The Maths Curriculum Pathway
The Tilstock Way

*'**Pure mathematics is, in its way, the poetry of logical ideas.'***
Albert Einstein,

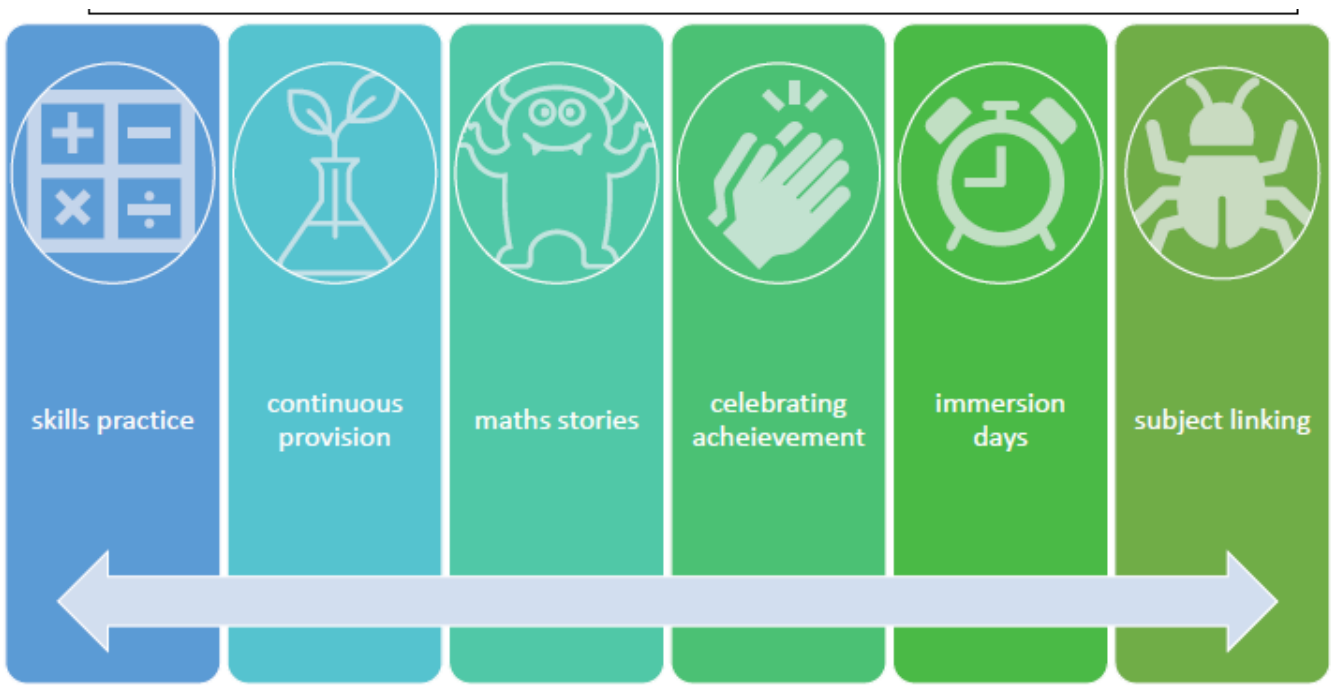
Maths at our school aims to ensure that all our children become fluent in the fundamental of maths, reason mathematically and can solve problems.

Fluency – We know that our children must know their number bonds, times tables and place value securely to provide them with the key knowledge to enable them to work mathematically. We have regular 'maths skills' sessions using *Target Your Maths* to instil this learning into their long term memories. We use online learning platforms such as *NumBots* and *Times-table Rockstars* to allow children regular time to practice and secure the fundamentals of maths.

Reasoning- This is an essential part of the daily maths lesson. Children are encouraged to talk about and discuss how they are going to work something out, to unearth the deeper learning and thinking mathematically. Children are encouraged to answer questions such as 'What do you notice?' How could you begin solving this question' What are the key features?' This is also an opportunity to develop and use mathematical vocabulary. We use *White Rose Maths as a* consistent framework across the school to develop reasoning skills.

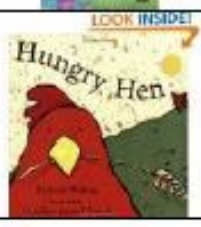
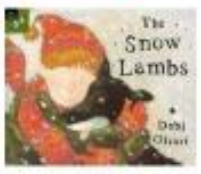
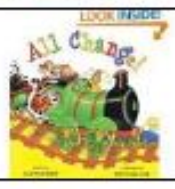
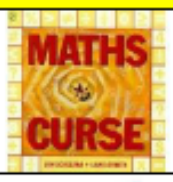
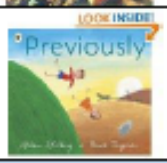
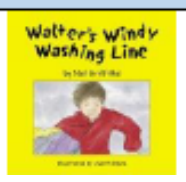
Problem Solving – This is a vital strand of our maths curriculum as an opportunity for children to transfer their understanding to new concepts. As well as linking maths to cross-curriculum subjects in real-life contexts, we use Nrich and NCETM materials to expose our children to a range of mathematical problems.

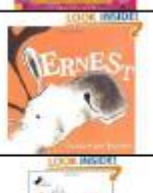
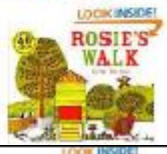
We also delve deeper into Maths as a subject through stories and our class immersion days. At the beginning of new units of teaching we will explore units such as addition, subtraction, multiplication and division through stories, the history of maths, purpose and use within the real-life contexts, occupations and the wider world. This hopefully allows our children a real understanding of the purpose of maths but a passion for the beauty of maths.



Maths stories

White Rose Maths and the NC

PATTERN			
Title	Author	Maths Objectives	Image and link
When a Monster is Born	Sean Taylor	Branching Databases, pattern	
Hopping Mad	Michael Catchpool	Number bonds to 10	
The Feather	Dot Cleeve and Kim Harley	Pattern	
Hungry Hen	Richard Waring	Increasing and Decreasing patterns	
The Snow Lambs	Debi Gliori	Increasing and Decreasing pattern	
All Change	Ian Whybrow	Growing Pattern	
Charlie Cook's Favourite Book	Julia Donaldson & Axel Scheffler	Pattern	
HANDLING DATA			
Five Creatures	Emily Jenkins	Sets	
PROBLEM SOLVING			
Maths Curse	Jon Scieszka and Lane Smith	Everyday maths problems	
Number Devil	Hans Magnus Enzensberger	Higher Level concepts	
Sir Cumference and the First Round Table	Cindy Neuschwander	Different designs for the round table	
Previously	Allan Ahlberg	Explaining reasoning	
VARIOUS ACTIVITIES			
Walter's Windy Washing Line	Neil Griffiths	Measures, Shape, number etc.	

NUMBER			
A Remainder of One	Elinor J Pinczes	Remainders, Number	
If The World Were a Village	David J Smith	Fractions, decimals and percentages	
How Big is a Million?	Anna Milbourne	Large numbers	
One More Sheep	Mij Kelly	One more than, counting on	
One is a Snail, Ten is a Crab	April Pulley Sayre & Jeff Sayre	Number bonds to 100	
SHAPE, SPACE & MEASURES			
The Shape Game	Anthony Browne	Shape - mainly aimed at KS2	
Spaghetti and Meatballs for all	Marilyn Burns	Area/Perimeter	
Sir Cumference and the Dragon of Pi	Cindy Neuschwander	Circumference/Radius	
What's Your Angle Pythagorus?	Julie Ellis	Angles, Area, Square numbers	
The Greedy Triangle	Marilyn Burns	Shape	
Ernest	Catherine Rayner	Shape and size	
How Big is a Foot?	Rolf Myller	Measure, scale	
Rosie's Walk	Pat Hutchins	Positional Language	
A Squash and a Squeeze	Julia Donaldson & Axel Scheffler	Size - Capacity	
Jo-Jo The Melon Donkey	Michael Morpurgo	Guided reading probability activity	
Titch	Pat Hutchins	Size comparisons, feelings graphs	

Tilstock Maths Pathway

NCETM – NumberBlocks – White Rose Maths – Daily Counting

The Five counting principles

Babies and toddlers will start counting by copying counting behaviours modelled by adults. Gelman and Gallistel (1986) describe five principles which are used when counting and can be divided into two groups: how to count and what to count:

How to count principles:

- the one-one principle, the stable-order principle, the cardinal principle

What to count principles:

- the abstract principle, the order-irrelevance principle

Counting is a fundamental skill for children to learn and master from an early age. Although this skill may seem fairly straightforward, there are many counting concepts that young children need to master and many misconceptions that can develop along the way. When a young child begins counting, they count by rote, meaning they will be able to say the number names in order simply because they have remembered the words and the order they go in. From this starting point, children then need to begin to master five counting principles. These five principles were put forward in Gelman and Gallistel's 1978 research (Gelman. R & Gallistel. C (1978)

We use material from the NCETM to enhance our daily maths sessions. https://www.ncetm.org.uk/classroom-resources/ey-cardinality-and-counting/

The 5 Counting Principles	
The one-one principle	"I can count each object only once and say one number name for each object." This principle refers to the need of matching one counting word to each item in the set to be counted. Children will be encouraged to:Recite the counting words in order.Coordinate the touch and oral count so that they happen at the same time. Pointing to/touching items and counting is important in the process of counting as it ensures that each item is included. Keep track of items that have been counted and those that have not been. Children find it easier to move items as they count to keep track and, therefore, find counting objects easier than pictures.
The stable-order principle	"When I count, I say the numbers in order. This order always stays the same." say the counting words in order. Usually young children's counting 'string' will consist of the first few words learnt correctly, a group of correct words with some omissions followed by words chosen randomly (Fuson et al. 1982). Learning to count in the English language is complicated as it involves rote learning of words that do not have a recognisable pattern until the number fourteen. Initially children may just be chanting words memorised through rhymes and stories with it not having much meaning. Increasingly, the order of words takes meaning and children will begin to realise that the order of counting words is always the same and must always be said in this order.
The cardinal principle	"When I count the objects in a group, the last number I say tells me the total for the group". Children often learn counting as a process without understanding that the purpose is to find out the total number in the set. In other words, not realising that the final number in the count is not just identifying and labelling the last item counted but that this final number is a representation of the total number of items. The cardinal principle usually develops after the one-one principle and the stable-order principle. It is, therefore, important for adults to make the purpose of counting clear emphasising the final count is representing the total amount. Suriyakham (2007) recommends the use of gesture at the end of the count to develop this understanding, for example, a circular gesture which includes the whole set and emphasis is put on the final count word.
The abstraction principle	"I can count anything. Even things that cannot be touched or seen." This principle refers to counting when children are moving on from counting objects which they can see and touch to counting through hearing and imagining items as they say the words. Most young children's counting experience is limited to using simple counting objects with most five-year- olds counting money in 'ones' irrespective of its value (Carraher and Schliemann, 1990). This limited experience can affect the development of place-value concepts at a later stage so it is important from the early years to teach pupils to use the correct number names for money, for example, this is two pence.
The order-irrelevance principle	"It doesn't matter which order I count a group of objects in, the total will be the same." Understanding that the total number in a set of objects will be the same when objects are counted in another order is a complex concept for young children to understand. Children may need to understand the cardinal principle more fully in order to develop the order-irrelevance principle. Interestingly, if a puppet is used to change the order of objects, children are more likely to realise the total amount will be the same compared to when an adult changes the order.

The Reception Maths learning journey

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	Getting to Know You			Just Like Me!			It's Me 1 2 3!			Light and Dark			Consolidation	
Spring	Alive in 5!			Growing 6, 7, 8			Building 9 and 10			Consolidation				
Summer	On the Move			Superhero to 20 and Beyond			First then Now			Find my Pattern			Consolidation	

There are 10 maths phases throughout the year. Each phase lasts roughly 3 weeks.

Each phase has a number focus with suggested links to measure, shape and spatial thinking.

The Tilstock Year 1 Maths Journey

Counting

- 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 2s, 5s and 10s

Representing number:

- Identify and represent numbers using objects and pictorial representations including the number line
- Read and write numbers from 1 to 20 in numerals and words

Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs

Number Facts

- given a number, identify one more and one less
- represent and use number bonds and related subtraction facts within 20

Addition and Subtraction

- add and subtract one-digit and two-digit numbers to 20, including zero

Vocabulary

- comparing number: equal to, more than, less than (fewer), most, least
- lengths and heights: long/short, longer/shorter, tall/short, double/half
- mass/weight: heavy/light, heavier than, lighter than
- capacity and volume: full/empty, more than, less than, half, half full, quarter
- time: quicker, slower, earlier, later, minute, hour, days of the week, months of the year

Mental Maths

- Counting forwards and backwards in 1s to 100
- Order a set of consecutive and then random numbers to 20.
- Counting forwards in multiples of 10 to 100.
- Adding any number to 10 eg 10 + 5
- Adding/subtracting 1 more/less to any number up to 100
- Counting on from largest number/re-ordering numbers to add
- Partition numbers to 10
- Number bonds to 20
- Recall double numbers to 10
- Add near doubles
- Recognise even and odd numbers

Fractions

- Recognise, find and name a half as one of two equal parts of an object, shape or quantity
- Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

Measures compare, describe and solve practical problems for:

- Length/height, weight/mass, capacity/volume & time
- Measure and begin to record length/height, weight/mass, capacity/volume & time

Money

- Recognise and know the value of different denominations of coins and notes

Time

- Sequence events in chronological order using language
- 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

Position and Direction

- Describe position, direction and movement, including whole, half, quarter and three-quarter turns.

Shape:

- Recognise and name common 2-D shapes (e.g. Square, circle,
- triangle)
- Recognise and name common 3-D shapes (e.g. Cubes, cuboids,
- pyramids & spheres)

Problem Solving

- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations
- Missing number problems such as 7 = □ – 9.
- solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support

The Tilstock Year 2 Maths Journey

Place Value
- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward
- compare and order numbers from 0 up to 100; use <, > and = signs
- identify, represent and estimate numbers using different representations, including the number line
- read and write numbers to at least 100 in numerals and in words

Addition and Subtraction
- 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 solve missing number problems.

Multiplication and Division
- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward
- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

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

Vocabulary:
Numbers one to one hundred, tens, hundreds, partition, recombine, hundred more/less
Measure: quarter past/to m/km, g/kg, ml/l temperature (degrees)
Position: rotation, clockwise, anticlockwise Straight line, ninety degree turn, right angle, Size, Bigger, larger, smaller, Symmetrical, line of symmetry, fold, match, mirror line, reflection, Pattern, repeating pattern,
Fractions: Three quarters, one third, a third, Equivalence, equivalent
Statistics: count, tally, sort, Vote, Graph, block graph, pictogram, represent group, set, list, table Label, title, most popular, most common, least popular, least common,
Problem solving: Predict, describe the pattern, describe the rule Find, find all, find different, investigate

Statistics
- 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

Fractions
- Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line
- recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity
- write simple fractions e.g. 1/2 of 6 = 3 and recognise the equivalence of 2/4 and 1/2.

Measures
- 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

Money
- 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

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.
- Know the number of minutes in an hour and the number of hours in a day.

Position and Direction
- Use mathematical vocabulary to describe position, direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)
- Order and arrange combinations of mathematical objects in patterns and sequences

Shape:
- Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- Compare and sort common 2-D and 3-D shapes and everyday objects

Problem Solving
- 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
- Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.
- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- Compare and sequence intervals of time
- Order and arrange combinations of mathematical objects in patterns

Tilstock C of E Primary School

Maths Progression Map

Number and Place Value

	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Counting	count from 0-10 Represent numbers with fingers. Recognise anything can be used to count	count from 0-20 count an irregular arrangement of up to 10 objects	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	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward	count from 0 in multiples of 4, 8, 50 and 100 find 10 or 100 more or less than a given number	count backwards through zero to include negative numbers count in multiples of 6, 7, 9, 25 and 1 000 find 1 000 more or less than a given number	interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000	use negative numbers in context, and calculate intervals across zero
Comparing Numbers	compare two groups of objects	compare quantities of identical objects compare quantities of non-identical objects compare groups up to 10 use the language of more than and fewer than	use the language of: equal to, more than, less than (fewer), most, least	compare and order numbers from 0 up to 100; use <, > and = signs	compare and order numbers up to 1 000	order and compare numbers beyond 1 000 compare numbers with the same number of decimal places up to two decimal places	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
Identifying, representing and estimating numbers	match numeral and quantity	select the correct numeral to represent 1-5, then 1-10 objects	identify and represent numbers using objects and pictorial representations including the number line	identify, represent and estimate numbers using different representations, including the number line	identify, represent and estimate numbers using different representations	identify, represent and estimate numbers using different representations		
Reading and writing numbers	show an interest in writing numbers making to represent numbers	write the correct numeral for a given number	read and write numbers from 1 to 20 in numerals and words	read and write numbers to at least 100 in numerals and in words	read and write numbers up to 1 000 in numerals and in words tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks	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.	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit read Roman numerals to 1 000 (M) and recognise years written in Roman numerals.	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
Understanding place value				recognise the place value of each digit in a two-digit number (tens, ones)	recognise the place value of each digit in a three-digit number (hundreds, tens, ones)	recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) 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 units, tenths and hundredths	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1 000 where the answers are up to three decimal places
Rounding						round any number to the nearest 10, 100 or 1 000 round decimals with one decimal place to the nearest whole number	round any number up to 1 000 000 to the nearest 10, 100, 1 000, 10 000 and 100 000 round decimals with two decimal places to the nearest whole number and to one decimal place	round any whole number to a required degree of accuracy solve problems which require answers to be rounded to specified degrees of accuracy
Problem Solving				use place value and number facts to solve problems	solve number problems and practical problems involving these ideas.	solve number and practical problems that involve all of the above and with increasingly large positive numbers	solve number and practical problems that involve all of the above	solve number and practical problems that involve all of the above

Addition and Subtraction

	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number bonds		Bonds to 5 Number bonds 10 (tens frame) Number bonds to 10 (part-part whole model)	represent and use number bonds and related subtraction facts within 20	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100				
Mental Calculations		Find one more and one less Combine two groups to find the whole Adding by counting on Subtract by counting back	add and subtract one-digit and two-digit numbers to 20, including zero read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)	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	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 mentally with increasingly large numbers	perform mental calculations, including with mixed operations and large numbers use their knowledge of the order of operations to carry out calculations involving the four operations
Written methods			read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)		add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	
Inverse operations, estimating and checking answers				recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	estimate the answer to a calculation and use inverse operations to check answers	estimate and use inverse operations to check answers to a calculation	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Problem Solving		Sorting into groups	solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$	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 • solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	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

Multiplication and Division

	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication and division facts		Doubling Halving and sharing Odds and evens	count in multiples of two's, five's and ten's	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	count from 0 in multiples of 4, 8, 50 and 100 recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	count in multiples of 6, 7, 9, 25 and 1 000 recall multiplication and division facts for multiplication tables up to 12 × 12	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000	
Mental calculations				show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	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 and divide numbers mentally drawing upon known facts multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	perform mental calculations, including with mixed operations and large numbers associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8)
Written Calculation				calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	multiply two-digit and three-digit numbers by a one-digit number using formal written layout	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers 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 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 short division where appropriate for the context 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 use written division methods in cases where the answer has up to two decimal places
Properties of numbers: multiples, factors, primes, square and cube numbers						recognise and use factor pairs and commutativity in mental calculations	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19 recognise and use square numbers and cube numbers, and the notation for squared and cubed.	identify common factors, common multiples and prime numbers use common factors to simplify fractions; use common multiples to express fractions in the same denomination calculate, estimate and compare volume of cubes and cuboids using standard units, including centimeter cubed (cm^3) and cubic meters (m^3), and extending to other units such as mm^3 and km^3
Order of operations								use their knowledge of the order of operations to carry out calculations involving the four operations
Inverse operations, estimating and checking answers					estimate the answer to a calculation and use inverse operations to check answers	estimate and use inverse operations to check answers to a calculation		use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
Problem Solving			solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	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	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	solve problems involving addition, subtraction, multiplication and division solve problems involving similar shapes where the scale factor is known or can be found

Fractions, Decimals and Percentages

	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Counting in fraction steps				Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line	count up and down in tenths	count up and down in hundredths		
Reasoning fractions			recognise, find and name a half as one of two equal parts of an object, shape or quantity recognise, find and name a quarter as one of four equal parts of an object, shape or quantity	recognise, find, name and write fractions $^1/_3$, $^1/_4$, $^2/_4$ and $^3/_4$ of a length, shape, set of objects or quantity	recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators recognise that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10. recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators	recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.	recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	
Comparing fractions					compare and order unit fractions, and fractions with the same denominators		compare and order fractions whose denominators are all multiples of the same number	compare and order fractions, including fractions >1
Comparing decimals						compare numbers with the same number of decimal places up to two decimal places	read, write, order and compare numbers with up to three decimal places	identify the value of each digit in numbers given to three decimal places
Rounding including decimals						round decimals with one decimal place to the nearest whole number	round decimals with two decimal places to the nearest whole number and to one decimal place	solve problems which require answers to be rounded to specified degrees of accuracy
Equivalence				write simple fractions e.g. $^1/_2$ of 6 = 3 and recognise the equivalence of $^2/_4$ and $^1/_2$.	recognise and show, using diagrams, equivalent fractions with small denominators	recognise and show, using diagrams, families of common equivalent fractions recognise and write decimal equivalents of any number of tenths or hundredths	identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths read and write decimal numbers	use common factors to simplify fractions; use common multiples to express fractions in the same denomination associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)

		Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
							recognise and write decimal equivalents to $^{1}/_{4}$; $^{1}/_{2}$; $^{3}/_{4}$	as fractions (e.g. $0.71 = {}^{71}/_{100}$) recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents 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 fraction	recall and use equivalences between simple fractions, decimals and percentages, including in different contexts
	Addition and subtraction of decimals					add and subtract fractions with the same denominator within one whole (e.g. $^{5}/_{7} + {}^{1}/_{7} = {}^{6}/_{7}$)	add and subtract fractions with the same denominator	add and subtract fractions with the same denominator and multiples of the same number recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. $^{2}/_{5} + {}^{4}/_{5} = {}^{6}/_{5} = 1^{1}/_{5}$)	add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
	Multiplication and division of fractions							multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $^{1}/_{4} \times {}^{1}/_{2} = {}^{1}/_{8}$) multiply one-digit numbers with up to two decimal places by whole numbers
									divide proper fractions by whole numbers (e.g. $^{1}/_{3} \div 2 = {}^{1}/_{6}$)
	Multiplicaitan and divition of decimals						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		multiply one-digit numbers with up to two decimal places by whole numbers multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^{3}/_{8}$) use written division methods in cases where the answer has up to two decimal places
	Problem Solving					solve problems that involve all of the above	solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number solve simple measure and money problems involving fractions and decimals to two decimal places.	solve problems involving numbers up to three decimal places solve problems which require knowing percentage and decimal equivalents of $^{1}/_{2}$, $^{1}/_{4}$, $^{1}/_{5}$, $^{2}/_{5}$, $^{4}/_{5}$ and those with a denominator of a multiple of 10 or 25.	

Ratio and Proportion		Nursery Reception	Year 1 Year 2	Year 3 Year 4	Year 5	Year 6
						solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison solve problems involving similar shapes where the scale factor is known or can be found solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Measurement		Nursery Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Comparing and estimating		compare, describe and solve practical problems for: • lengths and heights [e.g. long/short, longer/shorter, tall/short, double/half] • mass/weight [e.g. heavy/light, heavier than, lighter than] • capacity and volume [e.g. full/empty, more than, less than, half, half full, quarter] • time [e.g. quicker, slower, earlier, later] sequence events in chronological order using language [e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]		compare durations of events, for example to calculate the time taken by particular events or tasks. estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight (appears also in Telling the Time)	estimate, compare and calculate different measures, including money in pounds and pence (also included in Measuring)	calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes (also included in measuring) estimate volume (e.g. using 1 cm^3 blocks to build cubes and cuboids) and capacity (e.g. using water)	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 such as mm^3 and km^3.

		Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Measuring and calculating		Daily routine Recognise length, height and distance Understand the difference between weight and capacity	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	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 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	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	estimate, compare and calculate different measures, including money in pounds and pence measure and calculate the perimeter of a rectilinear figure find the area of rectilinear shapes by counting squares	measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) measure the perimeter of simple 2-D shapes calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	estimate, compare and calculate different measures, including money in pounds and pence measure and calculate the perimeter of a rectilinear figure calculate the area of parallelograms and triangles calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [e.g. mm^3 and km^3]. recognise when it is possible to use formulae for area and volume of shapes
	Telling the time		Daily routine Order and sequence events measure short periods of time	tell the time to the hour and half past the hour and draw the hands on a clock face to show these times recognise and use language relating to dates, including days of the week, weeks, months and years	tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times know the number of minutes in an hour and the number of hours in a day.	tell and write the time from 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, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight	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 (appears also in Converting)	solve problems involving converting between units of time	
	Converting				know the number of minutes in an hour and the number of hours in a day. (appears also in Telling the Time)	know the number of seconds in a minute and the number of days in each month, year and leap year	convert between different units of measure (e.g. kilometer to meter; hour to minute) read, write and convert time between analogue and digital 12 and 24-hour clocks solve problems involving converting between units of time solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days	convert between different units of metric measure (e.g. kilometre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) solve problems involving converting between units of time understand and use equivalences between metric units and common imperial units such as inches, pounds and pints	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 solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate convert between miles and kilometers

		Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Geometry: Properties of shape	Identifying shapes and their properties	talk about the shapes of everyday objects	recognise 2-D and 3-D shapes; using mathematical terms selects a particular named shape	recognise and name common 2-D and 3-D shapes, including: • 2-D shapes [e.g. rectangles (including squares), circles and triangles] • 3-D shapes [e.g. cuboids (including cubes), pyramids and spheres].	identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]		identify lines of symmetry in 2-D shapes presented in different orientations	identify 3-D shapes, including cubes and other cuboids, from 2-D representations	recognise, describe and build simple 3-D shapes, including making nets illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
	Drawing and constructing	show an interest in shape by playing with shapes	Make simple patterns Explore more complex patterns			draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them	complete a simple symmetric figure with respect to a specific line of symmetry	draw given angles, and measure them in degrees (°)	draw 2-D shapes using given dimensions and angles recognise, describe and build simple 3-D shapes, including making nets
	Comparing and classifying	identify similarities of shapes in the environment	order two or three items by length and height order two items by weigh or capacity		compare and sort common 2-D and 3-D shapes and everyday objects		compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes	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	compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
	Angles					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	identify acute and obtuse angles and compare and order angles up to two right angles by size	know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles identify: • angles at a point and one whole turn (total 360°) • angles at a point on a straight line and ½ a turn (total 180°) • other multiples of 90°	recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles

Statistics

	Nursery Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Interpreting, constructing and presenting data			interpret and construct simple pictograms, tally charts, block diagrams and simple tables. ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity ask and answer questions about totalling and comparing categorical data.	interpret and present data using bar charts, pictograms and tables.	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.	complete, read and interpret information in tables, including timetables.	interpret and construct pie charts and line graphs and use these to solve problems.
Solving problems				solve one-step and two-step questions [e.g. 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.	solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.	solve comparison, sum and difference problems using information presented in a line graph	calculate and interpret the mean as an average

Algebra

	Nursery Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Equations		solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$ represent and use number bonds and related subtraction facts within 20	recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems. recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. solve problems, including missing number problems, involving multiplication and division, including integer scaling		use the properties of rectangles to deduce related facts and find missing lengths and angles	express missing number problems algebraically find pairs of numbers that satisfy number sentences involving two unknowns. enumerate all possibilities of combinations of two variables.
Formula					Perimeter can be expressed algebraically as $2(a + b)$ where a and b are the dimensions in the same unit.		use simple formulae recognise when it is possible to use formulae for area and volume of shapes.
Sequences		sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening	compare and sequence intervals of time order and arrange combinations of mathematical objects in patterns				Perimeter can be expressed algebraically as $2(a + b)$ where a and b are the dimensions in the same unit.

Geometry: Position and direction

	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Position, direction and movement	use positional language	describe the position of an object	describe position, direction and movement, including half, quarter and three-quarter turns.	use mathematical vocabulary to describe position, direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)		describe positions on a 2-D 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	identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed	describe positions on the full coordinate grid (all four quadrants) draw and translate simple shapes on the coordinate plane, and reflect them in the axes.
Pattern		Use common shapes to create patterns and build models		order and arrange combinations of mathematical objects in patterns and sequences				