Maths Policy

BEDWELL PRIMARY SCHOOL

Bedwell Crescent,
Stevenage, Herts, SG1 1NJ

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CONTENTS

1. AIMS

At Bedwell Primary School, we want all our pupils to experience deep, sustained understanding so that they become happy and confident mathematicians. Through a positive, practical approach, we will nurture confidence in the subject and a love of mathematics, enabling every child to reach their full potential. We promote a 'can do' attitude to maths without a fear of making mistakes. Children will be given time, support and resources to develop a depth of understanding where children can express ideas fluently, and talk about the subject using mathematical language. Using a spiral maths curriculum, we circle back to key concepts, in order for the children to retain more knowledge. This 'sticky learning' is embedded within the teaching of maths at Bedwell.

Our key aims are to:

- become fluent in the fundamentals of mathematics, through varied and frequent practice, so that pupils rehearse conceptual understanding and become confident in recalling and applying knowledge rapidly and accurately.
- use age-appropriate mathematical vocabulary to reason effectively, and solve problems by applying their skills to a variety of problems with increasing challenge.
- communicate, justify, argue and prove points using mathematical vocabulary through discussion.
- develop their character (learning superheroes including resilience, confidence and independence, so that they contribute positively to the life of the school, their local, national and international community.

2. The teaching of maths

2.1 Essential Maths

Each class will take part in a daily mathematics lesson. Each session will be planned from the Herts Essential planning materials and will focus on one of the following strands:

- Number and Place Value
- Number – Addition, Subtraction, Multiplication and Division.
- Number - Fractions
- Measurement
- Geometry – properties of shape and position and direction
- Statistics

The aim of the mathematics curriculum is to ensure that all pupils become more fluent in the fundamentals of number, can reason mathematically and can solve problems with confidence.

2.2 Concrete-pictorial-abstract

Concrete manipulatives
- Concrete manipulatives are objects that can be touched and moved by pupils to introduce, explore or reinforce a mathematical concept. They provide a vehicle to help pupils make sense of complex, symbolic and abstract ideas through exploration and manipulation. Furthermore, they support the development of internal models and help build stronger memory pathways.

Pictorial (including jottings)
- The act of translating the concrete experience into a pictorial representation helps focus attention on what has happened and why. This supports deeper understanding and a stronger imprint on memory. Pictorial representations are more malleable than concrete resources and, once understanding is secured, allow exploration of complex problems that may be challenging to reproduce with manipulatives. For example Bar models, part-part-whole.

Abstract - Written
- The aim, within this policy, to exemplify compacted forms of notation. These have developed through the history of mathematics. Explicit individual steps in procedure are hidden or they have been shortcut. The informal and expanded methods expose all the intermediate steps, replicating thought processes more closely, and support understanding prior to compaction.

Abstract - Spoken
- Learning to use the correct mathematical vocabulary is vital for the development of mathematical proficiency. The ability to articulate accurately allows pupils to communicate and build meaning. Ideas become more permanent. This can be scaffolded effectively using speaking frames.

2.3 Grouping
The teaching of particular groups of children at Bedwell changes across key stages and year groups. At the beginning of each academic year, this is reassessed to ensure it is appropriate for the needs of each class. Where classes and year groups are grouped in ability, teachers plan carefully to ensure that there is coverage of both year groups and that gaps in knowledge are not missed.

Currently as of (23/24) ,setting is taking place across year 1-2 with one higher and one lower ability set.
Year 3 is not set but differentiation and episodic teaching is taking place in lessons.
Year 3 and 4 are set with 5 of the most able year 3s going to year 4 and visa versa. Year 5 and 6 are set in ability groups and are currently split between 4 classes.
Early years group according to ability for maths activities.

2.4 Cross-curricular links

The mathematics curriculum is inter-connected with Science, Computing and Design and Technology. With the use of hand held technology and cross curricular methods we aim to make these links clear to pupils so they can make the connections between these subjects.

Key mathematical vocabulary is introduced and displayed throughout (see section 9), applying it to everyday experiences.

2.5-Differentiation

Differentiation occurs in the support and intervention provided to different pupils, not in the topics taught, particularly at earlier stages. There is no differentiation in content taught within a maths class, but the questioning and scaffolding individual pupils receive in class as they work through problems will differ. Children who are working above the expected age are challenged through more demanding problems, which deepen their knowledge of the same content. Pupils' difficulties and misconceptions are identified through immediate formative assessment and addressed in the lesson by the teacher. Differentiation at Bedwell comes in many different forms, but for most lessons there will be a minimum of three levels of differentiation.

3. MATHS IN THE EARLY YEARS

3.1 Essentials for Counting

In Nursery and Reception, we follow the *Herts Essential Foundations for Counting* program. This focusses on four key pre-counting skills:

- Comparison
- Classification
- Pattern
- Group recognition (subitising)

The crucial principle of conservation permeates throughout the four pre-counting skills and will benefit from lots of practice. Teachers constantly provide children with opportunities to experience and explore the fact that a quantity does not change just because we are counting objects of different types and sizes, moving them around or creating different arrangements. This practice continues well into Years 1 and 2.

For more details, see the *Essential Foundations for Counting* guidance booklets developed by HfL Education.

3.2 Working mathematically

Reasoning and problem-solving skills are developed through all areas of learning, as shown below. This enables all children to build, use and demonstrate the Characteristics of Effective Learning (as defined by the DfE. Adults focus on language development, which allows for rich mathematical talk, allowing children to deepen their mathematical understanding.

	Application

Ideas, questions and lines of enquiry	• chooses and identifies ways of bringing mathematical thinking to everyday activities
	   - shows curiosity, is willing to have a go and begins to develop an approach e.g. trial and error
	   - makes connections and asks questions about aspects that are familiar
	 • selects appropriate resources and adapts work where necessary
	 • asks appropriate questions relevant to the activity and finds new ways to do things

Represent and communicate	• uses talk to connect ideas and describe what is happening
	 • creates simple representations of the story of the problem
	 • captures experiences and responses in a range of ways
	   - constructs and or makes marks with a purpose in mind
	   - records, using marks that they can interpret and explain

	- uses talk to organise their activities taking account of one another's ideas and checks how well it is going - in practical activities and discussion, begins to use the vocabulary involved in mathematical thinking
Plan an approach and implement it	- draws on their knowledge of their familiar world to make decisions about how to approach a task, solve a problem and reach a goal - initiates activities and seeks challenge applying their knowledge of mathematical concepts and appropriate vocabulary e.g. counting, comparing, pattern making - checks how well their activities are going, changes strategy as needed and reviews how well the approach worked
Computational complexity	- shows an interest in number problems - responds to instructions involving a two-part sequence

Reasoning	
Make connections	- uses talk to make links and notice patterns in their experiences - uses their experience to test their ideas and anticipate what might happen - comments and asks questions about aspects of their familiar world
Evaluate	questions why things happened and gives explanations
Draw conclusions	- makes predictions and tests them e.g. developing ideas of grouping, sequences, cause and effect - answers 'how and why' questions about their experiences
Generalise	- recognises similarities between learning experiences and begins to use this understanding in new contexts - realises not only objects, but anything can be counted, including steps, claps or jumps - builds up vocabulary that reflects the breadth of their experiences to describe patterns and characteristics of the world around them
Justify	- uses talk to clarify thinking - talks about why things happen and how things work

4. SKILLS PROGRESSIONS

4.1 Number & Place Value

Nursery	Pupils should be taught to:
	• Recite numbers past 5.
	• Say one number name for each item in order: 1, 2, 3, 4, 5.
	• Know that the last number reached when counting a small set of objects tells you how many there are in total
	• Fast recognition of up to 3 objects, without having to count them individually ('subitising').
	• Show 'finger numbers' up to 5.
	• Link numerals & amounts: for example, showing the right number of objects to match the numeral, up to 5
	• Experiment with their own symbols and marks as well as numerals.
	• Compare quantities using language: 'more than', 'fewer than'.
	• Solve real world mathematical problems with numbers up to 5.
Reception	Pupils should be taught to:
	• Count objects, actions and sounds.
	• Verbally count beyond 20, recognising the pattern of the counting system.
	• Subitise (recognising quantities without counting) up to 5.
	• Link the number symbol (numeral) with its cardinal number value.
	• Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
	• Understand the 'one more than/one less than' relationship between consecutive numbers.
	• Have a deep understanding of numbers to 10, including the composition of each number.
	• Read and write numbers 0-10.
Year 1	Pupils should be taught to:
	• 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 the number line, 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
Year 2	Pupils should be taught to: • Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward recognise the place value of each digit in a two-digit number (tens, ones). • Identify, represent and estimate numbers using different representations, 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. • Use place value and number facts to solve problems.
Year 3	Pupils should be taught to: • Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number. • Recognise the place value of each digit in a three-digit number (hundreds, tens, ones). • Compare and order numbers up to 1000. • Identify, represent and estimate numbers using different representations. • Read and write numbers up to 1000 in numerals and in words. • Solve number problems and practical problems involving these ideas.
Year 4	Pupils should be taught to: • Count in multiples of 6, 7, 9, 25 and 1000. • Find 1000 more or less than a given number. • Count backwards through zero to include negative numbers. • Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones). • Order and compare numbers beyond 1000. • Identify, represent and estimate numbers using different representations. • Round any number to the nearest 10, 100 or 1000. • Solve number and practical problems that involve all of the above and with increasingly large positive numbers. • 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.
Year 5	Pupils should be taught to: • 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 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.
Year 6	Pupils should be taught to: - Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit. - 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.

4.2 Addition & Subtraction

Nursery	Pupils should be taught to: - Compare two groups of objects, saying when they have the same number. - Show an interest in number problems. - Separate a group of three or four objects in different ways, beginning to recognise that the total is still the same.
Reception	Pupils should be taught to: - Use the language of 'more' and 'fewer' to compare two sets of objects and find the total number of items in two groups by counting all of them. - Find one more or one less from a group of up to five objects, then ten objects. - Automatically recall number bonds for number 0-10. - In practical activities and discussion, begin to use the vocabulary involved in adding and subtracting. - Explore and represent patterns within numbers up to 10, including. - evens and odds, double facts and how quantities can be distributed evenly. - Record, using marks that they can interpret and explain. - Automatically recall number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.
Year 1	Pupils should be taught to:

	- 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
Year 2	Pupils should be taught to: - Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures; applying their increasing knowledge of mental and written methods. - 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 .representations, and mentally, including: a two-digit number and ones; a two-digit number. - and tens; two two-digit numbers; adding three one-digit numbers. - 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 and use this to check calculations and missing number problems.
Year 3	Pupils should be taught to: - 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. - Estimate the answer to a calculation and use inverse operations to check answers. - Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.
Year 4	Pupils should be taught to: - Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate. - Estimate and use inverse operations to check answers to a calculation. - Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Year 5	Pupils should be taught to:
	• 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.
	• 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.
Year 6	Pupils should be taught to:
	• 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 addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
	• Solve problems involving addition and subtraction, use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

4.3 Multiplication & Division

Nursery	Pupils should be taught to:
	• Compare two groups of objects, saying when they have the same number.
	• Show an interest in number problems.
	• Show an interest in representing numbers.
Reception	Pupils should be taught to:
	• Find the total number of items in two groups by counting all of them.
	• Record, using marks that they can interpret and explain.
	• Begin to identify own mathematical problems based on own interests and fascinations.
	• Solve problems, including doubling, halving and sharing.
Year 1	Pupils should be taught to:
	• 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.
Year 2	Pupils should be taught to:
	• 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
Year 3	Pupils should be taught to: - Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. - Write and calculate mathematical statements for multiplication anddivision using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. - 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 m objects.
Year 4	Pupils should be taught to: - Recall multiplication and division facts for multiplication tables up to 12 × 12 - 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. - Recognise and use factor pairs and commutativity in mental calculations - Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. - 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 are connected to m objects.
Year 5	Pupils should be taught to: - 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 (non-prime) numbers. - Establish whether a number up to 100 is prime and recall prime numbers up to 19.

		- 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 multiplication and division including using their knowledge of factors and multiples, squares and cubes - 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
Year 6		Pupils should be taught to: - 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 operations and large numbers. - Identify common factors, common multiples and prime numbers - Use their knowledge of the order of operations to carry out calculations involving the four operations. - Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why - Solve problems involving addition, subtraction, multiplication and division. - Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

4.4 Fractions

Nursery	Pupils should be taught to: • Shows curiosity about numbers by offering comments or asking questions. • Shows an interest in number problems.
Reception	Pupils should be taught to: • Begins to identify own mathematical problems based on own interests and fascinations. • Solve problems, including doubling, halving and sharing
Year 1	Pupils should be taught to: • 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
Year 2	Pupils should be taught to: • Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ 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 $\frac{1}{2}$
Year 3	Pupils should be taught to: • 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 and non-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 • Add and subtract fractions with the same denominator within one whole (for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$) • Compare and order unit fractions, and fractions with the same denominators • Solve problems that involve all of the above
Year 4	Pupils should be taught to: • Recognise and show, using diagrams, families of common equivalent fractions • Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten

	- 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 - Add and subtract fractions with the same denominator - Recognise and write decimal equivalents of any number of tenths or hundredths - Recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ - 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 - Round decimals with one decimal place to the nearest whole number - Compare numbers with the same number of decimal places up to two decimal places - Solve simple measure and money problems involving fractions and decimals to two decimal places
Year 5	Pupils should be taught to: - 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 (for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$) - 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 - Read and write decimal numbers as fractions (for example, $0.71 = \frac{71}{100}$) - 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 "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 $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25
Year 6	Pupils should be taught to:

	- Use common factors to simplify fractions; use common multiples to express fractions in the same denomination - Compare and order fractions, including fractions >1 - 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 (for example, $^1/_4 \times {}^1/_2 = {}^1/_8$) - Divide proper fractions by whole numbers (for example, $^1/_3 \div 2 = {}^1/_6$) - Associate a fraction with division and calculate decimal fraction equivalents (for example, 0.375) for a simple fraction (for example, $^3/_8$) - Identify the value of each digit in numbers given to three decimal places.

4.5 Measurement

Nursery	Pupils should be taught to: - Show awareness of similarities of shapes in the environment. - Show interest in shape by sustained construction activity or by talking about shapes or arrangements. - Begin to talk about the shapes of everyday objects, e.g. 'round' and 'tall'. - Make comparisons between objects relating to size, length, weight and capacity. - Begin to describe a sequence of events, real or fictional, using words, such as 'first', 'then…'
Reception	Pupils should be taught to: - Compare and order two or three items by length or height. - Compare and order two items by weight or capacity. - Use familiar objects and common shapes to create and recreate patterns and build models. - Order and sequence familiar events. - Begin to measure short periods of time using timer and calendars - Use everyday language to talk about size, weight, capacity, position, distance, time and money. - Show an awareness of measuring tools in everyday experiences and play.
Year 1	Pupils should be taught to: - Compare, describe and solve practical problems for: lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]; mass/weight [for example, heavy/light, heavier than, lighter than]; capacity and volume [full/empty, more than, less than, half, half full, quarter]; time [quicker, slower, earlier, later]

	- Measure and begin to record the following: 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 and after, next, first, today, yesterday, tomorrow, morning, afternoon 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 to show these times
Year 2	Pupils should be taught to: - 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
Year 3	Pupils should be taught to: - Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) - Measure the perimeter of simple 2-D shapes - Add and subtract amounts of money to give change, using both £ and p in practical contexts - Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks - Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight - Know the number of seconds in a minute and the number of days in each month, year and leap year

	• Compare durations of events [for example to calculate the time taken by particular events or tasks]
Year 4	Pupils should be taught to: • Convert between different units of measure (for example, kilometre to metre; hour to minute) • Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres • Find the area of rectilinear shapes by counting squares Estimate, compare and calculate different measures, including money in pounds and pence • 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
Year 5	Pupils should be taught to: • Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) • Understand and use approximate 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 • Calculate and compare the area of rectangles (including squares) using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes • Estimate volume [for example, using 1 cm^3 blocks to build cuboids (including cubes)] and capacity (for example, using water) • Solve problems involving converting between units of time • Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation including scaling
Year 6	Pupils should be taught to: • Solve problems involving the calculation and conversion 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 a 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

	• Recognise that shapes with the same areas can have different 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 centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3]

4.6 Geometry – Properties of shape

Nursery	Pupils should be taught to: • Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides', 'corners', 'straight', 'flat', 'round'. • Select shapes appropriately: flat surfaces for a building, a triangular pattern for a roof, etc. • Combine shapes to make new ones – an arch, a bigger triangle, etc.
Reception	Pupils should be taught to: • Begin to use mathematical names for 'solid' 3D shapes and 'flat' 2D shapes, and mathematical terms to describe shapes. • Select a particular named shape. • Use familiar objects and common shapes to create and recreate patterns and build models. • Select, rotate and manipulate shapes in order to develop spatial reasoning skills. • Compose and decompose shapes so that children can recognise a shape can have other shapes within it, just as numbers can. • Explore characteristics of everyday objects and shapes and use mathematical language to describe them
Year 1	Pupils should be taught to: • Recognise and name common 2-D and 3-D shapes, including 2D shapes [for example, rectangles (including squares), circles and triangles] and 3D shapes [for example, cuboids, pyramids and spheres]
Year 2	Pupils should be taught to: • Identify and describe the properties of 2D shapes, including the number of sides and symmetry in a vertical line • Identify and describe the properties of 3D shapes, including the number of edges, vertices and faces

	- 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 and 3D shapes and everyday objects
Year 3	Pupils should be taught to: - Draw 2D shapes and make 3D shapes using modelling materials; recognise 3D shapes in different orientations and describe them - Recognise angles as a property of shape or a description of a turn - 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 and pairs of perpendicular and parallel lines
Year 4	Pupils should be taught to: - Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes - 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
Year 5	Pupils should be taught to: - Identify 3D shapes, including cubes and other cuboids, from 2D representations - 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 (total 360°); angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°); other multiples of 90° - 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
Year 6	Pupils should be taught to: - Draw 2D shapes using given dimensions and angles - Recognise, describe and build simple 3D shapes, including making nets - Compare and classify shapes based on their properties and sizes and find unknown angles in triangles, quadrilaterals, and regular polygons - Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius

	• Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles

4.7 Geometry – Position & Direction

Nursery	Pupils should be taught to: • Talk about and identify the patterns around them. For example, stripes on clothes, designs on rugs and wallpaper. • Use informal language like 'pointy', 'spotty', 'blobs', etc. • Extend and create ABAB patterns – stick, leaf, stick, leaf. • Notice and correct an error in a repeating pattern. • Understand position through words alone (without pointing), for example, "The bag is under the table," • Describe a familiar route. • Discuss routes and locations, using words like 'in front of' and 'behind'
Reception	Pupils should be taught to: • Continue, copy and create repeating patterns. • Can describe their relative position such as 'behind' or 'next to'. • Uses familiar objects and common shapes to create and recreate patterns and build models. • Draw information from a simple map. • Use everyday language to talk about position, distance, to compare quantities and objects and to solve problems.
Year 1	Pupils should be taught to: • Describe position, direction and movement, including whole, half, quarter and three-quarter turns
Year 2	Pupils should be taught to: • 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 anticlockwise)
Year 3	Pupils should be taught to: • -------
Year 4	Pupils should be taught to: • Describe positions on a 2D grid as coordinates in the first quadrant • Describe movements between positions as translations of a given unit to the left/right and up/down

	• Plot specified points and draw sides to complete a given polygon
Year 5	Pupils should be taught to: • 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
Year 6	Pupils should be taught to: • 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
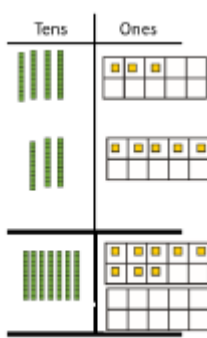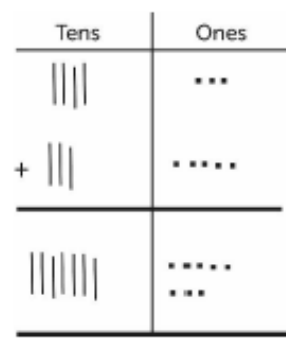
4.8 Statistics

Nursery	Pupils should be taught to: • Shows curiosity about numbers by offering comments or asking questions. • Compares two groups of objects, saying when they have the same number. • Shows an interest in number problems. • Experiment with their own symbols and marks, as well as numerals.
Reception	Pupils should be taught to: • Uses the language of 'more' and 'fewer' to compare two sets of objects. • Finds the total number of items in two groups by counting all of them
Year 1	Pupils should be taught to: • Interpret and construct simple pictograms.
Year 2	Pupils should be taught to: • 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
Year 3	Pupils should be taught to: • 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
Year 4	Pupils should be taught to: • Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs

	• Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs
Year 5	Pupils should be taught to: • Solve comparison, sum and difference problems using information presented in a line graph • Complete, read and interpret information in tables, including timetables
Year 6	Pupils should be taught to: • Interpret and construct pie charts and line graphs and use these to solve problems • Calculate and interpret the mean as an average

5. PROGRESSION IN WRITTEN CALCULATIONS

<u>5.1 Addition</u>

Year 2 : Expanded written method with no regrouping (2-digit numbers)		
<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
		$\begin{array}{r} 1\ 4 \\ +\ 3\ 3 \\ \hline 4\ 7 \end{array}$
Year 2 : Expanded written method with regrouping of ones (2-digit numbers)		
	<u>Pictorial</u>	<u>Abstract</u>
<u>Concrete</u>		$\begin{array}{r} 5\ 6 \\ +\ 2\ 6 \\ \hline 8\ 2 \\ _{1} \end{array}$

Year 3 : Formal written addition with no regrouping (up to three-digit numbers)

Concrete	Pictorial	Abstract
		$$\begin{array}{r} 1\ 4\ 2 \\ +\ 3\ 3\ 4 \\ \hline 4\ 7\ 6 \end{array}$$ 142 + 334 = 476

Year 3 : Formal written addition with regrouping of ones (up to three-digit numbers)

Concrete	Pictorial	Abstract
		$$\begin{array}{r} 2\ 4\ 7 \\ +\ 1\ 3\ 5 \\ \hline 3\ 8\ 2 \\ 1 \end{array}$$ 247 + 135 = 382

Year 3 : Formal written addition with regrouping of tens only (up to three-digit numbers)

Concrete	Pictorial	Abstract

		$$\begin{array}{r} 2\ 7\ 6 \\ +\quad 5\ 0 \\ \hline 3\ 2\ 6 \\ \hline 1\quad\quad \end{array}$$ 276 + 50 = 326

Year 3 : Formal written addition with regrouping of tens and ones (up to 3-digit numbers)

Concrete	Pictorial	Abstract
		$$\begin{array}{r} 2\ 7\ 6 \\ +\quad 5\ 6 \\ \hline 3\ 3\ 2 \\ \hline 1\ 1\quad \end{array}$$ 276 + 56 = 332

Once pupils have fully understood and rehearsed regrouping within formal column addition of 3-digit numbers, this learning continues to be rehearsed and applied throughout Years 4, 5 and 6, including to 4-digit numbers, larger numbers, decimal numbers, money and measures.

5.2 Subtraction

Year 2 : Expanded written subtraction, 2-digit numbers with no regrouping

Concrete	Pictorial	Abstract
		$$\begin{array}{r} 3\ 4 \\ -\ 1\ 2 \\ \hline 2\ 2 \\ \hline \end{array}$$

Year 2 : Expanded written subtraction, 2-digit numbers with regrouping

Concrete	Pictorial	Abstract
		$$\begin{array}{r} \overset{3}{\cancel{4}}\,{}^{1}5 \\ -\ 2\ 6 \\ \hline 1\ 9 \end{array}$$

Year 2 : Formal written subtraction with no regrouping (up to 3-digit numbers)

Concrete	Pictorial	Abstract
		$$\begin{array}{r} 3\ 4\ 5 \\ -\ 1\ 2\ 4 \\ \hline 2\ 2\ 1 \end{array}$$ 345 – 124 = 221

Year 3 : Formal written subtraction – regrouping tens into ones only (up to 3-digit numbers)

Concrete	Pictorial	Abstract
		$^7\cancel{8}\,^10$ $-\quad 2\ 4$ ———— $5\ 6$ 80 – 24 = 56

Year 3 : Formal written subtraction – regrouping hundreds into tens only (3-digit numbers)

Concrete	Pictorial	Abstract
		$^2\cancel{3}\,^12\ 3$ $-\quad 1\ 4\ 1$ ———— $1\ 8\ 2$ 323 – 141 = 182
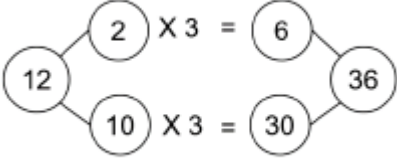
Year 3 : Formal written subtraction – regrouping hundreds and tens (3-digit numbers)

Concrete	Pictorial	Abstract
		$^3\cancel{4}\,^1\cancel{0}\,^{9}\,^14$ $-\quad 2\ 2\ 6$ ———— $1\ 7\ 8$ 404 – 226 = 178
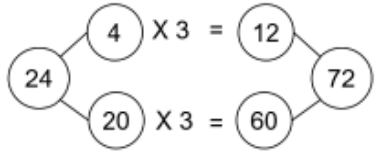
Once pupils have fully understood and rehearsed regrouping within formal subtraction, this learning continues to be rehearsed and applied throughout Years 4, 5 and 6, including to multi-digit, decimal numbers, money and measures.
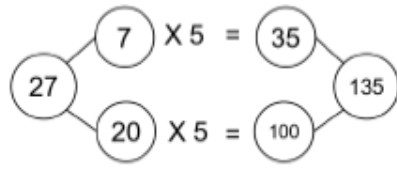
5.3 Multiplication
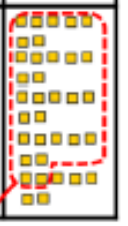
Year 3 : Introducing short mulitplication with no regrouping

Concrete	Pictorial	Abstract
Tens / Ones	$2 \times 3 = 6$, 12, $10 \times 3 = 30$, 36	$\begin{array}{r} 1\ 2 \\ \times\quad 3 \\ \hline 3\ 6 \end{array}$ $12 \times 3 = 36$
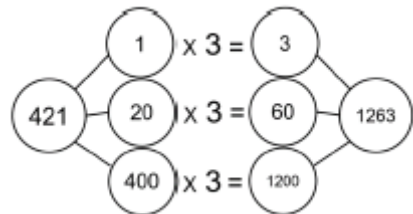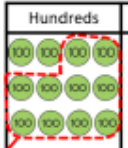
Year 3 : Short multiplication with regrouping of ones into tens only

Concrete	Pictorial	Abstract
Tens / Ones	$4 \times 3 = 12$, 24, $20 \times 3 = 60$, 72	$\begin{array}{r} 2\ 4 \\ \times\quad 3 \\ \hline 7\ 2 \\ {}^{1} \end{array}$ $24 \times 3 = 72$

Year 3 : Short multiplication with regrouping of tens and ones

Concrete	Pictorial	Abstract
Hundreds / Tens / Ones	$7 \times 5 = 35$, 27, $20 \times 5 = 100$, 135	$\begin{array}{r} 2\ 7 \\ \times\quad 5 \\ \hline 1\ 3\ 5 \\ {}^{3} \end{array}$ $27 \times 5 = 135$

Year 4 : Formal written multiplication with regrouping which generates a new column

Concrete	Pictorial	Abstract
Hundreds / Tens / Ones	$1 \times 3 = 3$, 421, $20 \times 3 = 60$, $400 \times 3 = 1200$, 1263	$\begin{array}{r} 4\ 2\ 1 \\ \times\quad 3 \\ \hline 1\ 2\ 6\ 3 \end{array}$ $421 \times 3 = 1263$

Year 5 : Expanded vertical multiplication 2-digit by 2-digit		
Concrete	Pictorial	Abstract
		$$\begin{array}{r} 3\ 2 \\ \times\ 1\ 4 \\ \hline 8 \\ 1\ 2\ 0 \\ 2\ 0 \\ 3\ 0\ 0 \\ \hline 4\ 4\ 8 \end{array}$$ 32 x 14 = 448

Year 5 : Long multiplication 2-digit by 2-digit with simple regrouping		
Concrete	Pictorial	Abstract
		$$\begin{array}{r} 3\ 2 \\ \times\ 1\ 4 \\ \hline 1\ 2\ 8 \\ 3\ 2\ 0 \\ \hline 4\ 4\ 8 \end{array}$$ 32 x 14 = 448

Year 5 : Long multiplication 2-digit by 2-digit regrouping in first and second stage		
Concrete	Pictorial	Abstract
		$$\begin{array}{r} 1\ 3\ 2 \\ \times\ 4\ 6 \\ \hline 7\ 9\ 2 \\ 5\ 2\ 8\ 0 \\ \hline 6\ 0\ 7\ 2 \end{array}$$ 132 x 46 = 6,072
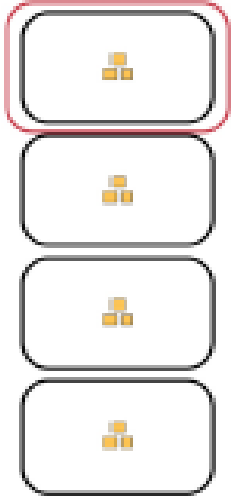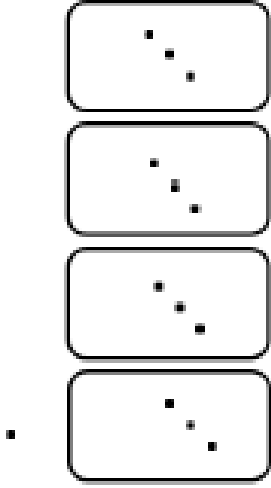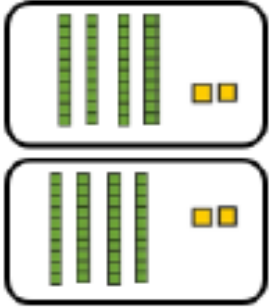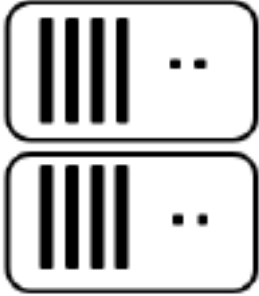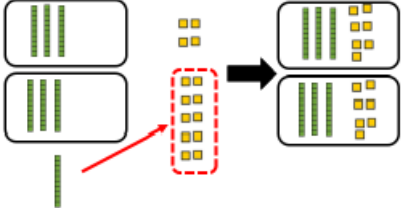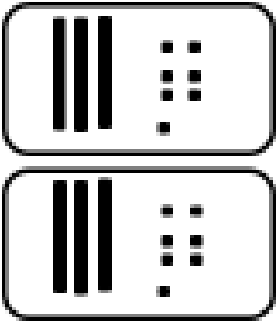
Year 6 : Formal written multiplication involving numbers with up to 2 decimal places multiplied by a 1-digit number		
<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
	Jottings: multiples of tricky multipliers 6 12 18 24 30 36 42 48 54 60 66 72	$$\begin{array}{r} \overset{2}{}\overset{1}{} \\ 34.2 \\ \times\quad 6 \\ \hline 205.2 \end{array}$$ 34.2 x 6 = 205.2|

Year 6 : Long multiplication; up to 4-digit by 2-digit		
<u>Abstract – using speaking frame</u>	<u>Pictorial</u>	<u>Abstract</u>
First, I need to consider the ones in the multiplier. 7 groups of 6 ones is 42 ones. I need to regroup into 4 tens and 2 ones. 7 groups of 3 tens is 21 tens. I need to add the regrouped 4 tens. I now have 25 tens. I need to regroup into 2 hundreds and 5 tens. 7 groups of 8 hundreds is 56 hundreds. I need to add the regrouped 2 hundreds. I now have 58 hundreds. I can regroup this into 5 thousands and 8 hundreds. Then, considering the tens in the multiplier. 20 groups of 6 ones is 120 ones. I need to regroup into 1 hundred and 2 tens. 20 groups of 3 tens is 6 hundreds. I need to add the regrouped 1 hundred. I now have 7 hundreds. 20 groups of 8 hundred is 16 thousand. There are no regroups to add. The total of the two partial products is 22, 572. The product of 836 and 27 is 22, 572.	Jottings: multiples of tricky multipliers 7 14 21 28 35 42 49 56 63 70 77 84	$$\begin{array}{r} \overset{2}{}\overset{1}{4} \\ 836 \\ \times\quad 27 \\ \hline 5852 \\ 16720 \\ \hline 22572 \\ 1\ 1 \end{array}$$ 836 x 27 = 22,572

5.4 Division

Year 3 : Introducing the long division method (sharing ones)

Concrete	Pictorial	Abstract

$$4 \overline{\smash{)}\,13} \quad \begin{array}{r} 3 \\ -12 \\ \hline 1 \end{array}$$

13 ÷ 4 = 3 r 1

Year 3 : Short multiplication with regrouping of ones into tens only

Concrete	Pictorial	Abstract

$$2 \overline{\smash{)}\,84} \quad \begin{array}{r} 4\ \ 2 \\ -8 \\ \hline 0\ \ 4 \\ 4 \\ \hline 0 \end{array}$$

84 ÷ 2 = 42

Year 3 : Long division of tens and ones with regrouping (sharing structure)

Concrete	Pictorial	Abstract

$$2 \overline{\smash{)}\,74} \quad \begin{array}{r} 3\ \ 7 \\ -6 \\ \hline 1\ \ 4 \\ -1\ \ 4 \\ \hline 0 \end{array}$$

74 ÷ 2 = 37

Year 4 : Long division with regrouping hundreds into tens (sharing structure)		
Concrete	Pictorial	Abstract
		  426 ÷ 3 = 142

Year 4 : Introducing formal short division (sharing structure)		
Concrete	Pictorial	Abstract
		  426 ÷ 3 = 142

Year 5 : Introducing formal short division regroup from tens to ones (grouping structure)		
Concrete	Pictorial	Abstract
		  52 ÷ 4 = 13

Year 5 : Short division for numbers up to 4-digits (grouping structure)
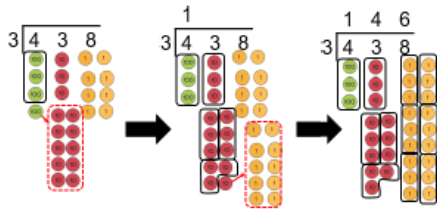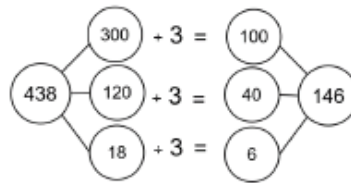
Concrete	Pictorial	Abstract
		$$438 \div 3 = 146$$

Year 5 : Short division (grouping structure) - expressing quotients with fractions
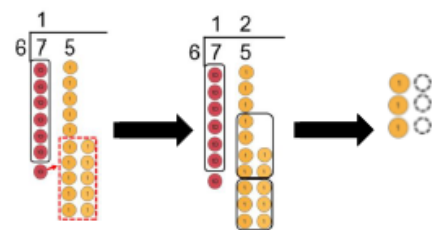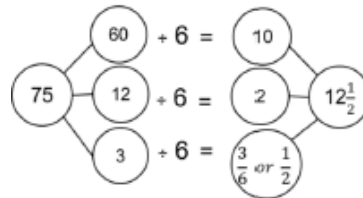
Concrete	Pictorial	Abstract
		$$75 \div 6 = 12\frac{1}{2}$$

Year 5 : Short division (grouping structure) - expressing quotients with decimals
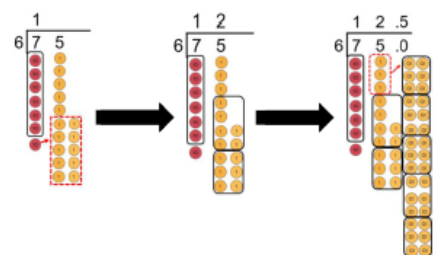
Concrete	Pictorial	Abstract
	Jottings: multiples of the divisor 6 12 18 24 30 36 42 48 54 60	$$75 \div 6 = 12.5$$

Year 5 : Long division for numbers up to 4 digits
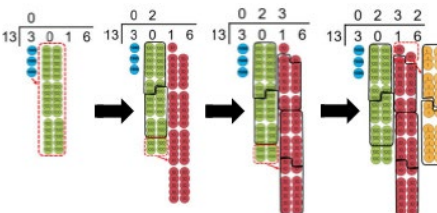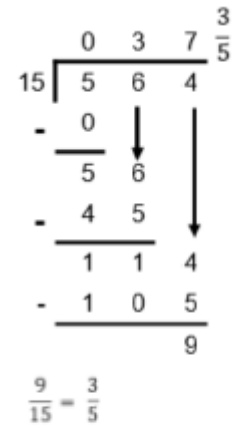
Concrete	Pictorial	Abstract
	Jottings: multiples of the divisor 13 26 39 52 65 78 91 104	$$3016 \div 13 = 232$$
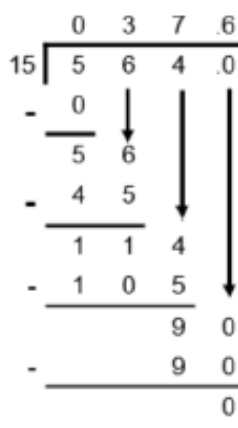
Year 6 : Long division for numbers up to 4 digits - expressing quotients with fractions

Abstract – using speaking frame	Pictorial	Abstract
I have a remainder of 9. This is 9 out of the 15 which I need for another group. This can be written as a fraction $^9/_{15}$. This can be simplified to $^3/_5$. There are 37 $^3/_5$ in each of the 15 groups.	Jottings: multiples of the divisor 15 30 45 60 75 90 105 120 135 150	$$564 \div 15 = 37\frac{3}{5}$$

Year 5 : Long division for numbers up to 4 digits - expressing quotients with decimals

Abstract – using speaking frame	Pictorial	Abstract
I have a remainder of 9. I need to regroup the 9 ones into 90 tenths. How many groups of 15 tenths are in 90 tenths, without regrouping? I can make 6 groups of 15 tenths. There is nothing remaining. There are 37.6 groups of 15 in 564.	Jottings: multiples of the divisor 15 30 45 60 75 90 105 120 135 150	$$564 \div 15 = 37.6$$

6. SUPPORTING CHILDREN WITH SEND

All children at Bedwell Primary School have equal access to the Mathematics curriculum, regardless of race, religion, ability or gender. Children access the curriculum at the level appropriate to them, ensuring rapid measurable progress. Resources and learning environments are planned and designed to enable all children access to the learning required. Class setting and differentiated activities are provided to support learners of all abilities and challenge more able learners, so they are able to work at greater depth in mathematics. Lessons aim to be practical, with the use of manipulatives and Communicate and Print to support children with SEND.

Children with English as an additional language (E.A.L.) will be given access to additional resources and teaching to support their learning and to ensure they make maximum progress from their individual starting points. Translation apps, Communicate and Print and CPG early EAL materials are all used to aid access to this subject.

7. RECALL OF NUMBER FACTS

It is unreasonable to expect our children to learn number bonds, addition facts and multiplication tables by simply saying them over and over again. Our aim is for children to be able to recall all these facts instantaneously (responding as quickly as if they were asked "What is your name?"), and this requires explicit teaching using a wide range of strategies.

Key number facts (doubling, halving and number bonds in Key Stage 1; multiplication facts in Key Stage 2) are selected by each teacher, and these are rehearsed and practiced every day. Children from Year 2 up are tested weekly on their number facts and times table knowledge by class TAs, progressing through a range of Bronze, Silver and Gold Awards as their recall improves.

Children in year 4 practice daily on their recall of times tables facts to prepare them for National Times tables check and are given strategies and support in learning these rapidly.

Teachers and TAs have access to times tables packs that can be sent home in order for the children to continue this practice at home.

Working walls

At Bedwell working walls are an ever changing environmental resource. Their purpose is to support the children in their current learning and enable them to become more independent. As well as supporting them with a visual reminder of what they are learning it will include their previous learning from the unit before. Children will be taught how to use it and their teacher will often refer to it, so that it becomes a useful learning tool. Working walls at Bedwell Primary School should contain the following:

- Visual model of what is being taught, ensuring it follows the methods set out in Essential maths.
- Key vocabulary for that unit, which is in a font large enough to be seen across the classroom.
- Whole class shared ideas that reflect the progression in the maths unit, brainstorm of definition, methods, examples of the skill applied, or key facts.
- Will be updated regularly by teachers to ensure it reflects what is currently being taught.

Some examples of working walls at Bedwell Primary.
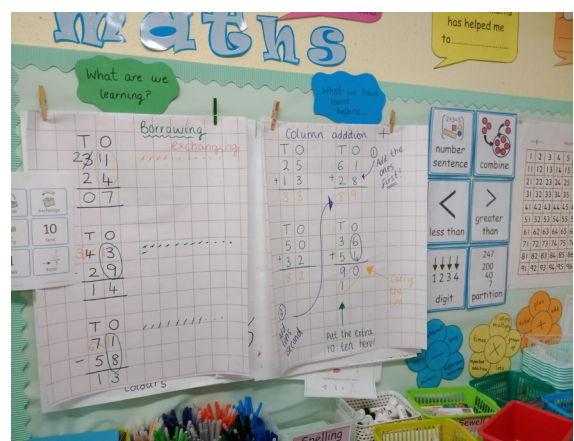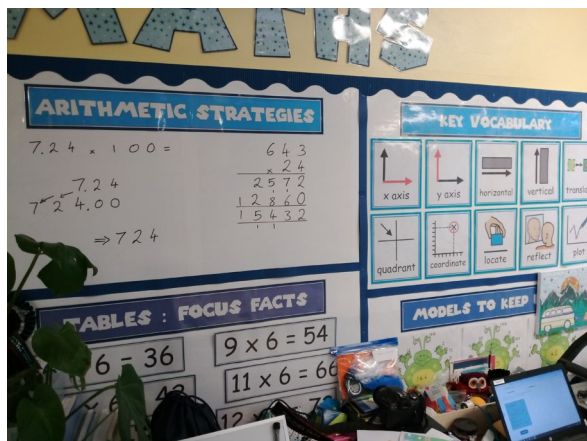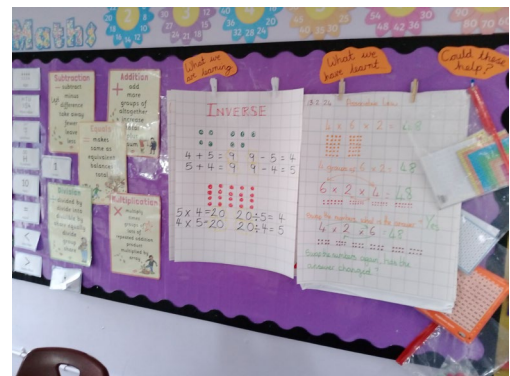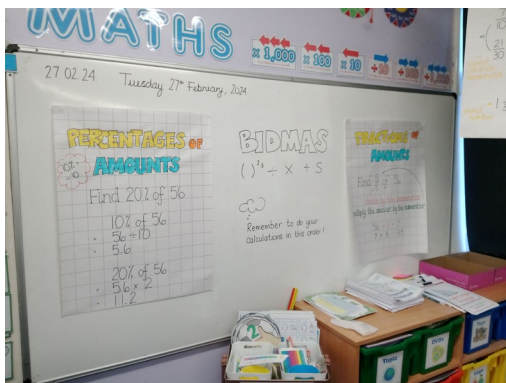
Classroom environment

In addition to a regularly updated working wall, classrooms will have the following display resources up for children to use at all times.

- A number line
- A number square
- Multiplication facts

These will be of sufficient size to be seen from all areas of the classroom.

9. KEY VOCABULARY

Teaching and learning mathematical language are key to developing deep mathematical understanding. The ability to use words to explain, justify and communicate mathematically is important to help pupils clarify and organise their mathematical schema. Fluency in mathematical language not only allows a pupil to communicate their understanding accurately but also relieves cognitive load, permitting more focus on the lengthier tasks. For example, procedural computations or multi-step problems.

9.1 Challenges presented when learning mathematical language
First and foremost, the sheer volume of language to be acquired and understood can be challenging. 'Dumped' upon a child in one go, these words will be overwhelming and it is very unlikely that their specific meanings will stick. In addition to this basic problem (which applies to the teaching of vocabulary across the curriculum), maths language does present specific problems of its own:

- Words with different specific mathematical meanings and meanings in everyday life - for instance, 'product' as the result of multiplication and 'product' as something that has been made in a factory.
- Words that are homophones, e.g. Pi and pie.
- Words that are closely related but have specific meanings, such as circumference and perimeter.
- Concepts that can be expressed in multiple ways, e.g. '15 minutes past' and 'quarter past' or all the words we use for adding - add, total, altogether, sum, combined, extended etc.
- Informal words which are not mathematically correct, such as using 'diamond' to describe a shape rather than 'rhombus' (or 'square'); the use of 'sum' to describe any calculation rather than precisely an addition situation.

9.2 Teaching vocabulary
Children will naturally acquire some new vocabulary through experiences. However, these experiences are not sufficient for most children, and will lead to gaps and misconceptions

that can be much harder to address later on. As a result, key vocabulary should be explicitly taught, modelled and practiced. Hands-on experiences should be provided where possible, and new vocabulary should always be linked to a visual representation (using Communicate In Print resources wherever possible).

New vocabulary to be taught in each year group is set out in the table below:

	Number	Calculation	Fractions	Measures	Geometry	Statistics
EYFS	one more one less order number count number names to 20 number line answer equals forwards backwards	add subtract single digit count on count back doubling halving sharing pattern check problem solve	----	measure size weight compare object time year month week before after coin penny pound price cost	left, right top, bottom middle behind in front between above below pattern position distance direction move shape square rectangle circle triangle sides straight curved	----
Year 1 (as above, plus:)	ones tens numerals multiples equal to more than less than fewer most least identify represent digit calculate odd even	problem concrete object pictorial missing number interpret equals sign one-digit two-digit ones mental (-ly) array divide division multiply	half / halve quarter sharing groups grouping part whole equal parts same size bar fraction equal equally	o'clock half-past minutes quarter past / to older newer faster quicker slower earlier later amount weight balance gram	two / three dimensional 2d / 3d kite cube cuboid pyramid cylinder sphere sides corner base point whole turn half turn forwards	----

	number names up to one hundred	multiplication multiple		kilogram scales distance metre centimeter ruler volume amount value	backwards underneath besides	
<u>Year 2</u> *(as above, plus:)*	two-digit estimate place value greater than less than nearest ten number fact partition compare determine reduce increase fact family	order inverse calculation quantity formal method mental method operation share equally repeated addition grouping rebalancing	third equivalent / equivalence whole half as much twice as much numerator denominator	minutes past / to clockwise anti-clockwise noon midday midnight width standard units scale temperature degrees thermometer Celsius (°C)	vertical horizontal vertex edge face quadrilateral polygon pentagon hexagon heptagon octagon prism cone symmetry surface mirror line properties classify opposite rotate angle right angle arrange row column	pictogram tally diagram table data category key sorting totaling Venn / Carroll diagram
<u>Year 3</u> *(as above, plus:)*	hundreds three-digit ascending descending Roman numeral number names up to one thousand decimal	column addition column subtraction multiple recall product divisible remainder comparison scaling	fifths sixths sevenths eighths ninths tenths order unit fraction discrete continuous	am / pm duration analogue digital 12-hour / 24-hour clock event leap year perimeter millimetre	orientation degree perpendicular parallel horizontal vertical acute obtuse reflection north south	bar chart interpret frequent survey discrete continuous data

Year						
	decimal place				east west compass	
Year 4 (as above, plus:)	thousands four-digit place holder negative number rounding nearest ten / hundred / thousand whole number integer tenths hundredths	operation methods factor factor pair derive distributive law	hundredths decimal equivalent decimal place decimal point proportion convert proper / improper fraction	convert conversion rectilinear area dimensions kilometre	nonagon decagon isosceles scalene equilateral parallelogram trapezium rhombus protractor adjacent regular irregular internal angle congruent coordinate plot grid translate axis / axes	label graph line graph infer
Year 5 (as above, plus:)	ten thousands hundred thousands millions context prime number square number cube number thousandths number names up to one million	prime factor common factor short division long multiplication divisor	mixed number thousandth percent % percentages	metric Imperial pound (lb) inch (in) foot (ft) yard mile pint centimeter squared cm^2 metre squared m^2 centimeter cubed cm^3 compound shape	diagonal whole turn reflex angle x-axis y-axis	timetable
Year 6 (as above, plus:)	intervals three decimal places hundredths	long division common multiple order of operations	simplify accuracy	stones ounces gallons metres cubed m^3	net radius diameter circumference dimensions	pie chart mean average variable

	thousandths number names up to ten million	brackets variable		millimetres cubed mm^3 miles per hour (mph) kilometres per hour (kph)	dissect coordinate plane four quadrants	

10. ASSESSMENT

10.1 Formative assessment

Formative assessment (or Assessment for Learning) takes place throughout every session, and is the basis on which teachers tailor learning to the needs of the children they are teaching.

10.2 Summative assessment

Summative assessment takes place termly and will be conducted through the use of PUMA maths tests. These tests, once marked, will enable the teacher to see what gaps are present within their class, allowing them to adapt their planning, bridge gaps and address misconceptions. Puma tests are also used to give a picture of 'age-relatedness' for each individual child.

The data from summative assessments will be added to data on the school sever termly and is the responsibility of the class teacher.

APPENDIX A – KEY LEARNING IN EACH YEAR GROUP

(INFORMATION FOR PARENTS & WEBSITE)

<u>Maths : The EYFS Learner</u>

<u>Counting and understanding numbers</u>

Children will recognise quantities up to 5 without counting. Show small quantities in familiar patterns (for example, dice) and random arrangements. Play games which involve quickly revealing and hiding numbers of objects. They can put objects into five frames and then tens frame. They will be able to recite forwards and backwards number word sequences which are supported by using songs and rhymes. Children continue number sequences starting from different numbers with some prior words in appropriate range e.g. 3, 4, 5, 6... or 24, 23... Children will begin to recite numbers bonds to ten and some doubles, showing these on fingers or on dice.

<u>Calculating</u>

Children will be able to say the number that is one more or one less than a given number. Combine two or more quantities to find the total (combining) . They will find one more or one less than a group of up to five, then ten objects. They count on and count back when adding or subtracting to a group (holding the first number in their head.) Children will be able to add and subtract two sets of objects that are the same and add two sets of objects that are different. Increase and decrease one quantity by a given amount to find the total). They will begin to record using marks they can interpret and explain. They will recognise and name + and - & = signs.

Further to this they will be able to lay out and match equal groups. They will recognise when they are given equal amounts and can double objects. They will begin to relate doubles as repeated addition and recognise odd and even numbers. They will be able to share objects between two people equally and group objects in to equal groups. They will begin to halve equal numbers up to 10.

<u>Measurement</u>

Children will be able to compare and order item by their length, height and weight. They will begin to measure short periods of time using calendars and timers. They will be bale to use language to talk about size, weight, time, position and money. They will how an awareness of measuring tools in everyday experiences and play.

<u>Geometry</u>

Children will begin to use mathematical names for 'solid' 3D shapes and 'flat' 2D shapes, and mathematical terms to describe shapes. They will be able to give a simple shape a name. They will be able to use familiar objects and common simple shapes to create patterns and build models. They can describe their relative position such as 'behind' or 'next to' and begin to draw information from a map. They will talk about position and distance.

Maths: The Year 1 Learner

Working mathematically
By the end of year 1, children begin to solve simple problems involving addition and subtraction in familiar contexts such as going shopping, using a range of hands-on equipment, symbols, images and pictures. They begin to use what they know to tackle problems that are more complex and provide simple reasons for their opinions.

Counting and understanding numbers
Children will identify and represent numbers using objects, pictures and models, such as the number line, and use 'equal to, more than, less than (fewer), most and least.' Children will accurately count numbers to, and across, 100 forwards and backwards from any given number with increasing understanding. They count, read, write and order numbers in numerals up to 100 and from 1 to 20 in words. When given a number, they can identify one more and one less. They can count in multiples of twos, fives and tens.

Calculating
Children will understand known addition and subtraction facts within 20, including zero. They will demonstrate an understanding of multiplication and division through grouping and sharing using hands-on resources, pictorial representations and arrays (2, 5 and 10). They understand doubling and halving small quantities.

Fractions
Through play and hands-on resources, children will find and name half and one quarter of objects, shapes and quantities.

Measurement
Children will begin to measure using non-standard units (finger widths, blocks etc.) moving to standard units of measure (e.g. cm) using tools such as a ruler, weighing scales and containers. They will begin to record and compare measurements such as lengths and heights, mass and weight, capacity and volume using language such as long / short; heavy / light; full / half-full / empty. They will tell the time to the hour, half past the hour and be able to sequence events in chronological order using precise language (for example, before and after, next, first, today etc.). Children will recognise and know the value of different denominations of coins and notes.

Geometry
Children will recognise and name common 2-D shapes, e.g. rectangles (including squares), circles and triangles, and 3-D shapes, e.g. cuboids (including cubes, pyramids and spheres) in different orientations and sizes. They will describe position, direction and movement, including whole, half and three quarter turns.

Statistics
In preparation for year 2, children will begin to compare, sort and classify information, including through cross curricular links e.g. science – sorting materials into groups according to their properties. They will also begin to construct simple pictograms and tables.

Maths: The Year 2 Learner

Working mathematically
By the end of year 2, children will solve problems with one or a small number of simple steps. Children will discuss their understanding and begin to explain their thinking using appropriate mathematical

vocabulary, hands-on resources and different ways of recording. They will ask simple questions relevant to the problem and begin to suggest ways of solving them.

Counting and understanding numbers
Children will develop their understanding of place value of numbers to at least 100 and apply this when ordering, comparing, estimating and rounding. Children begin to understand zero as a place holder as this is the foundation for manipulating larger numbers in subsequent years. Children will count fluently forwards and backwards up to and beyond 100 in multiples of 2, 3, 5 and 10 from any number. They will use hands-on resources to help them understand and apply their knowledge of place value in two digit numbers, representing the numbers in a variety of different ways.

Calculating
Children learn that addition and multiplication number sentences can be re-ordered and the answer remains the same (commutativity) such as 9+5+1= 5+1+9. They learn that this is not the case with subtraction and division. They solve a variety of problems using mental and written calculations for +, -, x, ÷ in practical contexts. These methods will include partitioning which is where the number is broken up into more manageable parts (e.g. 64 = 60 + 4 or 50 + 14), re-ordering (e.g. moving the larger number to the beginning of the number sentence when adding several small numbers) and using a number line. Children will know the 2, 5 and 10 times tables, as well as the matching division facts (4 x 5 = 20, 20 ÷ 5 = 4) and can recall them quickly and accurately. They apply their knowledge of addition and subtraction facts to 20 and can use these to work out facts up to 100.

Fractions including decimals
Throughout year 2, children will develop their understanding of fractions and the link to division. They explore this concept using pictures, images and hands-on resources. They will solve problems involving fractions (e.g. find 1/3 of the hexagon or ¼ of the marbles) and record what they have done. They will count regularly and fluently in fractions such as ½ and ¼ forwards and backwards and, through positioning them on a number line, understand that some have the same value (equivalent) e.g. ½ = 2/4.

Measurement
Children will estimate, choose, use and compare a variety of measurements for length, mass, temperature, capacity, time and money. By the end of year 2, they will use measuring apparatus such as rulers accurately. They will use their knowledge of measurement to solve problems (e.g. how many ways to make 50p). They extend their understanding of time to tell and write it on an analogue clock to 5 minute intervals, including quarter past / to the hour. They will know key time related facts (minutes in an hour, hours in a day) and relate this to their everyday life.

Geometry
Children will identify, describe, compare and sort common 2-D and 3-D shapes according to their properties (sides, vertices, edges, faces) and apply this knowledge to solve simple problems. They develop their understanding by finding examples of 3-D shapes in the real world and exploring the 2-D shapes that can be found on them (e.g. a circle is one of the faces on a cylinder). Children begin to describe position, direction and movement in a range of different situations, including understanding rotation (turning through right angles, clockwise and anti-clockwise).

Statistics
Children sort and compare information, communicating findings by asking and answering questions. They will draw simple pictograms, tally charts and tables.

Maths: The Year 3 Learner

Working mathematically

By the end of year 3, children will talk about their mathematics using the numbers they are familiar with, applying their understanding of number, measures and shape to a greater range of problems. They will make decisions about calculations and information that is needed to solve problems, for example when a recipe for two people needs to be doubled to make a recipe for four. Children will be expected to prove their thinking through pictures, jottings and conversations. They will be encouraged to pose their own questions, working in an organised way to solve them which will help pupils to identify common patterns or any errors more easily.

Counting and understanding numbers
Children will be very familiar with numbers that have 3 digits and will have experienced many opportunities to order, compare and show them in different ways using apparatus such as a tape measure, a 100 grid or money. Using their understanding of place value (how the value of each digit changes depending on its position in the number), children will be able to partition (break and make) numbers in different ways e.g. 234 = 200 and 30 and 4; 100 and 100 and 20 and 10 and 4; or 200 and 20 and 14. They will develop a secure understanding of numbers up to 1000 and will count beyond it in 1s, 10s and 100s. They will use this counting to help find 10 or 100 more than any given number.

Children will be introduced to numbers with one decimal place and will count up and down in tenths; share groups of objects or shapes into tenths and represent these in pictures and using hands-on resources.

Children will count forwards and backwards from 0 in steps of 4, 8, 50 and 100 and link this to multiplication and division. They will also count in 3s to help maintain their fluency from Year 2.

Calculating
Children will continue to develop their mental calculation skills to add and subtract combinations of three-digit numbers e.g. 248 +/- 8; 319 +/- 40; 428 +/- 200. They will develop their range of strategies using jottings (sketches and notes to help them remember the steps) and number lines to help them understand how each calculation works. Children will share their methods with others to help them see which work best, are quickest and most accurate. Children will understand the importance of estimation when calculating to see if their answer is reasonable or not. They will recall their multiplication and division facts for 3, 4 and 8x tables and be supported to see the links between the 2, 4 and 8x tables. They explore patterns and rules for the times tables they learn and will use pictures and objects to support their understanding. They will also learn that multiplication can be done in any order e.g. 3 x 4 x 2 = 2 x 3 x 4.

Children will be introduced to more formal methods of recording addition and subtraction, including column methods. They will use hands-on resources to secure their understanding of these methods. This will be applied to numbers up to three digits. Children who become very adept at these calculations will be stretched through problems such as those involving missing numbers so that they know when, if and why they need to use these methods.

Children will develop their understanding of multiplication and division and apply their times table knowledge to multiply 2-digit by 1-digit numbers using the skills of partitioning (breaking and making numbers). For example, 43 x 5 can also be thought of as 40 x 5 and 3 x 5 or (4 x 5 x 10) + (3 x 5). They will move from informal methods of calculating multiplication and division to formal written methods i.e. short column multiplication and be supported by using hands-on resources.

Fractions
Children will develop their understanding of fractions and decimals and will be introduced to tenths. They will count and understand tenths as ten equal parts as well as through dividing sets of objects

into ten equal parts / groups. They will find and write fractions of objects using their multiplication tables knowledge, e.g. 1/5 of a group of 20 buttons can be solved by 20 ÷ 5 = 4, and will continue to explore equivalent fractions using diagrams to explain their understanding e.g. 2/4 is equivalent to or of equal value to 4/8. They will also begin to add and subtract fractions where the denominator is the same e.g. 4/6 + 1/6 = 5/6.

<u>Measurement</u>
Children will continue to measure, compare, add and subtract measurements and progress to mixed units e.g. expressing amounts as litres and millilitres – 2 litres 400ml. They will measure the perimeter of 2-D shapes and will continue to add and subtract amounts of money including giving change. Children will estimate and read time to the nearest minute on analogue and digital clock faces. They will be introduced to the Roman numerals I to XII to help with this. Problem solving and calculating with time will involve comparing the duration of events such as the length of favourite television programme or journeys to school. They will use language with increasing accuracy, such as seconds, minutes and hours; o'clock, a.m. / p.m., morning, afternoon, noon and midnight. They will need to recall the number of seconds in a minute and the number of days in each month, year and leap year.

<u>Geometry</u>
Children will accurately draw 2-D shapes with rulers measuring sides accurately.

They will make 3-D shapes to help them understand how they are composed and will recognise 3-D shapes in a range of places and contexts (e.g. buildings, packages) and use correct mathematical vocabulary to describe them. They will learn what a right angle is and know that two right angles make a half-turn, three make three quarters of a turn and four a complete turn as well as identify whether angles are greater than or less than a right angle . They will also be able to identify horizontal and vertical lines and pairs of perpendicular (L) and parallel lines (=).

<u>Statistics</u>
Children will collect, organise, answer and pose questions about information using bar charts, pictograms and tables to answer questions such as 'how many more children prefer football to cricket?'.

Maths: The Year 4 Learner

Working mathematically

By the end of year 4, children will apply their understanding of maths to solve a wide variety of problems with more than one step and be expected to prove their thinking through pictures, jottings and conversations. They will continue to make connections between different areas of maths and ask their own questions, working in an organised way to find solutions which help them identify common patterns or any errors more easily.

Counting and understanding numbers

Children will be very familiar with numbers that have up to 4 digits and will be able to order and compare by showing them in different ways such as on a tape measure or using hands-on resources. Using their understanding of place value (how the value of each digit changes depending on its position in the number), children will be able to partition (break and make) numbers in different ways e.g. 2345 = 2000 and 300 and 40 and 5 but could also represent this as 1000 and 1000 and 200 and 100 and 40 and 5 or 2000 and 200 and 145. They will work with numbers securely up to 10,000 and may begin to count beyond in 1s, 10s, 100s and 1000s. They will use this to help them find 10, 100 or 1000 more or less than any given number. They will multiply and divide whole numbers by 10 and 100 and understand that this changes the value of each digit rather than 'just adding a 0'. They will develop their understanding to decimal hundredths, comparing and ordering these using contexts such as money. Children will also learn about the pattern to find any Roman numeral to 100.

Children will develop their expertise when counting forwards and backwards from 0 to include multiples of 6, 7, 9 and 25; decimals with up to 2 places and fractions. They will be able to fluently count in tenths, hundredths and simple fractions. They will develop their understanding of negative numbers through counting backwards through 0. Children will be able to recognise and describe number patterns and relationships including multiples (e.g. 3, 6, 9, 12 are multiples of 3) and factor pairs (e.g. 1 and 12, 2 and 6, 3 and 4 are all factor pairs for 12) for known times tables.

Calculating

Children will develop various strategies for solving +, -, x, ÷ calculations mentally, using jottings when appropriate and for checking that their answers are sensible. Children will be encouraged to share their methods with others to help them see which work best, are quickest and most accurate. Over the course of the year, children will become fluent in all multiplication and division facts up to 12 x 12 and apply these facts to other problems e.g. 232 x 7 = (200 x 7) + (30 x 7) + (2 x 7). Children will use the = sign to demonstrate equal value e.g. 3 x 8 = 48 ÷ 2 and solve missing number problems e.g. 3 x ? = 48÷2. They will explore patterns and rules for the times tables they learn and use pictures and objects to support their understanding.

Children will be required to solve problems accurately using the column addition and subtraction methods for numbers with up to 4-digits and explain how the methods work. They will use apparatus to secure their understanding of these. This will include addition and subtraction calculations with different numbers of digits (such as 1286 + 357); and numbers containing 0s (such as 8009 – 3231). They will use formal written methods of short multiplication and short division for two and three digit numbers by a single digit. Children who become very adept at these types of calculations will be stretched through problems such as those containing missing numbers so that they know when, if and why they need to use the methods.

Fractions including decimals

Children will develop their understanding of fractions by comparing to, or finding a part of, the whole. Through hands-on resources, pictures or jottings, such as a number line, children will add and subtract two fractions with the same denominator (e.g. 2/3 + 2/3). Children will solve problems involving

fractions such as 'find ¾ of 20 litres' using their knowledge of multiplication and division and through practical equipment. Children secure their understanding that fractions and decimals are different ways of expressing numbers and proportions.

Measurement
Children secure their understanding of place value and decimals to record measurements accurately. They use their understanding of multiplying and dividing by 10, 100 and 1000 to convert between different units of measure of length (km, m, cm, mm), weight (kg, g) and money (£ and p). Children will link their understanding of area to multiplication and describe how to find the perimeter of a rectangle quickly. Children will read and write the time accurately using analogue and digital clocks, including clocks with Roman numerals. They will convert between units of time (hours, minutes and seconds). Children estimate, compare, calculate and solve a variety of problems involving all units of measurement.

Geometry
Children will extend their knowledge of shape to include more unusual quadrilaterals (four-sided shapes) and triangles. They will use increasingly more specific vocabulary such as parallelogram, rhombus and trapezium; scalene and isosceles. They refine their understanding of symmetry and solve problems where the shape is not displayed in its usual way (e.g. it might be on its side). Children find and name different angles and use this information to decide if a shape is regular or irregular. Children describe position and movement on a grid as co-ordinates and will plot points to draw 2-D shapes.

Statistics
Children will complete, read and interpret information on bar charts; they will solve problems that involve finding information in charts, tables and graphs; including time graphs.

Maths: The Year 5 Learner

Working mathematically

By the end of year 5, children will apply their mathematical experiences to explore ideas and raise relevant questions, constructing complex explanations and reasoned arguments. They will be able to solve a wide variety of complex problems which require sustained concentration and demand efficient written and mental methods of calculations. These will include problems relating to fractions, scaling (times as many), converting between units of measure and employ all four operations (+, -, x, ÷).

Counting and understanding numbers

Children extend and apply their knowledge of place value for numbers up to one million, rounding, estimating and comparing them (including decimals and negative numbers) in a variety of situations. They are introduced to powers of ten and are able to count forwards or backwards from any number (for example, -50, -5… 5, 50, 500, 5000…). Through investigations, they will discover special numbers including factors, primes, square and cube numbers.

Calculating

Children will be fluent in a wide range of mental calculation strategies for all operations and will select the most appropriate method dependent on the calculation. They apply their knowledge of place value fluently to multiply and divide numbers (including decimals) by 10, 100 and 1000. When mental methods are not appropriate, they use formal written methods of addition and subtraction accurately. They continue to develop their understanding of the formal methods through hands-on resources and use their known facts within long multiplication (up to 4 digit numbers by 2 digit numbers e.g. 2345 x 68) and short division (up to 4 digit numbers by 1 digit number e.g. 2345 ÷ 7) which may result in remainders. They solve multi-step problems in meaningful contexts and decide which operations to use.

Fractions including decimals and percentages

Children secure their strong understanding that fractions express a proportion of amounts and quantities (such as measurements), shapes and other visual representations. Children extend their knowledge and understanding of the connections between fractions and decimals to also include percentages. They will be able to derive simple equivalences (e.g. 67% = 67/100 = 0.67) and recall percentage and decimal equivalents for ½, ¼, 1/5, 2/5, 4/5 and fractions with a denominator of a multiple of 10 or 25 (e.g. 25% = 25/100).

They order, add and subtract fractions, including mixed numbers and those whose denominators are multiples of the same number, for example + = + = = . Using apparatus, images and models, they multiply proper fractions and mixed numbers by whole numbers. Children continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities in real life situations.

Measurement

Through a wide variety of practical experiences and hands-on resources, children extend their understanding of measurement. They convert larger to smaller related units of measure and vice-versa including length, capacity, weight, time and money. Children will convert between imperial (such as inches, pints, miles) and metric units (such as centimetres, litres, kilometres). Children will measure, calculate and solve problems involving perimeter of straight-sided, right-angled shapes (rectilinear) and learn to express this algebraically such as, 4 + 2b = 20. They find and measure the area of these shapes with increasing accuracy. They begin to estimate volume.

Geometry

Children will measure, identify and draw angles in degrees, developing a strong understanding of acute, obtuse, reflex and right angles. They use this knowledge to find missing angles and lengths in a variety

of situations, including at a point, on a straight line and within a shape. Children will move (translate), reflect shapes and describe their new positions. Language will be used with increasing sophistication to compare and classify shapes based on their properties and size. They will be able to visualise 3-D shapes from 2-D diagrams. They will use their understanding or shapes to solve problems.

<u>Statistics</u>
Children will complete, read and solve comparison, sum and difference problems using information presented in graphs, charts and tables, including timetables. They begin to decide which representations of data are the most appropriate and are able to justify their reasons.

Maths : The Year 6 Learner

Working mathematically

By the end of year 6, children will structure their own investigations and solve a wide variety of increasingly complex problems. They will independently develop their own lines of enquiry and be expected to prove their solutions in a variety of ways including algebra, negative proof (use a counter example to prove the rule) and be able to communicate their results using accurate mathematical language. Children will demonstrate secure knowledge and confidence to talk in depth about mathematical concepts and explain their solutions, decisions and reasoning.

Counting and understanding numbers

Children extend and apply their knowledge of place value for numbers up to and beyond one million (including decimals and negative numbers) in a variety of situations. Special numbers are extended to include common factors, common multiples and a deeper understanding of prime numbers. Children will be able to round numbers and identify what degree of accuracy is appropriate.

Calculating

Children will be fluent in a wide range of mental and formal written calculation strategies for all operations, extending to long division (four digit numbers by two digit numbers) by the end of the year. They will apply estimation in a range of ways. Through investigations, they explore the effect of the order of operations including the use of brackets.

Fractions including decimals and percentages

Children recall and using equivalences between simple fractions, decimals and percentages. Additionally, they are able to express fractions in their simplest form and calculate the decimal equivalent, for example = 3 ÷ 8 = 0.375.

Applying this understanding of equivalent fractions, children will order, add and subtract fractions (including mixed numbers and those with different denominators) by the end of the year e.g. + + c = 1. Using hands-on resources and images, they will multiply and divide proper fractions and mixed numbers by whole numbers e.g. x 2 = and ÷ 2 = . Children will solve problems involving the calculation of percentages linked to real life situations.

Ratio and proportion

Pupils explore ratio and proportion through real life experiences such as changing the quantities in recipes (scaling), scale drawings and maps.

Algebra

Throughout their primary experience children will have encountered algebra in a number of different situations which is drawn together and formalised in year 6. By the end of the year, they will confidently use symbols and letters to represent variables and unknowns in mathematical situations that they already understand, for example, simple formula and equivalent expressions a+b = b+a. Children will describe number sequences and missing number calculations.

Measurement

Through investigation and problem solving, children convert between a range of measurement units (including both imperial and metric). Calculation of perimeter and area is extended to include parallelograms and triangles. Additionally, they will explore the relationship between area and perimeter. They will know how to calculate, estimate and compare volume of cubes and cuboids identifying when it is appropriate to use formula.

Geometry

Children will draw 2-D and build 3-D shapes with accuracy using given dimensions and angles. They will create nets of common 3-D shapes. They will consolidate their knowledge of angles within shapes and extend it to find missing angles in triangles, quadrilaterals and regular polygons. Children name parts of circles, including radius, diameter and circumference, and explore the relationships between these elements. Children will use four quadrant co-ordinate grids to describe positions, draw and translate simple shapes. Using their knowledge of the properties of shape, they will be able to predict missing co-ordinates and express these algebraically.

Statistics

Children will increase their knowledge of different data representations to include interpreting and constructing pie charts (using their knowledge of angles, fractions and percentages) and line graphs (e.g. miles to km conversion). They will know when it is appropriate to use the mean as an average and how to calculate it.