# Bird's Bush Primary School

# Long Term Mathematics Plans

## Purpose of study

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary in most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, and a sense of enjoyment and curiosity about the subject.

## Aims

The National Curriculum for mathematics aims to ensure that all pupils:

- ✓ become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- ✓ **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- ✓ can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

# The principal focus of mathematics teaching

| | |
|---|---|
| KEY STAGE 1 | • The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].<br>• At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.<br>• By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.<br>• Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1. |
| LOWER KEY STAGE 2 | • The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.<br>• At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.<br>• By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.<br>• Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling. |

| | |
|---|---|
| UPPER KEY STAGE 2 | • The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.<br>• At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.<br>• By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.<br>• Pupils should read, spell and pronounce mathematical vocabulary correctly. |

# MATHEMATICS – end of year standards for Year 1

**By the end of Yr 1 pupils will be able to …**

## Number and place value

- **count** to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number ; identify **one more/less** than any given a number
- **count** in twos, fives and tens from different multiples *e.g. 6, 8, 10, 12, 14*
- **count, read, write** and **compare** numbers to 100 in numerals
- begin to recognise **place value** in numbers beyond 20
- **identify** and **represent** numbers using objects and pictorial representations including the number line
- use the **language** of: equal to, more than, less than (fewer), most, least
- **read** and **write** numbers from 1 to 20 in **words**

## Addition and subtraction

- **read**, **write** and **interpret** mathematical statements involving addition (+), subtraction (-) and equals (=) signs
- **use** number **bonds** and **related subtraction facts** within 20 e.g. 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9
- add and subtract **one-digit and two-digit numbers** to 20 including zero
- solve **simple one-step problems** that involve addition and subtraction, using concrete objects and pictorial representations, and **missing number** problems such as 7 = ▢ - 9

## Multiplication and division

- **begin** to **understand multiplication and division** through grouping and sharing small quantities; doubling numbers and quantities, and finding simple fractions of objects, numbers and quantities
- solve **simple one-step problems** involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

## Fractions

- **recognise, find** and **name**:
  - a half as one of two equal parts of an object, shape or quantity
  - a quarter as one of four equal parts of an object, shape or quantity
- connect halves and quarters to the equal sharing

## Measurement

## Geometry: properties of shapes

## Geometry: position and direction

## Statistics

| | | | | |
|---|---|---|---|---|
| **By the end of Yr 1 pupils will be able to …** | • **compare**, **describe** and **solve practical problems** for:<br>- lengths and heights *e.g. long/short, longer/shorter, tall/short, double/half*<br>- mass or weight *e.g. heavy/light, heavier / lighter than*<br>- capacity/volume *e.g. full/empty, more /less than, half/quarter full*<br>- time *e.g. quicker, slower, earlier, later*<br>• **measure** and begin to **record**:<br>- lengths and heights<br>- mass/weight<br>- capacity and volume<br>- time (hours, minutes, seconds)<br>• use **non-standard units** moving to common **standard units**<br>• recognise and know the **value** of different denominations of **coins and notes**<br>• totalling amounts of money involving all coins<br>• **sequence events** in chronological order using language *e.g. before, after, next, first, today, yesterday, tomorrow, morning, afternoon, evening*<br>• **recognise** and **use language relating to dates**, including days of the week, weeks, months and years<br>• **tell the time** to the **hour** and **half past the hour** and draw the hands on a clock face to show these times | • **recognise** and **name** common 2-D and 3-D shapes (in **different orientations** and sizes), including:<br>- 2-D shapes *e.g. rectangles (including squares), circles and triangles*<br>- 3-D shapes *e.g. cuboids (including cubes), pyramids and spheres* | • describe position, directions and movements, including **whole, half, quarter** and **three-quarter turns**. (using language such as left and right, forwards and backwards) | **No statutory requirements** |

| **MATHEMATICS – end of year standards for Year 2** | | | | |
|---|---|---|---|---|
| | **Number and place value** | **Addition and subtraction** | **Multiplication and division** | **Fractions** |

| By the end of Yr 2 pupils will be able to … | | | | |
|---|---|---|---|---|
| | • **count** in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward<br>• **recognise** the **place value** of each digit in a two-digit number (tens, ones) and **partition numbers in different ways** *e.g. 23 = 20 + 3*<br>• **identify**, **represent** and **estimate** numbers using different representations, including the number line and **arrays**<br>• **compare** and **order** numbers from 0 up to 100; **use** <, > and = signs<br>• **read** and **write** numbers to at least 100 in **numerals** and in **words**<br>• use place value and number facts to **solve problems** | • **solve problems** with addition and subtraction:<br>- using concrete objects and pictorial representations, involving numbers, quantities and measures<br>- applying knowledge of mental and written methods<br>• **recall** and **use** addition and subtraction **facts** to 20 fluently, **derive** and **use related facts** up to 100 *e.g. 3 + 7 = 10, 10 - 7 = 3 and 7 = 10 - 3 to calculate 30 + 70 = 100, 100 - 70 = 30 and 70 = 100 - 30*<br>• **add** and **subtract** numbers using concrete **objects**, pictorial representations, and **mentally**, including:<br>○ a two-digit number and ones<br>○ a two-digit number and tens<br>○ two two-digit numbers<br>○ adding three one-digit numbers<br>• show that addition of two numbers can be done in any order (**commutative**) and subtraction of one number from another cannot<br>• recognise and use the **inverse** relationship between addition and subtraction and use this to **check** calculations and solve **missing number problems** | • **recall** and **use** multiplication and division **facts** for the 2, 5 and 10 multiplication tables, including recognising **odd** and **even** numbers<br>• **calculate** multiplication and division statements within the **2, 5 and 10 multiplication tables** and write them using the multiplication (×), division (÷) and equals (=) signs<br>• show that multiplication of two numbers can be done in any order (**commutative**) and division of one number by another cannot<br>• **solve problems** involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts | • **recognise**, **name** and **write** simple fractions $^1/_3$, $^1/_4$, $^2/_4$ and $^3/_4$<br>• **find fractions** $^1/_3$, $^1/_4$, $^2/_4$ and $^3/_4$ of sets of **objects** or **shapes**, **quantities**, lengths *e.g.* $^1/_2$ *of 6 = 3*<br>• recognise the **equivalence** of $^2/_4$ and $^1/_2$<br>• **count** in fractions *e.g.* $1^1/_4$, $1^2/_4$ , *(or* $1^1/_2$*),* $1^3/_4$ |
| | **Measurement** | **Geometry: properties of shapes** | **Geometry: position and direction** | **Statistics** |

| | | | | |
|---|---|---|---|---|
| **By the end of Yr 2 pupils will be able to …** | • **choose** and **use** appropriate **standard units** to **estimate** and **measure** length/height (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels<br>• **compare** and **order** lengths, mass, volume/capacity<br>• recognise and use symbols for **pounds (£)** and **pence (p)**<br>• totalling amounts of money involving all coins and notes<br>• **combine amounts** to make a particular value<br>• find different combinations of coins that equal the same amounts of money<br>• **solve simple problems** in a practical context involving **addition and subtraction** of **money** of the same unit, including **giving change** (recording pounds and pence separately)<br>• **compare** and **sequence** intervals of time<br>• **tell** and write the **time to five minutes**, including quarter past/to the hour and draw the hands on a clock face to show these times.<br>• **know** the number of minutes in an hour and the number of hours in a day | • **identify** and **describe** the **properties** of **2-D shapes**, (*e.g. pentagons, hexagons, octagons*), including number of sides or vertices, symmetry in a vertical line<br>• **identify** and **describe** the **properties** of **3-D shapes**, including the number of edges, vertices and faces<br>• **identify** 2-D shapes on the **surface of 3-D** shapes, *e.g. a circle on a cylinder and a triangle on a pyramid*<br>• **compare** and **sort** common 2-D and 3-D shapes and everyday objects | • **order** and **arrange** combinations of mathematical objects in **patterns** and **sequences**<br>• use mathematical **vocabulary** to **describe position**, **direction** and movement, including movement in a straight line and distinguishing between **rotation as a turn** and in terms of **right angles** for quarter, half and three-quarter turns (clockwise and anti-clockwise) *e.g. pupils themselves moving in turns, programming robots using instructions given in right angles* | • **interpret** and **construct** simple pictograms (symbol representing 2, 5, 10), tally charts, block diagrams and simple tables<br>• **ask** and **answer simple questions** by counting the number of objects in each category and sorting the categories by quantity<br>• ask and answer questions about **totalling** and **compare** categorical data, *e.g. how many…? how many more/fewer…?* |

# MATHEMATICS – end of year standards for Year 3

| | Number and place value | Addition and subtraction | Multiplication and division | Fractions |
|---|---|---|---|---|
| **By the end of Yr 3 pupils will be able to …** | • **count** from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 **more or less** than a given number<br>• **read and write numbers** to at least 1000 in numerals and in words<br>• recognise the **place value** of each digit in a three-digit number (hundreds, tens, ones)<br>• **compare** and **order** numbers up to 1000<br>• **identify, represent** and **estimate** numbers using different representations including measures e.g. on number lines and measuring scales<br>• **solve** number **problems** and practical problems involving these ideas.<br>• recognise how tenths arise by dividing by 10 | • **add and subtract** ones, tens and hundreds to or from three-digit numbers **mentally**; two two-digit numbers where the answers could exceed 100 *e.g. 78 + 46*<br>• **add and subtract** numbers with up to three digits, using **formal written methods** of columnar addition and subtraction<br>• **estimate** the answer to a calculation and use **inverse operations** to check answers<br>• **solve problems**, including **missing number** problems, using number facts, place value, and more complex addition and subtraction. | • **recall** and **use multiplication** and **division facts** for the 3, 4 and 8 multiplication tables<br>• write and **solve multiplication and division calculations** using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using **mental** and progressing to **efficient written methods** *e.g. 27 x 3, 81 ÷ 3*<br>• **solve problems**, including **missing number** problems, involving multiplication and division, including positive integer **scaling problems** (*e.g. scaling up or down a recipe for 4 people*) and **correspondence problems** in which n objects are connected to m objects *e.g.3 hats and 4 coats, how many outfits?* | • **count** up and down in **tenths**; recognise how tenths arise by dividing by 10<br>• **recognise, find and write fractions** of a set of objects (unit and non-unit fractions linking to know tables) *e.g.* $^2/_3$ *of 24*<br>• recognise and show **equivalent fractions** with small denominators e.g. $^2/_6 = {}^1/_3$ (using diagrams)<br>• **add and subtract fractions** with the same denominator within one whole *e.g.* $^5/_7 + {}^1/_7 = {}^6/_7$<br>• **compare** and **order** unit fractions, and fractions with the same denominators<br>• **solve problems** that involve all of the above. |
| | **Measurement** | **Geometry: properties of shapes** | **Geometry: position and direction** | **Statistics** |

| | | | | |
|---|---|---|---|---|
| **By the end of Yr 3 pupils will be able to …** | • **measure, compare**, **add** and **subtract:** lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)<br>• **measure** the **perimeter** of simple 2-D shapes<br>• **add and subtract amounts of money** to give **change**, using both £ and p in practical contexts *e.g. £297 + £106, 86p – 47p (*The decimal recording of money is introduced formally in year 4)<br>• use both **analogue** (including using Roman numerals from I to XII) and **digital** clocks to **tell the time to the nearest minute** using 12-hour and 24-hour clocks<br>• **estimate** and read time with increasing accuracy to the nearest minute;<br>• **record** and **compare** time in terms of seconds, minutes and hours<br>• use **time vocabulary** *e.g. a.m./p.m., morning, afternoon, noon, midnight*<br>• **know** and **use** relevant **time facts** *e.g. seconds in a minute, number of days in each month, year and leap year*<br>• **compare** durations of events *e.g. calculate the time taken by particular events or tasks i.e. running races* | • **draw 2-D shapes** accurately using a ruler<br>• **make**, **recognise** and **describe 3-D shapes** in different orientations<br>• recognise that angles are a property of shape or a description of a **turn**<br>• use right angles as a marker for comparison e.g. two right angles make a half-turn, four a complete turn; identify whether angles are greater than or less than a right angle<br>• identify **horizontal** and **vertical** lines and pairs of **perpendicular** and **parallel** lines<br>• identify symmetry in a horizontal and vertical line<br>• complete a simple symmetric figure with **horizontal or vertical lines of symmetry** | **No statuary requirements** | • **interpret** and **present** data using bar charts, pictograms and tables *e.g. using scales with increments of 2, 5 and 10*<br>• solve one-step and two-step questions *e.g. 'How many more?' and 'How many fewer?'* |

| MATHEMATICS – end of year standards for Year 4 | | | | |
|---|---|---|---|---|
| | **Number and place value** | **Addition and subtraction** | **Multiplication and division** | **Fractions (including decimals)** |

| By the end of Yr 4 pupils will be able to … | Measurement | Geometry: properties of shapes | Geometry: position and direction | Statistics |
|---|---|---|---|---|
| | • **count** in multiples of 6, 7, 9, 25 and 1000; finding 1000 more or less than a given *number e.g. 1000 more/less than 2467, 1078*<br>• recognise the **place value** of each digit in a four-digit number (thousands, hundreds, tens, and ones)<br>• **order** and **compare** numbers beyond 1000<br>• **compare** numbers with the same number of decimal places up to two decimal places<br>• identify, represent and estimate numbers using different *representations e.g. on number lines and scales*<br>• **round** any number to the nearest 10, 100 or 1000<br>• **round decimals** with one decimal place to the **nearest whole number**<br>• find the **effect of dividing** a one- or two-digit number **by 10 and 100**, identifying the **place value** of the digits in the answer as ones, tenths and hundredths; start to use decimal notation<br>• recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten<br>• **count backwards** through zero to include **negative** numbers<br>• **solve number** and **practical problems** that involve all of the above<br>• read **Roman numerals to 100** (I to C) and know that over time, the numeral system changed to include the concept of zero and place value (historical context). | • **add and subtract** numbers with up to 4 digits using **mental strategies** and the **formal written methods** of columnar addition and subtraction where appropriate<br>• **estimate** and use **inverse operations** to check answers to a calculation<br>• **solve addition and subtraction** two-step problems in contexts, deciding which operations and methods to use and why. | • recall multiplication and division facts for multiplication tables up to 12 × 12<br>• use **place value, known and derived facts to multiply and divide mentally**, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers *e.g. 2 x 6 x 9 and 600 ÷ 3*<br>• recognise and use **factor pairs and commutativity** in mental calculations *e.g. 40 x 7= 10 x 4 x 7 = 10 x 28 = 280, since 40 has a factor pair of 4 and 10; e.g. 2 x 6 x 9 = 2 x 54 = 108*<br>• **multiply** two-digit and three-digit numbers by a one-digit number using **formal written layout** *e.g. 84 x 6, 134 x 7*<br>• **solve problems** involving multiplying and adding, including using the **distributive law** *(e.g. 39 x = 30x7 + 9x7)* to multiply two digit numbers by one digit, **integer scaling problems** and harder **correspondence problems** such as which n objects are connected to m objects *e.g. the number of choices of a meal on a menu.* | • recognise and show, using diagrams, families of **common equivalent fractions**<br>• **count** up and down in **hundredths**; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten<br>• **find fractions of amounts and quantities**, use fractions to divide quantities, including non-unit fractions where the answer is a whole number *e.g.* $^{3}/_{8}$ *of £48 and* $^{5}/_{6}$ *of 180*<br>• **add and subtract fractions** with the same denominator (over 1 whole) e.g. $^{5}/_{7} + {}^{4}/_{7} = {}^{9}/_{7}$<br>• **recognise** and **write decimal equivalents** of any number of tenths or hundredths and decimal equivalents to $^{1}/_{4}$; $^{1}/_{2}$; $^{3}/_{4}$<br>• **solve simple measure and money problems** involving fractions and decimals to two decimal places. |

| | | | | |
|---|---|---|---|---|
| **By the end of Yr 4 pupils will be able to …** | • **convert** between different units of measure [e.g. km to m; hour to minute]<br>• **measure** and **calculate** the **perimeter** of a rectilinear figure (shapes with right-angled corners) in centimetres and metres<br>• find the **area** of rectilinear shapes by counting squares<br>• **estimate, compare** and **calculate** different measures, including money in pounds and pence (using decimal notation)<br>• **read, write** and **convert time** between analogue and digital 12 and 24-hour clocks<br>• **solve problems** involving converting units of time *e.g. hours to minutes; minutes to seconds; years to months; weeks to days.* | • **compare** and **classify** geometric shapes, including **quadrilaterals and triangles**, based on their properties and sizes<br>• identify **acute** and **obtuse** angles and compare and order angles up to 180°<br>• identify **lines of symmetry** in 2-D shapes presented in different orientations<br>• complete a simple **symmetric figure** with respect to a specific line of symmetry. | • **read, write** and **use** pairs of co-ordinates in the **first quadrant** to describe positions *e.g. (2,5)*<br>• describe movements between positions as **translations** of a given unit to the left/right and up/down<br>• plot specified points and draw sides to complete a given polygon. | • **interpret** and **present discrete** and **continuous** data using appropriate graphical methods, including bar charts and time graphs *e.g. with scales with increments of 25, 50, 0.1*<br>• **solve comparison, sum and difference problems** using information presented in bar charts, pictograms, tables and other graphs. |

| MATHEMATICS – end of year standards for Year 5 | | | | |
|---|---|---|---|---|
| | **Number and place value** | **Addition and subtraction** | **Multiplication and division** | **Fractions (including decimals and percentages)** |

| By the end of Yr 5 pupils will be able to … | | | | |
|---|---|---|---|---|
| | • read, write, order and compare numbers to at least 1 million and determine the value of each digit<br>• read, write, order and compare numbers with up to 3 decimal places<br>• multiply and divide whole numbers and decimals by 10, 100 and 1000<br>• count forwards or backwards in steps of powers of 10 for any given number up to 1 million<br>• round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000<br>• interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero<br>• solve number problems and practical problems that involve all of the above<br>• read Roman numerals to 1000 (M) and recognise years written in Roman numerals<br>• round decimals with 2 decimal places to the nearest whole number and to 1 decimal place | • add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)<br>• add and subtract numbers with up to 3 decimal places, using formal written methods (columnar addition and subtraction)<br>• add and subtract numbers mentally with increasingly large numbers *e.g. 12462 – 2300 = 10162*<br>• use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy<br>• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why | • identify multiples and factors, finding all factor pairs of a number, and common factors of two numbers<br>• recall prime numbers up to 19 and establish whether a number up to 100 is prime; use appropriate vocabulary<br>• multiply numbers up to 4 digits by a 1 digit number using a formal written method *e.g. 3721 x 7*<br>• multiply one-digit numbers with up to three decimal places by whole numbers<br>• multiply numbers up to 4 digits by 2-digit number using a formal written method *e.g. 3721 x 37*<br>• multiply numbers up to 4 digits with up to 3 decimal places by a 1 digit number using a formal written method *e.g. 5243.4 x 6*<br>• multiply and divide mentally using known facts<br>• divide numbers up to 4 digits by a one-digit number using the formal written method and interpret remainders<br>• divide numbers up to 4 digits with up to 3 decimal places by a one-digit number using the formal short written method<br>• recognise and use square and cube numbers, and the notation squared ($^2$) and cubed ($^3$)<br>• solve problems involving multiplication and division including<br>• knowledge of factors, multiples, squares, cubes<br>• scaling by simple fractions<br>• simple rates.<br>• solve problems all four operations and a combination of these, including understanding the meaning of the equals sign *e.g. 13 + 24 = 12 + 25, 33 = 5 x* ▢ | • compare and order fractions whose denominators are all multiples of the same number<br>• identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths<br>• recognise mixed numbers and improper fractions, convert from one form to the other, write statements > 1 as a mixed number *e.g.* $^2/_5 + {}^4/_5 = {}^6/_5 = 1^1/_5$<br>• add and subtract fractions with the same denominator and multiples of the same number<br>• multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams<br>• read and write decimal numbers as fractions *e.g.* $0.71 = {}^{71}/_{100}$<br>• recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents<br>• solve problems involving number up to 3 decimal places<br>• recognise the per cent symbol (%) and understand that per cent relates to "number of parts per hundred", and write percentages as a fraction with denominator hundred, and as a decimal<br>• solve problems which require knowing percentage and decimal equivalents of $^1/_2$, $^1/_4$, $^1/_5$, $^2/_5$, $^4/_5$ and those with a denominator of a multiple of 10 or 25. |
| | **Measurement** | **Geometry: properties of shapes** | **Geometry: position and direction** | **Statistics** |

| | | | | |
|---|---|---|---|---|
| **By the end of Yr 5 pupils will be able to …** | • convert between different units of measure (e.g. km and m; cm and m; cm and mm; g and kg; l and ml)<br>• use all four operations to solve problems involving measure e.g. length, mass, volume, money, using decimal notation including scaling<br>• understand and use basic equivalences between metric units and common imperial units such as inches, pounds and pints<br>• measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres<br>• calculate and compare the area of rectangles (including squares), including using standard units, square centimetres ($cm^2$) and square metres ($m^2$) and estimate the area of irregular shapes<br>• estimate volume e.g. using 1 $cm^3$ blocks to build cuboids (including cubes) and capacity e.g. using water<br>• solve problems involving converting between units of time e.g. days to weeks, expressing the answer as weeks and days | • identify 3-D shapes, including cubes and cuboids, from 2-D representations<br>• know angles are measured in degrees; estimate and compare acute, obtuse and reflex angles<br>• draw given angles and measure them in degrees (°)<br>• identify:<br>– angles at a point and one whole turn (total 360°)<br>– angles at a point on a straight line and a half turn (total 180°)<br>– other multiples of 90°<br>• use the properties of rectangles to deduce related facts and find missing lengths and angles; use the term diagonal<br>• distinguish between regular and irregular polygons based on reasoning about equal sides and angles. | • 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.<br>• **read, write** and **use** pairs of co-ordinates in the **first and second quadrant** to describe positions *e.g. (2,5) (1 lesson- building on Y4)* | • solve comparison, sum and difference problems using information presented in line graphs<br>• complete, read and interpret information in tables, including timetables |

# MATHEMATICS – end of year standards for Year 6

| | Number and place value | Addition, subtraction, multiplication and division | Fractions (decimals and percentages) |
|---|---|---|---|
| **By the end of Yr 6 pupils will be able to …** | • read, write, order and compare numbers up to 10 million and determine the value of each digit<br>• round decimals with up to 3 decimal places to the nearest whole number, 1 decimal place and 2 decimal places<br>• use negative numbers in context, and calculate intervals across zero *e.g. -5 + 7*<br>• solve number and practical problems that involve all of the above<br>• identify the value of each digit to 3 decimal places<br>• multiply and divide numbers by 10, 100 and 1000 with answers up to 3 decimal places | • multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication<br>• divide numbers up to 4 digits by a two-digit whole number using the formal written method of division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context:<br>-short division<br>-long division<br>• perform mental calculations, including with mixed operations and large numbers<br>• identify common factors, common multiples and prime numbers<br>• use knowledge of the order of operations to carry out calculations involving the four operations *e.g. 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9*<br>• solve addition, subtraction, multiplication and division multi-step problems in contexts, deciding which operations and methods to use and why<br>• use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.<br>• use written division methods in cases where the answer has up to two decimal places | • use common factors to simplify fractions; use common multiples to express fractions in the same denomination<br>• compare and order fractions, including fractions >1<br>• add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions<br>• multiply simple pairs of proper fractions, writing the answer in its simplest form *e.g.* $^1/_4 \times {}^1/_2 = {}^1/_8$<br>• divide proper fractions by whole numbers *e.g.* $^1/_3 \div 2 = {}^1/_6$<br>• associate a fraction with division to calculate decimal fraction equivalents [e.g. 0.375] for a simple fraction *e.g.* $^3/_8$<br>• solve problems which require answers to be rounded to specified degrees of accuracy.<br>• recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. |
| | **Algebra** | | **Ratio and Proportion** |

| | | | | |
|---|---|---|---|---|
| | • use simple formulae<br>• generate and describe linear number sequences<br>• express missing number problems algebraically<br>• find pairs of numbers that satisfy an equation involving two unknowns.<br>• enumerate all possibilities of combinations of two variables | | • solve problems involving<br>- the relative sizes of two quantities, where missing values can be found by using integer multiplication and division facts<br>- the calculation of percentages [e.g. of measures such as 15% of 360m] and the use of percentages for comparison<br>- similar shapes where the scale factor is known or can be found (a:b- quantities, sizes and scale drawings)<br>- unequal sharing and grouping using knowledge of fractions and multiples (a:b or as a fractions) | |
| | **Measurement** | **Geometry: properties of shapes** | **Geometry: position and direction** | **Statistics** |
| **By the end of Yr 6 pupils will be able to …** | • solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate<br>• use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to three decimal places<br>• convert between miles and kilometres<br>• recognise that shapes with the same areas can have different perimeters and vice versa<br>• recognise when it is possible to use the formulae for area and volume of shapes<br>• calculate the area of parallelograms and triangles<br>• calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed ($cm^3$) and cubic metres ($m^3$) and extending to other units [e.g. $mm^3$ and $km^3$]. | • draw 2-D shapes using given dimensions and angles<br>• recognise, describe and build simple 3-D shapes, including making nets<br>• compare and classify geometric shapes based on properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons<br>• illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius<br>• recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles | • describe positions on the full coordinate grid (all four quadrants)<br>• draw and translate simple shapes on the coordinate plane, and reflect them in the axes. | • interpret and construct pie charts and line graphs and use these to solve problems<br>• calculate and interpret the mean as an average. |