Riverside Meadows Academy – KS3 Mathematics Level Descriptors

Subject Strands	AF1- Using and applying	AF2 – Number & Algebra	AF3 – Shape, space and measures	AF4 – Statistics
National Curriculum Level 1	• Pupils use mathematics as an integral part of classroom activities. • They represent their work with objects or pictures and discuss it. • They recognise and use a simple pattern or relationship	• Pupils count, order, combine, increase and decrease quantities when solving problems in practical contexts. • They read and write the numbers involved	• When working with 2-D and 3-D shapes, pupils use mathematical language to describe properties and positions. • They measure and order objects using direct comparison, and order events	• Pupils sort objects and classify them, demonstrating the criterion they have used. • They collect data to answer questions
National Curriculum Level 2	• Pupils select the mathematics they use in some classroom activities. • They discuss their work using mathematical language and are beginning to represent it using symbols and simple diagrams. • They explain why an answer is correct.	• Pupils count sets of objects reliably, and use mental recall of addition and subtraction facts to 10. • They begin to understand the place value of each digit in a number and use this to order numbers up to 100. • They choose the appropriate operation when solving addition and subtraction problems. • They use the knowledge that subtraction is the inverse of addition. • They use mental calculation strategies to solve number problems involving money and measures. • They recognise sequences of numbers, including odd and even numbers.	• Pupils use mathematical names for common 3-D and 2-D shapes and describe their properties, including numbers of faces, edges and vertices. • They distinguish between straight and turning movements, recognise angle as a measurement of turn, and right angles in turns. • They begin to use everyday non-standard and standard units to measure length and mass.	• Pupils sort objects and classify them using more than one criterion. When they have gathered information to answer a question or explore a situation, pupils record results in simple lists, tables, diagrams and block graphs, in order to communicate their findings

| National Curriculum Level 3 | • Try different approaches to find ways of overcoming difficulties when solving problems
• Organise work and check results
• Discuss mathematical work
• Explain thinking
• Use and interpret mathematical symbols and diagrams.
• Show understanding of general statements by finding examples | • Show understanding of place value in numbers up to 1000 and use this to make approximations.
• Use decimal notation, in the context of measures and money, and to recognise negative numbers in practical contexts such as temperature.
• Use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers.
• Add and subtract numbers with two digits mentally and numbers with three digits using written methods.
• Use mental recall of the 2, 3, 4, 5 and 10 multiplication tables and derive the associated division facts.
• Solve whole-number problems involving multiplication or division including those that give rise to remainders.
Use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent. | • Classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes.
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. | Extract and interpret information presented in simple tables and lists. Construct charts and diagrams to communicate information they have gathered for a purpose, and they interpret information presented to them in this form. |
| National Curriculum Level 4 | • Develop their own strategies for solving problems and use these strategies both in working within mathematics and in applying mathematics to practical contexts. | • Use understanding of place value to mentally multiply and divide whole numbers by 10 or 100.
• Solve number problems, using a range of mental methods of computation with the four operations, including mental recall of multiplication facts up to | • Use and make geometric 2-D and 3-D patterns, scale drawings and models in practical contexts.
• Reflect simple shapes in a mirror line.
• Choose and use appropriate units and tools, interpreting, with | • Generate and answer questions that require the collection of discrete data which they record using a frequency table.
• Understand and use an average and range to describe sets of data.
• Using technology where appropriate: they group data in equal class intervals |

	• Solve problems, with or without ICT, they check their results are reasonable by considering the context. • Look for patterns and relationships, presenting information and results in a clear and organised way, using ICT appropriately. Search for a solution by trying out ideas of their own.	10 x 10 and quick derivation of corresponding division facts. • Select efficient strategies for addition, subtraction, multiplication and division. • Recognise approximate proportions of a whole and use simple fractions and percentages to describe these. Begin to use simple formulae expressed in words.	appropriate accuracy, numbers on a range of measuring instruments. Find areas of simple shapes.	if necessary, represent collected data in frequency diagrams and interpret such diagrams. Construct and interpret simple line graphs.
National Curriculum Level 5	• Explore mathematical situations by carrying out tasks or tackle problems • Identify the mathematical aspects and obtain necessary information. • Calculate accurately, using ICT where appropriate. • Check your working and results, considering whether these are sensible. • Show understanding of situations by describing them mathematically using symbols, words and diagrams. Draw simple conclusions of your own and explain your reasoning.	• Understand place value to multiply and divide whole numbers and decimals. • Order, add and subtract negative numbers in context. • Use all four operations with decimals to two places. • Solve simple problems involving ratio and direct proportion. • Calculate fractional or percentage parts of quantities and measurements, using a calculator where appropriate. • Construct, express in symbolic form and use simple formulae involving one or two operations. • Use brackets appropriately. Use and interpret coordinates in all four quadrants.	• Constructing models and drawing or using shapes, pupils measure and draw angles to the nearest degree and use language associated with angles. • Know the angle sum of a triangle and that of angles at a point. • Identify all the symmetries of 2-D shapes. • Convert one metric unit to another. • Make sensible estimates of a range of measures in relation to everyday situations. Understand and use the formula for the area of a rectangle.	• Understand and use the mean of discrete data. • Compare two simple distributions using the range and one of the mode, median or mean. • Interpret graphs and diagrams, including pie charts, and draw conclusions. • Understand and use the probability scale from 0 to 1. • Find and justify probabilities and approximations to these by selecting and using methods based on equally likely outcomes and experimental evidence, as appropriate. Understand that different outcomes may result from repeating an experiment.
National Curriculum Level 6	• Carry out substantial tasks and solve quite complex problems by independently and systematically breaking them down into smaller, more manageable tasks.	• Order and approximate decimals when solving numerical problems and equations, using trial and improvement methods.	• Recognise and use common 2-D representations of 3-D objects. • Know and use the properties of quadrilaterals. • Solve problems using angle and symmetry, properties of polygons	• Collect and record continuous data, choosing appropriate equal class intervals over a sensible range to create frequency tables. • Construct and interpret frequency diagrams.

	• Interpret, discuss and synthesise information presented in a variety of mathematical forms, relating findings to the original context. • Your written and spoken language explains and informs your use of diagrams. You begin to give mathematical justifications, making connections between the current situation and situations you have encountered before.	• Evaluate one number as a fraction or percentage of another. • Understand and use the equivalences between fractions, decimals and percentages, and calculate using ratios in appropriate situations. • Add and subtract fractions by writing them with a common denominator. • Find and describe in words the rule for the next term or nth term of a sequence where the rule is linear. • Formulate and solve linear equations with whole-number coefficients. Represent mappings expressed algebraically, and use Cartesian coordinates for graphical representation interpreting general features.	and angle properties of intersecting and parallel lines, and explain these properties. • Devise instructions for a computer to generate and transform shapes and paths. Understand and use appropriate formulae for finding circumferences and areas of circles, areas of plane rectilinear figures and volumes of cuboids when solving problems.	• Construct pie charts. • Draw conclusions from scatter diagrams, and have a basic understanding of correlation. • When dealing with a combination of two experiments, you identify all the outcomes. Solve problems, using your own knowledge that the total probability of all the mutually exclusive outcomes of an experiment is 1.
National Curriculum Level 7	• Starting from problems or contexts that have been presented to them, pupils explore the effects of varying values and look for invariance in models and representations, working with and without ICT. • Progressively refine or extend the mathematics used, giving reasons for their choice of mathematical presentation	• When making estimates, you can round to one significant figure and multiply and divide mentally. • Understand the effects of multiplying and dividing by numbers between 0 and 1. • Solve numerical problems involving multiplication and division with numbers of any size, using a calculator efficiently and appropriately. • Understand and use proportional changes, calculating the result of	• Pupils understand and apply Pythagoras' theorem when solving problems in two dimensions. • Calculate lengths, areas and volumes in plane shapes and right prisms. • Enlarge shapes by a fractional scale factor, and appreciate the similarity of the resulting shapes. • Determine the locus of an object moving according to a rule. • Appreciate the imprecision of measurement and recognise that a	• Specify hypotheses and test them by designing and using appropriate methods that take account of variability or bias. • Determine the modal class and estimate the mean, median and range of sets of grouped data, selecting the statistic most appropriate to their line of enquiry. • Use measures of average and range, with associated frequency polygons, as appropriate, to compare distributions and make inferences.

	and explaining features you have selected. • Justify their generalisations, arguments or solutions, looking for equivalence to different problems with similar structures. Appreciate the difference between mathematical explanation and experimental evidence.	any proportional change using only multiplicative methods. • Find and describe in symbols the next term or nth term of a sequence where the rule is quadratic. Use algebraic and graphical methods to solve simultaneous linear equations in two variables.	measurement given to the nearest whole number may be inaccurate by up to one half in either direction. Understand and use compound measures, such as speed.	Understand relative frequency as an estimate of probability and use this to compare outcomes of experiments.
National Curriculum Level 8	• Develop and follow alternative approaches. • Compare and evaluate representations of a situation, introducing and using a range of mathematical techniques. • Reflect on their own lines of enquiry when exploring mathematical tasks. • Communicate mathematical or statistical meaning to different audiences through precise and consistent use of symbols that is sustained throughout the work. • Examine generalisations or solutions reached in an activity and make further progress in the activity as a result. Comment constructively on the reasoning and logic, the process employed and the results obtained.	• Solve problems that involve calculating with powers, roots and numbers expressed in standard form. • 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. • Evaluate algebraic formulae or calculate one variable, given the others, substituting fractions, decimals and negative numbers. Manipulate algebraic formulae, equations and expressions, finding common factors and multiplying two linear expressions. • Solve inequalities in two variables. Sketch and interpret graphs of linear, quadratic, cubic and reciprocal functions, and graphs that model real situations.	• Understand and use congruence and mathematical similarity. Use sine, cosine and tangent in right-angled triangles when solving problems in two dimensions.	• Interpret and construct cumulative frequency tables and diagrams. • Estimate the median and interquartile range and use these to compare distributions and make inferences. Understand how to calculate the probability of a compound event and use this in solving problems.

Exceptional Progress	• Critically examine the strategies adopted when investigating within mathematics itself or when using mathematics to analyse tasks. • Explain why different strategies were used, considering the elegance and efficiency of alternative lines of enquiry or procedures. • Apply the mathematics they know in a wide range of familiar and unfamiliar contexts. • Use mathematical language and symbols effectively in presenting a convincing, reasoned argument. Include mathematical justifications, distinguishing between evidence and proof and explaining your solutions to problems involving a number of features or variables.	• Understand and use rational and irrational numbers. • Determine the bounds of intervals. • Understand and use direct and inverse proportion. • Simplifying algebraic expressions, using rules of indices for negative and fractional values. • Find formulae that approximately connect data, they express general laws in symbolic form. • Solve simultaneous equations in two variables where one equation is linear and the other is quadratic. Solve problems using intersections and gradients of graphs.	• Sketch the graphs of sine, cosine and tangent functions for any angle, and generate and interpret graphs based on these functions. • Use sine, cosine and tangent of angles of any size, and Pythagoras' theorem when solving problems in two and three dimensions. • Construct formal geometric proofs. Calculate lengths of circular arcs and areas of sectors, and calculate the surface area of cylinders and volumes of cones and spheres. Appreciate the continuous nature of scales that are used to make measurements.	• Interpret and construct histograms. • Understand how different methods of sampling and different sample sizes may affect the reliability of conclusions drawn. • Select and justify a sample and method to investigate a population. Recognise when and how to work with probabilities associated with independent, mutually exclusive events.