Greenholm Primary School

Programme of Study for Numeracy

	By the end of **Y1** children should be able to…	By the end of of **year 2** children should be able to…	Children working at a **mastery level in year 2** should…
Number and Place Value	• _count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number_ • _count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens_ • _given a number, identify one more and one less_ • identify and represent numbers using objects and pictorial representations including numberlines, and use the language of: equal to, more than, less than (fewer), most, least • read and write numbers from 1 to 20 in numerals and words. • recognise and create repeating patterns with objects and • practise counting (1, 2, 3…), ordering (first, second, third…), and to indicate a quantity (3 apples, 2 centimetres), including solving simple concrete problems, until fluent • begin to recognise place value in numbers beyond 20 by reading, writing, counting and comparing numbers up to 100, supported by objects and pictorial representations • _practise counting as reciting numbers and counting as enumerating objects, and counting in twos, fives and tens from different multiples including varied and frequent practice through increasingly complex questions._ use the terms **odd** and **even**	• _count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward_ • recognise the place value of each digit in a two-digit number (tens, ones) • identify, represent and estimate numbers using different representation including the number line • compare and order numbers from 0 up to 100; use <, > and = signs • read and write numbers to at least 100 in numerals and in words • Practise counting, reading, writing and comparing numbers to at least 100 • _Count in multiples of three to support later understanding of a third._ • represent larger numbers in different ways, including spatial representations • partition numbers in to T (Eg. 23= 20 + 3 and 23= 10 + 13) • Solve problems that emphasise the value of each digit in two-digit numbers. begin to understand zero as a place holder.	• use place value and number facts to solve problems. • Practise counting, comparing numbers to at least 100 and solving a variety of related problems to develop fluency. • Solve problems that emphasise the value of each digit to at least two-digit numbers ,understand zero as a place holder. • _count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number_ • read and write numbers up to 1000 in numerals and in words • solve number problems and practical problems involving these ideas. • use multiples of 2, 3, 4, 5, 8, 10, 50 and 100 use larger numbers to at least 1000, applying partitioning related to place value using varied and increasingly complex problems, building on work in year 2 (for example, 146 = 100 + 40 and 6, 146 = 130 + 16). continue to count in ones, tens and hundreds, to become fluent in the order and place value of numbers to 1000.

Addition and subtraction	- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs *represent and use number bonds and related subtraction facts within 20* *add and subtract one-digit and two-digit numbers to 20, including zero* - solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ☐ – 9. *memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9).* - realise the effect of adding or subtracting zero to establish addition and subtraction as related operations. - combine and increase numbers, counting forwards and backwards. discuss and solve problems in familiar practical contexts, including using quantities and include the terms: **put together, add, altogether, total, take away, distance between, difference between, more than and less than**, to develop the concept of addition and subtraction and use these operations flexibly.

The remaining columns:

- *recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100*
- *add and subtract numbers using concrete objects, pictorial representation and mentally, including:*
  - ➢ *a two-digit number and ones;*
  - ➢ *a two-digit number and tens;*
  - ➢ *two two-digit numbers;*
  - ➢ *adding three one-digit numbers*
- solve problems with addition and subtraction using concrete objects and pictorial representation including those involving numbers, quantities and measures
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction .
- use the language of addition and subtraction to include **sum** and **difference**.
- *practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 – 7 = 3 and 7 = 10 – 3 to calculate 30 + 70 = 100; 100 – 70 = 30 and 70 = 100 – 30.*
- check calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5) to establish commutativity and associativity of addition.

Third column:

- solve problems with addition and subtraction:
- ➢*using concrete objects and pictorial representations, including those involving numbers, quantities and measures*
- ➢*applying increasing knowledge of mental and written methods*
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems
- *add and subtract numbers mentally, including:*
  - ➢ *a three-digit number and ones;*
  - ➢ *a three-digit number and tens;*
  - ➢ *a three-digit number and hundreds*
- estimate the answer to a calculation and use inverse operations to check answers
- *practise solving varied addition and subtraction questions, for mental calculations with two-digit numbers, the answers could exceed 100.*

use understanding of place value and partitioning.

| Multiplication and division | • solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with support

• begin to understand:
➢ multiplication and division through grouping and sharing small quantities;
➢ doubling numbers and quantities;
➢ finding simple fractions of objects, numbers and quantities.

• make connections between arrays, number patterns, and counting in twos, fives and tens. | • _recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers_

• calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs

• show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

• use a variety of language to describe multiplication and division.

• _begin to become familiar with multiplication tables and practise to become fluent in the 2, 5 and 10 x tables and connect them to each other._

• connect the 10 x table to place value, and the 5 x table to the divisions on the clock face.

• work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. | • _begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations._

• _recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables_

• begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).

• 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

• _connect the 2, 4 and 8 multiplication tables through doubling_

• develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers. |

Fractions			
Fractions	▪ 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 and find half of a length, quantity, set of objects or shape. ▪ connect halves and quarters to the equal sharing and grouping of sets of objects and to measures, as well as recognising and combining halves and quarters as parts of a whole.	▪ recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ of a length, shape, set of objects or quantity ▪ write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$ ▪ use fractions as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. ▪ connect unit fractions to equal sharing and grouping, to numbers when they can be calculated, and to measures, finding fractions of lengths, quantities, sets of objects or shapes, $\frac{3}{4}$ as the first example of a non-unit fraction.	▪ recognise, find, name and write fractions $\frac{3}{4}$ of a length, shape, set of objects or quantity ▪ count in fractions up to 10, starting from any number and using the $\frac{1}{2}$ and $\frac{2}{4}$ equivalence on the number line (for example, $1\frac{1}{4}$, $1\frac{2}{4}$ (or $1\frac{1}{2}$), $1\frac{3}{4}$, 2) to reinforce the concept of fractions as numbers which can add up to more than one. ▪ 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 ▪ connect tenths to place value, decimal measures and to division by 10 ▪ recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators ▪ begin to understand unit and non-unit fractions as numbers on the number line, and deduce relations between them, such as size and equivalence, going beyond the [0, 1] interval, and relate this to measure

Measurements

- compare, describe and solve practical problems for:
  - ➢ lengths and heights [Eg. long/short, longer/shorter, tall/short, double/half];
  - ➢ mass/weight [Eg. heavy/light, heavier than, lighter than];
  - ➢ capacity and volume [Eg. full/empty, more than, less than, half, half full, quarter];
  - ➢ time [Eg. quicker, slower, earlier, later]
- measure and begin to record:
  - ➢ lengths and heights
  - ➢ mass/weight
  - ➢ capacity and volume
  - ➢ time (hours, minutes, seconds)
- recognise and know the value of different denominations of coins and notes
- sequence events in chronological order using language [for example, **before, after, next, first, today, yesterday, tomorrow, morning, afternoon, evening**]
- recognise and use language relating to dates: **days of the week, weeks, months, years**
- tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.
- move from using and comparing different types of quantities and measures using non-standard units, including discrete (Eg. counting) and continuous (Eg. liquid) measurement, to using manageable common standard units (cm, m, l, kg).
- begin to use measuring tools such as a ruler, weighing scales and containers.

- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/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 >, < and =
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a 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
- 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.
- use standard units of measurement with increasing accuracy, using knowledge of the number system.
- use the appropriate language and record using standard abbreviations (l, ml, m, cm, kg, g, km).
- compare measures includes simple multiples such as 'half as high'; 'twice as wide'.
- become fluent in counting and recognising all coins
- read and say amounts of money confidently and use the symbols £ and p accurately, recording pounds and pence separately.

- become fluent in telling the time on analogue clocks and recording it.
- measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- add and subtract amounts of money to give change, using both £ and p in practical contexts
- estimate and read time with increasing accuracy to the nearest minute;
- know the number of seconds in a minute and the number of days in each month, year and leap year
- compare durations of events [Eg. calculate time taken by particular events or tasks]
- continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed units (Eg. 1 kg and 200g) and simple equivalents of mixed units (Eg. 5m = 500cm)
- simple scaling by integers (Eg. a given quantity or measure is twice as long or five times as high) and connect to multiplication.
- continue to become fluent in recognising the value of coins, by adding and subtracting amounts, including mixed units, and giving change using manageable amounts.
- record £ and p separately (formal decimal recording introduced in Year 4)

	■ use the language of time, including telling the time throughout the day, first using o'clock and then half past.		
Geometry properties of Shapes	■ recognise and name common 2-D and 3-D shapes, including: ➢ 2-D shapes [rectangle, square, circle triangle] ➢ 3-D shapes [cuboid, cube, pyramid sphere]. ■ handle common 2-D and 3-D shapes, naming these and related everyday objects fluently. ■ recognise common 2-D and 3-D shapes in different orientations and sizes, and know that rectangles, triangles, cuboids and pyramids are not always similar to each other.	■ handle and name a wide variety of common 2-D and 3-D shapes , and identify the properties of each shape ■ identify and describe the properties of 2-D shapes, including the **number of sides** and **line symmetry** in a vertical line ■ identify and describe the properties of 3-D shapes, including the **number of edges**, **vertices** and **faces** ■ identify 2-D shapes on the surface of 3-D shapes ■ compare and sort common 2-D and 3-D shapes and everyday objects ■ draw lines and shapes using a straight edge ■ read and write names for shapes that are appropriate for their word reading and spelling	■ handle and name a wide variety of common 2-D and 3-D shapes including: **quadrilaterals, polygons, cuboids, prisms, cones**, and identify the properties of each shape ■ identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces ■ draw 2-D shapes and make 3-D shapes using modelling materials ■ recognise 3-D shapes in different orientations and describe them ■ identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle ■ identify **horizontal and vertical lines** ■ extend knowledge of the properties of shapes to symmetrical and non-symmetrical polygons ■ extend their use of the properties of shapes to describe the properties of 2-D and 3-D shapes using accurate language, for angles greater or lesser than a right angle.

Geometry Position and Direction	- describe position, direction and movement, including whole, half, quarter and three-quarter turns. - use the terms: **left, right, top, middle and bottom, on top of, in front of, above, between, around, near, close,far, up, down, forwards backwards, inside, outside.** - make whole, half, quarter and three-quarter turns in both directions and connect turning clockwise with movement on a clock face.	- 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 ➢distinguishing between rotation as a turn ➢right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise). - work with patterns of shapes, including those in different orientations.	use the concept and language of angles to describe 'turn' by applying rotations, including in practical contexts (for example, themselves moving in turns, giving instructions to others, using robots)
	- interpret and construct simple pictograms, tally charts, block diagrams and simple tables - 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	- interpret and construct simple pictograms, tally charts, block diagrams and simple tables - 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 - record, interpret, collate, organise and compare information (for example, using many-to-one correspondence in pictograms with simple ratios 2, 5, 10)	- interpret and present data using bar charts, pictograms and tables - solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables - understand and use simple scales (for example, 2, 5, 10 units per cm) in pictograms and bar charts with increasing accuracy

Key performance indicators are in BOLD.