Maths – Using and Applying (Key Stage 3)

BFS *Beyond Foundation Stage*	I can critically examine the strategies adopted when investigating within mathematics itself or when using mathematics to analyse tasks. I examine generalisations or solutions reached in an activity and make further progress in the activity as a result. I can comment constructively on the reasoning and logic, the process employed and the results obtained. I can explain why different strategies were used, considering the elegance and efficiency of alternative lines of enquiry or procedures. I apply the mathematics I know in a wide range of familiar and unfamiliar contexts. I use mathematical language and symbols effectively in presenting a convincing, reasoned argument. My reports include mathematical justifications, distinguishing between evidence and proof and explaining my solutions to problems involving a number of features or variables.
FS5 *Foundation Stage 5*	Starting from problems or contexts that have been presented to me, I can explore the effects of varying values and look for invariance in models and representations, working with and without ICT. I progressively refine or extend the mathematics used, giving reasons for my choice of mathematical presentation and explaining features I have selected. I justify my generalisations, arguments or solutions, looking for equivalence to different problems with similar structures. I appreciate the difference between mathematical explanation and experimental evidence. I can develop and follow alternative approaches. I can compare and evaluate representations of a situation, introducing and using a range of mathematical techniques. I reflect on my own lines of enquiry when exploring mathematical tasks. I can communicate mathematical or statistical meaning to different audiences through precise and consistent use of symbols that is sustained throughout the work.
FS4 *Foundation Stage 4*	I can carry out substantial tasks and solve quite complex problems by independently and systematically breaking them down into smaller, more manageable tasks. I can interpret, discuss and synthesise information presented in a variety of mathematical forms, relating findings to the original context. My written and spoken language explains and informs my use of diagrams. I am beginning to give mathematical justifications, making connections between the current situation and situations I have encountered before.
FS3 *Foundation Stage 3*	In order to explore mathematical situations, carry out tasks or tackle problems, I first identify the mathematical aspects and obtain necessary information. I can calculate accurately, using ICT where appropriate. I check my working and results, considering whether these are sensible. I show understanding of situations by describing them mathematically using symbols, words and diagrams. I can draw simple conclusions of their own and explain their reasoning.
FS2 *Foundation Stage 2*	I can develop my own strategies for solving problems and use these strategies both in working within mathematics and in applying mathematics to practical contexts. When solving problems, with or without ICT, I check my results are reasonable by considering the context. I look for patterns and relationships, presenting information and results in a clear and organised way, using ICT appropriately. I can search for a solution by trying out ideas of my own.
FS1 Foundation Stage 1	I try different approaches and find ways of overcoming difficulties that arise when I am solving problems. I am beginning to organise my work and check results. I can discuss my mathematical work and am beginning to explain my thinking. I use and interpret mathematical symbols and diagrams. Students show that I understand a general statement by finding particular examples that match it.
PFS *Pre-Foundation Stage*	I use mathematics as an integral part of classroom activities. I can represent my work with objects or pictures and discuss it. I can recognise and use a simple pattern or relationship. I can select the mathematics I use in some classroom activities. I can discuss my work using mathematical language and am beginning to represent it using symbols and simple diagrams. I can explain why an answer is correct.

Maths – Number, Ratio, Proportion, Rates of Change and Algebra (Key Stage 3)

BFS *Beyond Foundation Stage*	I understand and can use rational and irrational numbers. I can determine the bounds of intervals. I understand and can use direct and inverse proportion. In simplifying algebraic expressions, I can use rules of indices for negative and fractional values. In finding formulae that approximately connect data, I can express general laws in symbolic form. I can solve simultaneous equations in two variables where one equation is linear and the other is quadratic.
FS5 *Foundation Stage 5*	I understand the effects of multiplying and dividing by numbers between 0 and 1. I understand and can use proportional changes, calculating the result of any proportional change using only multiplicative methods. I can find and describe in symbols the next term or nth term of a sequence where the rule is quadratic. I can use algebraic and graphical methods to solve simultaneous linear equations in two variables. I can solve problems that involve calculating with powers, roots and numbers expressed in standard form. I can manipulate algebraic formulae, equations and expressions, finding common factors and multiplying two linear expressions. I can sketch and interpret graphs of linear and quadratic. I am able to choose to use fractions or percentages to solve problems involving repeated proportional changes or the calculation of the original quantity given the result of a proportional change. I can evaluate algebraic formulae or calculate one variable, given the others, substituting fractions, decimals and negative numbers. I can solve inequalities in two variables. I can sketch and interpret graphs of cubic and reciprocal functions, and graphs that model real situations. I can solve simultaneous equations in two variables where both equations are linear. I can solve problems using intersections and gradients of graphs.
FS4 *Foundation Stage 4*	I can order and approximate decimals when solving numerical problems and equations, using trial and improvement methods. I understand and can use the equivalences between fractions, decimals and percentages, and calculate using ratios in appropriate situations. I can add and subtract fractions by writing them with a common denominator. I can formulate and solve linear equations with whole-number coefficients. I can represent mappings expressed algebraically, and use Cartesian coordinates for graphical representation interpreting general features. When making estimates, I am able to round to one significant figure and multiply and divide mentally. I can solve numerical problems involving multiplication and division with numbers of any size, using a calculator efficiently and appropriately.
FS3 *Foundation Stage 3*	I can use all four operations with decimals to two places. I can solve simple problems involving ratio and direct proportion. I can calculate fractional or percentage parts of quantities and measurements, using a calculator where appropriate. I can construct, express in symbolic form and use simple formulae involving one or two operations. I can use brackets appropriately. I can order and approximate decimals when solving numerical problems. I can evaluate one number as a fraction or percentage of another. I can find and describe in words the rule for the next term or nth term of a sequence where the rule is linear.
FS2 *Foundation Stage 2*	When solving number problems, I use a range of mental methods of computation with the four operations, including mental recall of multiplication facts up to 10 x 10 and quick derivation of corresponding division facts. I can select efficient strategies for addition, subtraction, multiplication and division. I am able to recognise approximate proportions of a whole and use simple formulae expressed in words. I can use my understanding of place value to multiply and divide whole numbers and decimals. I can order, add and subtract negative numbers in context. I can use and interpret coordinates in all four quadrants.
FS1 Foundation Stage 1	I am able to show understanding of place value in numbers up to 1000 and use this to make approximations. I am beginning to use decimal notation, in the context of measures and money, and to recognise negative numbers in practical contexts such as temperature. I can use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers. I can add and subtract numbers with two digits mentally and numbers with three digits using written methods. I can use mental recall of the 2, 3, 4, 5 and 10 multiplication tables and derive the associated division facts. I can solve whole-number problems involving multiplication or division including those that give rise to remainders. I can use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent. I am able to use my understanding of place value to mentally multiply and divide whole numbers by 10 or 100. When solving number problems, I use a range of mental methods of computation with the four operations, including mental recall of multiplication facts up to 10 x 10.
PFS *Pre-Foundation Stage*	I can count, order, combine, increase and decrease quantities when solving problems in practical contexts. I can read and write the numbers involved. I can count sets of objects reliably, and use mental recall of addition and subtraction facts to 10. I am beginning to understand the place value of each digit in a number and use this to order numbers up to 100. I can choose the appropriate operation when solving addition and subtraction problems. I am able to use the knowledge that subtraction is the inverse of addition. I can use mental calculation strategies to solve number problems involving money and measures. I recognise sequences of numbers, including odd and even numbers.

Maths – Space and Shape (Key Stage 3)

BFS *Beyond Foundation Stage*	I can sketch the graphs of the sine, cosine and tangent functions for any angle, and generate and interpret graphs based on these functions. I can use the sine, cosine and tangent of angles of any size, and Pythagoras' theorem when solving problems in two and three dimensions. I am able to construct formal geometric proofs. I can calculate the surface area of cylinders and volumes of cones and spheres.
FS5 *Foundation Stage 5*	I understand and am able to apply Pythagoras' theorem when solving problems in two dimensions. I can calculate lengths, areas and volumes in plane shapes and right prisms. I can enlarge shapes by a fractional scale factor, and am able to appreciate the similarity of the resulting shapes. I can determine the locus of an object moving according to a rule. I understand and am able to use congruence and mathematical similarity. I can use the sine, cosine and tangent ratios in right-angled triangles when solving problems in two dimensions. I can sketch the graphs of the sine, cosine and tangent functions for any angle. I can calculate the lengths of circular arcs and areas of sectors. I appreciate the continuous nature of scales that are used to make measurements.
FS4 *Foundation Stage 4*	I can solve problems using angles and symmetry, properties of polygons and angle properties of intersecting and parallel lines, and explain these properties. I can devise instructions for a computer to generate and transform shapes and paths. I understand and can use appropriate formulae for finding circumferences and areas of circles when solving problems. I appreciate the imprecision of measurement and recognise that a measurement given to the nearest whole number may be inaccurate by up to one half in either direction. I understand and can use compound measures, such as speed.
FS3 *Foundation Stage 3*	When constructing models and drawing or using shapes, I can measure and draw angles to the nearest degree and use language associated with angles. I know the angle sum of a triangle and that of angles at a point. I can convert one metric unit to another. I understand and can use the formula for the area of a rectangle. I recognise and am able to use common 2-D representations of 3-D objects. I know and can use the properties of quadrilaterals. I can devise instructions for a computer to generate and transform shapes and paths. I understand and can use appropriate formulae for areas of plane rectilinear figures and volumes of cuboids when solving problems.
FS2 *Foundation Stage 2*	I can use and make geometric 2-D and 3-D patterns, scale drawings and models in practical contexts. I can find areas of simple shapes. I can identify all the symmetries of 2-D shapes. I can make sensible estimates of a range of measures in relation to everyday situations.
FS1 Foundation Stage 1	I can classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes. I can use non-standard units, standard metric units of length including finding perimeters, capacity and mass, and standard units of time, in a range of contexts. I can reflect simple shapes in a mirror line. I am able to choose and use appropriate units and tools, interpreting, with appropriate accuracy, numbers on a range of measuring instruments.
PFS *Pre-Foundation Stage*	When working with 2-D and 3-D shapes, I am able to use mathematical language to describe properties and positions. I can measure and order objects using direct comparison, and order events. I can use mathematical names for common 3-D and 2-D shapes and describe their properties, including numbers of faces, edges and vertices. I can distinguish between straight and turning movements, recognise angle as a measurement of turn, and right angles in turns. I am beginning to use every day non-standard and standard units to measure length and mass.

Maths – Statistics (Key Stage 3)

BFS *Beyond Foundation Stage*	I understand how different methods of sampling and different sample sizes may affect the reliability of conclusions drawn. I can select and justify a sample and method to investigate a population. I recognise when and how to work with probabilities associated with independent, mutually exclusive events.
FS5 *Foundation Stage 5*	I can specify hypotheses and test them by designing and using appropriate methods that take account of variability or bias. I can determine the modal class and estimate the mean, median and range of sets of grouped data, selecting the statistic most appropriate to my line of enquiry. I understand relative frequency as an estimate of probability and can use this to compare outcomes of experiments. I can interpret and construct cumulative frequency tables and diagrams. I can estimate the median and interquartile range and use these to compare distributions and make inferences. I understand how to calculate the probability of a compound event and can use this in solving problems. I can interpret and construct histograms
FS4 *Foundation Stage 4*	I can draw conclusions from scatter diagrams, and have a basic understanding of correlation. I can use measures of average and range, with associated frequency polygons, as appropriate, to compare distributions and make inferences. When dealing with a combination of two experiments, I can identify all the outcomes. When solving problems, I can use their knowledge that the total probability of all the mutually exclusive outcomes of an experiment is 1.
FS3 *Foundation Stage 3*	I can interpret graphs and diagrams, including pie charts, and draw conclusions. I can collect and record continuous data, choosing appropriate equal class intervals over a sensible range to create frequency tables. I can construct and interpret frequency diagrams. I can construct pie charts. I can find and justify probabilities and approximations to these by selecting and using methods based on equally likely outcomes and experimental evidence, as appropriate. I understand that different outcomes may result from repeating an experiment.
FS2 *Foundation Stage 2*	Using technology where appropriate, I can group data in equal class intervals if necessary, represent collected data in frequency diagrams and interpret such diagrams. I understand and can use the mean of discrete data. I can compare two simple distributions using the range and one of the mode, median or mean. I understand and can use the probability scale from 0 to 1.
FS1 Foundation Stage 1	I can extract and interpret information presented in simple tables and lists. I can construct charts and diagrams to communicate information I have gathered for a purpose, and I can interpret information presented to me in this form. I can generate and answer questions that require the collection of discrete data which I am then able to record using a frequency table. I understand and can use an average and range to describe sets of data. I can construct and interpret simple line graphs.
PFS *Pre-Foundation Stage*	I can sort objects and classify them, demonstrating the criterion I have used. I can collect data to answer questions. I can sort objects and classify them using more than one criterion. When I have gathered information to answer a question or explore a situation, I am able to record results in simple lists, tables, diagrams and block graphs, in order to communicate my findings.