognise whether a reflection is correct Find angles of elevation and angles of depression Understand and use vector notation Add and subtract vectors	Understand, recall and use Pythagoras' theorem in 3-D problems Know and apply the sine rule $a/\sin A = b/\sin B = c/\sin C$ to find unknown lengths and angles know and apply the cosine rule $a^2 = b^2 + c^2 – 2bc \cos A$ to find unknown lengths Calculate the resultant of two vectors	Solve problems involving more complex shapes and solids, including segments of circles and frustums of cones Know the exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0°$, 30°, 45°, 60° and 90°; know the exact value of $\tan \theta$ for $\theta = 0°$, 30°, 45° and 60°

Statistics	Construct on paper, and using ICT, simple bar graphs to represent discrete data Find the mode and range for a small set of discrete data Calculate the median of a set of data	Interpret simple diagrams and charts Interpret simple pie charts Group data, where appropriate in equal class intervals Use information provided to complete a two-way table Construct a simple (no boundary data) frequency table with given equal class intervals for continuous data. Calculate the mean of a set of data Identify possible sources of bias and plan to minimise it Understand what is meant by a sample and a population	Interpret scatter graphs in terms of the relationship between two variables	Use and understand frequency density	
Probability	Apply the property that the probabilities of an exhaustive set of outcomes sum to 1 Mark events and/or probabilities on a probability scale of 0 to 1	Apply the property that the probabilities of an exhaustive set of outcomes sum to 1 Identify all possible mutually exclusive outcomes of a single event Identify all mutually exclusive outcomes for two successive events with two outcomes in each event Use the vocabulary of probability Write probabilities in words, fractions, decimals and percentages Find and justify probabilities based on equally likely outcomes in simple contexts	Use tree diagrams to calculate the probability of two dependent events Use tree diagrams to calculate the probability of two dependent events		