Maths
at
Harden Primary School

BELIEVING . ACHIEVING . SUCCEEDING

HARDEN
primary school

MATHS CURRICULUM

This document defines the fundamental elements of primary mathematics teaching at Harden. Much of the pedagogy is based on the NCETM's research into primary mathematics teaching in East Asian jurisdictions and follows the long-term plan based on White Rose Maths. It is fully consistent with the Primary National Curriculum in England.

Rationale

This policy is the formal statement of intent for teaching mathematics at Harden Primary. The policy facilitates how we have adapted our lessons to incorporate the fundamental elements of primary mathematics teaching and how we follow the National Curriculum requirements. The implementation of this policy is the responsibility of all teaching staff. Our curriculum is a cumulative curriculum, so that once a topic is covered it is met many times again in other contexts, therefore building on previous learning.

Aims

We aim to:

- provide our pupils with a mathematics curriculum which will produce individuals who are numerate, literate, creative, independent, inquisitive, enquiring and confident

- provide a stimulating environment and adequate resources so that pupils can develop their mathematical skills to their full potential

- ensure all pupils become fluent in mathematics through varied and frequent practise with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately

- to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language, and

- enable our pupils to solve problems by applying their mathematics to a variety of problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Children who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any new content is accessed. Children who are not sufficiently fluent with earlier materials should consolidate their understanding, including through additional practice, before moving on.

Teaching and Learning

Teaching and learning follows the Early Years Framework and National Curriculum learning objectives through the White Rose Maths units for each specific year group.

- Teachers will ensure all children have easy access to a variety of resources to help visualise abstract concepts, and know how to use these resources to visualise concepts and ideas to aid their understanding.
- Teachers will provide children will a variety of opportunities to develop and extend their mathematical skills using a variety of concrete, pictorial and abstract activities including: group work, paired work, whole class teaching and individual work.
- Children are taught efficient written methods for each operation as stated in the school's Calculation Policy.
- Daily lessons include a variety of fluency, problem solving and reasoning activities based on the current maths skill being taught. Children will be given work based on their pre-learning task assessment data.
- Teachers will make full use of ITPs and other ICT resources like WRM smart notebook pages to enhance their maths lessons.
- Teachers will, wherever appropriate, include mathematics in other subjects including the creative curriculum.

Teaching principles

Teaching is underpinned by a belief in the importance of mathematics and that the vast majority of children can succeed in learning mathematics in line with national expectations for the end of each key stage.

All children are assessed at the start of a unit based on the unit's key objectives; these are based on the children's own working assessment level. Work during the unit is then pitched appropriately based on this data and teacher assessment.

During the unit, the learning needs of each individual child is addressed through careful scaffolding, skilful questioning and appropriate rapid intervention during or after the lesson, in order to provide the necessary support and challenge.

After the unit, children are assessed using a post learning assessment task allowing them to showcase their progress across the unit. This data is then used by teachers, to plan opportunities to further support individuals/groups of children.

Factual knowledge (e.g. times tables), procedural knowledge (e.g. formal written methods) and conceptual knowledge (e.g. of place value) are taught in a fully integrated way and are important elements in the learning of mathematics.

Precise mathematical language, modelled in full sentences, is used by teachers and support staff, so that mathematical ideas are conveyed with clarity and precision. Pupils are expected to use the appropriate vocabulary to explain their understanding.

Conceptual variation and procedural variation are used extensively throughout teaching, to present the mathematics in ways that promote deep, sustainable learning. Sufficient time is spent on key concepts to ensure learning is well developed and deeply embedded before moving on. The reasoning behind mathematical processes is emphasised with exploration of how answers are obtained, why the method/strategy worked and what might be the most efficient method/strategy.

Lesson design

The White Rose Maths programmes of study are used as a basis to provide lessons that are carefully sequenced. Learning is broken down into small, connected steps, building from what pupils already know. Potential misconceptions are identified in advance and used as teaching points with strategies to address these.

Key questions are planned and used to challenge thinking and develop learning for all pupils. A variety of contexts and representations are carefully chosen to develop reasoning skills and to help pupils link concrete ideas to abstract mathematical concepts.

Assessment

Assessment is an integral part of teaching and learning in mathematics and is a continuous process. It is the responsibility of the class teacher to assess all pupils in their class regularly and use this information, to inform future teaching and learning in lessons and for interventions. Assessment is purposeful and allows teachers to match the current level of work to the needs of each pupil, ensuring progress.

Assessment takes several forms:

- Pre and post learning tasks at the beginning and end of each new unit
- Formative assessment leading towards a data collection (in each term).
- Summative assessment during lessons through quality questioning, paired work, group work, 1:1 work and recorded work in books.

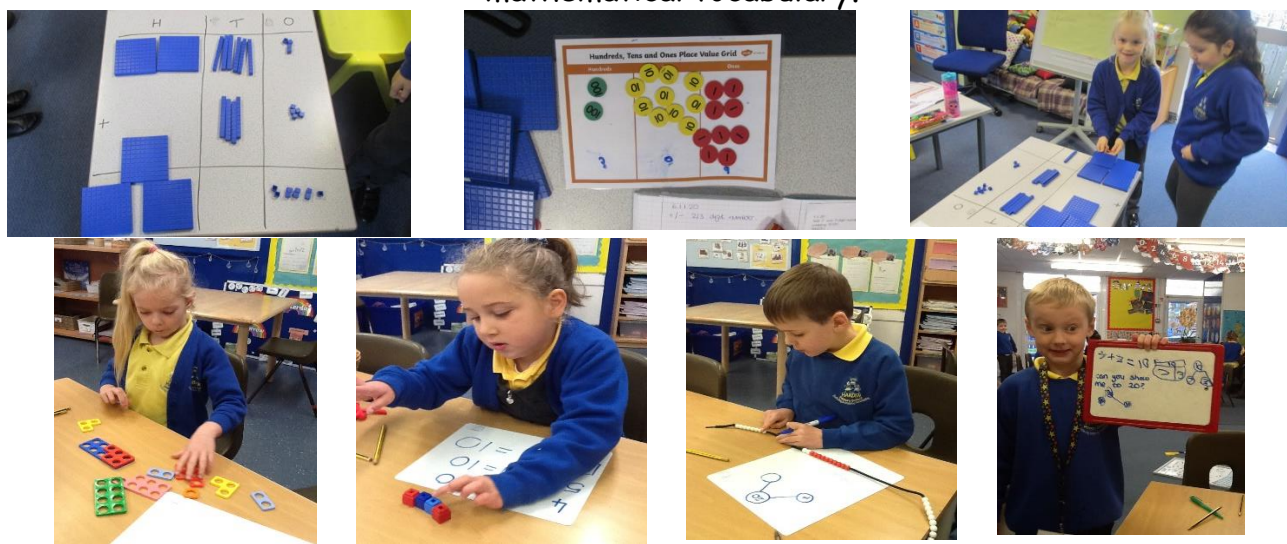# SEQUENCE OF LEARNING

Step 1 – Pre-Learning Task

All units of learning begin with a short (no more than one lesson) pre-learning task.

The children are asked to answer questions about each key objective from the unit and this is then self-assessed by the children and marked. The findings are analysed on a class grid to allow all following activities within the unit to be appropriately pitched for all abilities.

Step 2 – Maths Journey

The children are taught through a CPA approach (concrete, pictorial and abstract) which allows them to 'make it, draw it and write it' making links between resources, images and written calculations. Small steps are identified using the White Rose Maths schemes of learning and these are taught in order to make links and build upon previous skills learnt. Children will be taught through a variety of fluency, problem solving and reasoning activities and are expected to show their working out including any explanations using key mathematical vocabulary.

Step 3 – Post-Learning Task

All units of learning are completed with a short (one lesson) post-learning task.

When the unit has been completed, the children are re-assessed using a post-learning task. This activity is marked and analysed on a class grid; the results are used to identify any children who would benefit from specific intervention.
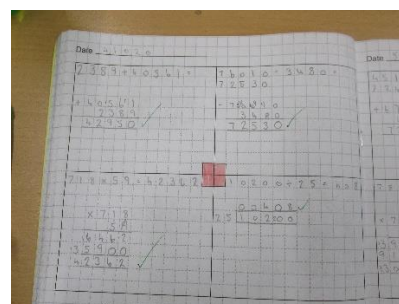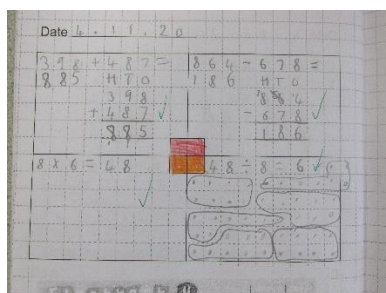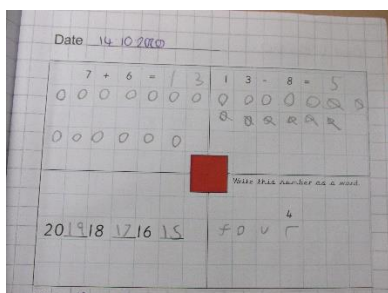
numbers to 10,000,000		Round any number		identify negative numbers		compare and order any number		Additional comments
PRE 1,2,3,10,11	POST 1,3,11	PRE 4,10	POST 2,4,10	PRE 5	POST 5	PRE 6,7,8,9	POST 1,4,6,7,8,9	
								20
								14 no line interval; negative nos; rounding
								20
								20
								18 no line interval
								20
								17 negative nos
								17 negative nos
								20
								20
								20
								14 no line interval; negative nos

INTERVENTION

Based on the post-learning task results, teachers plan an intevention for specific objectives where children are not yet secure which will be delivered either by the teacher or a teaching assistant. This can be revisited throughout the year according to further assessment results.
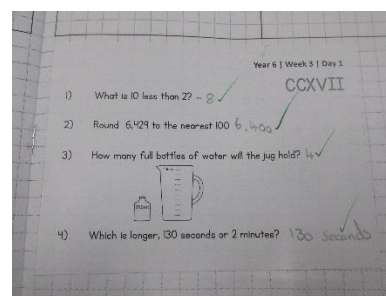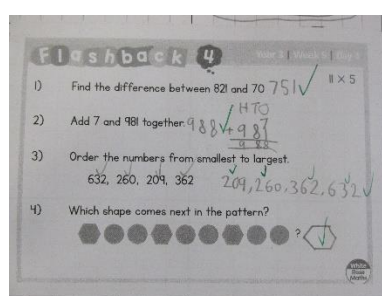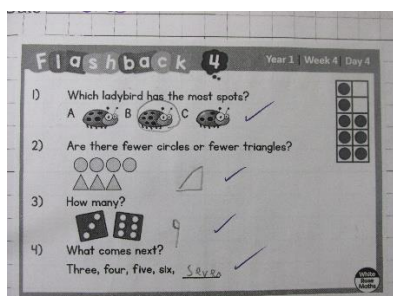
DAILY DRILLING

Children will spend up to 15 minutes per day (at least 4 times per week), in addition to their daily maths lesson developing their skills of fluency across the four number operations (addition, subtraction, multiplication and division).

FLASHBACK FOUR

Children will spend 5 minutes per day in addition to their daily maths lesson revisiting previously taught skills from across the curriculum using the White Rose Maths Flashback Four activities. The first question is related to the previous lesson; the next question is related to the previous week and the third and fourth questions are related to concepts studied in the last month or previous year.

TT ROCKSTARS

Times Tables Rock Stars is a carefully sequenced programme of daily times tables practice. Each week concentrates on a different times table, with a recommended consolidation week for rehearsing the tables that have recently been practised every third week or so. The children (Year 2 – Year 6) are taught the current table through a variety of concrete apparatus and activities; they then practise online using the TT Rockstars app. Children also have access to home learning on the app. Children's achievements are celebrated weekly during achievement assembly when they are rewarded with a certificate for achieving a new 'rock status'; this is then added to the whole school TT Rockstar display.

Name ↓	Avg Speed (s/q)	% Accuracy	% Active players	Daily minutes per active player	Avg coins per person	Avg correct answers per person
Year 6	2.58	92.36	97	25s	5,548	630
Year 5	2.65	90.98	97	45s	3,414	694
Year 4	4.42	77.45	97	30s	2,202	347
Year 3	5.00	82.41	71	26s	2,962	316
Year 2	5.47	98.99	3	10s	953	98

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EYFS

Mathematics in the Early Years Foundation Stage Curriculum comes under two strands, each of which has an Early Learning Goal attached: -

Number
Early Learning Goal - Have a deep understanding of number to 10, including the composition of each number.
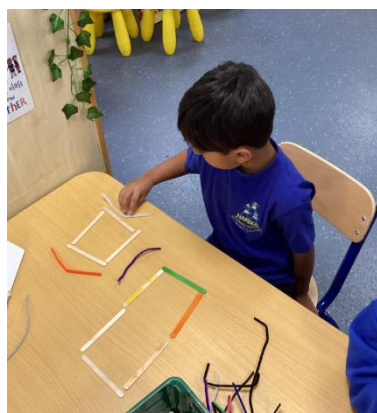- Subitise (recognise quantities without counting) up to 5;
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

Numerical Patterns
Early Learning Goal - Verbally count beyond 20, recognising the pattern of the counting system.
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

As with all other areas of learning, the teaching and learning of mathematics in Reception takes place both indoors and outdoors through a wide range of practical and "hands on" activities. Staff use their knowledge and expertise to plan a high-quality learning environment which provides children with lots of opportunities to explore different aspects of number and shape, space and measures to learn new concepts. Children develop a love of maths through games, songs, rhymes, and play using concrete manipulatives, pictorial structures, and representations. The children have a wide range of structured play resources available to them throughout the year - this is known as "continuous provision". The adults model the use of these resources and the appropriate mathematical language as they support the children in their play.

LONG TERM PLAN – RECEPTION

	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	To 20 and Beyond			First Then Now			Find My Pattern			On The Move				

LONG TERM PLAN – YEAR 1

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	**Number** Place value (within 10)					**Number** Addition and subtraction (within 10)					Geometry Shape	Consolidation
Spring	**Number** Place value (within 20)			**Number** Addition and subtraction (within 20)			**Number** Place value (within 50)		Measurement Length and height		Measurement Mass and volume	
Summer	**Number** Multiplication and division			**Number** Fractions		Geometry Position and direction	**Number** Place value (within 100)		Measurement Money	Measurement Time		Consolidation

LONG TERM PLAN – YEAR 2

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number **Place value**				Number **Addition and subtraction**					Geometry **Shape**		
Spring	Measurement **Money**		Number **Multiplication and division**					Measurement **Length and height**		Measurement **Mass, capacity and temperature**		
Summer	Number **Fractions**			Measurement **Time**			Statistics		Geometry **Position and direction**		Consolidation	

LONG TERM PLAN – YEAR 3

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number **Place value**			Number **Addition and subtraction**					Number **Multiplication and division A**			
Spring	Number **Multiplication and division B**			Measurement **Length and perimeter**			Number **Fractions A**			Measurement **Mass and capacity**		
Summer	Number **Fractions B**		Measurement **Money**		Measurement **Time**			Geometry **Shape**		Statistics		Consolidation

LONG TERM PLAN – YEAR 4

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number **Place value**				Number **Addition and subtraction**			Measurement **Area**	Number **Multiplication and division A**			Consolidation
Spring	Number **Multiplication and division B**			Measurement **Length and perimeter**	Number **Fractions**				Number **Decimals A**			
Summer	Number **Decimals B**		Measurement **Money**		Measurement **Time**		Consolidation	Geometry **Shape**			Statistics	Geometry **Position and direction**

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LONG TERM PLAN – YEAR 5

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number **Place value**			Number **Addition and subtraction**		Number **Multiplication and division A**			Number **Fractions A**			
Spring	Number **Multiplication and division B**			Number **Fractions B**		Number **Decimals and percentages**			Measurement **Perimeter and area**		**Statistics**	
Summer	Geometry **Shape**			Geometry **Position and direction**		Number **Decimals**			Number **Negative numbers**	Measurement **Converting units**		Measurement **Volume**

LONG TERM PLAN – YEAR 6

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number **Place value**		Number **Addition, subtraction, multiplication and division**					Number **Fractions A**		Number **Fractions B**		Measurement **Converting units**
Spring	**Ratio**		**Algebra**		Number **Decimals**		Number **Fractions, decimals and percentages**		Measurement **Area, perimeter and volume**		**Statistics**	
Summer	Geometry **Shape**		Geometry **Position and direction**	**Themed projects, consolidation and problem solving**								

PLACE VALUE

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value: Counting	• count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • Count numbers to 100 in numerals; count in multiples of twos, fives and tens **Autumn 1** **Autumn 4** **Spring 2** **Summer 4**	• count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward **Autumn 1**	• count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number **Autumn 1** **Autumn 3**	• count in multiples of 6, 7, 9, 25 and 1000 • count backwards through zero to include negative numbers **Autumn 1** **Autumn 4**	• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • count forwards and backwards with positive and negative whole numbers, including through zero **Autumn 1**	
Place Value: Represent	• identify and represent numbers using objects and pictorial representations • read and write numbers to 100 in numerals • read and write numbers from 1 to 20 in numerals and words. **Autumn 1** **Autumn 4** **Spring 2** **Summer 4**	• read and write numbers to at least 100 in numerals and in words • identify, represent and estimate numbers using different representations, including the number line **Autumn 1**	• identify, represent and estimate numbers using different representations • read and write numbers up to 1000 in numerals and in words **Autumn 1**	• identify, represent and estimate numbers using different representations • 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 **Autumn 1**	• read, write, (order and compare) numbers to at least 1 000 000 and determine the value of each digit • read Roman numerals to 1000 (M) and recognise years written in Roman numerals. **Autumn 1**	• read, write, (order and compare) numbers up to 10 000 000 and determine the value of each digit **Autumn 1**

PLACE VALUE

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value : Use PV and Compare	• given a number, identify one more and one less **Autumn 1** **Autumn 4** **Spring 2** **Summer 4**	• recognise the place value of each digit in a two-digit number (tens, ones) • compare and order numbers from 0 up to 100; use <, > and = signs **Autumn 1**	• recognise the place value of each digit in a three-digit number (hundreds, tens, ones) • compare and order numbers up to 1000 **Autumn 1**	• find 1000 more or less than a given number • recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) • order and compare numbers beyond 1000 **Autumn 1**	• (read, write) order and compare numbers to at least 1 000 000 and determine the value of each digit **Autumn 1**	• (read, write), order and compare numbers up to 10 000 000 and determine the value of each digit **Autumn 1**
Place Value: Problems& Rounding		• use place value and number facts to solve problems. **Autumn 1**	• solve number problems and practical problems involving these ideas **Autumn 1**	• 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 **Autumn 1**	• interpret negative numbers in context • round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 • solve number problems and practical problems that involve all of the above **Autumn 1**	• 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 **Autumn 1**

ADDITION AND SUBTRACTION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition & Subtraction: Recall, Represent, Use	• read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs • represent and use number bonds and related subtraction facts within 20	• recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • show that addition of two numbers can be done in any order (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	• 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	
	Autumn 2 Spring 1	Autumn 2 .	Autumn 2	Autumn 2	Autumn 2	

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ADDITION AND SUBTRACTION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition & Subtraction: Calculations	• add and subtract one-digit and two-digit numbers to 20, including zero	• 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	• add and subtract numbers mentally, including: ➢ a three-digit number and ones ➢ a three-digit number and tens ➢ a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	• add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	• add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) • add and subtract numbers mentally with increasingly large numbers	• perform mental calculations, including with mixed operations and large numbers • use their knowledge of the order of operations to carry out calculations involving the four operations
	Autumn 2 Spring 1	Autumn 2	Autumn 2	Autumn 2	Autumn 2	Autumn 2

ADDITION AND SUBTRACTION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition & Subtraction: Solve Problems	• solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ – 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 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 problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
	Autumn 2 Spring 1	Autumn 2	Autumn 2	Autumn 2	Autumn 2	Autumn 2

MULTIPLICATION AND DIVISION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication & Division: Recall, Represent, Use		• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	• recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	• recall multiplication and division facts for multiplication tables up to 12 × 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	• 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 (^{2}) and cubed (^{3})	• identify common factors, common multiples and prime numbers • use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
		Autumn 4 Spring 1	Autumn 3	Autumn 4 Spring 1	Autumn 4	Autumn 2

MULTIPLICATION AND DIVISION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication & Division: Calculations		• calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	• write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and 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 • 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	• 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
		Autumn 4 Spring 1	Autumn 3 Spring 1	Spring 1	Autumn 4 Spring 1 Summer 1	Autumn 2

MULTIPLICATION AND DIVISION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication & Division: Solve Problems	• solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher **Summer 1**	• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts **Autumn 4** **Spring 1**	• 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 **Spring 1**	• 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 **Spring 1**	• solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes • solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates **Autumn 4** **Spring 1**	• solve problems involving addition, subtraction, multiplication and division **Autumn 2**
Multiplication & Division: Combined Operations					• solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign **Spring 1**	• use their knowledge of the order of operations to carry out calculations involving the four operations **Autumn 2**

FRACTIONS, DECIMALS AND PERCENTAGES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions: Recognise and Write	• 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 Summer 2	• 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 Spring 4	• 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 Spring 5	• count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. Spring 3	• 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, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$] Spring 2	
Fractions: Compare		• Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$ Spring 4	• recognise and show, using diagrams, equivalent fractions with small denominators • compare and order unit fractions, and fractions with the same denominators Summer 1	• recognise and show, using diagrams, families of common equivalent fractions Spring 3	• compare and order fractions whose denominators are all multiples of the same number Spring 2	• use common factors to simplify fractions; use common multiples to express fractions in the same denomination • compare and order fractions, including fractions > 1 Autumn 3

FRACTIONS, DECIMALS AND PERCENTAGES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions: Calculations		• write simple fractions for example, $\frac{1}{2}$ of 6 = 3 **Spring 4**	• add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$] **Summer 1**	• add and subtract fractions with the same denominator **Spring 3**	• 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 **Spring 3**	• 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, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$] • divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$] **Autumn 3**
Fractions: Solve Problems			• solve problems that involve all of the above **Spring 5** **Summer 1**	• 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 **Spring 3**		

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FRACTIONS, DECIMALS AND PERCENTAGES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Decimals: Recognise and Write				• recognise and write decimal equivalents of any number of tenths or hundredths • recognise and write decimal equivalents to $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ **Spring 4** **Summer 1**	• 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 **Spring 3**	• identify the value of each digit in numbers given to three decimal places **Spring 1**
Decimals: Compare				• 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 **Summer 1**	• 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 **Spring 3**	

FRACTIONS, DECIMALS AND PERCENTAGES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Decimals: Calculations & Problems				• find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths	• solve problems involving number up to three decimal places	• multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places • multiply one-digit numbers with up to two decimal places by whole numbers • use written division methods in cases where the answer has up to two decimal places • solve problems which require answers to be rounded to specified degrees of accuracy
				Spring 4	Summer 1	Spring 1

FRACTIONS, DECIMALS AND PERCENTAGES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions, Decimals and Percentages				• solve simple measure and money problems involving fractions and decimals to two 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 fractions with a denominator of a multiple of 10 or 25	• associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts
				Spring 3 **Spring 4** **Summer 1**	**Spring 3**	**Spring 1** **Spring 2**

RATIO AND PROPORTION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Ratio and Proportion						• solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts • solve problems involving the calculation of percentages [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. **Spring 6**

ALGEBRA

ALGEBRA

ALTHOUGH ALGEBRAIC NOTATION IS NOT INTRODUCED UNTIL YR6, ALGEBRAIC THINKING STARTS MUCH EARLIER AS EXEMPLIFIED BY THE 'MISSING NUMBER' OBJECTIVES FROM YR1, 2 AND 3

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Algebra	• solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ – 9	• recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	• solve problems, including missing number problems			• use simple formulae • generate and describe linear number sequences • express missing number problems algebraically • find pairs of numbers that satisfy an equation with two unknowns • enumerate possibilities of combinations of two variables. **Spring 3**

MEASUREMENT

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Using Measures	• 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 [for example, full/empty, more than, less than, half, half full, quarter] ➢ time [for example, quicker, slower, earlier, later] • measure and begin to record the following: ➢ lengths and heights ➢ mass/weight ➢ capacity and volume ➢ time (hours, minutes, seconds)	• 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 =	• measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)	• Convert between different units of measure [for example, kilometre to metre; hour to minute] • estimate, compare and calculate different measures	• 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 • use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling	• 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
	Spring 3 **Spring 4** **Summer 6**	**Spring 5** **Summer 4**	**Spring 4** **Summer 4**	**Autumn 3** **Spring 2** **Summer 3**	**Summer 1** **Summer 4** **Summer 5**	**Spring 4**

MEASUREMENT

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Money	• recognise and know the value of different denominations of coins and notes	• 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	• 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	• use all four operations to solve problems involving measure [for example, money]	
	Summer 5	Autumn 3	Spring 2	Summer 2	Summer 1	

MEASUREMENT

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Time	• 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	• compare and sequence intervals of time • tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times • know the number of minutes in an hour and the number of hours in a day	• tell and write the time from 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]	• read, write and convert time between analogue and digital 12- and 24-hour clocks • solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days	• solve problems involving converting between units of time	• use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit, and vice versa
	Summer 6	Summer 3	Summer 2	Summer 3	Summer 4	Year 5 Summer 4

MEASUREMENT

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Perimeter, Area, Volume			• measure the perimeter of simple 2-D shapes	• measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres • find the area of rectilinear shapes by counting squares	• measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres • calculate and compare the area of rectangles (including squares), and including using standard 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]	• 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 cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3]
			Spring 4	**Autumn 3** **Spring 2**	**Autumn 5** **Summer 5**	**Spring 5**

GEOMETRY

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Geometry: 2-D Shapes	• recognise and name common 2-D shapes [for example, rectangles (including squares), circles and triangles] **Autumn 3**	• identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line • 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 shapes and everyday objects **Spring 3**	• draw 2-D shapes **Summer 3**	• compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes • identify lines of symmetry in 2-D shapes presented in different orientations **Summer 5**	• distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • use the properties of rectangles to deduce related facts and find missing lengths and angles **Summer 2**	• draw 2-D shapes using given dimensions and angles • compare and classify geometric shapes based on their properties and sizes • illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius **Summer 1**
Geometry: 3-D Shapes	• recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] **Autumn 3**	• recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres]. • compare and sort common 3-D shapes and everyday objects **Spring 3**	• make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them **Summer 3**		• identify 3-D shapes, including cubes and other cuboids, from 2-D representations **Summer 2**	• recognise, describe and build simple 3-D shapes, including making nets **Summer 1**

GEOMETRY

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Geometry: Angles & Lines			• recognise angles as a property of shape or a description of a turn • identify right angles, recognise that two right angles make a half-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 • identify lines of symmetry in 2-D shapes presented in different orientations • complete a simple symmetric figure with respect to a specific line of symmetry	• know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles • draw given angles, and measure them in degrees • identify: ➢ angles at a point and one whole turn (total 360°) ➢ angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°) ➢ other multiples of 90°	• find unknown angles in any triangles, quadrilaterals, and regular polygons • recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
			Summer 3	Summer 5	Summer 2	Summer 1

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GEOMETRY

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Geometry: Position & Direction	• describe position, direction and movement, including whole, half, quarter and three-quarter turns	• order and arrange combinations of mathematical objects in patterns and sequences • use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)		• describe positions on a 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
	Summer 3	Spring 3 Summer 1		Summer 6	Summer 3	Autumn 4

STATISTICS

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Statistics: Present and Interpret		• interpret and construct simple pictograms, tally charts, block diagrams and simple tables Spring 2	• interpret and present data using bar charts, pictograms and tables Spring 3	• interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs Summer 4	• complete, read and interpret information in tables, including timetables Autumn 3	• interpret and construct pie charts and line graphs and use these to solve problems Summer 3
Statistics: Solve Problems		• 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 Spring 2	• 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 Spring 3	• solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs Summer 4	• solve comparison, sum and difference problems using information presented in a line graph Autumn 3	• calculate and interpret the mean as an average Summer 3

APPENDIX 1: MATHS BOOK GUIDANCE

Maths Books

KS1 - 1cm square pages   KS2 - 7mm square pages

- All work to be dated with the skill identified and underlined (not what the children are doing, but what they are learning).

- CPA - different representations _CONCRETE_ e.g. practical objects (straws, base 10, counters); _PICTORIAL_ e.g. part, part whole, tens frame, bar model); _ABSTRACT_ e.g. problem solving and reasoning explanations. Photographs of concrete activities should always show the outcome so that the learning is evident.

- Fluency - examples to learn/consolidate skills in different representations, using procedural variation (each question will move the learning on).

- Problem Solving and Reasoning - examples of problem solving activities for all abilities regularly (per small step), where the children are to show/explain their working out and not just give the answer. Evidence of the use of correct mathematical vocabulary (spelt correctly) to explain method and/or thinking.

- Presentation - work to be stuck in/presented neatly with the answer clearly evident. All lines should be drawn with a ruler and any errors are to be crossed out and not erased.

- Marking - marking (including live marking) is to be regular and up to date so misconceptions can be identified early and acted upon quickly. Evidence of asking children to check any errors, short question/activity to consolidate (if required). Improvements or corrections should be completed in green pen and marked so that any further misconceptions can be identified and addressed.

APPENDIX 2: LEARNING ENVIRONMENT GUIDANCE

LEARNING ENVIRONMENT

MATHS TEACHING AND LEARNING GUIDANCE

MUST: (NON-NEGOTIABLES)

Maths working wall needs to be accessible to children to scaffold learning during maths lessons. It should be referred to (active) during the lesson by the Teacher/Teaching Assistant. Children should also be trained to use it as a 'go to' to support their learning.

- ***Maths working wall (ACTIVE) to include***:
    - Age appropriate vocabulary for current topic
    - Strategies (WRM small steps) broken down in to child speak steps
    - Children's work (mixture of fluency, problem solving and reasoning)
    - Variety of representations (CPA)
    - Journey of small steps throughout unit
    - Related sentence STEMS

The other areas of the classroom used to display maths resources, can be built up, added to or changed throughout the year.

- ***Maths working wall (STATIC) to include***:
    - Age appropriate prompts e.g number bonds, timetables
    - Age appropriate numberline/no square
    - Selection of revisit material e.g. arithmetic
    - Times tables

APPENDIX 3: DAILY DRILLING GUIDANCE

Daily Drilling Guidance (November 2023)

Daily drilling should be completed for a **minimum**:

Year 1: 3 times a week (Spring and Summer term addition and subtraction)

Year 2: 4 times a week (addition and subtraction only Autumn term 1)

Year 3: 4 times a week

Year 4: 4 times a week

Year 5: 4 times a week

Year 6: 4 times a week

All four calculations (+, -, x and ÷) should be provided for at three different levels:

Green (below ARE)   Yellow (ARE)   Red (GD)

Record calculation if a balancing equation or missing number etc.

Where appropriate, children should be catered for at their individual level enabling them to access daily drilling.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	• Addition facts within 10 • Add 1 and 2 digit numbers to 20 (inc. 0)	• Add across 10 • Add within 100 (only 1's/only 10s) • Add within 100 (any 2 digit numbers) • Add three 1 digit numbers	• Add up to 3 digit numbers (columnar method) • Add fractions within 1 (same denominator)	• Add up to 4 digit numbers (columnar method) • Add improper and mixed fractions with the same denominator (bridging whole)	• Add numbers with more than 4 digits (columnar method) • Add numbers up to 2dp • Add improper and mixed fractions with the same denominator (bridging whole)	• Add numbers with more than 4 digits (columnar method) • Add numbers up to 2dp • Add improper and mixed fractions with the same/diff denominator (bridging whole)
Subtraction	• Subtraction facts within 10 • Subtract 1 and 2 digit numbers to 20 (inc. 0)	• Subtract across 10 • Subtract within 100 (only 1's/only 10s) • Add within 100 (any 2 digit numbers)	• Subtract up to 3 digit numbers (columnar method) • Subtract fractions within 1 (same denominator)	• Subtract up to 4 digit numbers (columnar method) • Subtract improper and mixed fractions with the same denominator (bridging whole)	• Subtract numbers with more than 4 digits (columnar method) • Subtract numbers up to 2dp • Subtract improper and mixed fractions with the same denominator (bridging whole)	• Subtract numbers with more than 4 digits (columnar method) • Subtract numbers up to 2dp • Subtract improper and mixed fractions with the same/ diff denominator (bridging whole)

Multiplication	*SEQUENCE* • Count with 100, forwards/backwards from any number • Count in multiples of 2, 5 and 10 • Count on and back through odd numbers	• Repeated addition (2x, 5x, 10x) • Multiply 2x, 5x and 10x	• Multiply 2x, 3x, 4x, 5x, 8x and 10x • Multiply 2 digit x 1 digit (using 2,3,4,5,8 and 10x tables)	• Multiply using all tables up to 12x12 • Multiply 2 digit and 3 digit numbers by 1 digit numbers • Multiply by 10 and 100	• Multiply using all tables up to 12x12 • Multiply upto 4 digit numbers by 1 and 2 digit numbers • Multiply by 10 and 100 • Multiply proper fractions and mixed numbers by whole numbers	• Multiply using all tables up to 12x12 • Multiply upto 4 digit numbers by 1 and 2 digit numbers • Multiply by 10 and 100 (upto 3dp) • Multiply proper fractions and mixed numbers by whole numbers • Multiply simple pars of proper fractions • Multiply 1 digit numbers with up to 2dp by whole numbers
Division	*COMPARING* • Compare using <> and = within 20 •	• Grouping and division equations (2x, 5x, 10x) • Half of (up to 20)	• Divide 2 digit by 1 digit (using 2,3,4,5,8 and 10x tables)	• Divide 2 and 3 digit (using all tables) • Divide by 10 and 100	• Divide up to 4 digits (using all tables) and find remainders • Divide by 10 and 100	• Divide up to 4 digits (using all tables) and find remainders • Divide by 10 and 100 • Divide proper fractions by whole numbers • Divide to give answer up to 2dp

A variety of calculation types should be shown over time e.g. missing number, answer first, balancing equations, use of decimals, fractions or percentages (appropriate to age group).

Children's books must be monitored to check for progress or lack of and any misconceptions. Also, encourage children to move on/back to allow for appropriate pitch.

All work should be dated and each calculation should be colour coded. Tick or dot (only) each box to record result.

Marking: Marking should be completed on the same day with the whole session taking no longer than 15 minutes. A mixture of teacher/pupil working through each calculation and giving the children the answers should be used. Children should mark their own answers and show where they went wrong.