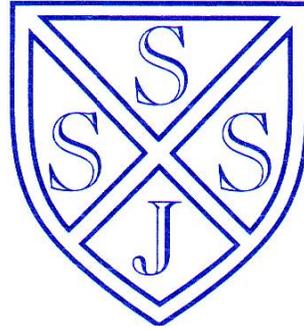


# SHARMANS CROSS JUNIOR SCHOOL



## ASSESSING PUPIL PROGRESS

### *Assessment Guidelines*

Pupil's Name	Date Started

Sharmans Cross Junior School – Assessing Pupil Progress

<b>Ma1 Using and Applying, Level 5</b>					
In order to carry through tasks and solve mathematical problems, pupils identify and obtain necessary information. They check their results, considering whether these are sensible. Pupils show understanding of situations by describing them mathematically using symbols, words and diagrams. They draw simple conclusions of their own and give an explanation of their reasoning.					
Using and applying mathematics					
	Problem solving	Communicating	Reasoning		
<b>L5</b>	<ul style="list-style-type: none"> <li>◆ identify and obtain necessary information to carry through a task and solve mathematical problems, e.g.                             <ul style="list-style-type: none"> <li>- recognise information that is important to solving the problem, determine what is missing and develop lines of enquiry</li> <li>- break a several-step problem or investigation into simpler steps</li> <li>- consider efficient methods, relating problems to previous experiences</li> </ul> </li> <li>◆ check results, considering whether these are reasonable, e.g.                             <ul style="list-style-type: none"> <li>- check as they work, spotting and correcting errors and reviewing methods</li> </ul> </li> <li>◆ solve word problems and investigations from a range of contexts e.g.                             <ul style="list-style-type: none"> <li>- use mathematical content from levels 4 and 5 to solve problems and investigate</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ show understanding of situations by describing them mathematically using symbols, words and diagrams, e.g.                             <ul style="list-style-type: none"> <li>- organise their work from the outset, looking for ways to record systematically</li> <li>- decide how best to represent conclusions, using appropriate recording</li> <li>- begin to understand and use formulae and symbols to represent problems</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ draw simple conclusions of their own and give an explanation of their reasoning e.g.                             <ul style="list-style-type: none"> <li>- explain and justify their methods and solution</li> <li>- identify more complex patterns, making generalisations in words and begin to express generalisations using symbolic notation</li> <li>- use examples and counter examples to justify conclusions</li> </ul> </li> </ul>	Level 5	Level 5
<b>L4</b>	<ul style="list-style-type: none"> <li>◆ developing own strategies for solving problems, e.g.                             <ul style="list-style-type: none"> <li>- make their own suggestions of ways to tackle a range of problems</li> <li>- make connections to previous work</li> <li>- pose and answer questions related to a problem</li> <li>- check answers and ensure solutions make sense in the context of the problem</li> <li>- review their work and approaches</li> </ul> </li> <li>◆ use their own strategies within mathematics and in applying mathematics to practical context                             <ul style="list-style-type: none"> <li>- use mathematical content from levels 3 and 4 to solve problems and investigate</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ present information and results in a clear and organised way, e.g.                             <ul style="list-style-type: none"> <li>- organise written work, for example record results in order.</li> <li>- begin to work in an organised way from the start</li> <li>- consider appropriate units</li> <li>- use related vocabulary accurately</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ search for a solution by trying out ideas of their own, e.g.                             <ul style="list-style-type: none"> <li>- check their methods and justify answers</li> <li>- identify patterns as they work and form their own generalisations / rules in words</li> </ul> </li> </ul>	Level 4	Level 4
	Insufficient evidence	Insufficient evidence	Insufficient evidence		
<b>Ma1 Using and Applying, Level 4</b>					
Pupils are developing their own strategies for solving problems and are using these strategies both in working within mathematics and in applying mathematics to practical contexts. They present information and results in a clear and organised way. They search for a solution by trying out ideas of their own.					

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<b>Ma1 Using and Applying, Level 3</b>			
Pupils try different approaches and find ways of overcoming difficulties that arise when they are solving problems. They are beginning to organise their work and check results. Pupils discuss their mathematical work and are beginning to explain their thinking. They use and interpret mathematical symbols and diagrams. Pupils show that they understand a general statement by finding particular examples that match it			
	Using and applying mathematics		
	Problem solving	Communicating	Reasoning
<b>L3</b>	<ul style="list-style-type: none"> <li>◆ select the mathematics they use in a wider range of classroom activities, e.g.                             <ul style="list-style-type: none"> <li>- use classroom discussions to break into a problem, recognising similarities to previous work</li> <li>- put the problem into their own words</li> <li>- choose their own equipment appropriate to the task, including calculators</li> </ul> </li> <li>◆ try different approaches and find ways of overcoming difficulties that arise when they are solving problems e.g.                             <ul style="list-style-type: none"> <li>- check their work and make appropriate corrections, for example decide that two numbers less than 100 cannot give a total more than 200 and correct the addition</li> <li>- begin to look for patterns in results as they work and use them to find other possible outcomes</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ begin to organise their work and check results, e.g.                             <ul style="list-style-type: none"> <li>- begin to develop own ways of recording</li> <li>- develop an organised approach as they get into recording their work on a problem</li> </ul> </li> <li>◆ discuss their mathematical work and begin to explain their thinking, e.g.                             <ul style="list-style-type: none"> <li>- use appropriate mathematical vocabulary</li> <li>- talk about their findings by referring to their written work</li> </ul> </li> <li>◆ use and interpret mathematical symbols and diagrams</li> </ul>	<ul style="list-style-type: none"> <li>◆ understand a general statement by finding particular examples that match it, e.g.                             <ul style="list-style-type: none"> <li>- make a generalisation with the assistance of probing questions and prompts</li> </ul> </li> <li>◆ review their work and reasoning, e.g.                             <ul style="list-style-type: none"> <li>- respond to “What if?” questions</li> <li>- when they have solved a problem, pose a similar problem for a partner</li> </ul> </li> </ul>
	Level 3	Level 3	Level 3
<b>L2</b>	<ul style="list-style-type: none"> <li>◆ select the mathematics they use in some classroom activities, e.g. with support                             <ul style="list-style-type: none"> <li>- find a starting point, identifying key facts / relevant information</li> <li>- use apparatus, diagrams, role play etc to represent and clarify a problem</li> </ul> </li> <li>- move between different representations of a problem e.g. a situation described in words, a diagram etc.</li> <li>- adopt a suggested model or systematic approach</li> <li>- make connections and apply their knowledge to similar situations</li> </ul>	<ul style="list-style-type: none"> <li>◆ discuss their work using mathematical language, e.g. with support                             <ul style="list-style-type: none"> <li>- describe the strategies and methods they use in their work</li> <li>- listen to others’ explanations, try to make sense of them, compare.... evaluate...</li> </ul> </li> <li>◆ begin to represent their work using symbols and simple diagrams, e.g. with support                             <ul style="list-style-type: none"> <li>- use pictures, diagrams and symbols to communicate their thinking, or demonstrate a solution or process</li> <li>- begin to appreciate the need to record and develop their own methods of recording</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ explain why an answer is correct, e.g. with support                             <ul style="list-style-type: none"> <li>- test a statement such as, ‘The number twelve ends with a 2 so 12 sweets can’t be shared equally by 3 children’</li> </ul> </li> <li>◆ predict what comes next in a simple number, shape or spatial pattern or sequence and give reasons for their opinions</li> </ul>
	Level 2	Level 2	Level 2
<b>Ma1 Using and Applying, Level 2</b>			
Pupils select the mathematics they use in some classroom activities. They discuss their work using some mathematical language and are beginning to represent it using symbols and simple diagrams. They explain why an answer is correct.			

## Sharmans Cross Junior School – Assessing Pupil Progress

<b>Ma2 Number, Level 5</b>					
Pupils use their understanding of place value to multiply and divide whole numbers and decimals by 10, 100 and 1000. They order, add and subtract negative numbers in context. They use all four operations with decimals to two places. They reduce a fraction to its simplest form by cancelling common factors and solve simple problems involving ratio and direct proportion. They calculate fractional or percentage parts of quantities and measurements, using a calculator where appropriate. Pupils understand and use an appropriate non-calculator method for solving problems that involve multiplying and dividing any three-digit number by any two-digit number. They check their solutions by applying inverse operations or estimating using approximations. They construct, express in symbolic form, and use simple formulae involving one or two operations. They use brackets appropriately. Pupils use and interpret coordinates in all four quadrants					
Counting and understanding numbers		Calculating			Using and applying mathematics
Numbers and the number system		Knowing and using number facts		Algebra	
Fractions, decimals, percentages, ratio and proportion		Operations, relationships between them		Solving numerical problems	
<ul style="list-style-type: none"> <li>◆ use understanding of place value to multiply and divide whole numbers and decimals by 10, 100 and 1000 and explain the effect</li> <li>◆ round decimals to the nearest decimal place</li> <li>◆ order negative numbers in context</li> <li>◆ recognise and use number patterns and relationships e.g.</li> <li>- find two-digit prime numbers</li> <li>- make generalisations about sequences saying whether much larger numbers will be in the sequence or not</li> </ul>	<ul style="list-style-type: none"> <li>◆ use equivalence between fractions, e.g.</li> <li>- convert fractions such as <math>\frac{2}{5}</math> into tenths or hundredths and express them as decimals or percentages and vice versa</li> <li>◆ reduce a fraction to its simplest form by cancelling common factors</li> <li>◆ order fractions and decimals e.g.</li> <li>- order fractions with different denominators</li> <li>- order decimals that have a mixture of 1, 2 or 3 decimal places</li> <li>◆ understand simple ratio</li> </ul>	<ul style="list-style-type: none"> <li>◆ use known facts, place value and knowledge of operations to calculate e.g.</li> <li>- calculate decimal complements to 10 or 100, such as <math>100 - 63.8</math></li> <li>- multiply a two-digit number by a single digit e.g. <math>39 \times 7</math></li> <li>- calculate simple fractions or percentages of a number/quantity e.g. <math>\frac{3}{5}</math> of 400g or 60% of £300</li> <li>◆ apply inverse operations</li> <li>◆ use brackets appropriately, e.g.</li> <li>- know and use the order of operations, including brackets</li> </ul>	<ul style="list-style-type: none"> <li>◆ add and subtract negative numbers in context</li> <li>◆ estimate using approximations</li> <li>◆ use all four operations with decimals to two places, e.g.</li> <li>- add and subtract numbers which do not have the same number of decimal places</li> <li>- multiply or divide decimal numbers by a single digit e.g. <math>31.62 \times 7</math></li> <li>◆ use a calculator where appropriate to calculate fractions/percentages of quantities/measurements e.g.</li> <li>- find fractions of quantities such as <math>\frac{3}{8}</math> of 980</li> <li>- find percentages such as 15% of 360g</li> <li>◆ understand and use an appropriate non-calculator method for solving problems that involve multiplying and dividing any three-digit number by any two-digit number</li> </ul>	<ul style="list-style-type: none"> <li>◆ solve simple problems involving ordering, adding, subtracting negative numbers in context</li> <li>◆ solve simple problems involving ratio and direct proportion, e.g.</li> <li>- begin to use multiplication rather than trial and improvement to solve ratio problems</li> <li>◆ approximate to check answers to problems are of the correct magnitude</li> <li>◆ check solutions by applying inverse operations or estimating using approximations</li> </ul>	<ul style="list-style-type: none"> <li>◆ construct, express in symbolic form, and use simple formulae involving one or two operations, e.g.</li> <li>- understand simple expressions using symbols e.g. '2 less than n' can be written as 'n - 2'</li> <li>- evaluate expressions by substituting numbers into them</li> <li>- use symbols to represent an unknown number or a variable</li> <li>◆ use and interpret coordinates in all four quadrants</li> </ul>
Level 5	Level 5	Level 5	Level 5	Level 5	Level 5
<ul style="list-style-type: none"> <li>◆ recognise and describe number patterns, e.g.</li> <li>- continue sequences involving decimals</li> <li>◆ recognise and describe number relationships including multiple, factor and square</li> <li>◆ use place value to multiply and divide whole numbers by 10 or 100</li> </ul>	<ul style="list-style-type: none"> <li>◆ recognise approximate proportions of a whole and use simple fractions and percentages to describe these</li> <li>- recognise simple equivalence between fractions, decimals and percentages e.g. <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{10}</math>, <math>\frac{3}{4}</math></li> <li>- convert mixed numbers to improper fractions and vice versa</li> <li>◆ order decimals to three decimal places</li> <li>◆ begin to understand simple ratio</li> </ul>	<ul style="list-style-type: none"> <li>◆ use inverse operations, e.g.</li> <li>- use a calculator and inverse operations to find missing numbers, including decimals</li> <li>- 'undo' two-step problems</li> <li>- understand 'balancing sums' including those using division, such as <math>20 + \square = 100 \div 4</math>.</li> <li>◆ understand the use of brackets in simple calculations</li> <li>◆ quickly derive division facts that correspond to multiplication facts up to <math>10 \times 10</math></li> </ul>	<ul style="list-style-type: none"> <li>◆ use a range of mental methods of computation with all operations, e.g.</li> <li>- calculate complements to 1000.</li> <li>◆ recall multiplication facts up to 10 and quickly derive corresponding division facts, e.g.</li> <li>- use their knowledge of tables and place value in calculations with multiples of 10 such as <math>30 \times 7</math>, <math>180 \div 3</math>.</li> <li>◆ use efficient written methods of addition and subtraction and of short multiplication and division</li> <li>- calculate <math>1202 + 45 + 367</math> or <math>1025 - 336</math></li> <li>- add and subtract decimals to two places</li> <li>◆ multiply a simple decimal by a single digit</li> <li>- calculate <math>36.2 \times 8</math></li> </ul>	<ul style="list-style-type: none"> <li>◆ solve problems with or without a calculator</li> <li>- solve two-step problems choosing appropriate operations</li> <li>- deal with two constraints simultaneously</li> <li>- interpret a calculator display of 4.5 as £4.50 in context of money</li> <li>- carry out simple calculations involving negative numbers in context</li> <li>◆ check the reasonableness of results with reference to the context or size of numbers</li> </ul>	<ul style="list-style-type: none"> <li>◆ begin to use simple formulae expressed in words</li> <li>◆ use and interpret coordinates in the first quadrant</li> </ul>
Level 4	Level 4	Level 4	Level 4	Level 4	Level 4
<b>Ma2 Number, Level 4</b>					
Pupils use their understanding of place value to multiply and divide whole numbers by 10 or 100. In solving number problems, pupils use a range of mental methods of computation with the four operations, including mental recall of multiplication facts up to $10 \times 10$ and quick derivation of corresponding division facts. They use efficient written methods of addition and subtraction and of short multiplication and division. They add and subtract decimals to two places and order decimals to three places. In solving problems with or without a calculator, pupils check the reasonableness of their results by reference to their knowledge of the context or to the size of the numbers. They recognise approximate proportions of a whole and use simple fractions and percentages to describe these. Pupils recognise and describe number patterns, and relationships including multiple, factor and square. They begin to use simple formulae expressed in words. Pupils use and interpret coordinates in the first quadrant.					

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Calculating						
Counting and understanding numbers		Knowing and using number facts				
Numbers and the number system	Fractions and decimals	Operations, relationships between them	Mental methods	Solving numerical problems	Written methods	
<p><b>Ma2 Number, Level 3</b> Pupils show understanding of place value in numbers up to 1000 and use this to make approximations. They begin to use decimal notation and to recognise negative numbers, in contexts such as money and temperature. Pupils use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers. They add and subtract numbers with two digits mentally and numbers with three digits using written methods. They use mental recall of the 2, 3, 4, 5 and 10 multiplication tables and derive the associated division facts. They solve whole number problems involving multiplication or division, including those that give rise to remainders. They use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent.</p>						
<p><b>L3</b></p> <ul style="list-style-type: none"> <li>understand place value in numbers to 1000 e.g.                             <ul style="list-style-type: none"> <li>represent / compare numbers using number lines, 100-squares, base 10 materials etc</li> <li>recognise that some numbers can be represented as different arrays</li> <li>use understanding of place value to multiply/ divide whole numbers by 10 (whole number answers)</li> </ul> </li> <li>use place value to make approximations</li> <li>recognise negative numbers in contexts such as temperature</li> <li>recognise a wider range of sequences, e.g.                             <ul style="list-style-type: none"> <li>recognise sequences of multiples of 2, 5 and 10</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent e.g.                             <ul style="list-style-type: none"> <li>understand and use unit fractions such as <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{3}</math>, <math>\frac{1}{5}</math>, <math>\frac{1}{10}</math> and find those fractions of shapes and sets of objects</li> <li>recognise and record fractions that are several parts of the whole such as <math>\frac{3}{4}</math>, <math>\frac{2}{5}</math></li> <li>recognise some fractions that are equivalent to <math>\frac{1}{2}</math></li> </ul> </li> <li>begin to use decimal notation in contexts such as money, e.g.                             <ul style="list-style-type: none"> <li>order decimals with one dp, or two dp in context of money</li> <li>know that £3.06 equals 306p</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>derive associated division facts from known multiplication facts, e.g.                             <ul style="list-style-type: none"> <li>given a number sentence, use understanding of operations to create related sentences, e.g. given <math>14 \times 5 = 70</math>, create <math>5 \times 14 = 70</math>, <math>70 \div 5 = 14</math>, <math>70 \div 14 = 5</math>, <math>14 \times 5 = 10 \times 5</math> add <math>4 \times 5</math></li> <li>use inverses to find missing whole numbers in problems such as, 'I think of number, double it and add 5. The answer is 35. What was my number?'</li> <li>begin to understand the role of '=' , the 'equals' sign e.g</li> <li>solve 'balancing' problems such as <math>7 \times 10 = 82 - \square</math></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>add and subtract 2-digit numbers mentally e.g.                             <ul style="list-style-type: none"> <li>calculate <math>36 + 19</math>, <math>63 - 26</math>, and complements to 100 such as <math>100 - 24</math></li> </ul> </li> <li>use mental recall of the 2, 3, 4, 5 and 10 multiplication tables, e.g.                             <ul style="list-style-type: none"> <li>multiply a 2-digit number by 2, 3, 4 or 5</li> <li>understand finding a quarter of a number of objects as halving the number and halving again.</li> <li>begin to know multiplication facts for 6, 8, 9 and <math>7 \times</math> tables</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers, e.g.                             <ul style="list-style-type: none"> <li>choose to calculate mentally, on paper or with apparatus</li> <li>solve one-step whole number problems appropriately</li> <li>solve two-step problems that involve addition and subtraction</li> </ul> </li> <li>solve whole number problems including those involving multiplication or division that may give rise to remainders, e.g.                             <ul style="list-style-type: none"> <li>identify appropriate operations to use</li> <li>round up or down after simple division, depending on context</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>add and subtract 3-digit numbers using written method, e.g.                             <ul style="list-style-type: none"> <li>use written methods that involve bridging 10 or 100</li> <li>add and subtract decimals in the context of money, where bridging is not required</li> </ul> </li> <li>multiply and divide 2-digit numbers by 2, 3, 4 or 5 as well as 10 with whole number answers and remainders e.g.                             <ul style="list-style-type: none"> <li>calculate <math>49 \div 3</math></li> </ul> </li> </ul>	
Level 3	Level 3	Level 3	Level 3	Level 3	Level 3	
<p><b>L2</b></p> <ul style="list-style-type: none"> <li>count sets of objects reliably, e.g.                             <ul style="list-style-type: none"> <li>group objects in tens, twos or fives to count them</li> </ul> </li> <li>begin to understand the place value of each digit, use this to order numbers up to 100, e.g.                             <ul style="list-style-type: none"> <li>know the relative size of numbers to 100</li> <li>use 0 as a place holder</li> <li>demonstrate knowledge using a range of models/images</li> </ul> </li> <li>recognise sequences of numbers, including odd and even numbers, e.g.                             <ul style="list-style-type: none"> <li>continue a sequence increasing/ decreasing in regular steps</li> <li>recognise numbers from counting in tens or twos</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>begin to use halves and quarters, e.g.                             <ul style="list-style-type: none"> <li>use the concept of a fraction of a number in practical contexts such as sharing sweets between two to get <math>\frac{1}{2}</math> each , among four to get <math>\frac{1}{4}</math> each</li> <li>work out halves of numbers up to 20 and begin to recall them</li> </ul> </li> <li>relate the concept of half of a small quantity to the concept of half of a shape, e.g.                             <ul style="list-style-type: none"> <li>shade one half or one quarter of a given shape including those divided into equal regions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>use the knowledge that subtraction is the inverse of addition e.g.                             <ul style="list-style-type: none"> <li>given 14, 6 and 8, make related number sentences <math>6 + 8 = 14</math>, <math>14 - 8 = 6</math>, <math>8 + 6 = 14</math>, <math>14 - 6 = 8</math></li> <li>understand halving as a way of 'undoing' doubling and vice versa</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>use mental recall of addition and subtraction facts to 10 e.g.                             <ul style="list-style-type: none"> <li>use addition/subtraction facts to 10 and place value to add or subtract multiples of 10 e.g. know <math>3 + 7 = 10</math> and use place value to derive <math>30 + 70 = 100</math>.</li> </ul> </li> <li>use mental calculation strategies to solve number problems including those involving money and measures, e.g.                             <ul style="list-style-type: none"> <li>recall doubles to <math>10+10</math> and other significant doubles e.g. double 50p is 100p or £1</li> <li>use knowledge of doubles to <math>10 + 10</math> to derive corresponding halves</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>choose the appropriate operation when solving addition and subtraction problems, e.g.                             <ul style="list-style-type: none"> <li>use repeated addition to solve multiplication problems</li> <li>begin to use repeated subtraction or sharing equally to solve division problems</li> </ul> </li> <li>solve number problems involving money and measures, e.g.                             <ul style="list-style-type: none"> <li>add/subtract two-digit and one-digit numbers, bridging tens where necessary in contexts using units such as pence, pounds, centimetres</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>record their work in writing, e.g.                             <ul style="list-style-type: none"> <li>record their mental calculations as number sentences</li> </ul> </li> </ul>	
Level 2	Level 2	Level 2	Level 2	Level 2	Level 2	
<p><b>Ma2 Number, Level 2</b> 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.</p>						

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**Ma3 Shape, space and measures, Level 5**

When constructing models and when drawing or using shapes, pupils measure and draw angles to the nearest degree, and use language associated with angle. Pupils know the angle sum of a triangle and that of angles at a point. They identify all the symmetries of 2-D shapes. They know the rough metric equivalents of imperial units still in daily use and convert one metric unit to another. They make sensible estimates of a range of measures in relation to everyday situations. Pupils understand and use the formula for the area of a rectangle

Understanding shapes		Measuring
Properties of shape	Properties of position and movement	Measures
<p><b>L5</b></p> <ul style="list-style-type: none"> <li>◆ use a wider range of properties of 2-D and 3-D shapes, e.g.                             <ul style="list-style-type: none"> <li>- understand 'parallel' and begin to understand 'perpendicular' in relation to edges or faces</li> <li>- classify quadrilaterals, including trapezium and kite, using their properties e.g. number of parallel sides</li> <li>- reason about special triangles and quadrilaterals e.g. given the perimeter and one side of an isosceles triangle, find both possible triangles</li> <li>- draw a parallelogram or trapezium of a given area on a square grid</li> <li>- given the coordinates of three vertices of a parallelogram, find the fourth</li> </ul> </li> <li>◆ know and use the angle sum of a triangle and that of angles at a point, e.g.                             <ul style="list-style-type: none"> <li>- calculate 'missing angles' in triangles, including isosceles triangles or right angled triangles, when only one/one other angle is given</li> <li>- calculate angles on a straight line or at a point such as the angle between the hands of a clock, or intersecting diagonals at the centre of a regular hexagon</li> </ul> </li> </ul> <p style="text-align: right;">Level 5 <input type="checkbox"/></p>	<ul style="list-style-type: none"> <li>◆ identify all the symmetries of 2-D shapes (for rotation symmetry see key stage 3 programme of study )                             <ul style="list-style-type: none"> <li>- find lines of reflection symmetry in shapes and diagrams</li> <li>- recognise order of rotation symmetry</li> </ul> </li> <li>◆ transform shapes                             <ul style="list-style-type: none"> <li>- reflect shapes in oblique (45°) mirror lines where the shape either does not touch the mirror line, or where the shape crosses the mirror line</li> <li>- reflect shapes not presented on grids, by measuring perpendicular distances to/from the mirror</li> <li>- reflect shapes in two mirror lines, where the shape is not parallel or perpendicular to either mirror</li> <li>- rotate shapes, through 90° or 180°, when the centre of rotation is a vertex of the shape and recognise such rotations</li> <li>- translate shapes along an oblique line</li> </ul> </li> <li>◆ reason about shapes, positions and movements                             <ul style="list-style-type: none"> <li>- visualise a 3-D shape from its net and match vertices that will be joined</li> <li>- visualise where patterns drawn on a 3-D shape will occur on its net e.g. when shown a cube with patterns drawn on two or three faces, create the net to make the cube</li> <li>- draw shapes with a fixed number of lines of symmetry</li> </ul> </li> </ul> <p style="text-align: right;">Level 5 <input type="checkbox"/></p>	<ul style="list-style-type: none"> <li>◆ measure and draw angles to the nearest degree, when constructing models and drawing or using shapes, e.g.                             <ul style="list-style-type: none"> <li>- measure and draw reflex angles to the nearest degree, when neither edge is horizontal / vertical</li> <li>- construct a triangle given the length of two sides and the angle between them (accurate to 1mm and 2°)</li> </ul> </li> <li>◆ use language associated with angle</li> <li>◆ read and interpret scales on a range of measuring instruments, explaining what each labelled division represents</li> <li>◆ solve problems involving the conversion of units e.g.                             <ul style="list-style-type: none"> <li>- solve problems such as 1.5kg ÷ 30g</li> <li>- work out approximately how many km are equivalent to 20 miles</li> </ul> </li> <li>◆ make sensible estimates of a range of measures in relation to everyday situations</li> <li>◆ understand and use the formula for the area of a rectangle and distinguish area from perimeter                             <ul style="list-style-type: none"> <li>- find the length of a rectangle given its perimeter and width</li> <li>- find the area or perimeter of simple L shapes, given some edge lengths</li> </ul> </li> </ul> <p style="text-align: right;">Level 5 <input type="checkbox"/></p>
<p><b>L4</b></p> <ul style="list-style-type: none"> <li>◆ use the properties of 2-D and 3-D shapes, e.g.                             <ul style="list-style-type: none"> <li>- recognise and name most quadrilaterals e.g. trapezium, parallelogram, rhombus</li> <li>- recognise right-angled, equilateral, isosceles and scalene triangles</li> <li>- recognise an oblique line of symmetry in a shape</li> <li>- use mathematical terms such as horizontal, vertical, congruent (same size, same shape)</li> <li>- understand properties of shapes, e.g. why a square is a special rectangle</li> <li>- visualise shapes and recognise them in different orientations</li> </ul> </li> <li>◆ make 3-D models by linking given faces or edges</li> </ul> <p style="text-align: right;">Level 4 <input type="checkbox"/></p>	<ul style="list-style-type: none"> <li>◆ draw common 2-D shapes in different orientations on grids, e.g.                             <ul style="list-style-type: none"> <li>- complete a rectangle which has 2 sides drawn at an oblique angle to the grid</li> </ul> </li> <li>◆ reflect simple shapes in a mirror line, e.g.                             <ul style="list-style-type: none"> <li>- use a grid to plot the reflection in a mirror line presented at 45° where the shape touches the line or not</li> <li>- begin to use the distance of vertices from the mirror line to reflect shapes more accurately</li> </ul> </li> <li>◆ begin to rotate a simple shape or object about its centre or a vertex</li> <li>◆ translate shapes horizontally <u>or</u> vertically</li> </ul> <p style="text-align: right;">Level 4 <input type="checkbox"/></p>	<ul style="list-style-type: none"> <li>◆ choose and use appropriate units and instruments</li> <li>◆ interpret, with appropriate accuracy, numbers on a range of measuring instruments, e.g.                             <ul style="list-style-type: none"> <li>- measure a length using mm, to within 2mm</li> <li>- measure and drawn acute and obtuse angles to the nearest 5°, when one edge is horizontal /vertical</li> </ul> </li> <li>◆ find perimeters of simple shapes and find areas by counting squares, e.g.                             <ul style="list-style-type: none"> <li>- use the terms area and perimeter accurately and consistently</li> <li>- find areas by counting squares and part squares</li> <li>- begin to find the area of shapes that need to be divided into rectangles</li> <li>- use 'number of squares in a row times number of rows' to find the area of a rectangle</li> </ul> </li> <li>◆ use units of time, e.g.                             <ul style="list-style-type: none"> <li>- calculate time durations that go over the hour.</li> <li>- read and interpret timetables.</li> </ul> </li> </ul> <p style="text-align: right;">Level 4 <input type="checkbox"/></p>

**Ma3 Shape, space and measures, Level 4**

Pupils make 3-D mathematical models by linking given faces or edges, draw common 2-D shapes in different orientations on grids. They reflect simple shapes in a mirror line. They choose and use appropriate units and instruments, interpreting, with appropriate accuracy, numbers on a range of measuring instruments. They find perimeters of simple shapes and find areas by counting squares.

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Ma3 Shape, space and measures, Level 3			
Pupils classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes. They use non-standard units, standard metric units of length, capacity and mass, and standard units of time, in a range of contexts			
	Understanding shapes		Measuring
	Properties of shape	Properties of position and movement	Measures
L3	<ul style="list-style-type: none"> <li>◆ classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes, e.g.</li> <li>- sort objects and shapes using more than one criterion, e.g. pentagon, not pentagon <u>and</u> all edges the same length/not the same length</li> <li>- sort the shapes which have all edges the same length and all angles the same size from a set of mixed shapes and begin to understand the terms 'regular' and 'irregular'</li> <li>- recognise right angles in shapes in different orientations</li> <li>- recognise angles which are bigger/smaller than 90° and begin to know the terms 'obtuse' and 'acute'</li> <li>- recognise right angled and equilateral triangles</li> <li>- demonstrate that a shape has reflection symmetry by folding and recognise when a shape does not have a line of symmetry</li> <li>- recognise common 3-D shapes e.g. triangular prism, square-based pyramid</li> <li>- relate 3-D shapes to drawings and photographs of them, including from different viewpoints</li> <li>◆ begin to recognise nets of familiar 3-D shapes e.g. cube, cuboid, triangular prism, square-based pyramid</li> </ul>	<ul style="list-style-type: none"> <li>◆ recognise shapes in different orientations</li> <li>◆ reflect shapes, presented on a grid, in a vertical or horizontal mirror line, e.g.</li> <li>- reflect a shape even if the shape is at 45° to the mirror line, touching the line or not</li> <li>- begin to reflect simple shapes in a mirror line presented at 45°</li> <li>◆ describe position and movement, e.g.</li> <li>- use terms such as left/right, clockwise/anticlockwise, quarter turn/90° to give directions along a route</li> </ul>	<ul style="list-style-type: none"> <li>◆ use non-standard units and standard metric units of length, capacity and mass in a range of contexts, e.g.</li> <li>- measure a length to the nearest ½ cm</li> <li>- read simple scales, e.g. increments of 2, 5 or 10</li> <li>◆ use standard units of time, e.g.</li> <li>- read a 12-hour clock and generally calculate time durations that do not go over the hour</li> <li>◆ use a wider range of measures, e.g.</li> <li>- begin to understand area as a measure of surface and perimeter as a measure of length.</li> <li>- begin to find areas of shapes by counting squares and explain answers as a number of squares even if not using standard units such as cm<sup>2</sup> or m<sup>2</sup>.</li> <li>- recognise angles as a measure of turn and know that one whole turn is 360 degrees</li> </ul>
	Level 3	Level 3	Level 3
L2	<ul style="list-style-type: none"> <li>◆ use mathematical names for common 3-D and 2-D shapes, e.g.</li> <li>- identify 2-D and 3-D shapes from pictures of them in different orientations, e.g. square, triangle, hexagon, pentagon, octagon, cube, cylinder, sphere, cuboid, pyramid</li> <li>◆ describe their properties, including numbers of sides and corners, e.g.</li> <li>- make and talk about shapes referring to properties and features such as edge, face, corner</li> <li>- sort 2-D and 3-D shapes according to a single criterion e.g. shapes that are pentagons or shapes with a right angle</li> <li>- visualise frequently used 2-D and 3-D shapes</li> <li>- begin to understand the difference between shapes with two dimensions and those with three</li> <li>- recognise properties that are the same even when a shape is enlarged e.g. comparing different size squares, circles, similar triangles, cubes or spheres</li> </ul>	<ul style="list-style-type: none"> <li>◆ describe the position of objects, e.g.</li> <li>- use ordinal numbers (first, second, third...) to describe the position of objects in a row or when giving directions</li> <li>- recognise and explain that a shape stays the same even when it is held up in different orientations</li> <li>◆ distinguish between straight and turning movements</li> <li>- distinguish between left and right and between clockwise and anticlockwise and use these when giving directions</li> <li>- instruct a programmable robot, combining straight-line movements and turns, to move along a defined path or reach a target destination</li> <li>◆ recognise right angles in turns</li> </ul>	<ul style="list-style-type: none"> <li>◆ understand angle as a measurement of turn</li> <li>- make whole turns, half-turns and quarter-turns</li> <li>◆ begin to use everyday non-standard and standard units to measure length and mass</li> <li>- begin to understand that numbers can be used not only to count discrete objects but also to describe continuous measures e.g. length</li> <li>- know which measuring tools to use to find, for example, how much an object weighs, how tall a child is, how long it takes to run around the edge of the playground, how much water it takes to fill the water tray</li> <li>- read scales to the nearest labelled division</li> <li>◆ begin to use a wider range of measures</li> <li>- make and use a 'right angle checker'</li> <li>- use a time line to order daily events and ordinal numbers (first, second, third...) to describe the order of some regular events</li> </ul>
	Level 2	Level 2	Level 2
Ma3 Shape, space and measures, Level 2			
Pupils use mathematical names for common 3-D and 2-D shapes and describe their properties, including numbers of sides and corners. They distinguish between straight and turning movements, understand angle as a measurement of turn, and recognise right angles in turns. They begin to use everyday non-standard and standard units to measure length and mass.			

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Ma4 Handling data, Level 5			
Pupils understand and use the mean of discrete data. They compare two simple distributions, using the range and one of mode, median or mean. They interpret graphs and diagrams, including pie charts, and draw conclusions. They understand and use the probability scale from 0 to 1. Pupils find and justify probabilities, and approximations to these, by selecting and using methods based on equally likely outcomes and experimental evidence, as appropriate. They understand that different outcomes may result from repeating an experiment			
Handling data and Using and applying mathematics			
	Specifying the problem and planning, collecting data	Processing and representing data	Interpreting data
L5	<ul style="list-style-type: none"> <li>◆ ask questions, plan how to answer them and collect the data required</li> <li>◆ in probability, select methods based on equally likely outcomes and experimental evidence, as appropriate</li> <li>- <i>decide if a probability can be calculated or if it can only be estimated from the results of an experiment</i></li> <li>◆ understand that different outcomes may result from repeating an experiment</li> </ul>	<ul style="list-style-type: none"> <li>◆ understand and use the mean of discrete data e.g.                             <ul style="list-style-type: none"> <li>- <i>use the mean of a set of measurements from a science experiment</i></li> </ul> </li> <li>◆ understand and use the probability scale from 0 to 1 (from the key stage 3 programme of study)</li> <li>◆ use methods based on equally likely outcomes and experimental evidence, as appropriate, to find and justify probabilities, and approximations to these (from the key stage 3 programme of study) e.g.                             <ul style="list-style-type: none"> <li>- <i>compare two spinners e.g. to find which is more likely to result in an even number</i></li> </ul> </li> <li>◆ create and interpret line graphs where the intermediate values have meaning e.g.                             <ul style="list-style-type: none"> <li>- <i>draw and use a conversion graph for pounds and Euros</i></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ compare two simple distributions, using the range and one of mode, median or mean (mean and median are drawn from the key stage 3 programme of study)                             <ul style="list-style-type: none"> <li>- <i>describe and compare two sets of football results, by using the range and mode</i></li> <li>- <i>solve problems such as, 'Find 5 numbers where the mode is 6 and the range is 8'</i></li> </ul> </li> <li>◆ interpret graphs and diagrams, including pie charts, and draw conclusions                             <ul style="list-style-type: none"> <li>- <i>complete a 2-way table, given some of the data</i></li> <li>- <i>interpret bar graphs with grouped data</i></li> <li>- <i>interpret and compare pie charts where it is not necessary to measure angles</i></li> <li>- <i>read between labelled divisions on a scale, for example read 34 on a scale labelled in tens or 3.7 on a scale labelled in ones, and find differences to answer, 'How much more...?'</i></li> <li>- <i>recognise the difference between discrete and continuous data</i></li> <li>- <i>recognise when information is presented in a misleading way, for example compare two pie charts where the sample sizes are different</i></li> <li>- <i>when drawing conclusions, identify further questions to ask</i></li> <li>- <i>describe and predict outcomes from data using the language of chance or likelihood</i></li> </ul> </li> </ul>
	Level 5	Level 5	Level 5
L4	<ul style="list-style-type: none"> <li>◆ collect discrete data, e.g.                             <ul style="list-style-type: none"> <li>- <i>given a problem, suggest possible answers and data to collect</i></li> <li>- <i>test a hypothesis about the frequency of an event by collecting data, for example collect dice scores to test ideas about how many scores of 6 will occur during 50 throws of a dice</i></li> </ul> </li> <li>◆ group data, where appropriate, in equal class intervals, e.g.                             <ul style="list-style-type: none"> <li>- <i>decide on a suitable class interval when collecting or representing data about pupils' hours per week spent watching television</i></li> </ul> </li> <li>◆ record discrete data using a frequency table</li> </ul>	<ul style="list-style-type: none"> <li>◆ represent collected data in frequency diagrams, e.g.                             <ul style="list-style-type: none"> <li>- <i>suggest an appropriate frequency diagram to represent particular data, for example decide whether a bar chart, Venn diagram or pictogram would be most appropriately and for pictograms use one symbol to represent, e.g. 2, 5, 10 or 100</i></li> </ul> </li> <li>◆ construct simple line graphs                             <ul style="list-style-type: none"> <li>- <i>decide upon an appropriate scale for a graph e.g. labelled divisions representing 2, 5, 10, 100</i></li> </ul> </li> <li>◆ continue to use Venn and Carroll diagrams to record their sorting and classifying of information, e.g.                             <ul style="list-style-type: none"> <li>- <i>represent sorting using two criteria typical of level 3 and 4 mathematics such as sorting numbers using properties 'multiples of 8' and 'multiples of 6'</i></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◆ understand and use the mode and range to describe sets of data                             <ul style="list-style-type: none"> <li>- <i>use mode and range to describe data relating to shoe sizes in their class and begin to compare their data with data from another class</i></li> </ul> </li> <li>◆ interpret frequency diagrams and simple line graphs.                             <ul style="list-style-type: none"> <li>- <i>interpret simple pie charts</i></li> <li>- <i>interpret the scale on bar graphs and line graphs, reading between the labelled divisions e.g. reading 17 on a scale labelled in fives</i></li> <li>- <i>interpret the total amount of data represented</i></li> <li>- <i>compare data sets and respond to questions e.g. how does our data about favourite televisions programmes compare to the data from year 3 children?</i></li> <li>- <i>in the context of data relating to everyday situations, understand the language of probability such as 'more likely, equally likely, fair, unfair, certain'</i></li> </ul> </li> </ul>
	Level 4	Level 4	Level 4
Ma4 Handling data, Level 4			
Pupils collect discrete data and record them using a frequency table. They understand and use the mode and range to describe sets of data. They group data, where appropriate, in equal class intervals, represent collected data in frequency diagrams and interpret such diagrams. They construct and interpret simple line graphs.			

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<b>Ma4 Handling data, Level 3</b> (included in programme of study for Ma2 Number in key stage 1) Pupils extract and interpret information presented in simple tables and lists. They construct bar charts and pictograms, where the symbol represents a group of units, to communicate information they have gathered, and they interpret information presented to them in these forms	
Handling data and Using and applying mathematics	
Processing and representing data	Interpreting data
<p><b>L3</b></p> <ul style="list-style-type: none"> <li>◆ gather information, e.g.                             <ul style="list-style-type: none"> <li>- <i>decide what data to collect to answer a question e.g. what is the most common way to travel to school</i></li> <li>- <i>make appropriate choices for recording data, e.g. a tally chart or frequency table</i></li> </ul> </li> <li>◆ construct bar charts and pictograms, where the symbol represents a group of units, e.g.                             <ul style="list-style-type: none"> <li>- <i>decide how best to represent data, for example whether a bar chart, Venn diagram or pictogram would show the information most clearly</i></li> <li>- <i>decide upon an appropriate scale for a graph, for example labelled divisions of 2, or, for a pictogram, one symbol to represent 2 or 5</i></li> </ul> </li> <li>◆ use Venn and Carroll diagrams to record their sorting and classifying of information, e.g.                             <ul style="list-style-type: none"> <li>- <i>represent sorting using one or two criteria typical of level 2 and 3 mathematics e.g. shapes sorted using properties such as right angles and equal sides</i></li> </ul> </li> </ul> <p style="text-align: right;">Level 3 <input type="checkbox"/></p>	<ul style="list-style-type: none"> <li>◆ extract and interpret information presented in simple tables lists, bar charts and pictograms, e.g.                             <ul style="list-style-type: none"> <li>- <i>use a key to interpret represented data</i></li> <li>- <i>read scales labelled in twos, fives and tens, including reading between labelled divisions such as a point halfway between 40 and 50 or 8 and 10</i></li> <li>- <i>compare data e.g. say how many more... than... and recognise the category that has most/least.</i></li> <li>- <i>respond to questions of a more complex nature such as 'How many children took part in this survey altogether?' or 'How would the data differ if we asked the children in year 6?'</i></li> <li>- <i>in the context of data relating to everyday situations, understand the idea of 'certain' and 'impossible' relating to probability</i></li> </ul> </li> </ul> <p style="text-align: right;">Level 3 <input type="checkbox"/></p>
<p><b>L2</b></p> <ul style="list-style-type: none"> <li>◆ sort objects and classify them using more than one criterion e.g.                             <ul style="list-style-type: none"> <li>- <i>sort a given set of shapes using two criteria such as triangle / not triangle and blue / not blue</i></li> </ul> </li> <li>◆ understand vocabulary relating to handling data e.g.                             <ul style="list-style-type: none"> <li>- <i>understand vocabulary such as sort, group, set, list, table, most common, most popular</i></li> </ul> </li> <li>◆ collect and sort data to test a simple hypothesis, e.g.                             <ul style="list-style-type: none"> <li>- <i>count a show of hands to test the hypothesis 'most children in our class are in bed by 7.30pm'</i></li> </ul> </li> <li>◆ record results in simple lists, tables, pictograms and block graphs, e.g.                             <ul style="list-style-type: none"> <li>- <i>present information in lists, tables and simple graphs where one symbol or block represents one unit</i></li> <li>- <i>enter data into a simple computer database</i></li> </ul> </li> </ul> <p style="text-align: right;">Level 2 <input type="checkbox"/></p>	<ul style="list-style-type: none"> <li>◆ communicate their findings, using the simple lists, tables, pictograms and block graphs they have recorded, e.g.                             <ul style="list-style-type: none"> <li>- <i>respond to questions about the data they have presented, e.g. how many of our names have 5 letters?</i></li> <li>- <i>pose similar questions about their data for others to answer</i></li> </ul> </li> </ul> <p style="text-align: right;">Level 2 <input type="checkbox"/></p>
<b>Ma4 Handling data, Level 2</b> (included in programme of study for Ma2 Number in key stage 1) Pupils sort objects and classify them using more than one criterion. When they have gathered information, pupils record results in simple lists, tables and block graphs, in order to communicate their findings.	