Lodge Farm Primary School

Maths - Knowledge and Skills Progression

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Strand | By the end of EYFS | By the end of Year 1 | By the end of Year 2 | By the end of Year 3 | By the end of Year 4 | By the end of Year 5 | By the end of Year 6 |
| **Place Value: Counting**  **Representation**  **Use Place Value and Compare** | Have a deep understanding of number to 10, including the composition of each number  Verbally count beyond 20, recognising the pattern of the counting system | Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.  Count numbers to 100 in numerals; count in multiples of two, fives and tens. | Count in steps of 2,3 and 5 from 0, and in tens from any number, forward and backward. | Count from 0 in multiples of 4,8,50 and 100; find 10 or 100 more or less than a given number. | Count in multiples of 6,7,9,25 and 1000.  Count backwards through zero to include negative numbers. | Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 |  |
| Find and match objects which are the same.  To understand when counting, numbers have to be said in a certain order.  Understand that anything can be counted including things that cannot be touched e.g sounds or movements. | Identify and represent numbers using objects and pictorial representations  Read and write numbers to 100 in numerals.  Read and write numbers from 1 to 20 in numerals and words. | Read and write numbers to at least 100 in numerals and in words.  Identify, represent, and estimate numbers using different representations, including the number line. | Identify, represent, and estimate numbers using different representations.  Read and write numbers up to 1000 in numerals and in words. | Identify, represent, and estimate numbers using different representations  Read Roman numerals to 100 and know that over time, the numeral system changed to include the concept of zero and place value | Read, write, order, and compare numbers to at least 1 000 000 and determine the value of each digit  Read Roman numerals to 1000 and recognise years written in Roman numerals. | Read, write, order and compare numbers to 10 000 000 and determine the value of each digit. |
| Use manipulatives, including small pebbles and tens frames for organising counting.  Numbers from 1 to 20, place them in order and say which number is one more or one less than a given number | Given a number, identify one more and one less. | Recognise the place value of each digit in a two-digit number  Compare and order numbers from 0 up to 100 using < > and = signs | Recognise the place value of each digit in a three-digit number (hundred, tens and ones)  Numbers up to 1000 | Find 1000 more or less than a given number  Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens and ones)  Order and compare numbers beyond 1000 | Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit | Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit. |
| **Place Value:**  **Problems and Rounding** | Understand the relationships between numbers to 10 and the patterns within those numbers. |  | Use place value and numbers facts to solve problems | Solve number problems and practical problems involving these ideas | Round any number to the nearest 10,100 or 1000  Solve number and practical problems that involve all the above and with increasingly large positive numbers. | Interpret negative numbers in context  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 the above. | Round any whole number to a required degree of accuracy  Use negative numbers in context and calculate intervals across zero  Solve number and practical problems that involve all of the above. |
| **Addition and Subtraction**  **Recall, represent and use.**  **Calculations**  **Solve Problems** | Subitise (recognise quantities without counting) up to 5  Use quantities and objects to add and subtract 2 single-digit numbers and count on or back to find the answer  Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. | Read, write and interpret mathematical statements involving addition, subtraction and equals signs.  Represent and use number bonds and related subtraction facts within 20 | Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100  Show that addition of two numbers can be done in any order and subtraction of one number from another cannot  Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems | Estimate the answer to a calculation and use inverse operations to check answers | Estimate and use inverse operations to check answers to a calculation | Use rounding to check answers to calculations and determine in the context of a problem levels of accuracy. |  |
| Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally. | Add and subtract one digit and two digit numbers to 20, including zero | Add and subtract numbers using concrete objects, pictorial representations, and mentally.  Adding three one digit numbers. | Add and subtract numbers mentally including a three digit number and ones, a three digit number and tens, a three digit number and hundreds.  Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction | Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate. | 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. | Perform mental calculations, including with mixed operations and large numbers  Use their knowledge of the order of operations to carry out calculations involving the four operations. |
|  | Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations and missing number problems | Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures and applying their increasing knowledge of mental and written methods. | Solve problems including missing number problems, using number facts, place value and more complex addition and subtraction. | Solve addition and subtraction two step problems in contexts, deciding which operations and methods to use and why. | Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.  Solve problems involving addition, subtraction, multiplication and division and a combination of these including understanding the meaning of equals sign. | Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. |
| **Multiplication and Division**  **Recall, represent and use.** |  |  | Recall and use multiplication and division facts for the 2,5 and 10 multiplication tables including recognising odd and even numbers  Show that multiplication of two numbers can be done in any order and division of one number by another cannot, | Recall and use multiplication and division facts for the 3,4 and 8 multiplication tables. | Recall multiplication and division facts for multiplication tables up to 12 x 12  Use place value, known and derived facts to divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers.  Recognise and use factor pairs and commutativity in mental calculations | Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers  Know and use the vocabulary of prime numbers, prime factors, and composite numbers.  Recognise and use square numbers and cube numbers, and the notation for squared and cubed. | Identify common factors, common multiples, and prime numbers.  Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. |
| **Calculations** |  |  | Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication, division and equals signs. | Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two digit numbers times one digit numbers, using mental and professing to formal written methods. | Multiply two digit and three digit numbers by a one digit number using formal written layout | 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 digit by 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. | Multiply multi-digit numbers up to 4 digits by a two digit whole number using the formal written method of long multiplication.  Divide numbers up to 4 digits by a two digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions or by rounding, as appropriate for the context.  Divide numbers up to 4 digits by a two digit number using the formal written method of short division where appropriate, interpreting remainders according to the context  Perform mental calculations, including with mixed operation and large numbers. |
| **Solve Problems** |  | Solve one step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations, and arrays with the support of the teacher. | Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts | Solve problems including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to mobjects. | Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects connected to m objects. | Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares, and cubes.  Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. | Solve problems involving addition, subtraction, multiplication, and division |
| **Combined Operations** |  |  |  |  |  | Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. | Use their knowledge of the order of operations to carry out calculations involving the four operations. |
| **Fractions**  **Recognise, Write and Compare** |  | Recognise, find and name a half as one of two equal parts of an object, shape or quantity  Recognise, find and name a quarter as one of four equal parts of an object shape or quantity | Recognise, find, name and write fractions 1/3, ¼, 2/4 and ¾ of a length, shape, set of objects or quantity.  Recognise the equivalence of 2/4 and 1/2 . | Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one digit numbers or quantities by 10.  Recognise, find and write fractions of a discrete set of objects: unit fractions with small denominators  Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators.  Recognise and show. Using diagrams, equivalent fractions with small denominators.  Compare and order unit fractions and fractions with the same denominators. | Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.  Recognise and show using diagrams, families of common equivalent fractions. | 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 greater than 1 as a mixed number  Compare and order fractions whose denominators are all multiples of the same number. | Use common factors to simplify fractions; use common multiples to express fractions in the same denomination  Compare and order fractions, including fractions > 1 |
| **Calculations** |  |  | Write simple fractions for example ½ of 6 = 3 | Add and subtract fractions with the same denominator within one whole | Add and subtract fractions with the same denominator | Add and subtract fractions with the same denominator and denominators that are multiples of the same number  Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams. | Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.  Multiply simple pairs of proper fractions, writing the answer in its simplest form.  Divide proper fractions by whole numbers. |
| **Fractions**  **Solve Problems** |  |  |  | Solve problems that involve all of the above. | Solve problems involving increasingly harder fractions to calculate quantities and fractions to divide quantities, including non-unit fractions where the answer is a whole number. |  |  |
| **Decimals**  **Recognise, Write and Compare** |  |  |  |  | Recognise and write decimal equivalents of any number of tenths or hundredths.  Recognise and write decimal equivalents.  Round decimals with one decimal place to the nearest whole number.  Compare number with the same number of decimal places up to two decimal places. | Read and write decimal numbers as fractions.  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, and order and compare numbers with up to three decimal places. | Identify the value of each digit in numbers given to three decimal places. |
| **Decimals**  **Calculations and Problems** |  |  |  |  | Find the effect of dividing a one- or two-digit number by 10 and 100.  Identifying the value of the digits in the answer as ones, tenths and hundredths. | Solve problems involving number up to three decimal places. | Multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places.  Multiply one digit numbers with up to two decimal places by whole numbers.  Use written division methods in cases where the answer has up to two decimal places.  Solve problems which require answers to be rounded to specific degrees of accuracy |
| **Fractions, Decimals and Percentages** |  |  |  |  | Solve simply measure and money problems involving fractions and decimals to two decimal places. | Recognise the percent symbol and understand that percent relates to number of parts per hundred and write percentages as a fraction with denominator 100 and as a decimal solve problems which require knowing percentage and decimal equivalents of ½. 1/4., 1/5, 2/5, 4/5 and those fractions with a denominator of multiple of 10 or 25. | Associate a fraction with a division and calculate decimal fraction equivalents for a simple fraction.  Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. |
| **Ratio and Proportion** |  |  |  |  |  |  | Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.  Solve problems involving the calculation of percentages and the use of percentages for comparison.  Solve problems involving similar shapes where the scale factor is known or can be found.  Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. |
| **Algebra** |  |  |  |  |  |  | Use simple formulae  Generate and describe linear number sequences  Express missing number problems algebraically  Find pairs of numbers that satisfy an equation with two unknowns  Enumerate possibilities of combinations of two variables. |
| **Measurement**  **Using Measures** | Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity  Use everyday language to talk about size, weight, capacity, position, distance, time, and money to compare quantities and objects and to solve problems | Compare, describe, and solve practical problems for:  Lengths and heights e.g long/shorter, double/half.  Mass and weight e.g heavy/light  Capacity and volume e.g full /empty more than/less than  Time e.g quicker/slower  Measure and begin to record the following:  Lengths and heights, mass and weight, capacity and volume and time. | Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm), mass (kg/g), temperature (c), capacity (L/ml) to the nearest appropriate unit.  Using rulers, scales, thermometers and measuring vessels, compare and order lengths, mass. Volume, capacity and record the results using < > or =. | Measure, compare and add and subtract lengths, mass, and volume. | Convert between different units of measure.  Estimate, compare and calculate different measures. | Convert between different units of metric measure  Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.  Use all found operations to solve problems involving measure. | Solve problems involving the calculation and conversation of units of measure, using decimal notation up to three decimal places where appropriate.  Use, read, write, and convert between standard units, converting measurements of length, mass, volume and time from smaller unit of measure to a larger unit and vice versa, using decimal notation to up to three decimal places.  Convert between miles and kilometres. |
| **Measurement**  **Money** |  | Recognise and know the value of different denominations of coins and notes. | Cognise and use symbols for pounds and pence; combine amount to make particular value.  Find different combinations of coins that equal the same amounts of money.  Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change. | Add and subtract amounts of money to give change, using £ and p in practical contexts. | Estimate, compare and calculate different measures including money in pounds and pence. | Use all four operations to solve problems involving measure |  |
| **Measurement**  **Time** |  | Sequence events in order using language e.g before, after first, today, morning and evening.  Recognise and use language relating to dates, including days of the week, weeks, months and years.  Tell the time to the hour and half past the hour and draw the hands on a clock face. | Compare and sequence intervals of time.  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.  Know the number of minutes in an hour and the number of hours in a day. | Tell and write the time from analogue clock, including using Roman numerals from I to XIII and 12 hour and 24 hour clocks.  Estimate and read time with increasing accuracy to the nearest minutes; record and compare time in terms of seconds, minutes and hours: use vocabulary such as o’clock, a.m/p.m  Know the number of seconds in a minute and the number of days in each month, years and leap year.  Compare durations of events. | Read, write and convert time between analogue and digital 12 and 24 hour clocks.  Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days. | Solve problems involving converting between units of time. | Use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit and vice versa. |
| **Measurement**  **Perimeter, Area, Volume** |  |  |  | Measure the perimeter of simple 2D shapes. | Measure and calculate the perimeter of a rectilinear figure including squares in centimetres and metres.  Find the area of rectilinear shapes by counting squares. | Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres.  Calculate and compare the area of rectangles (including squares) and including using standard unites, square centimetres and square metres and estimate the area of irregular shapes.  Estimate volume and capacity. | Recognise that shapes with the same areas can have difference perimeters and vice versa.  Recognise when it is possible to use formulae for area and volume of shapes.  Calculate the area of parallelograms and triangles.  Calculate, estimate, and compare volume of cubes and cuboids using standard units, including cubic centimetres and cubic metres, and extending to other units. |
| **Geometry**  **2D Shapes** | Explore characteristics of everyday objects and shapes and use mathematical language to describe them. | Recognise and name common 2D shapes including squares, circles and triangles. | Identify and describe the properties of 2D shapes, including the number of sides and line symmetry in a vertical line.  Identify 2D shapes on the surface of 3D shapes for example a circle on a cylinder and a triangle on a pyramid.  Compare and sort common 2D shapes and everyday objects. | Draw 2D shapes. | Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.  Identify lines of symmetry in 2D shapes presented in different orientations. | 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. | Draw 2D shapes using given dimensions and angles.  Compare and classify geometric shapes based on their properties and sizes.  Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. |
| **Geometry**  **3D Shapes** |  | Recognise and name common 3D shapes (cuboids, cubes, pyramids, and spheres). | Recognise, name, compare and sort common 3D shapes and everyday objects. | Make 3D shapes using modelling materials; recognise 3D shapes in different orientations and describe them. |  | Identify 3D shapes, including cubes and other cuboids from 2D representations. | Recognise, describe and build simple 3D shapes, including making nets. |
| **Geometry**  **Angles and Lines** |  |  |  | Recognise angles as a property of shape or a description of a turn.  Identify right angles, recognise that two right angles make a half term, three make three quarters of a turn and four a compete turn; identify whether angles are greater than or less than a right angle.  Identify horizontal and vertical lines and pairs of perpendicular and parallel lines. | Identify acute and obtuse angles and compare and order angles up to two right angles by size.  Identify lines of symmetry in 2D shapes presented in different orientations.  Complete a simple symmetric figure with respect to a specific line of symmetry | Know angles are measured in degrees: estimate and compare acute, obtuse, and reflex angles.  Draw given angles and measure them in degrees.  Identify angles at a point and one whole turn, angles at a point on a straight line and ½ a turn and other multiples of 90 degrees. | Find unknown angles in any triangles, quadrilaterals, and regular polygons.  Recognise angles where they meet at a point, are on a straight line, or are vertically opposite and find missing angles. |
| **Geometry**  **Position and Direction** | Recognise, create, and describe patterns | Describe position, direction and movement, including whole, half, quarter and three quarter turns. | Order and arrange combinations of mathematical objects in patterns and sequences.  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). |  | Describe positions on a 2D grid as coordinates in a direst quadrant.  Describe movements between positions as a translations of a given unit to the left/right and up/down.  Plot specified points and draw sides to compete a given polygon. | 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. | Describe positions on the full coordinate grid all four quadrants.  Draw and translate simple shapes on the coordinate plane, and reflect them in the axes. |
| **Statistics**  **Present and Interpret** |  |  | Interpret and construct simple pictograms, tally charts, block diagrams and simple tables. | Interpret and present data using bar charts, pictograms and tables. | Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. | Complete, read and interpret information in tables, including timetables. | Interpret and construct pie charts and line graphs and use these to solve problems. |
| **Statistics**  **Problem Solving** |  |  | Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity.  Ask and answer questions about totalling and comparing categorical data. | Solve one step and two step questions using information presented in scaled bar charts and pictograms and tables. | Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables, and other graphs. | Solve comparison, sum and difference problems using information presented in a line graph. | Calculate and interpret the mean as an average. |