Maths

We recognise that maths is a fundamental skill that we can teach our pupils that underpins their entire learning journey. Successful readers access curriculum content more effectively. We dedicate significant teaching time to maths daily. The intention of our mathematics curriculum at Penponds is to build the foundation of numeracy knowledge and skills that children require to successfully access the next stage of their education. It intends to develop fluent mathematicians who can recall number facts, handle large calculations efficiently, solve complex problems logically and make links between their maths and the wider world.

Through repeated practice, modelling and carefully planned small step progression we aim to develop long term memory of mathematics skills and knowledge. To support the progressive teaching of maths through the phases (EYFS, KS1, LKS2 and UKS2), carefully selected manipulatives and calculation strategies are intended to be used. Our intention to scaffold children's mathematical language, explanations, vocabulary, facts and strategies, sentence stems and repeated 'my turn, your turn' are used.

Our 'Challenge' approach intends to extend children to deepen understanding, whilst our approach to marking (assessment, reporting and reporting), at table guided teaching and use of daily distance marking sheets, intends to help children tackle misconceptions and practise further.

Committed, specific time to the teaching of number facts outside the main lesson time, intends to promote automaticity (fluency in number facts and good number sense). In EYFS and KS1, this is supported with the NCETM programme, Mastering Number at Reception and KS1 and the EYFS/KS1 version of the 99 Club. In KS2 this is supported by KS2 version of the 99 Club and White Rose Flashbacks.

The Maths Lead is responsible for supporting colleagues in their teaching, keeping them informed of current developments in the subject, and by providing a strategic lead and direction for Maths.

Our children are supported through our four school values – Curiosity, Creativity, Confidence and Caring- all embodied through our vision, 'Aiming High and Achieving Our Best' and our vision statement:

Penponds School will work with all stakeholders to create a ***happy, safe and stimulating environment*** *where children become* ***'Leaders of their own Learning'.*** *By maintaining* ***high expectations*** *of the whole school community, our children will be equipped to become* ***lifelong learner****s. We encourage* ***curiosity about the world, strive to be creative*** *in everything we do and* ***build confidence*** *in our children to enable them to grasp* ***opportunities and tackle challenges*** *with* ***resilience and self-assurance****.*

Developing Young Mathematicians

Maths

Agreed Teaching principles for Maths

- Innovation is led by Maths HUB research base and disseminated by Maths Lead
- Progressive, phase-related vocabulary should be taught and used explicitly
- Progressive, consistent manipulatives are modelled daily to support learning
- Tasks to challenge and deepen strands of learning are planned
- CPA (concrete-pictorial-abstract) approach is built on within the lesson
- Planning should be in small steps that build within the lesson and throughout the unit of work
- Learning is recapped and taken back to start (where necessary)

Teaching Approaches for Maths

- Progression and planning supported by NCETM and White Rose (EYFS) and Hamilton Brookes Maths (Year 1-6)
- Daily fluency development – NCETM and 99 Club (EYFS and KS1); 99 Club and Flashbacks (KS2)
- TT Rockstars and Sum Dog are used in school and for home learning
- Use of sentence stems and Maths Vocab Word Clouds are used to support children's mathematical explanations
- My Turn Your Turn approach to practise key mathematical terms
- Main calculation methods are used to build efficiency. Progressive Calculation Strategy is used if alternative methods are needed.
- Number fluency is explicitly taught at EYFS and KS1 with the use of the Rekenreks, Hungarian Number Frame (Dice) and Tens Frames
- Number fluency is built on across KS2.
- Maths lesson structure frames are used:

1. Arithmetic starter - four operations + previous lesson focus
2. What I learnt yesterday
3. Vocabulary for today's lesson (Word Cloud)
4. Introduce today's learning focus
5. Teach small steps
6. Model how to answer and use of manipulative and resources
7. Practise small step
8. Check for understanding
9. What do I need to remember today to help me? Working Wall
10. Practise lots – Teacher led guided group; Support Staff guided group; Independent of an adult groups; Questions/activities are progressive.
11. Review what we have learnt today

How do we measure the impact?

Weekly quiz results – 99 Club, TTRS scores
Daily in the moment feedback (Adult guided teach at table groups); Daily Distance Marking (Independent of an adult groups)
Challenge – to extend learning
Summative Standardised tests: NFER and SATs
Hamilton Brookes End of Unit Assessments

Maths - Skills and knowledge components: Progression document building from previous year's learning

YR	● 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. ● 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. ● ELG: Number Children at the expected level of development will: ● 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.						
	Place Value	**Addition and Subtraction**	**Multiplication and Division**	**Fractions and Decimals**	**Percentages**	**Ratio and Proportion**	**Algebra**
Y1	Count to and across 100, forwards and backwards, beginning from 0 or 1, or from any given number Count numbers to 100 in numerals; count in multiples of 2s, 5s, 10s Identify and represent numbers using objects and pictorial representations Read and write numbers up to 100 in numerals Read and write numbers from 1 to 20 in numerals and words Given a number, identify one more and one less	Read, write and interpret mathematical statements involving additional (+) and subtraction (-) and equals (=) signs Represent and use number bonds and related subtraction facts within 20 Add and subtract one-digit and 2-digit numbers to 20 including 0. Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 - ? = 9	Solve one-step problems involving multiplication and division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	Recognise, find and name a half as one of two equal parts of an object, shape or quantity Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity			Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7= ? - 9
Y2	Count in steps of 2, 3 and 5 from 0 and in 10s from any number, forward and backward Read and write numbers to at least 100 in numerals and words Identify, represent and estimate numbers using different representations, including the number line Recognise the place value of each digit in a two-digit number Compare and order numbers from 0 up to 100 Use place value and number facts to solve problems	Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100. Show that addition of 2 numbers can be done in any order (commutative) and subtraction of one number from another cannot. Recognise and use and the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems Add and subtract numbers using concrete objects, pictorial representations, and mentally including: -2-digit numbers and ones -2-digit numbers and tens -two 2-digit numbers -adding three 1-digit numbers Solve problems with addition and subtraction Using concrete objects and pictorial representations, including those involving numbers, quantities and measures Apply their increasing knowledge of mental and written calculations	Recall and use multiplication and division facts for the 2, 5, and 10 multiplication tables, including recognise odd and even numbers Show that multiplication of 2 numbers can be done in any order (commutative) and division of one number by another cannot Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division () and equals (=) sign Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in context.	Recognise, find, name and write fractions ⅓, 1/4, 2/4 and ¾ of length, shape, set of objects or quantity Recognise the equivalence of 2/4 and ½ Write simple fractions for example, ½ of 6 = 3			Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

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	Place Value	Addition and Subtraction	Multiplication and Division	Fractions and Decimals	Percentages	Ratio and Proportion	Algebra
Y3	Count from 0 in multiples of, 4, 8, 50 and 100; find 10 or 100 more or less than a given number Identify, represent and estimate numbers using different representations Read and write numbers up to 1000 in numerals and words Recognise the place value of each digit in a 3-digit number Compare and order numbers up to 1000 Solve number problems and practical problems	Estimate the answer to a calculation and use inverse operation to check answers Add and subtract numbers, mentally, including: - 3-digit number and ones - 3-digit number and tens - 3-digit number and hundreds Add and subtract numbers with up to 3-digits, using formal written method of columnar addition and subtraction Solve problems, including missing number problems, using number facts, place value and more complex addition and subtraction	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit number, using mental and progressing formal written methods Solve problems including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 Recognise, find and write fractions of a discrete set of objects; unit fractions and non-unit fractions with small denominators Recognise and use fractions as numbers; unit fractions and non-unit fractions with small denominators Recognise and show , using diagrams, equivalent fractions with small denominators Compare and order unit fractions, and fractions with the same denominators Add and subtract fractions with the same denominator within one whole (e.g 5/7 +1/7 = 6/7) Solve problems that involve all of the above			Solve problems including missing number problems
Y4	Count in multiples of 6, 7, 9, 25 and 1000 Count backwards through zero to including negative numbers Identify, represent and estimate numbers using different representations Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value Find 1000 more or less than a given number Recognise the place value of each digit in a 4-digit number Order and compare numbers beyond a 1000 Round any number to the nearest 10, 100, 1000 Solve problems that involve all of the above	Estimate and use inverse operations to check answers to a calculation Add and subtract numbers with up to 4-digits using formal written method of columnar addition and subtraction where appropriate Solve addition and subtraction two-step problems in contexts, deciding which operations and method to use and why	Recall multiplication and division facts for the multiplication tables up to 12 X 12 Use place value, known and derived facts to multiply and divide mentally, including; multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers Recognise and use factor pairs and commutativity in mental calculations Multiply 2-digit and 3-digit numbers by 1-digit numbers using formal written layout Solve problems involving multiplying and adding, including using the distributive law to multiply 2-digit numbers by 1-digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	Count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10 Recognise and show , using diagrams, families of common equivalent fractions Add and subtract fractions with the same denominator 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 Recognise and write decimals equivalents of any number of tenths or hundredths Recognise and write decimal equivalents to ¼, ½, ¾ Round decimals with one decimal place to the nearest whole number Compare numbers with the same number of decimal places up to 2 decimal places 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			

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	Place Value	Addition and Subtraction	Multiplication and Division	Fractions and Decimals	Percentages	Ratio and Proportion	Algebra
Y5	Count forwards and backwards in steps of powers of 10 for any given number up to 1,000,000 Count forwards and backwards with positive and negative whole numbers, including through zero Read, write, (order and compare) numbers up to at least 1, 000, 000 and determine the value of each digit Read Roman numerals to 1000 (M) and recognise years written in roman numerals Interpret negative numbers in context Round any number up to 1,000,000 Solve problems	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Add and subtract whole numbers with more than 4-digits, including using formal written methods (columnar addition and subtraction) Add and subtract numbers mentally with increasingly larger numbers Solve addition and subtraction multi-step problems in context deciding which operations and methods to use and why Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	Identify multiples and factors, including finding all factors pairs of a number, and common factors of 2 numbers Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers Establish whether a number up to 100 is prime and recall prime numbers up to 19 Recognise and use square numbers and cube numbers, and the notation for squared and cubed Multiply numbers up to 4-digits by a 1-digit or 2-digit number using a formal written method, including long multiplication for 2-digit numbers Multiply and divide numbers mentally drawing upon known facts Divide numbers up to 4-digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates	Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths Recognise mixed numbers and improper fractions and convert one form to the other and write mathematical statements > 1 as a mixed number (e.g ⅖ +⅘ = 6/5 = 1 ⅕) Compare and order fractions whose denominators are all multiples of the same number Add and subtract fractions with the same denominator and denominators that are multiples of the same number Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams Read and write decimal numbers as fractions (e.g 0.71 = 71/100) Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalent Round decimals with 2 decimal places to the nearest whole number and to 1 decimal place Read, write, order and compare numbers with up to 3 decimal places Solve problems involving number up to 3 decimal places	Recognise the percent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal Solve problems which require knowing percentage and decimal equivalents of ½, ¼, ⅕, ⅖, ⅘ and those fractions with a denominator of a multiple of 10 or 25		

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	Place Value	Addition and Subtraction	Multiplication and Division	Fractions and Decimals	Percentages	Ratio and Proportion	Algebra
Y6	Read, write (order and compare) numbers up to 10, 000, 000 and determine the value of each digit Round any whole number to a required degree of accuracy Use negative numbers in context and calculate intervals across zero Solve number and practical problems that involve all of the above.	Perform mental calculations , including with mixed operations and large numbers Use their knowledge of the order of operations to carry out calculations involving the four operations Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why	Identify common factors, common multiples and prime numbers Use estimation to check answers to calculations and determine, in the context of the problem, an appropriate degree of accuracy Multiply multi-digit numbers up to 4-digits by a 2-digit whole number using the formal written method of long multiplication Divide numbers up to 4-digits by a 2-digit whole number using the formal written method of long division and short division and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context Perform mental calculations, including with mixed operations and large numbers Solve problems involving all four operations Use their knowledge of the order of operations to carry out calculations involving all 4 operations.	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination Compare and order fractions, including fractions >1 Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g ¼ x1/2 = ⅛) Divide proper fractions by whole numbers (e.g ⅓ divided by 2 = ⅙) Identify the value of each digit in numbers given to 3 decimal places Multiply and divide numbers by 10, 100 and 1000 giving answers up to 3 decimal places Multiply one-digit numbers with up to 2 decimal places by whole numbers Use written division methods in cases where the answer has up to 2 decimal places Solve problems which require answers to be rounded to specified degrees of accuracy	Associate a fraction with division and calculator decimals fraction equivalents (e.g. 0.375 for a simple fraction - e.g. ⅜) Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts	Solve problems involving the relative sizes of two quantities where missing values can be found using integer multiplication and division facts Solve problems involving the calculation of percentages (e.g 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	Use simple formulae Generate and describe linear number sequences Express missing number problems algebraically Find pairs of numbers that satisfy an equation with two unknowns Enumerate possibilities of combinations of two variables

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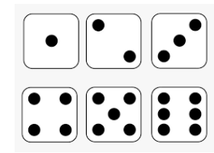
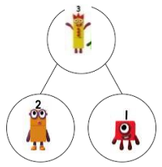
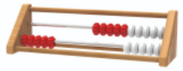
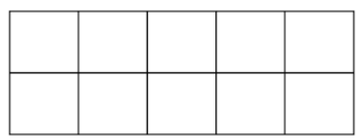
Progression in Calculation

Phase	Key Learning Intentions (National Curriculum/EYFS Framework)	How to support the learning	Key Vocabulary
EYFS	● 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. ● 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. ● ELG: Number Children at the expected level of development will: ● 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.	 **One-to-one correspondence** – match one number name to each item to be counted **Cardinality** – the last number in the count is the total size of the group **Stable order -** say the number names in the correct order   **Part- part-whole model** Conservation of number – a number can be partitioned but the whole (total) remains the same.  Explore the structure of the numbers 6 and 7 as '5 and a bit' and connect this to finger patterns and the Hungarian number frame **Hungarian number frame** subitise different arrangements, both unstructured and structured, including using the Hungarian number frame  Develop conceptual subitising skills including when using a **rekenrek**  **Number bonds** within 5 and then 10 Children are exposed to numbers to 100 in the class   **Odd and Even** - Even Tops and the Odd Blocks to match Numicon concrete manipulatives. 2 4 6 8 10 Explore numbers that make up a number Two-ness of 2 Three-ness of 3 Four-ness of 4 Five-ness of 5  **Ten Frame-** composition and comparison of numbers to 10, subitising numbers to 10 exploring  Number recognition: models and images commonly used in class.  Comparison of numbers 1 to 5 using the language of 'greater than' and 'less than' Blockzilla 	Subitise Counting to 10 Comparing sets of objects Equal/ unequal Matching Whole Parts Partitioning/ combining Doubles/ halves One more than One less than Pairs Addition Subtraction Number bonds to 5 Missing numbers Greater than, less than Finding the difference Longer, shorter Full, empty, nearly full, nearly empty, Match, sort, compare Measure, patterns Circle, triangle, square, rectangle, quadrilateral, sides, straight, corners, 2D 3D, mass, capacity, length, height, time, sharing, grouping **Stem Sentences Songs:** 'one and one is two' 'two is one and one' '… is one more than…' '… is one les than…' '…comes before…' '… comes after….' '… is a part of me and … is a part of me and the whole of me is…' 'if the whole is…, then .. is a part and … is a part' 'five is made of… and …' ' I see… without counting' 'one ten is the same as ten ones' 'ten ones is the same as one ten' '… take away 1 is…' '… add 1 is…' '… is even because it is made of two's' '…is odd because it has one on top '…is greater than…' '…is less than…' 'the difference between.. and … is …'

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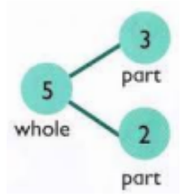
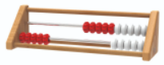
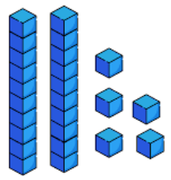
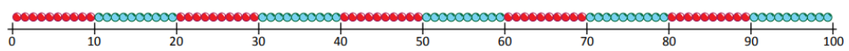
KS1 Addition and Subtraction (including Place Value)	**Year 1** ● Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number ● Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens ● Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs ● Represent and use number bonds and related subtraction facts within 20 ● Add and subtract one-digit and two-digit numbers to 20, including zero ● Solve one-step problems that involve addition and subtraction, using concrete objects, pictorial representations and simple missing number problems Year 2 ● Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward ● Recognise the place value of each digit in a two-digit number (tens, ones) ● Identify, represent and estimate numbers using different representations, including the number line ● Compare and order numbers from 0 up to 100; use and = signs Read and write numbers to at least 100 in numerals and in words Use place value and number facts to solve problems ● Solve problems with addition and subtraction ● Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 ● Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens, two two-digit numbers, adding three one-digit numbers ● Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	 **whole** 10 5 5 **part** **part** Part whole models and Bar models are used to support addition and subtraction, finding missing parts and place value using numerals to support concrete and pictorial concepts.  Rekenreks are used to represent and use number bonds and to add and subtract to and within 10 and 20.  Hundred squares are used to support cardinality and ordinality. Counting in twos, fives and tens. Counting, reading, writing, ordering and comparing numbers to 100.  Base 10 is used to support place value understanding and the addition and subtraction of 2 two-digit numbers, a two-digit number and ones and a two-digit number and tens. Representation of Base 10 will be used pictorally (I I .. = 22) and into the abstract (numerals – 22)  Number lines will be used to support understanding of ordinality, 1 more and 1 less, finding the difference and subtracting bridging 10. Formal written methods of calculations will be recorded as number sentences: 20 + 7 = 27 27 = 20 + 7 27 – 20 = 7 27 – 7 = 20 20 + ? = 27 27 - ? = 20	Addend + Addend=Sum Minuend - subtrahend = difference More/ less, larger/ smaller, many, few Tens, ones Equal to Compare Value **Stem Sentences:** ___ is made from ___ and ___ Double ____ is ____ ___ needs ___ to make ___ ___ is equal to ___ and ___ _____ can be made from double _____ and 1 more

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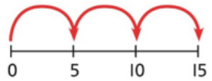
KS1 Multiplication and Division	**Year 1** ● Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. ● Recognise, find and name a half as one of two equal parts of an object, shape or quantity Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity Year 2 ● Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers ● Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs ● Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	 Concrete resources are used to show equal and unequal groups. Children also pictorially represent equal and unequal groups.  Arrays and Numicon are used to develop the x sign and commutative law, support multiplicative and additive relationships and to develop unitising in twos, fives and tens.  Number lines used to support repeated addition. Formal written methods of calculations will be recorded as number sentences: 6 X 2 = 12 12 ÷ 2 = 6 6 X ? = 12 12 ÷ ? = 6	Repeated Addition Factor x factor = Product/multiple Quotient (answer in a division calculation) Array, row, column Divide, divided by Lots of, groups of, multiply, multiplied by, times, repeated addition Double, halve Equal, unequal Odd, even Commutative Equal groups of **Stem sentence** Multiplication is … Arrays can help me with…

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LKS2 Addition and Subtraction (including Place Value)

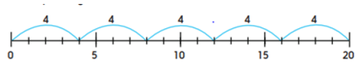
Year 3

- Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1000
- Identify, represent and estimate numbers using different representations
- Read and write numbers up to 1000 in numerals and in words solve number problems and practical problems involving these ideas
- Pupils should be taught to: add and subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds
- Add and subtract numbers with up to three digits, using formal written methods of column addition and subtraction
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Year 4

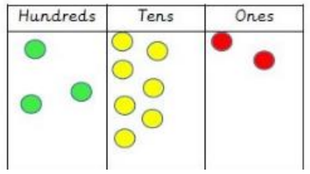
- Count in multiples of 6, 7, 9, 25 and 1000
- Find 1000 more or less than a given number
- Count backwards through zero to include negative numbers Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- Order and compare numbers beyond 1000
- Identify, represent and estimate numbers using different representations
- Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve all of the above and with increasingly large positive numbers
- Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.
- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate Estimate and use inverse operations to check answers to a calculation
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

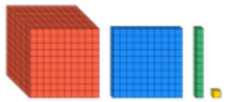
Support Strategies



Count in steps along a number line.

Place value grids with base 10, counters and numerals.



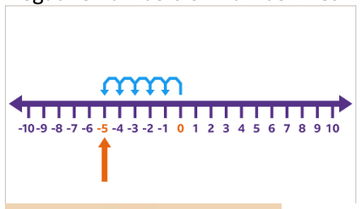


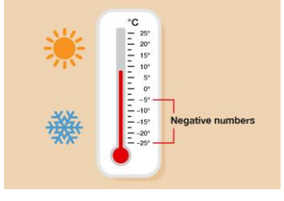
Base 10 supports and extends place value understanding and knowledge of 1 ten = 10 ones, ten 10's = 100

Using number facts

Number bonds to 100 e.g. 35 = 65, 46 + 54, 73 +27 etc

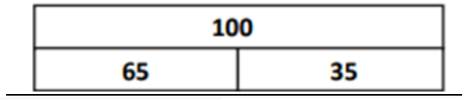
Negative numbers on numberlines in a variety of forms.

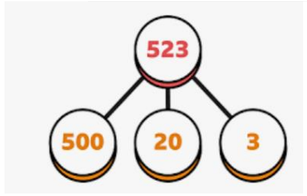




Formal Written Methods

Use of bar models to provide visual representations of calculations.

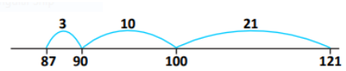




Partitioning numbers using part-whole model and place value

Counting up

Find a difference between two numbers by counting up from the smaller to the larger e.g. 121 - 87



Formal Column Method (including the use of exchanging)

	Th	H	T	O
	2	4	5	7
+	3	9	1	6

	Th	H	T	O
	8	9	3	2
–	4	1	5	7

$$\begin{array}{r} 7\ 8\ 9 \\ +\ 6\ 4\ 2 \\ \hline 1\ 4\ 3\ 1 \\ \ \ 1\ 1 \end{array}$$

$$\begin{array}{r} {}^{8}\not{9}^{1}\not{2}^{1}\not{3}^{1}\ 2 \\ -\ 4\ 5\ 7 \\ \hline 4\ 7\ 5 \end{array}$$

Addend + addend = sum

Minuend - subtrahend = Difference

Add
More
Plus
Sum
Total
Altogether

Subtract
Minus
Less
Take away
Difference between

Stem Sentences:
Addition can be done in any order.

Start with the largest number first.
When working on the column method, start with the ones column.

Maths

LKS2 Multiplication and Division

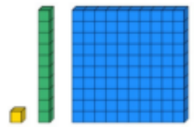
Year 3

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know
- Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Year 4

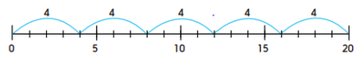
- Recall multiplication and division facts for multiplication tables up to 12 × 12
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Support strategies



Base 10 supports and extends place value understanding and knowledge of:
1 ten = 10 ones,
10 tens = 1 hundred

Counting in steps using number lines or grouping.



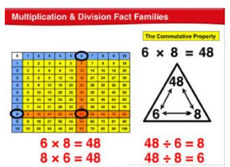
Doubling and halving
Using number facts, including the inverse.

The THREE Times Table		
3 x 0 = 0	0	0 ÷ 3 = 0
3 x 1 = 3	3	3 ÷ 3 = 1
3 x 2 = 6	6	6 ÷ 3 = 2
3 x 3 = 9	9	9 ÷ 3 = 3
3 x 4 = 12	12	12 ÷ 3 = 4
3 x 5 = 15	15	15 ÷ 3 = 5
3 x 6 = 18	18	18 ÷ 3 = 6
3 x 7 = 21	21	21 ÷ 3 = 7
3 x 8 = 24	24	24 ÷ 3 = 8
3 x 9 = 27	27	27 ÷ 3 = 9
3 x 10 = 30	30	30 ÷ 3 = 10
3 x 11 = 33	33	33 ÷ 3 = 11
3 x 12 = 36	36	36 ÷ 3 = 12

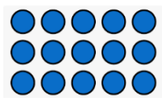
Rote learning
Times tables
Songs

3 x 5 = 15
5 x 3 = 15
15 ÷ 5 = 3
15 ÷ 3 = 5

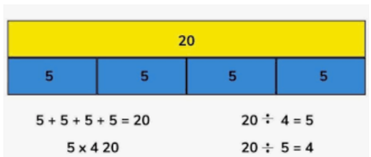
Noticing fact family triangles



Arrays

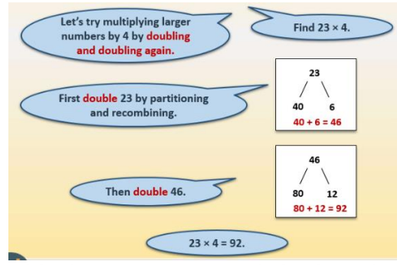


Bar models

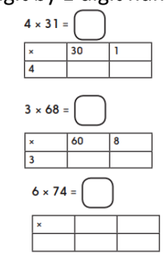


Formal written methods

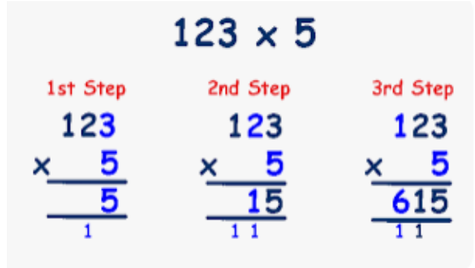
Partitioning numbers to multiply and divide 2- and 3-digit numbers by 1 digit numbers.



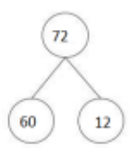
Build on partitioning to develop multiplication grid, to multiply 3 digit by 1 digit numbers.



Use a column method to multiply 3-digit numbers by 1 digit numbers.



Partitioning into smaller divisible units.



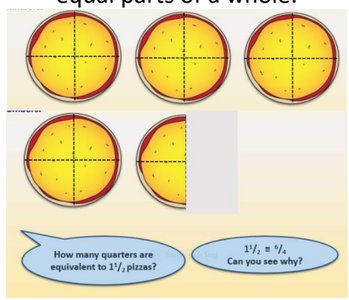
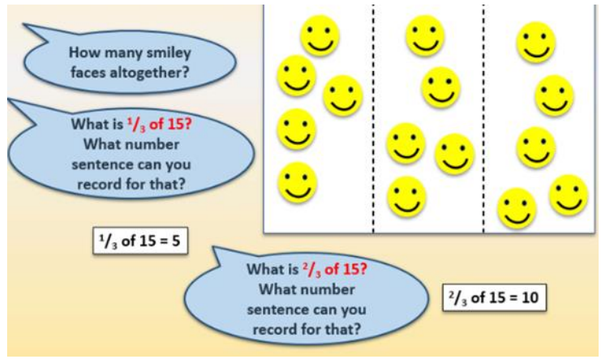
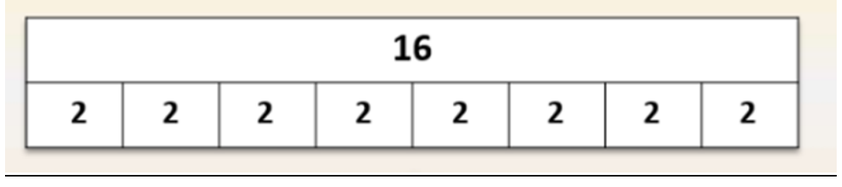
Repeated addition,
Times, Multiply, lots of, double
Multiple
Partition
Group, sharing, half, share equally, equal groups,
Dividend
Divisor
Quotient Remainder
Factor x factor =
Product/multiple

Stem Sentences:

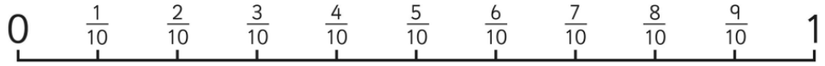
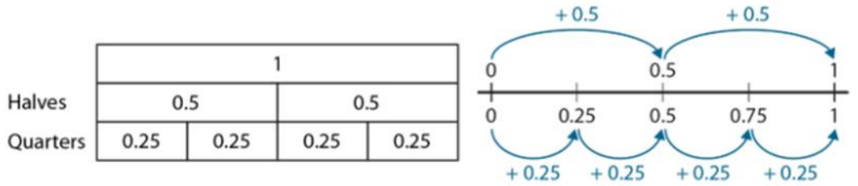
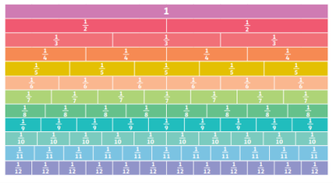
Multiplication can be done in any order.

When dividing, always have the greatest number first.

Maths

LKS2 Fractions and Decimals	**Year 3** **● Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10** **● Recognise, find and write fractions of a discrete set of objects; unit fractions and non-unit fractions with small denominators** **● Recognise and use fractions as numbers; unit fractions and non-unit fractions with small denominators** **● Recognise and show , using diagrams, equivalent fractions with small denominators** **● Compare and order unit fractions, and fractions with the same denominators** **● Add and subtract fractions with the same denominator within one whole (e.g 5/7 +1/7 = 6/7) Solve problems that involve all of the above** **Year 4** **● Count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10** **● Recognise and show , using diagrams, families of common equivalent fractions** **● Add and subtract fractions with the same denominator** **● 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**	**Methods** Base 10 and place value counters.  Use real life objects and shapes to as pictorial and concrete images to visualise fractions. Visualise that fractions are equal parts of a whole.  Use concrete and pictorial representations to calculate fractions of numbers e.g. 1/3 of 15 is 5.  Formal representation of this through bar models. 	Half of an odd number always ends in a ½ A numerator is 'never under'. The denominator is at the bottom.

Maths

	• **Recognise and write decimals equivalents of any number of tenths or hundredths** • **Recognise and write decimal equivalents to ¼, ½, ¾** • **Round decimals with one decimal place to the nearest whole number** • **Compare numbers with the same number of decimal places up to 2 decimal places** • **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**	Fraction number lines to count, compare and order fractions. A tool to support adding and subtracting fractions with the same denominator.  $\frac{1}{7} + \frac{4}{7} = \frac{5}{7}$ $\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$ Formal written method to calculate addition and subtraction of fractions. Bar models and number lines to show parts of a whole  Fraction wall to support understanding of equivalent fractions. **Fractions Wall**  **Fraction notation** / **Decimal notation** / **Name** $\frac{1}{10}$ / 0.1 / one-tenth $\frac{1}{100}$ / 0.01 / one-hundredth	

Maths

UKS2 Addition and Subtraction (including Place Value)

Year 5

- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Solve number problems and practical problems that involve all of the above.
- Read Roman numerals to 1000 (M) and recognise years written in Roman numerals
- Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)

Add and subtract numbers mentally with increasingly large numbers Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

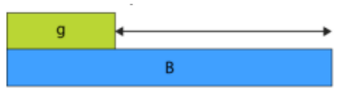
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Year 6

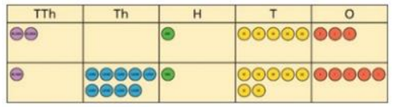
- Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- Round any whole number to a required degree of accuracy
- Use negative numbers in context, and calculate intervals across zero
- Solve number and practical problems that involve all of the above.
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- Solve problems involving addition, subtraction, multiplication and division
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Support strategies

Additive – comparative

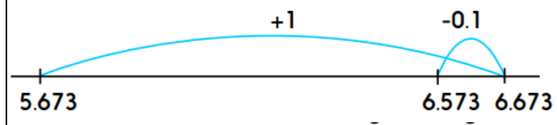


Additive or multiplicative



Add near multiples of 1, e.g. 6.345 + 0.999 or 5.673 + 0.9.

Partitioning, e.g. 2.4 + 5.8 as 2 + 5 and 0.4 + 0.8 and combine the totals: 7 + 1.2 = 8.2.



Partitioning, e.g. 9.54 + 3.25 as 9 + 3 and 0.5 + 0.2 and 0.04 + 0.05 to get 12.79.

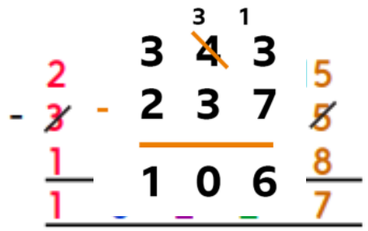
10s	1s	·	0.1s ⅒s	0.01s ⅒₀s
	9	·	5	4
	3	·	2	5
1	2	·	7	9

Adding fractions with unlike denominators,

e.g. ¾ + ⅓ = 1 ⅓ or 2 ¼ + 1 ⅓ = 3 ⅞

¾ + ⅓
= ⁹⁄₁₂ + ⁴⁄₁₂
= ¹³⁄₁₂
= 1 ⅓

Formal written methods



Subtracting fractions with unlike denominators,

e.g. 1¼ - ⅔
= ¾ - ⅔
= ¹⁵⁄₁₂ - ⁸⁄₁₂
= ⁷⁄₁₂

Addend + addend = sum
(5 + 4 = 9)

Minuend - subtrahend = difference
(10 – 3 = 7)

Additive

Multiplicative

Difference

Maths

UKS2 Multiplication and Division

Year 5

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- Establish whether a number up to 100 is prime and recall prime numbers up to 19
- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- Multiply and divide numbers mentally drawing upon known facts Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

Year 6

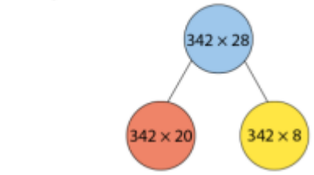
- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- Perform mental calculations, including with mixed operations and large numbers identify common factors, common multiples and prime numbers
- Use their knowledge of the order of operations to carry out calculations involving the four operations

Support strategies

Multiplication using decimal places.

£23.67
x 3
£71.01
1 2 2

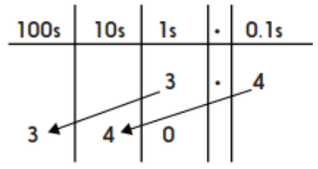
Part–part–whole model:



Grid method for multiplication, using partitioning.

x	300	40	5	
20	6000	800	100	6900
6	1800	240	30	2070
				8970

Place value grids to show that the decimal place doesn't move, the number moves across the grid.



Use partitioning to multiply 2, 3 or 4 digit numbers by 1 digit numbers:

e.g: 34 x 7 =

30 x 7 = 210
4 x 7 = 28
35 x 7 = 238

Use partitioning to multiply decimals by 1 digit numbers:

e.g: 4.5 x 9 =

4 x 9 = 36
0.5 x 9 = 4.5
4.5 x 9 = 40.5

Formal written methods

Short multiplication of 2, 3 and 4 digits by 1 digits.

3 4 2
× 8
2 7 3 6
3 1

Short multiplication of 2, 3 and 4 digits, combining partial products.

3 4 2
× 8
2 7 3 6
3 1

3 4 2
× 2 0
6 8 4 0

6 8 4 0
+ 2 7 3 6
9 5 7 6
1

Long multiplication of 2, 3, 4 digits by 2 digits (multiplying tens first):

16 x 27 = ?

27 × 10 = 270 + 27 × 6 = 162 (4) = 27 × 16 → 270 (x10) + 162 (x6) = 432 (x16)

16 x 27 = (10 x 27) + (6 x 27)

Long multiplication of 2, 3, 4 digits by 2 digits (multiplying ones first, explaining it's cumulative):

3 1
× 2 4
1 2 4
6 2 0
7 4 4

Short division of 3 and 4 digit numbers by 1 digit numbers.

dividend ÷ divisor = quotient

quotient
divisor) dividend

4 4 r3
6) 2 5 7

Factor x factor = product / multiple

Dividend
Divisor
Divisible
Quotient Remainder
Prime numbers
Prime factors
Composite numbers
Multiples
Factors
Common factors
Remainders
Rounding
Squared number
Cubed number
Integer
Scaling

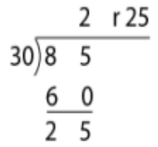
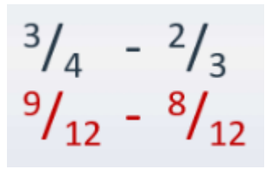
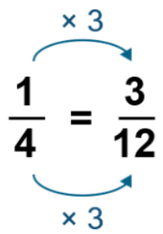
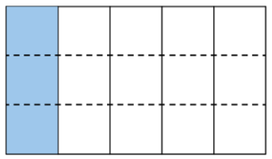
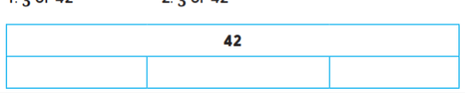
Stem Sentences:

A prime number is only divisible by itself and 1.

The decimal point never moves, the number moves across the place value grid.

Multiplication is cumulative. It can be done either way.

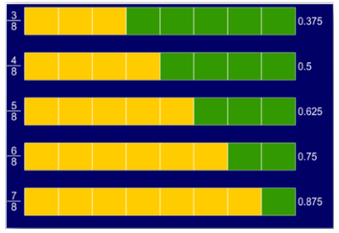
Maths

		Use times-tables facts up to 12 x 12 4 x 6 = 24 40 x 6 = 240 40 x 60 = 2,400 **Multiple** 4 x 9 = 36 **Factor** 4 x 9 = 36	**Long division of 3 and 4 digit numbers by 2 digit numbers.** Scaling initially used to introduce long division.  Progress onto long division.  	
UKS2 Fractions and Decimals	**Year 5:** ● Use common factors to simplify fractions; use common multiples to express fractions in the same denomination ● Compare and order fractions, including fractions >1 ● Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions. ● Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g ¼ x1/2 = ⅛) ● Divide proper fractions by whole numbers (e.g ⅓ divided by 2 = ⅙) ● Identify the value of each digit in numbers given to 3 decimal places. ● Multiply and divide numbers by 10, 100 and 1000 giving answers up to 3 decimal places. ● Multiply one-digit numbers with up to 2 decimal places by whole numbers. ● Use written division methods in cases where the answer has up to 2 decimal places. ● Solve problems which require answers to be rounded to specified degrees of accuracy. **Year 6:** ● Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	**Methods** **Finding equivalent fractions, using common multiples, and using them for addition and subtraction:**    1/5 = 3/15  **Writing fractions as improper fractions and mixed numbers:**  • How many quarters of pizza have been shaded? • We can say and write this as 5/4, an **improper fraction**, or as 1 1/4 pizzas, a **mixed number**. **Representing fractions of a number through bar models:** 1. 1/3 of 42 2. 2/3 of 42  	Mixed number Proper fraction Improper fraction Unit fraction Non- unit fraction Denominator Numerator Thousandth Hundredth Tenth

Maths

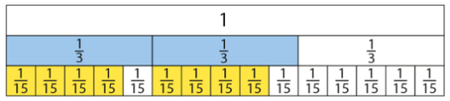
- Recognise mixed numbers and improper fractions and convert one form to the other and write mathematical statements > 1 as a mixed number (e.g ⅗ +⅘ = 6/5 = 1 ⅕)
- Compare and order fractions whose denominators are all multiples of the same number
- Add and subtract fractions with the same denominator and denominators that are multiples of the same number
- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- Read and write decimal numbers as fractions (e.g 0.71 = 71/100)
- Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalent
- Round decimals with 2 decimal places to the nearest whole number and to 1 decimal place
- Read, write, order and compare numbers with up to 3 decimal places
- Solve problems involving number up to 3 decimal places

Comparing fractions and decimals:



Multiplying fractions by a whole number:

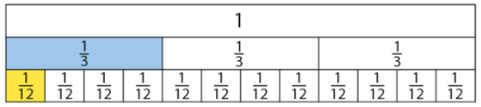
$\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$ $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$



Dividing fractions by a whole number:

$\frac{1}{3} \div 4 = \frac{1}{12}$

$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$



Multiply and divide decimals by 10, 100, 1000:

0.723 x 10 = 7.23

0.723 x 100 = 72.3

0.723 x 1000 = 723

Multiply decimals by whole numbers:

$685 \times 0.2 = \frac{2}{10}$ of 685

$\frac{1}{10}$ of 685 = 68.5

$$\begin{array}{r} 6\ 8\ .\ 5 \\ \times \quad\quad 2 \\ \hline 1\ 3\ 7\ .\ 0 \\ \hline 1\ 1 \end{array}$$

Multiply fractions by whole numbers:

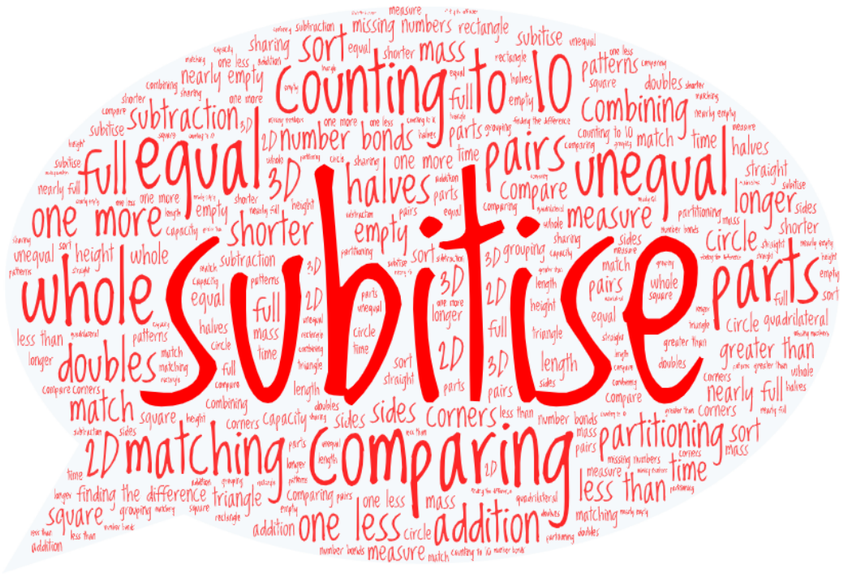
$685 \times \frac{1}{5}$

$$5\overline{)\,6\,{}^{1}8\,{}^{3}5} \quad 1\ 3\ 7$$

Maths

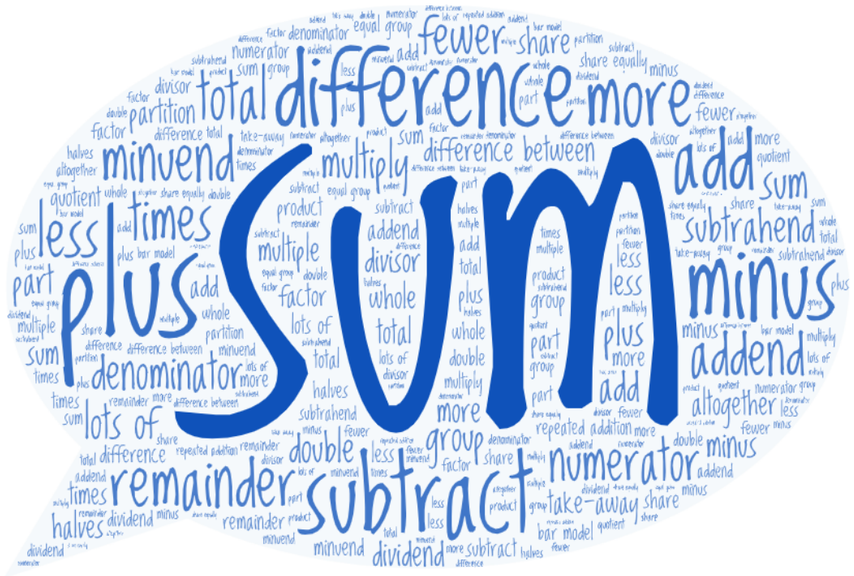
Maths Progression Vocabulary Word Clouds

EYFS



KS1

LKS2



UKS2

Strategies for supporting pupils with Special Educational Needs and Disabilities

in Maths lessons.

	Here's how we will help.
Attention Deficit Hyperactivity Disorder	• A non-confrontational approach will be used in everyaspect of the maths lesson • Adult support during the initial Power Maths starter where children may be using whiteboards to record their answers • Remind of Growth Mindset Power Maths characters • Verbal praise is given whenever necessary to help boost confidence and self esteem • Use of pictorial representations to support the learning taking place • We use concrete resources to support new mathematical concepts
Anxiety	• A trusting relationship will be nurtured between all adultsin the classroom and the child • This relationship will enable the adult to know any triggers or changes in behaviour that may be caused bythe child feeling anxious • Giving feedback or answers is always a non-compulsoryoption during any maths lesson so that children are no t'put on the spot' or made to feel pressured or uncomfortable • Maths lessons are calm and quiet where children can focuson the learning taking place • If children feel overwhelmed by the classroom environment, they can use a quiet break out space

Autism Spectrum Disorder	• Visual timetables are used to support the organisation ofthe maths lesson • Visual cues/resources are used to support the child as necessary throughout the session • A learning space is provided that best suits the child • There is a consistent approach to the maths lesson with any changes discussed with the child beforehand • Sensory breaks are given whenever necessary • Mathematical vocabulary is integrated into the lesson throughout, with visuals to support new language • Staff avoid asking specific or direct questions that focus on the child's mathematical understanding that may make them feel uncomfortable • Staff ensure that the child has a clear goal for what they are expected to achieve during the maths lesson
Dyscalculia	• Concrete resources and manipulatives are always made available and are clearly, labelled and accessible • Adults will ensure children understand how to use these manipulatives to support the specific learning goal • If a slideshow is being shown, an individual laptop will be provided so the child can follow the presentation successfully with support if needed • Power Maths lessons incorporate activities that specifically focus on recall and repeating areas of mathematics the children have already explored • Squared paper will be provided for all written calculations (i.e. long division) • Rulers and highlighters will be used to visually support the drawing/organisation of written calculation methods • Peer and adult support will be built into the lesson throughout to support any corrections with recording dictated numbers/number formation • Peer teaching will be used as a great way of the child sharing new knowledge that has been learnt

Dyslexia	• Different coloured paper can be provided for any written recordings • A text font size of 12 or above is used for any work sheets/PowerPoint presentations • Questions will be short with visual representations (diagrams, pictures, illustrations) to support • Data, charts and diagrams are clearly organised and structured • Specific clear, rounded and spaced out fonts are used onany writing within the lesson • Large spaces for working out will be provided under each question given on a work sheet or in a maths book
Dyspraxia	• A large learning space will be provided • Instructions can be written out for the child, usingdifferent colours for each line • Diagrams will be provided before labelling/editing • Suitable time limits will be given for all home learning for maths • Children can leave the maths session early to ensure there is time to move in and out of the classroom (breaktimes, lunchtimes, toilet trips etc.) • Children can move around the classroom whenever necessary • When using mathematical equipment, an adult or supportive peer will provide demonstration of how to successfully use the equipment • Adults will ensure they are watching closely for signs of • distress and provide a quiet, calm learning environment
Hearing Impairment	• A suitable working space will be agreed upon between the teacher and child in a safe, private conversation before the lesson • Adults within the classroom will ensure the child's hearing aid is turned on before the lesson begins • Adults will ensure they are facing the child when they are talking/giving instructions • Questions and any information given by peers will be repeated clearly to ensure the child has heard what their peers have asked/said • Children will be seated towards the front of the classroom to ensure they have a clear line of vision, especially during the input where the whiteboard will be the main focus
Toileting Issues	• Children will be able to leave and return to the classroom whenever necessary • A seating arrangement will be made so that the child can enter and leave the classroom discretely

	• All adults and children within the classroom environment will respect the child's privacy
Cognition and Learning Challenges	• Power Maths learning is naturally differentiated to meet the child's specific 'learning gaps' • This will ensure that the task being given to the child matches their individual academic needs • Concrete resources and visual representations will be given to the child to support any mental and written calculations needed • Self-checks can be used at each stage of a task so that children are aware of the tasks required of them and their achievement of reaching this • Key vocabulary and ideas will be addressed regularly throughout the maths lesson to check understanding
	• Information will be repeated clearly, varying the vocabulary used • PowerPoint slides will be simple and uncluttered with key information highlighted • Children will be provided with a 'work-buddy' during peer activities/opportunities
Speech, Language and Communication Needs	• Visual timetables, signs and symbols will be used to support communication within the maths lesson • Visual displays (maths working walls) will be used to support understanding of key information • Non-verbal clues will be used to back up what is being said • Any verbal instructions/information will be at a slow, clear pace that matches the child's understanding • Adults will regularly check the child's understanding so that adults can identify any misconceptions or misunderstandings
Tourette Syndrome	• Adults will listen and respond to the child with support and understanding • A structure will be provided (tick list) to support the learning taking place, this will be differentiated to the maths activity and include the main elements needed to aid the child's attention • There will be understanding that the activity may not be completed
Experienced Trauma	• The maths learning environment will be a calm, trusting place where children feel supported with their emotions at all times • Adults working with the child will be aware of any triggers and any ways to further support the child within the classroom • The PACE Approach will be used, using playfulness, acceptance, curiosity and empathy to understand emotions and behaviour. Lesson plans will be adapted to reflect this

	• There will be a consistent approach to expectations and behaviour that are based on positive praise.
Visual Impairment	• Anything that is being displayed (PowerPoint presentation, maths working wall) will be large and easily visible from anywhere in the classroom • Children will be able to 'take a break' from their maths learning whenever needed to ensure they are able to focus visually and avoid fatigue • Images and text within any printed work will be enlarged with the recommended font size • Children will be provided with a thicker and darker pencil to ensure their writing is clear