

Year 5 Mathematics Objectives 2014-15

Programme of study	Non Statutory guidance	Objectives
<p>Number and place Value</p> <ul style="list-style-type: none"> • read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit • count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers including through zero • round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 • solve number problems and practical problems that involve all of the above • read Roman numerals to 1000 (M) and recognise years written in Roman numerals. 	<p>Pupils identify the place value in large whole numbers. They continue to use number in context, including measurement. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions that they have met so far. They should recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule.</p>	<p>Counting</p> <ul style="list-style-type: none"> • Count on and back from any given number in powers of 10 e.g 10s, 100s 1000s etc. • Count on from any given number in decimal steps e.g 2.3, 2.6, 2.9, ? • Count backwards extending beyond zero into negative numbers <p>Comparing numbers</p> <ul style="list-style-type: none"> • Compare numbers to at least 1000000 including decimals. <p>Reading and writing numbers</p> <ul style="list-style-type: none"> • Read and write (in words and figures) numbers up to 1 000 000 • Read Roman numerals to 1000 (M) and recognise years written in Roman numerals <p>Place value</p> <ul style="list-style-type: none"> • Partition decimal numbers • Recognise the value of each digit in a decimal number. <p>Rounding</p> <ul style="list-style-type: none"> • Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 • Round decimal numbers to the nearest whole unit, tenth and hundredth <p>Solving problems Solve problems involving place value in a range of contexts.</p>
<p>Addition and subtraction</p> <ul style="list-style-type: none"> • add and subtract whole numbers with more than 4 digits, • including using formal written methods (columnar addition and subtraction) • add and subtract numbers mentally with increasingly large numbers 	<p>Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see Appendix 1). They practise mental calculations with increasingly large numbers to aid fluency (e.g. $12\,462 - 2\,300 = 10\,162$).</p>	<p>Mental calculations</p> <ul style="list-style-type: none"> • sums and differences of decimals, e.g. $6.5 + 2.7$, $7.8 - 1.3$ • doubles and halves of decimals, e.g. half of 5.6, double 3.4 • Count up to find differences e.g. $40870 + \square = 50000$, $7.2 + \square = 8$.

Year 5 Mathematics Objectives 2014-15

<ul style="list-style-type: none"> • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. 		<ul style="list-style-type: none"> • Tackle mental additions and subtractions of 3 and 4 digit numbers by using a variety of methods e.g. compensation, partitioning, comparison, rounding. <p>Written methods</p> <ul style="list-style-type: none"> • Use standard written methods for addition and subtraction • Compare informal and formal methods of calculation (to see the explicit links between them e.g. columnar, expanded methods, a range of mental strategies) • Explain the strategies used in written calculations <p>Inverse operations, estimating and checking answers</p> <ul style="list-style-type: none"> • Use rounding to work out approximate answers, considering levels of accuracy. <p>Solving Problems</p> <ul style="list-style-type: none"> • Solve multi-step problems involving addition and subtraction. • Explain which methods to use to solve problems and why.
<p>Multiplication and division</p> <ul style="list-style-type: none"> • identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. • solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors • know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers • establish whether a number up to 100 is prime and recall prime numbers up to 19 	<p>Pupils practise and extend their use of the formal written methods of short multiplication and short division (see Appendix 1). They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations. They use and understand the terms factor, multiple and prime, square and cube numbers. Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$).</p>	<p>Multiplication and division facts</p> <ul style="list-style-type: none"> • Rapid recall of multiplication facts up to 12X12 • Use multiplication facts to derive corresponding division facts eg $4 \times 3 = 12$ so $12/3 = 4$ • Apply multiplication facts to pairs of multiples of 10 and 100 eg 2×3 20×30 200×300 • Use multiplication facts to find factors of two-digit numbers and to multiply multiples of 10 and 100 <p>Mental calculations</p>

Year 5 Mathematics Objectives 2014-15

<ul style="list-style-type: none"> multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers multiply and divide numbers mentally drawing upon known facts divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. 	<p>Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres. Distributivity can be expressed as $a(b + c) = ab + ac$ in preparation for using algebra.</p>	<ul style="list-style-type: none"> Understand the terms and use the vocabulary of factor, multiple and product Devise mental strategies to address harder calculations such as $72 \div 3$ Use and apply knowledge of factors to work out harder calculations Multiply and divide numbers, including decimals, by 10, 100 and 1000 <p>Written methods</p> <ul style="list-style-type: none"> To use formal written methods to multiply and divide Use division with remainders and put them in their correct context Use short division as a method for dividing by a single digit number <p>Properties of numbers</p> <ul style="list-style-type: none"> Identify the pairs of factors of a given number Find prime factors of a given number Recall all prime numbers up to 19. Find common factors of two numbers. Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) <p>Solving multiplication and division problems</p> <ul style="list-style-type: none"> Use knowledge of square and cube numbers when solving surface area and volume problems Make sensible suggestions when solving problems such as 'a taxi can take 4 pupils. How many taxis do you need to take 23 pupils?' Use simple scaling/multiplicative thinking to make models and scale drawings solve puzzles and problems involving
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Year 5 Mathematics Objectives 2014-15

<p>Fractions</p> <ul style="list-style-type: none"> compare and order fractions whose denominators are all multiples of the same number identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. $2/5 + 4/5 = 6/5 = 1\frac{1}{5}$) add and subtract fractions with the same denominator and multiples of the same number multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams read and write decimal numbers as fractions (e.g. $0.71 = 71/100$) recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents round decimals with two decimal places to the nearest whole number and to one decimal place read, write, order and compare numbers with up to three decimal places solve problems involving number up to three decimal places recognise the per cent symbol (%) and understand that per cent relates to "parts per hundred", and write percentages 	<p>Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions. They extend their knowledge of fractions to thousandths and connect to decimals and measures.</p> <p>Pupils connect equivalent fractions > 1 that simplify to integers with division and fractions > 1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions.</p> <p>Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions > 1.</p> <p>Pupils practise adding and subtracting fractions to become fluent through a variety of increasingly complex problems. They extend their understanding of adding and subtracting fractions to calculations that exceed 1 as a mixed number. Pupils read and write proper fractions and mixed numbers accurately and continue to practise counting forwards and backwards in simple fractions.</p> <p>Pupils continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities, writing remainders as a fraction.</p> <p>Pupils extend counting from year 4, using decimals and fractions including bridging zero, for</p>	<p>multiplication and division</p> <p>Recognising fractions</p> <ul style="list-style-type: none"> Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents <p>Comparing fractions</p> <ul style="list-style-type: none"> compare fractions by converting to a common denominator. <p>Comparing decimals</p> <ul style="list-style-type: none"> read, write, order and compare numbers with up to three decimal places <p>Rounding decimals</p> <ul style="list-style-type: none"> Round decimals with two decimal places to the nearest whole number and to one decimal place. <p>Equivalence</p> <ul style="list-style-type: none"> Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths Read and write decimal numbers as fractions. Recognise 1000ths and relate to 100ths and 10ths Recognise the per cent symbol (%) and understand that per cent relates to "number of parts per hundred", Write percentages as a fraction with denominator 100 as a decimal fraction <p>Adding and subtracting fractions</p> <ul style="list-style-type: none"> add and subtract fractions with the same denominator and multiples of the same number. Recognise mixed numbers and improper fractions and convert from one form to the
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Year 5 Mathematics Objectives 2014-15

<p>as a fraction with denominator hundred, and as a decimal fraction</p> <ul style="list-style-type: none"> • solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25. 	<p>example on a number line.</p> <p>Pupils say, read and write decimal fractions and related tenths, hundredths and thousandths accurately and are confident in checking the reasonableness of their answers to problems. They mentally add and subtract tenths, and one-digit whole numbers and tenths. They practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (e.g. $0.83 + 0.17 = 1$). Pupils should go beyond the measurement and money models of decimals, for example by solving puzzles involving decimals. Pupils should make connections between percentages, fractions and decimals (e.g. 100% represents a whole quantity and 1% is $\frac{1}{100}$, 50% is $\frac{50}{100}$, 25% is $\frac{25}{100}$) and relate this to finding 'fractions of'. They recognise that percentages are proportions of quantities as well as operators on quantities.</p>	<p>other and write mathematical statements > 1 as a mixed number (e.g. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$)</p> <p>Multiplying and dividing fractions</p> <ul style="list-style-type: none"> • Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams <p>Solving problems</p> <ul style="list-style-type: none"> • solve problems involving numbers up to three decimal places • solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25.
<p>Measurement</p> <ul style="list-style-type: none"> • convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) • understand and use equivalences between metric units and • common imperial units such as inches, pounds and pints • measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres 	<p>Pupils use their knowledge of place value and multiplication and division to convert between standard units. Pupils calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically $4 + 2b = 20$ for a rectangle of sides 2 cm and b cm and perimeter of 20cm. They calculate the area from scale drawings using given measurements</p>	<p>Comparing and estimating</p> <ul style="list-style-type: none"> • calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes • estimate volume (e.g. using 1 cm³ blocks to build cubes and cuboids) and capacity (e.g. using water) <p>Measuring and calculating</p> <ul style="list-style-type: none"> • use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation

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Year 5 Mathematics Objectives 2014-15

<ul style="list-style-type: none"> calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes estimate volume (e.g. using 1 cm³ blocks to build cubes and cuboids) and capacity (e.g. using water) solve problems involving converting between units of time use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling. 	<p>Pupils use all four operations in problems involving time and money, including conversions (e.g. days to weeks, leaving the answer as weeks and days)..</p>	<ul style="list-style-type: none"> including scaling. measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres to calculate areas of squares and rectangles. To calculate areas of irregular shapes. <p>Telling the time</p> <ul style="list-style-type: none"> To solve problems involving converting units of time. Use timetables to solve problems. <p>Conversion</p> <ul style="list-style-type: none"> know the equivalence between the different metric units 1000g=1kg 1000ml=1L 1000mm=1m understand the meaning of prefixes (kilo-, milli-, centi-) convert cm and mm to m and m to Km in length convert g to Kg and Kg to g convert L to ml and ml to L know the approximate metric equivalents of imperial units use imperial units to solve problems relating to length, weight and volume/capacity.
<p>Shape and space Properties of shapes</p> <ul style="list-style-type: none"> identify 3-D shapes, including cubes and other cuboids, from 2-D representations know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles draw given angles, and measure them in degrees (o) 	<p>Pupils become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles.</p> <p>Pupils use the term diagonal and make conjectures about the angles formed by diagonals and sides, and other properties of quadrilaterals, for example using dynamic</p>	<p>Identifying shapes and their properties</p> <ul style="list-style-type: none"> identify 3-D shapes, including cubes and other cuboids, from 2-D representations <p>Drawing and constructing</p> <ul style="list-style-type: none"> draw given angles, and measure them in degrees (o) <p>Comparing and classifying</p> <ul style="list-style-type: none"> use the properties of rectangles to deduce related facts and find missing lengths and

Year 5 Mathematics Objectives 2014-15

<ul style="list-style-type: none"> identify: angles at a point and one whole turn (total 360o), angles at a point on a straight line and 1/2 a turn (total 180o) other multiples of 90o use the properties of rectangles to deduce related facts and find missing lengths and angles distinguish between regular and irregular polygons based on reasoning about equal sides and angles. use the properties of rectangles to deduce related facts and find missing lengths and angles distinguish between regular and irregular polygons based on reasoning about equal sides and angles. 	<p>geometry ICT tools. Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.</p>	<p>angles</p> <ul style="list-style-type: none"> distinguish between regular and irregular polygons based on reasoning about equal sides and angles <p>Angles</p> <ul style="list-style-type: none"> Recognise the different types of angles – acute $<90^\circ$, obtuse $> 90^\circ$ and $< 180^\circ$, right angle 90° Estimate, order and compare and order angles Use a protractor to measure angles accurately Calculate the size of an unknown angle from known facts without using a protractor- angles in a triangle = 180°, angles in a full circle = 360°, angles in a straight line = 180°, the 4 angles of a quadrilateral make a full turn, 360
<p>Position and direction</p> <ul style="list-style-type: none"> identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed. 	<p>Pupils recognise and use reflection and translation in a variety of diagrams, including continuing to use a 2-D grid and coordinates in the first quadrant. Reflection should be in lines that are parallel to the axes.</p>	<p>Position, direction and movement</p> <ul style="list-style-type: none"> accurately reflect shapes about the x axis accurately reflect shapes about the y axis give accurate directions to translate shapes in the first quadrant coordinate grid plot the coordinates of the vertices of a shape, naming the shape where appropriate understand parallel and perpendicular lines within the shapes that have been plotted
<p>Statistics</p> <ul style="list-style-type: none"> solve comparison, sum and difference problems using information presented in a line graph 	<ul style="list-style-type: none"> solve comparison, sum and difference problems using information presented in a line graph complete, read and interpret information in tables, including timetables. 	<p>Interpreting, constructing and presenting data</p> <ul style="list-style-type: none"> Complete, read and interpret tables including timetables. Predict missing facts in tables using

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Year 5 Mathematics Objectives 2014-15

<ul style="list-style-type: none">• complete, read and interpret information in tables, including timetables.		<p>patterns within the data</p> <ul style="list-style-type: none">• To plot points on a line graph, interpret information and present data in line graphs.• solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.
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