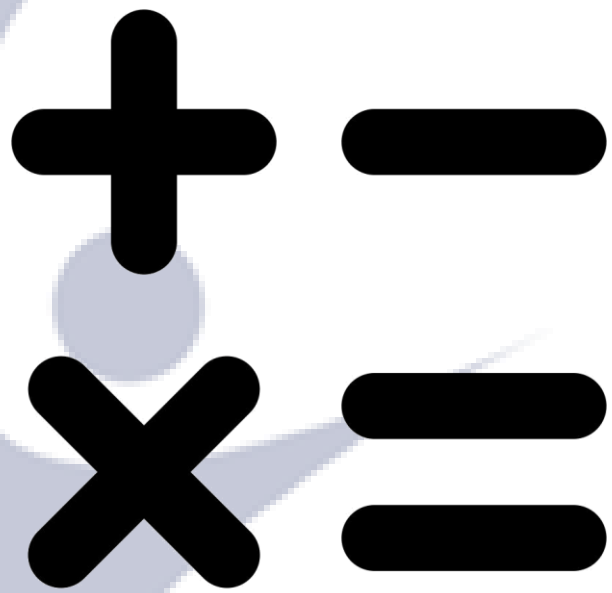
Mathematics



Subject Overview

Limitless Dreams Endless Opportunities

Mathematics curriculum intent

At Manor Park Primary School and Nursery, we believe mathematics is an important part of children's development throughout school, right from an early age. We embrace a Mastery Curriculum approach to our mathematic teaching. This means that as we work through the year group objectives with the children, we spend a greater amount of time going into depth in areas/ concepts. In line with the 2014 National Curriculum for maths, we aim to ensure all children become fluent in the fundamentals of mathematics, are able to reason mathematically and are able to solve problems through the application of their mathematical knowledge. These skills are embedded within Maths lessons and developed consistently over time. We are committed to ensuring that children are able to recognise the importance of Maths in the wider world and that they are also able to use their mathematical skills and knowledge confidently in their lives in a range of different contexts. We want all children to enjoy Mathematics and to experience success in the subject, with the ability to reason mathematically. We strive to ensure that the whole class moves through content at the same pace and when we scaffold, it is through depth rather than acceleration; everyone is given time to think deeply about the maths and we strive to develop a positive attitude in order to build self-confidence, resilience and a sense of achievement.

Through our study of Mathematics, we aim to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Implementation

The content and principles underpinning the 2014 Mathematics curriculum and the Maths curriculum at Manor Park reflect and reinforce an expectation that all children are capable of achieving high standards in Mathematics. The large majority of children progress through the curriculum content at the same pace. Scaffolding is achieved by emphasising deep knowledge and through individual support and intervention. Teaching is underpinned by methodical curriculum design and supported by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge. Practice and consolidation play a central role. Carefully designed variation within this builds fluency and understanding of underlying mathematical concepts. Teachers use precise questioning in class to test conceptual and procedural knowledge and assess children regularly to identify those requiring intervention, so that all children keep up.

Implementation – Power Maths

To ensure whole consistency and progression, the school uses the DfE approved 'Power Maths' scheme from Reception through to Year 6. This is fully aligned with the White Rose Maths scheme and the school's ongoing engagement with the DFE funded Maths Hubs programme continues to ensure that staff at all levels understand the pedagogy of the approach. New concepts are shared within the context of an initial related problem; which children are able to discuss in partners. This initial problem-solving activity prompts discussion and reasoning, as well as promoting an awareness of maths in relatable real-life contexts that link to other areas of learning. In KS1 and KS2, these problems are almost always presented with objects (concrete manipulatives) for children to use. Teachers use careful questions to draw out children's discussions and their reasoning. The teachers then leads children through strategies for solving the problem, including those already discussed. Independent work provides the means for all children to develop their fluency further, before progressing to more complex related problems. Mathematical topics are taught in blocks, to enable the achievement of 'mastery' over time. Each lesson phase provides the means to achieve greater depth, with more able children being offered rich and sophisticated problems, as well as exploratory, investigative tasks, within the lesson as appropriate.

Impact

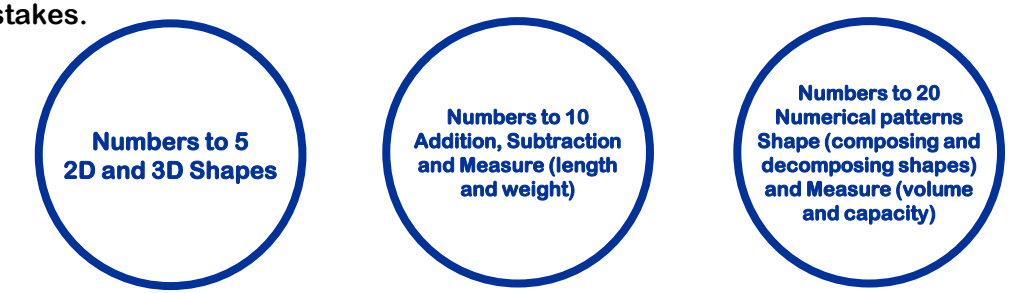
At Manor Park, we consistently deliver mathematics through the maths mastery approach across the school. The school has a supportive ethos and our approaches support the children in developing their collaborative and independent skills, as well as empathy and the need to recognise the achievement of others. Children who attend Manor Park, will make good or better progress from their own personal starting point. By the end of KS2 they will be able to fluently recall their times tables up to 12x; they will have a great understanding of place value; secure with the four operations; understand the relationship between fractions, decimals and percentages; use measurements effectively and accurately; understand how ratio and proportion can be used; solve algebraic problems; have a good understanding of geometry and be able to analyse statistics.

Maths in the Early Years Foundation Stage

Mathematics in the Early Years Foundation Stage (EYFS) is an integral part of children's mathematical development, one of the seven key areas of learning outlined in the EYFS framework and supported by the non-statutory guidance provided by Development Matters. Mathematics strands are set out in the early learning goals of 'Number' and 'Numerical Patterns'.

At Manor Park, developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures.

Development Matters guides educators in facilitating this exploration, suggesting age-appropriate goals and activities that help children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.



Number

Numerical Patterns

Mathematics – Development Matters

Children in Reception will be learning to:

a)Count objects, actions and sounds.

b) Subitise

c) Link the number symbol (numeral) with its cardinal number value. d) Count beyond ten.

e) Compare numbers.

f) Understand the 'one more than/one less than' relationship between consecutive numbers.

g) Explore the composition of numbers to 10.

h) Automatically recall number bonds for numbers 0–5 and some to 10.

i) Select, rotate and manipulate shapes to develop spatial reasoning skills.

j) Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.

k) Continue, copy and create repeating patterns.

l) Compare length, weight and capacity.

Mathematics – Early Learning Goals

Number

1. Have a deep understanding of number to 10, including the composition of each number;
2. Subitise (recognise quantities without counting) up to 5;
3. 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

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

Inclusion within Mathematics

We are an inclusive school and as such, do not believe in narrowing the curriculum for any learner. Our curriculum is designed with inclusion of all at heart, and our curriculum intent is therefore the same for all children.

However we are mindful that there are an abundance of factors which need to be considered in order for all learners to be able to access learning according to their individual needs; perhaps none more so than for those learners with Special Educational Needs and Disabilities (SEND).

Therefore, whilst our curriculum intent is the same for all learners; our implementation of the curriculum may well look different for different groups of pupils. Teachers will plan, scaffold, challenge and embed learning through activities which are adapted to meet children's needs – we call this adapted implementation. This is to ensure that our curriculum can be met by all within an inclusive environment, mindful and responsive to children's needs.

We use guidance set out within the NASEN teacher handbook to assist us in amending our implementation within Mathematics. Examples of this, though not an exhaustive list, can be seen to the right. Note, these are suggestions of what may be implemented but all teachers will amend according to learner need.



Same intent, adapted implementation



Mathematical language and vocabulary is clearly defined, applied in context and over learnt. Oral rehearsal is promoted throughout lessons.



Staff may scribe for children to ensure a child's explanations and articulation is not limited by writing competence.



Make regular references to relevant language throughout the lesson and school day using tools such as working and display walls.



Use small group teaching opportunities to dedicate more time and support to provide additional learning opportunities to learners working towards a planned objective.

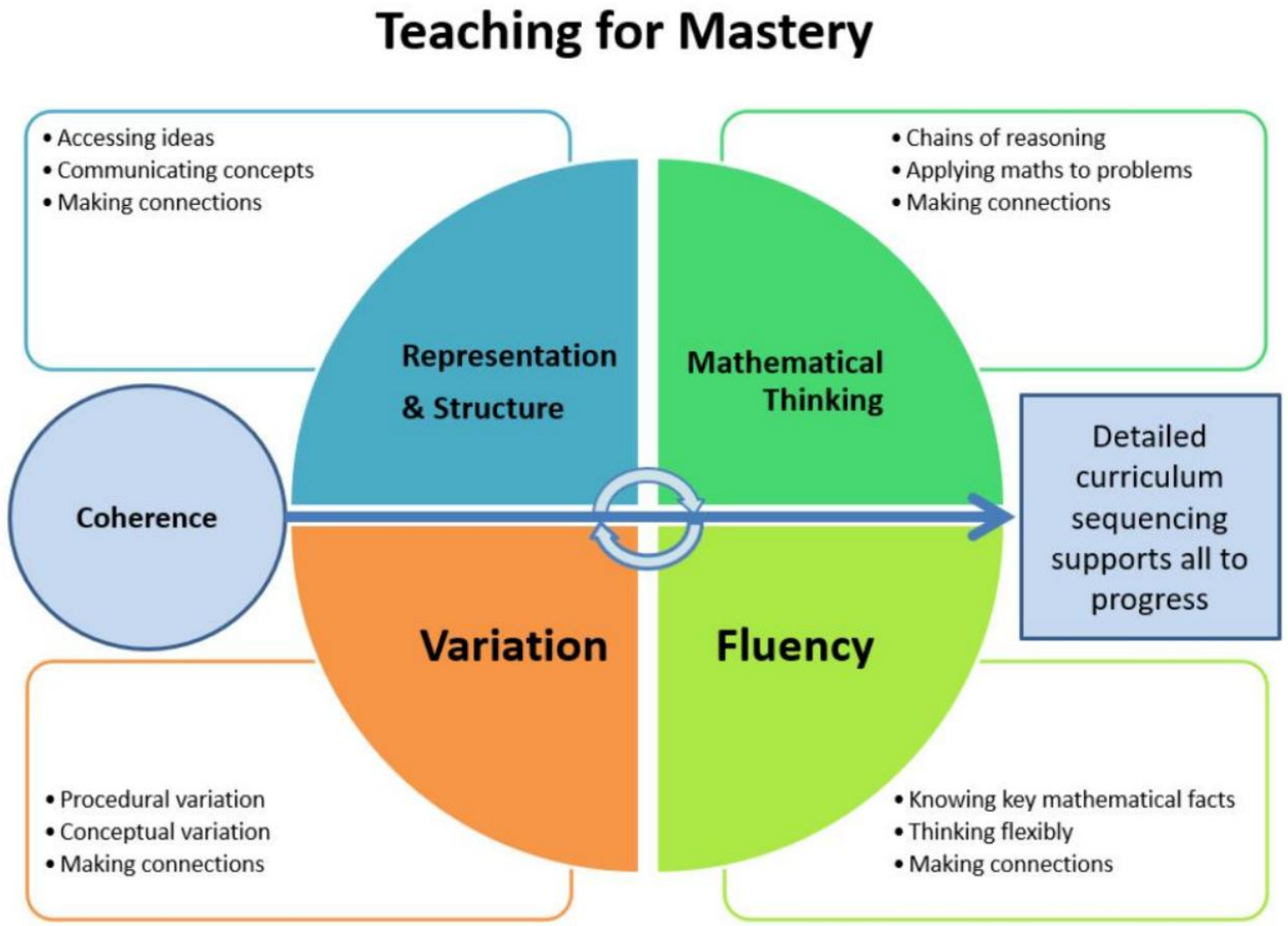


Provide learners with manipulatives and illustrations to support their understanding of mathematical concepts.

The Five Big Ideas – Mastery Maths

The Five Big Ideas of Mastery form the foundation of all Maths teaching within school.

REF: The Five Big Ideas - Mastery Maths – NCETM - 2017



The Five Big Ideas – Mastery Maths

Coherence
Lessons are designed to enable a coherent learning progression through the curriculum, providing access for all pupils to develop a deep and connected understanding of mathematics that they can apply in a range of contexts.

Representation and Structure
Teachers carefully select representations of mathematics to expose mathematical structure. The intention is to support pupils in 'seeing' the mathematics, rather than using the representation as a tool to 'do' the mathematics. These representations become mental images that students can use to think about mathematics, supporting them to achieve a deep understanding of mathematical structures and connections.

Mathematical Thinking
Mathematical thinking is central to how pupils learn mathematics and includes looking for patterns and relationships, making connections, conjecturing, reasoning, and generalising. Pupils should actively engage in mathematical thinking in all lessons, communicating their ideas using precise mathematical language.

Fluency
Efficient, accurate recall of key number facts and procedures is essential for fluency, freeing pupils' minds to think deeply about concepts and problems, but fluency demands more than this. It requires pupils to have the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections, and to choose appropriate methods and strategies to solve problems.

Variation
The purpose of variation is to draw closer attention to a key feature of a mathematical concept or structure through varying some elements while keeping others constant.

- Conceptual variation involves varying how a concept is represented to draw attention to critical features. Often more than one representation is required to look at the concept from different perspectives and gain comprehensive knowledge.
- Procedural variation considers how the student will 'proceed' through a learning sequence. Purposeful changes are made in order that pupils' attention is drawn to key features of the mathematics, scaffolding students' thinking to enable them to reason logically and make connections.

REF: The Five Big Ideas - Mastery Maths – NCETM - 2017

Mathematical Journaling at Manor Park

Journaling helps children to focus on their learning and take ownership of it.

As part of our learning at Manor Park, our maths lessons include journaling opportunities. We focus our journaling time on Investigative journaling, which allows the children to explore questions independently and collaboratively demonstrating their prior knowledge and application skills.

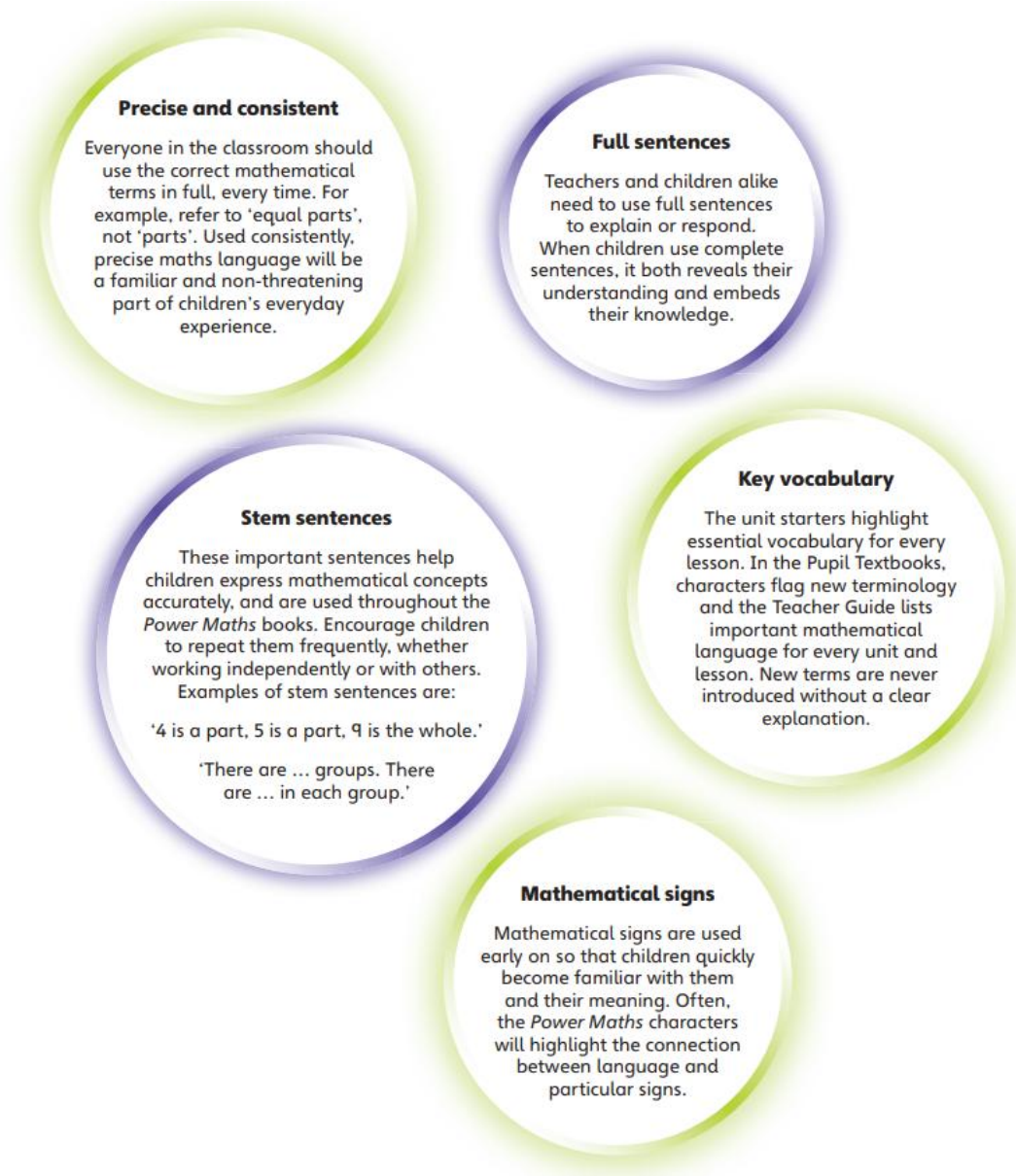
Through journaling and collaboration children are able to self-assess and begin to understand their own learning further. Journaling helps children to develop a higher level of thinking, through exploration and investigation they begin to shift their focus from the 'how' of mathematical thinking to the 'why' becoming fantastic reflective learners.

Oracy within our Maths lessons

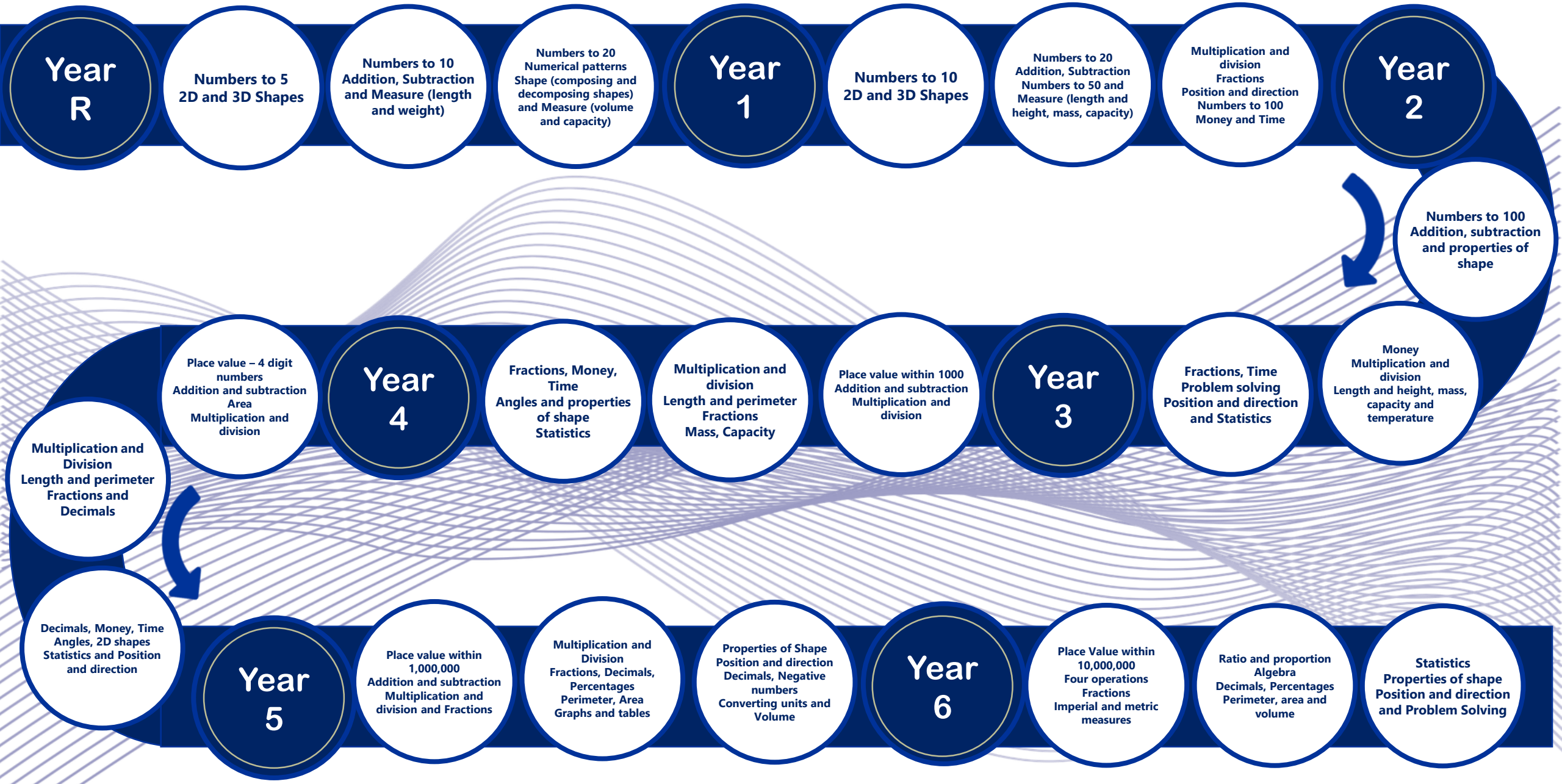
Teaching children specific mathematical vocabulary encourages precision, giving pupils a door on the world of the mathematician.

Within our Maths lessons and through the use of the fantastic resource Power Maths, we are able to use the following methods to promote and emphasise the importance of oracy within our Maths lessons.

We find that expressing mathematical ideas orally helps children to build communication skills and also form an important part of developing understanding of mathematical concepts and the ability to reason mathematically.



Manor Park Primary School Curriculum Road Map – Mathematics



Maths Key End Points – Ready to Progress Criteria: EYFS

Number

- 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

- 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.

Shape, Space and Measures

- There are no early learning goals that directly relate to shape, space and measure objectives.
- However, children will have experienced rich opportunities to develop their spatial reasoning skills in shape, space and measure.

Maths Key End Points – Ready to Progress Criteria: Year One

Number and Place Value

- Count within 100, forwards and backwards, starting with any number.
- Reason about the location of numbers to 20 within the linear number system, including comparing using < > and =.

Number Facts

- Develop fluency in addition and subtraction facts within 10.
- Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers.

Addition and Subtraction

- Compose numbers to 10 from 2 parts, and partition numbers to 10 into parts, including recognising odd and even numbers.
- Read, write and interpret equations containing addition (+), subtraction (−) and equals (=) symbols, and relate additive expressions and equations to real-life contexts.

Geometry

- Recognise common 2D and 3D shapes presented in different orientations, and know that rectangles, triangles, cuboids and pyramids are not always similar to one another.
- Compose 2D and 3D shapes from smaller shapes to match an example, including manipulating shapes to place them in particular orientations.

Maths Key End Points – Ready to Progress Criteria: Year Two

Number and Place Value

- Recognise the place value of each digit in two-digit numbers, and compose and decompose two-digit numbers using standard and non-standard partitioning.
- Reason about the location of any two-digit number in the linear number system, including identifying the previous and next multiple of 10.

Number Facts

- Secure fluency in addition and subtraction facts within 10, through continued practice.

Addition and Subtraction

- Add and subtract across 10.
- Recognise the subtraction structure of 'difference' and answer questions of the form, "How many more…?".
- Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number.
- Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract any 2 two-digit numbers.

Multiplication and Division

- Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables.
- Relate grouping problems where the number of groups is unknown to multiplication or division equations with a missing factor.

Geometry

- Use precise language to describe the properties of 2D and 3D shapes, and compare shapes by reasoning about similarities and differences in properties.

Maths Key End Points – Ready to Progress Criteria: Year Three

Number and Place Value

- Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three-digit multiples of 10.
- Recognise the place value of each digit in three-digit numbers, and compose and decompose three-digit numbers using standard and non-standard partitioning.
- Reason about the location of any three-digit number in the linear number system, including identifying the previous and next multiple of 100 and 10.
- Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts.

Number Facts

- Secure fluency in addition and subtraction facts that bridge 10, through continued practice.
- Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.
- Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10).

Addition and Subtraction

- Calculate complements to 100.
- Add and subtract up to three-digit numbers using columnar methods.
- Manipulate the additive relationship: Understand the inverse relationship between addition and subtraction, and how both relate to the part–part–whole structure. Understand and use the commutative property of addition, and understand the related property for subtraction.

Multiplication and Division

- Apply known multiplication and division facts to solve contextual problems with different structures.

Fractions

- Interpret and write proper fractions to represent 1 or several parts of a whole that is divided into equal parts.
- Find unit fractions of quantities using known division facts (multiplication tables fluency).
- Reason about the location of any fraction within 1 in the linear number system.
- Add and subtract fractions with the same denominator, within 1.

Geometry

- Recognise right angles as a property of shape or a description of a turn, and identify right angles in 2D shapes presented in different orientations.
- Draw polygons by joining marked points, and identify parallel and perpendicular sides.

Maths Key End Points – Ready to Progress Criteria: Year Four

Number and Place Value

- Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100.
- Recognise the place value of each digit in four-digit numbers, and compose and decompose four-digit numbers using standard and non-standard partitioning.
- Reason about the location of any four-digit number in the linear number system, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each.
- Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts.

Number Facts

- Recall multiplication and division facts up to 12 × 12, and recognise products in multiplication tables as multiples of the corresponding number.
- Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders, and interpret remainders appropriately according to the context.
- Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100).

Multiplication and Division

- Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size.
- Manipulate multiplication and division equations, understand and apply the commutative property of multiplication.
- Understand and apply the distributive property of multiplication.

Fractions

- Reason about the location of mixed numbers in the linear number system.
- Convert mixed numbers to improper fractions and vice versa.
- Add and subtract improper and mixed fractions with the same denominator, including bridging whole numbers.

Geometry

- Draw polygons, specified by coordinates in the first quadrant, and translate within the first quadrant.
- Identify regular polygons, including equilateral triangles and squares, as those in which the side-lengths are equal and the angles are equal. Find the perimeter of regular and irregular polygons.
- Identify line symmetry in 2D shapes presented in different orientations. Reflect shapes in a line of symmetry and complete a symmetric figure or pattern with respect to a specified line of symmetry.

Maths Key End Points – Ready to Progress Criteria: Year Five

Number and Place Value

- Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01.
- Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and non-standard partitioning.
- Reason about the location of any number with up to 2 decimals places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.
- Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts.
- Convert between units of measure, including using common decimals and fractions.

Multiplication and Division

- Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size.
- Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors.
- Multiply any whole number with up to 4 digits by any one-digit number using a formal written method.
- Divide a number with up to 4 digits by a one-digit number using a formal written method, and interpret remainders appropriately for the context.

Fractions, Decimals and Percentages

- Find non-unit fractions of quantities.
- Find equivalent fractions and understand that they have the same value and the same position in the linear number system.
- Recall decimal equivalents for 1/2, 1/4, 1/5 and 1/10, and for multiples of these proper fractions.

Number Facts

- Secure fluency in multiplication table facts, and corresponding division facts, through continued practice.
- Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth).

Geometry

- Compare angles, estimate and measure angles in degrees (°) and draw angles of a given size.
- Compare areas and calculate the area of rectangles (including squares) using standard units.

Maths Key End Points – Ready to Progress Criteria: Year Six

Number and Place Value

- Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000).
- Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and non-standard partitioning.
- Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system, and round numbers, as appropriate, including in contexts.
- Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.

Addition, Subtraction, Multiplication and Division

- Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number).
- Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.
- Solve problems involving ratio relationships.
- Solve problems with 2 unknowns.

Fractions, Decimals and Percentages

- Recognise when fractions can be simplified, and use common factors to simplify fractions.
- Express fractions in a common denomination and use this to compare fractions that are similar in value.
- Compare fractions with different denominators, including fractions greater than 1, using reasoning, and choose between reasoning and common denomination as a comparison strategy.

Geometry

- Draw, compose, and decompose shapes according to given properties, including dimensions, angles and area, and solve related problems.

Progression of knowledge and skills – Number and Place Value

Number: Number and Place Value

National Centre for Excellence in the Teaching of Mathematics

COUNTING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number			count backwards through zero to include negative numbers	interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero	use negative numbers in context, and calculate intervals across zero
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;	count in multiples of 6, 7, 9, 25 and 1000	count forwards or backwards in steps of powers of 10 for any given number up to 1000 000	
given a number, identify one more and one less		find 10 or 100 more or less than a given number	find 1000 more or less than a given number		
COMPARING NUMBERS					
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 1000	order and compare numbers beyond 1000 *compare numbers with the same number of decimal places up to two decimal places* (copied from Fractions)	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers)	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers)
IDENTIFYING, REPRESENTING AND ESTIMATING NUMBERS					
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		

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Progression of knowledge and skills – Number and Place Value

Number: Number and Place Value

National Centre for Excellence in the Teaching of Mathematics

READING AND WRITING NUMBERS (including Roman Numerals)					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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 1000 in numerals and in words		read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Comparing Numbers)	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Understanding Place Value)
		tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks (copied from Measurement)	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 Roman numerals to 1000 (M) and recognise years written in Roman numerals.	
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)	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers)	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers)
			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 (copied from Fractions)	*recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents* (copied from Fractions)	*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* (copied from Fractions)

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Progression of knowledge and skills – Number and Place Value

Number: Number and Place Value

ROUNDING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			round any number to the nearest 10, 100 or 1 000	round any number up to 1 000 000 to the nearest 10, 100, 1 000, 10 000 and 100 000	round any whole number to a required degree of accuracy
			round decimals with one decimal place to the nearest whole number (copied from Fractions)	*round decimals with two decimal places to the nearest whole number and to one decimal place* (copied from Fractions)	*solve problems which require answers to be rounded to specified degrees of accuracy* (copied from Fractions)
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 problems and practical problems that involve all of the above	solve number and practical problems that involve all of the above

Progression of knowledge and skills – Addition and Subtraction

Number: Addition and Subtraction

NUMBER BONDS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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 CALCULATION					
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 mentally with increasingly large numbers	perform mental calculations, including with mixed operations and large numbers
read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				use their knowledge of the order of operations to carry out calculations involving the four operations

Progression of knowledge and skills – Addition and Subtraction

Number: Addition and Subtraction

WRITTEN METHODS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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.

Progression of knowledge and skills – Addition and Subtraction

Number: Addition and Subtraction

PROBLEM SOLVING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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 simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change* (copied from Measurement)	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

Progression of knowledge and skills – Multiplication and Division

Number: Multiplication and Division

National Centre for Excellence in the Teaching of Mathematics

MULTIPLICATION & DIVISION FACTS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
count in multiples of twos, fives and tens (copied from Number and Place Value)	*count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward* (copied from Number and Place Value)	*count from 0 in multiples of 4, 8, 50 and 100* (copied from Number and Place Value)	*count in multiples of 6, 7, 9, 25 and 1 000* (copied from Number and Place Value)	*count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000* (copied from Number and Place Value)	
	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	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		
MENTAL CALCULATION					
		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 (appears also in 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	multiply and divide numbers mentally drawing upon known facts	perform mental calculations, including with mixed operations and large numbers
	show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot		recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	*associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)* (copied from Fractions)

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Progression of knowledge and skills – Multiplication and Division

Number: Multiplication and Division

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WRITTEN CALCULATION					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	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 (appears also in Mental 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 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 one-digit number using the formal written method of short division and interpret remainders appropriately for the context	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 (copied from Fractions (including

Progression of knowledge and skills – Multiplication and Division

Number: Multiplication and Division

National Centre for Excellence in the Teaching of Mathematics

					decimals))
PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			recognise and use factor pairs and commutativity in mental calculations (repeated)	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.	identify common factors, common multiples and prime numbers
				know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers	*use common factors to simplify fractions; use common multiples to express fractions in the same denomination* (copied from Fractions)
				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})	*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* (copied from Measures)

Progression of knowledge and skills – Multiplication and Division

Number: Multiplication and Division

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ORDER OF OPERATIONS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					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 (copied from Addition and Subtraction)	*estimate and use inverse operations to check answers to a calculation* (copied from Addition and Subtraction)		use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy

Progression of knowledge and skills – Multiplication and Division

Number: Multiplication and Division

National Centre for Excellence in the Teaching of Mathematics

PROBLEM SOLVING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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
				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 similar shapes where the scale factor is known or can be found* (copied from Ratio and Proportion)

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Progression of knowledge and skills – Fractions (including Decimals and Percentages)

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Number: Fractions (including Decimals and Percentages)

COUNTING IN FRACTIONAL STEPS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line (Non Statutory Guidance)	count up and down in tenths	count up and down in hundredths		
RECOGNISING FRACTIONS					
recognise, find and name a half as one of two 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 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 (appears also in Equivalence)	
		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 name a quarter as one of four equal parts of an object, shape or quantity		recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators			
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

Progression of knowledge and skills – Fractions (including Decimals and Percentages)

Number: Fractions (including Decimals and Percentages)

National Centre for Excellence in the Teaching of Mathematics

COMPARING DECIMALS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			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 (INCLUDING FRACTIONS, DECIMALS AND PERCENTAGES)					
	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	identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	use common factors to simplify fractions; use common multiples to express fractions in the same denomination
			recognise and write decimal equivalents of any number of tenths or hundredths	read and write decimal numbers as fractions (e.g. 0.71 = $^{71}/_{100}$)	associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)
				recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	
			recognise and write decimal equivalents to $^1/_4$; $^1/_2$; $^3/_4$	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 as a decimal fraction	recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

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Progression of knowledge and skills – Fractions (including Decimals and Percentages)

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Number: Fractions (including Decimals and Percentages)

ADDITION AND SUBTRACTION OF FRACTIONS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		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	add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
				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. $^2/_5 + ^4/_5 = ^6/_5 = 1^1/_5$)	
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. $^1/_3 \div 2 = ^1/_6$)

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Progression of knowledge and skills – Fractions (including Decimals and Percentages)

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Number: Fractions (including Decimals and Percentages)

MULTIPLICATION AND DIVISION OF DECIMALS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					multiply one-digit numbers with up to two decimal places by whole numbers
			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 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

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Progression of knowledge and skills – Fractions (including Decimals and Percentages)

Number: Fractions (including Decimals and Percentages)

PROBLEM SOLVING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		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 problems involving numbers up to three decimal places	
			solve simple measure and money problems involving fractions and decimals to two 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.	

Progression of knowledge and skills – Ratio and Proportion

Ratio and Proportion

National Centre for Excellence in the Teaching of Mathematics

Statements only appear in Year 6 but should be connected to previous learning, particularly fractions and multiplication and division					
					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.

Progression of knowledge and skills – Algebra

Algebra

EQUATIONS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and ***missing number problems*** *such as* *7 = □ - 9* (copied from Addition and Subtraction)	*recognise and use the inverse relationship between addition and subtraction and use this to check calculations and* ***missing number*** *problems.* (copied from Addition and Subtraction)	solve problems, *including* ***missing number*** *problems, using number facts, place value, and more complex addition and subtraction.* (copied from Addition and Subtraction) *solve problems, including* ***missing number*** *problems, involving multiplication and division, including integer scaling* (copied from Multiplication and Division)		*use the properties of rectangles to deduce related facts and find* ***missing lengths and angles*** (copied from Geometry: Properties of Shapes)	express missing number problems algebraically
	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 (copied from Addition and Subtraction)				find pairs of numbers that satisfy number sentences involving two unknowns
represent and use number bonds and related subtraction facts within 20 (copied from Addition and Subtraction)					enumerate all possibilities of combinations of two variables

Progression of knowledge and skills – Algebra

Algebra

FORMULAE					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			Perimeter can be expressed algebraically as 2(a + b) where a and b are the dimensions in the same unit. (Copied from NSG measurement)		use simple formulae *recognise when it is possible to use **formulae** for area and volume of shapes* (copied from Measurement)
SEQUENCES					
sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening (copied from Measurement)	*compare and sequence intervals of time* (copied from Measurement) *order and arrange combinations of mathematical objects in patterns* (copied from Geometry: position and direction)				generate and describe linear number sequences

Progression of knowledge and skills – Measurement

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Measurement

MEASURING and CALCULATING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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	measure, compare, add and subtract: **lengths** (m/cm/mm); **mass** (kg/g); **volume/capacity** (l/ml)	estimate, compare and calculate **different measures,** including **money in pounds and pence** (appears also in Comparing)	use all four operations to solve problems involving measure (e.g. **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 (appears also in Converting)
		measure the **perimeter** of simple 2-D shapes	measure and calculate the **perimeter** of a rectilinear figure (including squares) in centimetres and metres	measure and calculate the **perimeter** of composite rectilinear shapes in centimetres and metres	recognise that shapes with the same areas can have different **perimeters** and vice versa

Progression of knowledge and skills – Measurement

National Centre for Excellence in the Teaching of Mathematics

Measurement

MEASURING and CALCULATING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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	add and subtract amounts of **money** to give change, using both £ and p in practical contexts			
	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				
			find the area of rectilinear shapes by counting squares	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})* (copied from Multiplication and Division)	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

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Progression of knowledge and skills – Measurement

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Measurement

TELLING THE TIME					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	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.	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, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)		
recognise and use language relating to dates, including days of the week, weeks, months and years	know the number of minutes in an hour and the number of hours in a day. (appears also in Converting)	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 Comparing and Estimating)			
			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	

Progression of knowledge and skills – Measurement

Measurement

CONVERTING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	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. kilometre to metre; hour to minute)	convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)	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
			read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)	solve problems involving converting between units of time	solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate (appears also in Measuring and Calculating)
			solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days (appears also in Telling the Time)	understand and use equivalences between metric units and common imperial units such as inches, pounds and pints	convert between miles and kilometres

Progression of knowledge and skills – Geometry: Properties of Shapes

Geometry: Properties of Shapes

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IDENTIFYING SHAPES AND THIER PROPERTIES					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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 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 (appears also in Drawing and Constructing)
	identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces				illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
	identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]				
DRAWING AND CONSTRUCTING					
		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 ($^{\circ}$)	draw 2-D shapes using given dimensions and angles
					recognise, describe and build simple 3-D shapes, including making nets (appears also in Identifying Shapes and Their Properties)

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Progression of knowledge and skills – Geometry: Properties of Shapes

Geometry: Properties of Shapes

COMPARING AND CLASSIFYING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	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	compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
				distinguish between regular and irregular polygons based on reasoning about equal sides and angles	
ANGLES					
		recognise angles as a property of shape or a description of a turn		know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	
		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 acute and obtuse angles and compare and order angles up to two right angles by size	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
		identify horizontal and vertical lines and pairs of perpendicular and parallel lines			

Progression of knowledge and skills – Geometry: Position and Direction

Geometry: Position and Direction

National Centre for Excellence in the Teaching of Mathematics

POSITION, DIRECTION AND MOVEMENT					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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	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)
			describe movements between positions as translations of a given unit to the left/right and up/down		draw and translate simple shapes on the coordinate plane, and reflect them in the axes.
			plot specified points and draw sides to complete a given polygon		
PATTERN					
	order and arrange combinations of mathematical objects in patterns and sequences				

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Progression of knowledge and skills – Statistics

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Statistics

INTERPRETING, CONSTRUCTING AND PRESENTING DATA					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	interpret and construct simple pictograms, tally charts, block diagrams and simple tables	interpret and present data using bar charts, pictograms and tables	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs	complete, read and interpret information in tables, including timetables	interpret and construct pie charts and line graphs and use these to solve problems
	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				
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

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Mastering Number: Reception and KS1

Cardinality is a fundamental concept in early mathematics. The cardinal value of a number refers to the quantity of things it represents: the numerosity, 'how-many-ness', or 'three-ness' of three. When children understand the cardinality of numbers, they know what the numbers mean in terms of knowing how many things they refer to.

A lack of understanding of cardinality can easily be hidden by a routine that a child has learned to perform without understanding the mathematics. Our skilled Early Years, Reception and KS1 teachers are able to spot this, and also to teach using methods that will expose the structure for children and help them to deeply understand it.

The NCETM's Mastering Number Programme aims to equip KS1 teachers with the skills and knowledge to ensure that all children leave KS1 with strong, deep and flexible understanding of the number system. Understanding cardinality is critical to this and children will need varied opportunities to make connections between the counting of numbers and the quantity each number represents.

Language is also important, and teachers are advised to encourage children to answer questions in full sentences to support the building of understanding and images. Answering the question 'How many teddies can you see?' with 'Two' is not reinforcing structure as strongly as the answer 'I can see two teddies'.



Mastering Number EYFS and KS1 – Overview of Content – Reception

Mastering Number: Overview of content – Reception

Strand/ Half-term	Subitising	Cardinality, ordinality and counting	Composition	Comparison
1 Children will:	• perceptually subitise within 3 • identify sub-groups in larger arrangements • create their own patterns for numbers within 4 • practise using their fingers to represent quantities which they can subitise • experience subitising in a range of contexts, including temporal patterns made by sounds.	• relate the counting sequence to cardinality, seeing that the last number spoken gives the number in the entire set • have a wide range of opportunities to develop their knowledge of the counting sequence, including through rhyme and song • have a wide range of opportunities to develop 1:1 correspondence, including by coordinating movement and counting • have opportunities to develop an understanding that anything can be counted, including actions and sounds • explore a range of strategies which support accurate counting.	• see that all numbers can be made of 1s • compose their own collections within 4.	• understand that sets can be compared according to a range of attributes, including by their numerosity • use the language of comparison, including 'more than' and 'fewer than' • compare sets 'just by looking'.
2 Children will:	• continue from first half-term • subitise within 5, perceptually and conceptually, depending on the arrangements.	• continue to develop their counting skills • explore the cardinality of 5, linking this to dice patterns and 5 fingers on 1 hand • begin to count beyond 5 • begin to recognise numerals, relating these to quantities they can subitise and count.	• explore the concept of 'wholes' and 'parts' by looking at a range of objects that are composed of parts, some of which can be taken apart and some of which cannot • explore the composition of numbers within 5.	• compare sets using a variety of strategies, including 'just by looking', by subitising and by matching • compare sets by matching, seeing that when every object in a set can be matched to one in the other set, they contain the same number and are equal amounts.
3 Children will:	• increase confidence in subitising by continuing to explore patterns within 5, including structured and random arrangements • explore a range of patterns made by some numbers greater than 5, including structured patterns in which 5 is a clear part • experience patterns which show a small group and '1 more'	• continue to develop verbal counting to 20 and beyond • continue to develop object counting skills, using a range of strategies to develop accuracy • continue to link counting to cardinality, including using their fingers to represent quantities between 5 and 10 • order numbers, linking cardinal and ordinal representations of number.	• continue to explore the composition of 5 and practise recalling 'missing' or 'hidden' parts for 5 • explore the composition of 6, linking this to familiar patterns, including symmetrical patterns	• continue to compare sets using the language of comparison, and play games which involve comparing sets • continue to compare sets by matching, identifying when sets are equal • explore ways of making unequal sets equal.

Mastering Number EYFS and KS1 – Overview of Content – Reception

	• continue to match arrangements to finger patterns.		• begin to see that numbers within 10 can be composed of '5 and a bit'.	
4 **Children will:**	• explore symmetrical patterns, in which each side is a familiar pattern, linking this to 'doubles'.	• continue to consolidate their understanding of cardinality, working with larger numbers within 10 • become more familiar with the counting pattern beyond 20.	• explore the composition of odd and even numbers, looking at the 'shape' of these numbers • begin to link even numbers to doubles • begin to explore the composition of numbers within 10.	• compare numbers, reasoning about which is more, using both an understanding of the 'howmanyness' of a number, and its position in the number system.
5 **Children will:**	• continue to practise increasingly familiar subitising arrangements, including those which expose '1 more' or 'doubles' patterns • use subitising skills to enable them to identify when patterns show the same number but in a different arrangement, or when patterns are similar but have a different number • subitise structured and unstructured patterns, including those which show numbers within 10, in relation to 5 and 10 • be encouraged to identify when it is appropriate to count and when groups can be subitised.	• continue to develop verbal counting to 20 and beyond, including counting from different starting numbers • continue to develop confidence and accuracy in both verbal and object counting.	• explore the composition of 10.	• order sets of objects, linking this to their understanding of the ordinal number system.
6	In this half-term, the children will consolidate their understanding of concepts previously taught through working in a variety of contexts and with different numbers.			

Mastering Number EYFS and KS1 – Overview of Content – Year One

Mastering Number: Overview of content – Year 1

Strand/ Half-term	Subitising	Cardinality, ordinality and counting	Composition	Comparison	Addition and subtraction/ Number facts
1 Children will:	• revisit subitising within 5 using perceptual subitising • practise conceptual subitising of bigger numbers as they become more familiar with patterns made by the numbers 5–10.	• explore the linear number system within 10, looking at a range of ordinal representations • explore the link between the 'staircase' pattern and a number track.	• focus on the composition of numbers within 10, with a particular emphasis on the composition of numbers 6, 7, 8 and 9 as '5 and a bit', as well as exploring the composition of numbers 5 and 6 in-depth • explore the composition of odd and even numbers, identifying that even numbers are made of 2s and odd numbers have 'an extra 1' – they will link this to the 'shape' of these numbers.		Although children will not be looking at number bonds expressed as equations, their work on the composition of numbers within 10 will be developing their knowledge of number bonds.
2 Children will:	• continue to practise conceptually subitising numbers they have already explored the composition of.	• review the linear number system to 10 as they compare numbers.	• continue to explore the composition of the numbers 7–9 in-depth, linking this to their understanding of odd and even numbers • explore the composition of 10, developing a systematic approach to finding pairs that sum to 10.	• revisit what is meant by 'comparing' and see that quantities can be compared according to different attributes, including numerosity.	As above.
3 Children will:	• continue to practise conceptually subitising numbers they have already explored the composition of.		• review the composition of numbers within 10, linking these to part-part-whole representations • practise recalling missing parts for numbers within 10.	• compare numbers within 10, linking this to their understanding of the linear system • use the inequality symbol to create expressions, e.g. 7 > 2, and use the language of 'greater than' and 'less than'	• develop their recall of number bonds within 10, through the use of exercises which use written numerals but not the symbols +, – , or =.

Mastering Number EYFS and KS1 – Overview of Content – Year One

				• reason about inequalities, drawing on their knowledge of the composition of numbers, e.g. Is this true or false? 3 and 2 is less than 4.	
4 **Children will:**	• continue to practise conceptually subitising numbers they have already explored the composition of.	• review the linear number system to 10, looking at a range of representations, including a number line • explore the use of 'midpoints' to enable them to identify the location of other numbers.	• review the composition of odd and even numbers, identifying that even numbers are made of 2s and odd numbers have an 'odd 1'.		• solve a range of subtraction problems using knowledge of part-part-whole relationships. • use their understanding of the composition of even and odd numbers to add and subtract 2 to or from odd or even numbers within 10. • continue to develop their recall of bonds within 10, through the use of exercises which do NOT involve written equations, such as 4 + 3 = ?
5 **Children will:**	• continue to practise conceptually subitising numbers they have already explored the composition of. • conceptually subitise numbers within 20 as they become more familiar with the composition of numbers within 20.	• explore the linear number system to 20, looking at a range of representations, including a number line. • explore the use of 'midpoints' to enable them to identify the location of other numbers.	• explore the composition of the numbers 11–20, seeing representations which show the structure of these numbers as 'ten and a bit'. • review the composition of even numbers and focus on doubles.	• compare numbers within 20 using the inequality symbol.	• develop their fluency in additive relationships within 10, using a range of activities and games • draw on their knowledge of the composition of numbers to complete written equations • revisit strategies for addition and subtraction within 10 and apply these to a range of questions, including written equations.
6 **Children will:**	• continue to use conceptual subitising, especially when using a rekenrek.		• apply their knowledge of the composition of numbers, to calculations within 10 and 20.	• continue to compare numbers within 20, including questions which use the symbols	• continue to practise recalling additive facts within 20, applying their knowledge of the composition of numbers

Mastering Number EYFS and KS1 – Overview of Content – Year One

				+, <, >, or =, such as: True or false? 10 + 4 < 14 10 + 4 = 14 10 + 4 > 14	within 20 and strategies within 10.

Mastering Number EYFS and KS1 – Overview of Content – Year Two

Mastering Number: Overview of content – Year 2

Strand/ Half-term	Subitising	Cardinality, ordinality and counting	Composition	Comparison	Addition and subtraction/ Number facts
1 Children will:	• develop conceptual subitising skills as they become more familiar with patterns made by numbers within 10 and understand their composition • use perceptual and conceptual subitising when using a rekenrek.	• explore the linear number system within 10, looking at a range of representations • compare number tracks and number lines and explore the use of 'midpoints' to enable them to identify the location of other numbers.	• focus on the composition of numbers within 10, with a particular emphasis on the composition of numbers 6, 7, 8 and 9 as '5 and a bit', as well as exploring the composition of numbers 5 and 6 in-depth • explore the composition of odd and even numbers, identifying that even numbers are made of 2s and odd numbers have 'an extra 1' – they will link this to the 'shape' of these numbers.		• link their growing understanding of the composition of numbers within 10 to the related additive facts, including adding 2 to an odd or even number • practise recalling facts in a variety of ways, including through solving simple picture problems and completing equations with a missing sum or addend,
2 Children will:	• continue to practise conceptually subitising numbers they have already explored the composition of.	• review the linear number system as they compare numbers.	• continue to explore the composition of the numbers 7–9 in-depth, linking this to their understanding of odd and even numbers	• compare numbers within 10, linking this to their understanding of the linear number system • use the inequality symbols to create expressions, e.g. $7 > 2$, and use the language of 'greater than' and 'less than' • draw on their knowledge of number bonds to answer questions in the form: True or false? $5 + 3 > 7$	• continue to practise recalling additive facts for numbers within 10, using a range of equations, games and picture problems.

Mastering Number EYFS and KS1 – Overview of Content – Year Two

3 **Children will:**	• continue to practise conceptually subitising numbers they have already explored the composition of, including 'teen' numbers when they have reviewed the composition of 11–19.		• review the composition of 11 to 19 as 'ten and a bit' and explore ways to represent this.		• focus on number bonds within 10 presented in the part-part-whole structure, including identifying a missing 'part' and relating this to subtraction equations • review strategies for adding 1 and 2 to odd and even numbers to subtraction facts presented in different ways • apply their knowledge of the composition of 11–19 to calculations in which 10 is a part • apply their knowledge of composition to facts involving 3 addends.
4 **Children will:**	• continue to conceptually subitise the numbers 11–19 using a range of representations, which expose the structure of these numbers as 'ten and a bit'.	• revisit the structure of the linear number system within 20, making links between the midpoints of 5 and 10, and 15.	• review the composition of odd and even numbers, linking this to doubles and near doubles.	• continue to compare numbers within 20, including questions which use the symbols +, <, >, or =, such as: Write the correct symbol: 10 + 4 ☐ 15 10 + 4 ☐ 14 10 + 4 ☐ 13	• draw on their knowledge of the linear number system and apply this to calculations involving 1 more and 1 less, • use their understanding of the composition of odd and even numbers to find doubles and near doubles • apply known facts to calculations involving larger numbers, e.g. 5 + 2, 15 + 2.

Mastering Number EYFS and KS1 – Overview of Content – Year Two

5 **Children will:**	• revisit previous activities which develop their subitising skills.	• review the linear number system to 100, applying their knowledge of midpoints to place numbers on a structured number line – they will identify the multiples of 10 that come before and after a given number.	• revisit previous activities which develop their understanding of the composition of numbers within 10 and 20.	• reason about equalities and inequalities using equations and answering questions, such as: True or false? $5 + 3 = 6 + 2$ $9 + 4 > 9 + 5$ $9 + 6 < 10 + 5$ This will help them become fluent in the use of the inequality symbol as well as practising their number bond knowledge.	• become fluent in a range of strategies involving calculations within 20, using 'make 10' strategies to add, and subtracting through the tens boundary • practise recalling number bonds through a range of activities and games which will encourage them to reason about sums and differences.
6 **Children will:**	As above.		As above.		• develop their fluency in additive relationships within 20, using a range of activities and games and revisiting previously taught strategies where necessary.

Mastering Number: KS2

Knowledge of multiplication and division and its applications forms the single most important aspect of the KS2 curriculum, and is the gateway to success at secondary school. The NCETM's Mastering Number KS2 Programme enables pupils in Years 4 and 5 to develop fluency in multiplication and division facts, and a confidence and flexibility with number that exemplifies good number sense. Pupils in KS2 will develop automaticity in multiplication and division facts through regular practice. An example of a session is detailed below:

Session 2	Pupils will: • recap that a 'unit' can represent 'many as 1' • see that 1 unit can be repeated • represent 1 or more units using unitised counters and multiplication expressions.
Revisit	Display slide 16 of the presentation. *Which unitised counter correctly represents the coin shown? Can you explain why?* Animate slide 16 to match the coin to the correct counter. **Use the stem sentence: There is 1 _____ . There is _____ , _____ time.** [The word 'once' can also be used alongside '1 time'. Ensure pupils understand that 'once' and '1 time' have the same meaning.]
Teach and practise	Display slide 17 and discuss the question in the thought bubble. *Why is Cal wondering how to represent more than 1 unit? How could we represent more than 1 unit?* Discuss pupils' ideas, then animate slide 17 to reveal Mo's question: 'Could we use unitised counters?' Display slide 18. *What number will need to be on our stampers today, and why? (e.g. "50, because each coin has a value of 50 pence.")* Encourage pupils to make imaginary stampers with their fists, and to picture 50 written on them, then animate slide 18 to reveal the question. *How many times do you think we need to use our stampers to show 2 units of 50? (e.g. "Twice/2 times, to show two 50 pence coins.")* Ask pupils to use their stampers as you animate slide 18. Display slide 19 and provoke a discussion. *Cal and Mo are describing the units of 50 represented by the 2 counters. Whose way is correct?* Discuss pupils' thoughts. Ensure they understand that both sentences correctly describe the unitised counters on the slide. **Use the stem sentence: There are _____ _____ . There is _____ , _____ times.** Display slide 20. Ask questions to provoke a discussion, animating the slide to reveal the expressions, as appropriate. *Which multiplication expressions can we write to represent each picture of unitised counters? Does saying the stem sentence help you to think?* *Will either of the factors be the same? Why do you think that?*

Complete the table

Story	Counters	Expression
Mo has ____ coins. Each coin has a value of ____ pence.		4 x 20
There are _____ pupils in each class. There are 5 classes.	25 25 25 25 25	
There are 100 cars on each level of a car park. There are _____ levels.		3 x 100
There are _____ rooms on each floor of a hotel. There are 7 floors.	34 34 34 34 34 34 34	

Multiplication Overview

The quick recall of multiplication and division facts (times tables) is essential for all children. The ability to recall these facts quickly enables children to answer related questions with ease.

It is therefore important that we approach the teaching and testing of times tables in a similar and progressive format from Year 2 to Year 6.

At Manor Park, the expectation of times tables in each Year Group is as follows:

- Year 2: 2x, 5x, 10x and corresponding division facts.
- Year 3: Recall of 5x and 10x tables from Y2. 2x, 4x, 8x (the relationship between them), 3x and corresponding division facts.
- Year 4: 3x, 6x, 9x (the relationship between them), 7x, 11x, 12x. All x and ÷ facts (12x12) in preparation for the Multiplication Tables Check (MTC).
- Year 5: All x and ÷ facts (12x12).
- Year 6: All x and ÷ facts (12x12) and related language/symbols e.g. % and square root.

These facts will be assessed through weekly tests of 60 questions, taken in a set time period of 5 minutes for KS1 and 3 minutes for KS2. The children's scores should be recorded each week to track progress. By the end of each academic year, the vast majority of the children should be able to use and apply their multiplication facts appropriate to their year group. These tests are designed to test times tables knowledge, rather than to teach it.

There are many ways in which children can learn times tables - for example, playing games, quick-fire questions from an adult, chanting tables, writing the tables out, using songs, Education City and Times Tables Rock Stars. The teaching of multiplication needs to be done explicitly twice a week as learning needs to take place before the knowledge gained can be assessed in a test. It is also important for children to learn their times tables at home too.

Children should learn the multiplication tables in 'families' (2x, 4x and 8x for example). Making connections between the multiplication tables in each family will enable children to develop automatic recall more easily, and to provide a deeper understanding of multiplication and division.

The tests are given to reflect the above recommendations. The tests are not designed to be filled in electronically on your computer - they are to be printed out and filled in with a pencil.

Multiplication and division facts

Multiplication and division facts

The full set of multiplication calculations that pupils need to be able to solve by automatic recall are shown in the table below. Pupils must also have automatic recall of the corresponding division facts.

1 × 1	1 × 2	1 × 3	1 × 4	1 × 5	1 × 6	1 × 7	1 × 8	1 × 9	1 × 10	1 × 11	1 × 12
2 × 1	2 × 2	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10	2 × 11	2 × 12
3 × 1	3 × 2	3 × 3	3 × 4	3 × 5	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11	3 × 12
4 × 1	4 × 2	4 × 3	4 × 4	4 × 5	4 × 6	4 × 7	4 × 8	4 × 9	4 × 10	4 × 11	4 × 12
5 × 1	5 × 2	5 × 3	5 × 4	5 × 5	5 × 6	5 × 7	5 × 8	5 × 9	5 × 10	5 × 11	5 × 12
6 × 1	6 × 2	6 × 3	6 × 4	6 × 5	6 × 6	6 × 7	6 × 8	6 × 9	6 × 10	6 × 11	6 × 12
7 × 1	7 × 2	7 × 3	7 × 4	7 × 5	7 × 6	7 × 7	7 × 8	7 × 9	7 × 10	7 × 11	7 × 12
8 × 1	8 × 2	8 × 3	8 × 4	8 × 5	8 × 6	8 × 7	8 × 8	8 × 9	8 × 10	8 × 11	8 × 12
9 × 1	9 × 2	9 × 3	9 × 4	9 × 5	9 × 6	9 × 7	9 × 8	9 × 9	9 × 10	9 × 11	9 × 12
10 × 1	10 × 2	10 × 3	10 × 4	10 × 5	10 × 6	10 × 7	10 × 8	10 × 9	10 × 10	10 × 11	10 × 12
11 × 1	11 × 2	11 × 3	11 × 4	11 × 5	11 × 6	11 × 7	11 × 8	11 × 9	11 × 10	11 × 11	11 × 12
12 × 1	12 × 2	12 × 3	12 × 4	12 × 5	12 × 6	12 × 7	12 × 8	12 × 9	12 × 10	12 × 11	12 × 12

Pupils must be fluent in these facts by the end of year 4, and this is assessed in the multiplication tables check. Pupils should continue with regular practice through year 5 to secure and maintain fluency.

The 36 most important facts are highlighted in the table. Fluency in these facts should be prioritised because, when coupled with an understanding of commutativity and fluency in the formal written method for multiplication, they enable pupils to multiply any pair of numbers.

Assessment within Mathematics

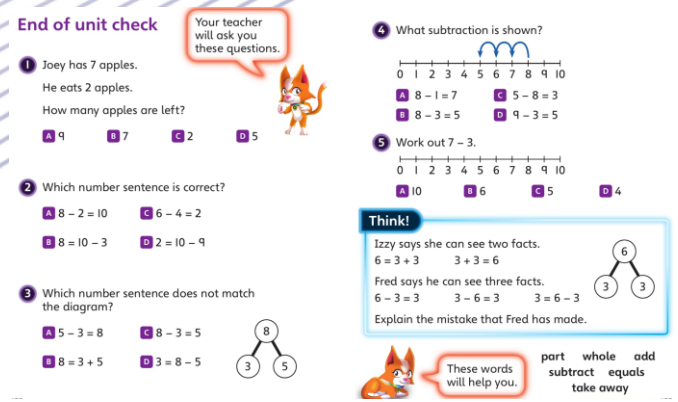
We place great emphasis on the importance of assessing children's knowledge, understanding and skillset within Mathematics.

When assessing Maths, it is first essential to clearly articulate two important areas:

1. The specific endpoint for the unit being delivered,
2. The substantive and disciplinary knowledge to be taught to reach this endpoint.

At Manor Park Primary School, we have clearly mapped out all endpoints for all the Mathematics units to be delivered, before specifying what substantive and disciplinary knowledge is to be taught within each unit to reach this endpoint. It is this knowledge and understanding that we assess children upon, believing accurate assessment can only be a reflection of what is taught to children .

End of unit checks within Power Maths are completed by children independently and a record of their performance is recorded on an excel spreadsheet that logs their scores for each area of maths.



Making judgements – formative assessment

When delivering lessons; teachers record notes, comments and reflections they feel pertinent to the formative assessment of their teaching and learning of Maths, recording these to inform their future planning. Such feedback is then delivered at the start of the following lesson, in order for children to recap prior learning undertaken before building upon this; as well as to give them opportunities to address misconceptions develop greater understanding of concepts and what has been taught.

Making judgements – summative assessment

With the unit endpoint in mind, teachers will form a summative assessment for each child within a particular unit. This will be either, working towards / working at / working above the expected standard.

White Rose Maths — Autumn progress check — Year 1

White Rose Maths — Spring Progress Check — Year 1

White Rose Maths — Summer Progress check — Year 1

SMART GRADE

Children will complete a White Rose assessment test at the end of each term. We use Smart Grade to input these results to give a standardised score. A triangulation of this result alongside end of unit checks and pupil's work in books is used by teachers to make a judgement at the end of each term for each child.