MATHS PROGRESSION

Overview:
We place a strong emphasis on the children learning and practising the fundamentals of mathematics, particularly number and calculation. We encourage the use of concrete objects and manipulatives to support a thorough understanding. We focus on deepening the children's understanding through three areas: fluency, problem solving and reasoning. We want the children to think mathematically when problem solving and see that they can apply the maths knowledge and understanding that they have learnt previously, to a problem. This in turn will enhance students' mathematical understanding and development.

- **Fluency** is primarily developed through varied and frequent practice.
- **Efficiency** - this implies that children do not get bogged down in too many steps or lose track of the logic of the strategy. An efficient strategy is one that the student can carry out easily, keeping track of sub-problems and making use of intermediate results to solve the problem.
- **Accuracy** depends on several aspects of the problem-solving process, among them careful recording, knowledge of number facts and other important number relationships, and double-checking results.
- **Flexibility** requires the knowledge of more than one approach to solving a particular kind of problem, such as two-digit multiplication. Students need to be flexible in order to choose an appropriate strategy for the numbers involved, and also be able to use one method to solve
- a problem and another method to check the results.
- Reasoning is developed in two ways: routinely in lessons through a consistent teaching approach of asking 'why?' more often than 'how?'; and through specific topic activities designed to teach skills in the context of the topic.
- Problem solving is developed both through routine problems and non-routine problems; the latter are focused on specific problem-solving skills shown below and taught in the context of the topic.

In each year, pupils will be learning to:

Number and Place Value

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Counting	**recognise up to 3 objects, without having to count them individually ('subitising')** **recite numbers past 5** **say one number for each item in order: 1,2,3,4,5** **know the last number reached when counting objects tells you how many there are**	**count objects, actions and sounds matching one number name to each item** **subitise to 5 (ELG)** and count to check **count beyond 20 verbally (ELG)**	**Fluency doubles (EYFS)** **Children should know: 1+2; 1+3; 1+4 (EYFS)** **1 to 1 correspondence when counting** **1+9; 2+8; 3+7; 4+6** **2 + 6; 2 + 7; 2 + 8; 2 + 9** **All number bonds for all numbers to 10 and the related subtraction facts** **3 + 4; 3 + 5; 3 + 6** **One more or one less than any number up to 50** **5 + 8; 5 + 9; 6 + 7** **Multiples of 10 up to 100** ***Counting forwards and backwards in ones or twos*** ***4 + 8 count on in ones from 4 or count on in ones from 8*** ***7 – 3 count back in ones from 7*** ***13 + 4 count on from 13*** ***15 – 3 count back in ones from 15*** ***18 – 6 count back in two*** ***Reordering by putting the larger number first*** ***2 + 7 = 7 + 2*** ***5 + 13 = 13 + 5*** ***Reordering to find number bonds*** ***3 + 4 + 7 = 3 + 7 + 4*** **count to and across 100, forwards, beginning with 0 or 1** **count to and across 100, forwards and backwards, beginning with any given number** **count to and across 100, backwards, beginning with any given number** **count in multiples of twos** **begin to recognise odd and even numbers**	**Fluency Autumn** **Revision of Y1 number facts: Adding 5, 6, 7, 8, 9 to single digit numbers** **Addition and subtraction facts within 10 and bridging 10** ***Counting forwards and backwards in tens, ones or a suitable multiple*** ***14 + 3 count on in ones from 14*** ***27 – 4 count on or back in ones from any two-digit number*** ***18 – 4 count back in twos from 18*** ***30 + 3 count on in ones from 30*** ***Find a small difference by counting up from the smaller to the larger number 32 – 28 count on from 28*** ***Reordering to start with larger number*** ***2 + 36 = 36 + 2*** ***Reordering to look for number bonds*** ***5 + 7 + 5 = 5 + 5 + 7*** ***Partitioning using multiples of 10 and 100*** ***30 + 47 = 30 + 40 + 7*** ***78 – 40 = 70 – 40 + 8*** ***25 + 14 = 20 + 5 + 10 + 4 = 20 + 10 + 5 + 4*** ***Partitioning – bridging through multiples of 10*** ***6 + 7 = 6 + 4 + 3*** ***23 – 9 = 23 – 3 – 6*** ***15 + 7 = 15 + 5 + 2*** ***count in multiples of threes, fives and tens*** ***recognise odd and even numbers***	**Fluency Autumn** **Revisit multiplication and division facts 2x, 5x, 10x** ***To count on in different jumps bridging 10s and 100s*** ***Count in 10s from 76*** ***Count in 2s from 15*** ***Reordering and finding number bonds or near doubles to add multiple numbers 23 + 54 = 54 + 23*** ***12 – 7 – 2 = 12 – 2 – 7*** ***13 + 21 + 13 = 13 + 13 + 21 (using double 13)*** ***c*** ***Partitioning using multiples of 1, 10 and 100*** ***23 + 45 = 40 + 5 + 20 + 3= 40 + 20 + 5 + 3*** ***68 – 32 = 60 + 8 – 30 – 2= 60 – 30 + 8 – 2*** ***Partitioning – bridging through multiples of 10*** ***49 +32 = 49 +1 +31*** **count from 0 in multiples of 4** **count from 0 in multiples of 8** **count from 0 in multiples of 50 and 100** **find 10 or 100 more or less than a given number**	**Fluency Autumn** **Recap multiplication and division facts: 2x (Y1); 5x, 10x, 3x, 0x (Y2); 4x, 8x, 6x, 9x (Y3)** ***To count on and back in different jumps bridging 10s, 100s and 100's*** ***Count in 10s from 76 or Count in 2s from 15*** ***86 – 30 count back in tens from 86 or count on in tens from 30*** ***960 – 500 count back in hundreds from 960 or count on in hundreds from 500*** ***Reordering to add or multiply 3 or more numbers*** ***6 + 13 + 4 + 3 = 6 + 4 + 13 + 3*** ***17 + 9 – 7 = 17 – 7 + 9*** ***4 x 3 x 5 = 5 x 4 x 3 = 20 x 3 = 60*** ***Partitioning – bridging through multiples of 10 or 100*** ***57 + 14 = 57 + 3 + 11 or 57 + 13 + 1*** **count in multiples of 6** **count in multiples of 7** **count in multiples of 9** **count in multiples of 25** **count in multiples of 1000** **find 1000 more or less than a given number**	**Fluency Autumn** **Revision of multiplication and division facts up to 12 x 12 and derive others beyond known facts** ***Counting backwards and forwards in multiples of 1 or 10 from any number to 1 000 000*** ***To be able to count backwards across 0 in different jumps*** ***Count back from 0 in 2s*** **count forwards in steps of powers of 10 for any given number up to 1,000,000** **count backwards in steps of powers of 10 for any given number up to 1,000,000** **interpret negative numbers in context** **count backwards through zero to include negative numbers**	**Fluency Autumn** **Revision of multiplication and division facts up to 12 x 12 and derive others beyond known facts** ***Counting backwards and forwards in multiples of 1 or 10 from any number to 1 000 000 Count in 20s from 346*** **To be able to count backwards across 0 in different jumps** **Count back from 0 in 2s** **count forwards in steps of powers of 10 for any given number up to 10,000,000** **count backwards in steps of powers of 10 for any given number up to 10,000,000** **calculate intervals across zero**

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Represent	**show fingers, marks on paper or pictures for numbers up to 5** **link numerals and amounts**: for example, showing the right number of objects to match the numeral, up to 5 experiment with their own symbols and marks as well as numerals	**link the number symbol with its cardinal number value to 10** **write recognisable numbers to 10**	**identify and represent one and two digit numbers using objects and pictorial representations*** **identify and represent numbers using the number line** **count, read and write numbers to 100 in numerals** **read and write numbers from 1 to 20 in words**	**estimate one and two digit numbers using different representations*** **estimate one and two digit numbers using the number line** **count, read and write numbers to 100 in numerals and words**	**identify and represent 3 digit numbers using different representations*** **identify and represent 3 digit numbers using the number line** **estimate 3 digit numbers using different representations*** **estimate 3 digit numbers using the number line** **read and write numbers up to 1000 in numerals and in words**	**identify and represent 4 digit numbers using different representations*** **estimate 4 digit numbers using different representations*** **identify and represent 4 digit numbers on a number line** **identify and represent numbers with decimals on a number line** **estimate 4 digit numbers on a number line** **estimate numbers with decimals on a number line** **read Roman numerals to 100 (I to C)** **understand that Romans did not use zero so could not use place value** understand that over time, the numeral system changed to include the concept of zero and place value	**read and write numbers to at least 1 000 000** **determine the value of each digit for numbers to at least 1 000 000** **order and compare numbers to at least 1 000 000** **read Roman numerals to 1000 (M)** **recognise years written in Roman numerals**	**read and write numbers to at least 10 000 000** **determine the value of each digit for numbers to at least 10 000 000** **order and compare numbers to at least 10 000 000**
Compare	**compare small quantities using language: 'more than', 'fewer than'**	**compare quantities up to 10 using the language of greater than/less than, more than,/fewer, the same (ELG)** **understand the one more/one less relationship between consecutive numbers**	**given a number, identify one more and one less** **use the language of equal to, more than, less than, most, least, (fewer)** know and use <, > and = signs for numbers within 10	**recognise the place value of each digit in a two-digit number (tens, ones)** **compare and order numbers from 0 up to 100** **use <, > and = signs**	**recognise the place value of each digit in a three-digit number (hundreds, tens, ones)** **compare and order numbers up to 1000**	**find 1 000 more or less than a given number** **recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)** **order and compare numbers beyond 1000** **round any number to the nearest 10** **round any number to the nearest 100** **round any number to the nearest 1000**	**determine the value of each digit to at least 1,000,000** **order and compare numbers to at least 1,000,000** **round any number up to 1,000,000 to the nearest 10** **round any number up to 1,000,000 to the nearest 100** **round any number up to 1,000,000 to the nearest 1000** **round any number up to 1,000,000 to the nearest 10,000** **round any number up to 1,000,000 to the nearest 100,000**	**determine the value of each digit up to 10,000,000** **order and compare numbers up to 10,000,000** **round any whole number to a required degree of accuracy**
Reasoning and Problem Solving (refer to skills at the end of the document)		**recognise the pattern of the counting system counting verbally**	**solve problems related to place value and number**	**solve problems related to place value and number**	**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**

**Mathematical representations and calculations policy*

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Terminology	one, two, three, four, five, zero, more than, fewer than, fingers	more, less, fewer, number, count, check, same, different, amount	digit, numeral, figure(s), compare, order/a different order, size, value, between, halfway between, above, below, tens, ones	numbers to one hundred, hundreds, partition, recombine	numbers to one thousand	tenths, hundredths, decimal (places), round (to nearest), thousand more/less than, negative integers, count through zero, Roman numerals I to C	powers of ten	numbers to ten million
Addition and Subtraction								
Themes within subject	**Pre-School**	**Year R**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Recall, Represent and Use	**know that a group of things changes in quantity when something is added or taken away**	**Fluency** **1+4=5** **2+3=5** **automatically recall number bonds to 5 (ELG)** **automatically recall some number bonds to 10 (ELG)**	**Autumn Fluency** **1 + 5; 1 + 6; 1 + 7; 1+ 8** **All number bonds and related subtraction facts for all numbers to 5, *e.g.* 4+0=4; 4-0= 4; 3+1=4; 4-1=3; 2+2=4;** **4-2=2; 1+3=4; 4-3=1; 0+4=4; 4-4=** **Spring Fluency** **6 + 6; 7 + 7; 8 + 8; 9 + 9; 10 + 10** **All number bonds for all numbers to 20 and the related subtraction facts, e.g. 10+2=12; 12-2=10; 9+3=12; 12-3=9; 8+4=12; 12-4=8** **read, write and interpret mathematical statements involving addition (+) and equals (=) signs** **read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs** **represent and use number bonds within 20** **represent and use subtraction facts related to number bonds within 20**	**Fluency** **All multiplication and division facts for 2x (1x)** **recall and use addition and subtraction facts to 20** **use + and - facts up to 100 related to known addition and subtraction facts to 20,** **understand that addition of two numbers can be done in any order (commutative)** **understand that subtraction of one number from another cannot be done in any order** **recognise the inverse relationship between addition and subtraction**	**Fluency Autumn** **All multiplication and division facts for 3x** **Sequence of counting in 50s** **estimate the answer to a calculation** **use inverse operations to check answers**	**Fluency Autumn** **All multiplication and division facts for 12x (6x)** **estimate and use inverse operations to check answers to a calculation independently**	**Fluency Autumn** **Revision of multiplication and division facts up to 12 x 12 and derive others beyond known facts** **use rounding to check answers** **determine levels of accuracy**	**Fluency Autumn** **Revision of multiplication and division facts up to 12 x 12 and derive others beyond known facts** **use estimation to check answers** **determine an appropriate degree of accuracy**
Calculations		**understand different ways of making numbers up to 10 (ELG)** **use visual representations* such as part-part whole up to 10**	***Compensating to add 9*** ***5 + 9 = 5 + 10 – 1*** ***Using Near Doubles*** ***5 + 6 is double 5 and add 1 or double 6 and subtract 1*** ***Bridging through 10 and later 20 when adding a single-digit number 17 + 6 = 17 + 3 + 3*** ***Use patterns of similar calculations*** ***7+ 8 is 15 so 27 + 18 will have 5 ones*** ***Estimating for checking*** ***Know that 7 + 9 will be between 10 and 20*** ***Know that doubled numbers will be even, numbers multiplied by 5 will have 5 or 0 in ones column***	***Compensating to add or subtract 9 or 19*** ***34 + 9 = 34 + 10 – 1*** ***52 + 19 = 52 + 20 - 1*** ***70 – 9 = 70 – 10 + 1*** ***Partitioning into '5 and a bit' to add 6, 7 or 8*** ***15 + 7 = 15 + 5 + 2*** ***Use the relationship between addition and subtraction*** ***I know 8 + 7 = 15 so I know 15 – 8 = 7*** **add and subtract a two-digit number and ones using concrete objects, pictorial representations*, and mentally** **add and subtract a two-digit number and tens using concrete objects, pictorial representations*, and mentally**	***Compensating to add or subtract 8,9, 18, 19 etc.*** ***53 + 9 = 53 + 10 - 1*** ***84 – 18 = 84 – 20 + 2*** ***Using Near Doubles*** ***18 + 16 is double 18 and subtract 2 or double 16 and add 2*** ***36 + 35 is double 36 and subtract 1 or double 35 and add 1*** ***60 + 70 is double 60 and add 10 or double 70 and subtract 10*** ***Using a known fact to identify others*** ***7 + 8 = 15 so 15 – 7 = 8*** ***7 + 8 = 15 so 7 + 28 = 15 + 20 =35*** **add and subtract a three-digit number and ones mentally** **add and subtract a three-digit number and tens mentally** **add and subtract a three-digit number and hundreds mentally**	***Compensating to add or subtract*** ***38 + 69 = 38 + 70 – 1*** ***53 + 29 = 53 + 30 – 1*** ***64 – 19 = 64 – 20 + 1*** ***e) Using Near Doubles*** ***38 + 35 is double 35 and add 3*** ***160 + 170 is double 150 and add 10 then add 20, or double 160 and add 10, or double 170 and subtract*** ***380 + 380 is double 400 and subtract 20 twice*** ***f) Identify fact families for addition and subtraction to solve problems*** ***I know 6 x 7 = 42 so I know 42 ÷ 6 = 7*** **add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate**	***Partitioning to add – bridging through multiples of 1, 10, 100 or 1,000*** ***3.8 + 2.6 = 3.8 + 0.2 + 2.4*** ***560 + 357 = 560 + 40 + 317*** ***Compensating to add or subtract any near multiples of 10 or 100*** ***138 + 69 = 138 + 70 – 1*** ***405 – 399 = 405 – 400 + 1*** ***21/2 + 13/4 = 21/2 + 2 – ¼*** **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**	***Partitioning to add – bridging through multiples of 1, 10, 100 or 1,000*** ***3.8 + 2.6 = 3.8 + 0.2 + 2.4*** ***560 + 357 = 560 + 40 + 317*** ***Compensating to add or subtract any near multiples of 10 or 100*** ***138 + 69 = 138 + 70 – 1*** ***405 – 399 = 405 – 400 + 1*** ***21/2 + 13/4 = 21/2 + 2 – ¼*** **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**

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			add and subtract one-digit and two-digit numbers to 20, including zero	**add and subtract two two-digit numbers using concrete objects, pictorial representations*, and mentally** **add three one-digit numbers** **use the inverse relationship between addition and subtraction to check calculations**	**add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction**			
Reasoning and Problem Solving (refer to skills at the end of the document)	**solve real world mathematical problems with numbers up to five**	**solve real world mathematical problems with numbers up to ten**	**solve one-step problems that involve addition and subtraction**	**show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot** **solve problems with addition and subtraction involving numbers** **solve problems with addition and subtraction involving quantities** **solve problems with addition and subtraction involving measures** **derive + and – facts up to 100 related to known addition and subtraction facts to 20**	**solve problems, including missing number problems, using more complex addition and subtraction**	**solve addition and subtraction two-step problems in contexts**	**solve addition and subtraction multi-step problems in contexts**	
Terminology	bigger, smaller	number bonds, more, less, altogether, count on, count back, part, whole	number line, add, plus, make, sum, total, near double, equals, is the same as (including equals sign), difference between, subtract, take away, minus, how many…?, how much…?	Inverse, bar model	column addition and subtraction	inverse operation	efficient written method	order of operations

Multiplication and Division

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recall, Represent and Use	**share/separate a group of three or four objects in different ways** **recognise that the total is still the same when objects are separated in different ways**	**double numbers and quantities of objects up to 5+5 (ELG)** **recognise even and odd numbers to 10 (ELG)**	**Factors:** **4 + 8; 4 + 9** **Multiples of 10 up to 100 (in order)** **double numbers and quantities of objects to 20** **halve numbers and quantities of objects to 10**	**Fluency Autumn** **Count in steps of 10 from any number** **Fluency Spring** **All multiplication and division facts for 10x (5x)** **recall and use multiplication facts for the 2 times table** **recall and use multiplication facts for the 5 times table** **recall and use multiplication facts for the 10 times table** **understand that multiplication of two numbers can be done in any order (commutative)** **recall and use division facts for the 2 times table**	**Fluency (Autumn)** **All multiplication and division facts for 4x (2x)** **Fluency Spring** **All multiplication and division facts for 8x (4x)** **recall and use multiplication facts for the 3 times table** **recall and use multiplication facts for the 4 times table** **recall and use multiplication facts for the 8 times table** **recall and use division facts for the 3 times table** **recall and use division facts for the 4 times table** **recall and use division facts for the 8 times table** **recognise the inverse relationship between multiplication and division**	**Fluency Autumn** **7 x 11; 7 x 12** **Sequence of counting in multiples of 25** **Fluency Spring** **All multiplication and division facts for 11x** **recall multiplication and division facts for the 6 times table** **recall multiplication and division facts for the 7 times table** **recall multiplication and division facts for the 9 times table** **recall multiplication and division facts for the 11 times table** **recall multiplication and division facts for the 12 times table** **multiply and divide by 1** **multiply by 0**	**Fluency Autumn** **Square numbers: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144** **Fluency Spring** **Prime numbers: 2, 3, 5, 7, 11, 13, 17, 19** **identify multiples** **identify factors** **find all factor pairs of a number** **find common factors of two numbers** **know and use the vocabulary of prime numbers** **know and use the vocabulary of prime factors** **know and use the vocabulary of composite (non-prime) numbers establish whether a number up to 100 is prime**	**Fluency Autumn** **Revision of multiplication and division facts up to 12 x 12 and derive others beyond known facts** **identify common factors** **identify common multiples** **identify prime numbers** **use estimation to check answers** **determine appropriate levels of accuracy**

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				recall and use division facts for the 5 times table **recall and use division facts for the 10 times table** **understand division of one number by another cannot be done in any order** start to recognise the inverse relationship between multiplication and division		**recognise and use factor pairs in mental calculations** **recognise and use commutativity in mental calculations** **use place value and known facts to multiply three numbers together**	**recall prime numbers up to 19** **recognise and use square numbers, and the notation for squared (^{2})** **recognise and use cube numbers, and the notation for cubed (^{3})**	

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Calculations		share even objects to 10, recognising that numbers can be split equally (ELG)	calculate simple multiplication and division answers using concrete objects calculate simple multiplication and division answers using pictorial representations* calculate simple multiplication and division answers using arrays, with the support of the teacher	*Multiplying by 10 moves one place value column to the left* *3 ones x 10 = 3 tens = 30* *2 tens x 10 = 2 hundreds = 200* calculate mathematical statements for multiplication within the tables they know write mathematical statements using the multiplication (×) and equals (=) signs calculate mathematical statements for division within the tables they know write mathematical statements using the division (÷) and equals (=) signs	*Multiplying by 10/100 moves one/two place value column to the left* *3 ones x 10 = 3 tens = 30* *2 tens x 100 = 2 thousands = 2,000* *To use estimations/number facts to check accuracy* *46 + 58 will be close to 100* *23 x 5 will end in 5 or 0* *to know the relationship between multiplication and division fact families 3 x 6 = 18 so 18 ÷ 3 = 6 and 18 ÷ 6 = 3* calculate mathematical statements for multiplication within the tables they know calculate two-digit numbers times one-digit numbers using mental methods calculate mathematical statements for division within the tables they know start to use formal written methods	*Multiplying by 10/100 moves one/two place value column to the left and dividing moves to the right* *3 ones x 10 = 3 tens = 30* *2 tens x 100 = 2 thousands = 2,000* *Using partitioning to multiply* *17 x 6 = 10 x 6 + 7 x 6 = 60 + 42 = 102* *Partitioning to double or halve any number* *Double 347 is double 300, double 40 and double 7* *Half of 450 is half 400, half 40, half 10* multiply two-digit and three-digit numbers by a one-digit number using a formal written layout	*Finding all factors of a number and identify fact families* *I know 24 is divisible by 1, 2, 3, 4, 6, 8, 12, and 24* *Multiplying by 10/100 moves one/two place value column to the left and dividing moves to the right* *3 ones x 10 = 3 tens = 30* *2 tens x 100 = 2 thousands = 2,000* *Using partitioning to multiply* *17 x 6 = 10 x 6 + 7 x 6 = 60 + 42 = 102* *h)To partition to multiply by multiples of 10, 100 etc* *43 x 30 = 43 x 3 x 10 or 43 x 10 x 3* *25 x 400 = 25 x 4 x 100* *To be able to identify the nearest multiple of 10, 100, 1,000* *578 is closest to 600* *8243 is closest to 8,000* *Estimate answers by rounding and using number facts* *687 + 503 will be roughly 700 + 500 =1,200* *67 x 38 will be roughly 70 x 40 =280* *876 ÷ 5 will have a remainder* multiply numbers up to 4 digits by a one-digit number using a formal written method multiply numbers up to 4 digits by a two-digit number using long multiplication divide numbers up to 4 digits by a one-digit number using the formal written method of short division multiply and divide whole numbers by 10 multiply and divide numbers involving decimals by 10 multiply and divide whole numbers by 100 and 1000 multiply and divide numbers involving decimals by 100 and 1000	*Multiplying by 10/100 moves one/two place value column to the left and dividing moves to the right etc.* *3 ones x 10 = 3 tens = 30* *2 tens x 100 = 2 thousands = 2,000* *Using partitioning to multiply* *17 x 6 = 10 x 6 + 7 x 6 = 60 + 42 = 102* *To partition to multiply by multiples of 10, 100 etc* *43 x 30 = 43 x 3 x 10 or 43 x 10 x 3* *25 x 400 = 25 x 4 x 100* *h)To be able to round to the nearest multiple of 10, 100, 1,000, etc.* *578,745 is closest to 600,000* *8243 is closest to 8,000* *To be able to count in tenths, hundredths and thousandths and know when to rename* *0.7, 0.8, 0.9, 1* *0.695, 0.696, 0.697, 0.698, 0.699, 0.7* *Estimate answers by rounding and using number facts* *687 + 503 will be roughly 700 + 500 =1,200* *67 x 38 will be roughly 70 x 40 =280* *876 ÷ 5 will have a remainder* multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division perform mental calculations with mixed operations perform mental calculations with large numbers use knowledge of the order of operations to carry out calculations multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places

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Reasoning and Problem Solving (refer to skills at the end of the document)	**solve real world mathematical problems with numbers up to five**	**solve real world mathematical problems with numbers to 10 and beyond ten**	**solve one-step problems involving multiplication and division as above** ***make connections between arrays, number patterns and counting in twos, fives and tens***	**solve problems involving multiplication and division as above, including problems in contexts** **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** **solve positive integer scaling problems** **solve correspondence problems in which n objects are connected to m objects** **extend known one-digit facts to two digit numbers by derivation (e.g. 2x3=6 so 20 x 3 =60)**	**solve problems involving multiplying and adding** **solve using the distributive law to multiply two digit numbers by one digit** **solve integer scaling problems** **solve harder correspondence problems such as n objects are connected to m objects** **extend known two-digit facts to three digit numbers by derivation (e.g. 20 x 3 =60, 60 ÷3= 20, so 600 ÷3=200)**	**solve problems involving using their knowledge of factors and multiples** **solve problems involving using their knowledge of squares and cubes** **solve problems involving simple rates** **solve problems combining two of addition, subtraction, multiplication and division** **multiply and divide numbers mentally drawing upon known facts** **interpret remainders appropriately for the context**	**solve multi-step problems involving addition, subtraction, multiplication and division** **interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context** **solve problems of relative sizes using integer multiplication and division facts to find missing values** **solve problems involving enlarging or reducing similar shapes where the scale factor is known** **solve problems involving enlarging or reducing similar shapes where the scale can be found**
Terminology	split up, separate, group	double, half, halve, share, share equally, group in twos, threes etc., equal groups of, total	once, twice, three times, five times, multiply, multiply by, repeated addition, array, row, column, divide, divided by, left over, pair	multiple of times multiplication	product, multiples of four, eight, fifty and one hundred, scale up	multiplication facts (up to 12x12), division facts, derive	factor pairs, composite numbers, prime number, prime factors, square number, cubed number, formal written method	common factors, common multiples

Fractions

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recognise and Write	share a snack between two, with adult support	**recognise that a group of objects can be shared equally between two people (ELG)**	**Fluency** **4 + 8; 4 + 9** **½ + ½ = 1 whole** **¼ + ¼ + ¼ + ¼ = 1 whole** **Revision of counting in fives** **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**	**Fluency Spring** **Counting in multiples of 3** **Halve all even numbers to 20** **recognise and find fractions $^1/_3$, $^1/_4$, $^2/_4$ and $^3/_4$ of a length, shape, set of objects or quantity** **name and write fractions $^1/_3$, $^1/_4$, $^2/_4$ and $^3/_4$ of a length, shape, set of objects or quantity**	**Fluency Spring** $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$; $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+$ $\frac{1}{5}+\frac{1}{5} = \frac{5}{5}$ = 1 whole; $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+$ $\frac{1}{6}+\frac{1}{6}+\frac{1}{6} = \frac{6}{6}$ = 1 whole; $\frac{1}{7}+\frac{1}{7}+$ $\frac{1}{7}+\frac{1}{7}+\frac{1}{7}+\frac{1}{7}+\frac{1}{7} = \frac{7}{7}$ = 1 whole; $\frac{1}{8}+$ $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8} = \frac{8}{8}$ = 1 whole; $\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9} = \frac{9}{9}$ = 1 whole; $\frac{1}{10}+\frac{1}{10}+\frac{1}{10}+\frac{1}{10}+\frac{1}{10}+\frac{1}{10}+\frac{1}{10}+\frac{1}{10}+$ $\frac{1}{10}+\frac{1}{10}+\frac{1}{10} = \frac{10}{10}$ = 1 whole **Fluency Summer** **All multiplication and division facts for 9x (3x; 6x)** **count up and down in tenths** **recognise that tenths arise from dividing an object into 10 equal parts** **recognise that tenths arise from dividing one-digit numbers or quantities by 10** **recognise, find and write unit fractions of a discrete set of objects:** **recognise, find and write non-unit fractions (with small denominators) of a discrete set of objects**	**Fluency Spring** **100 ÷ 10 = 10; 1000 ÷ 10 = 100 ; 10 ÷ 10 = 1; 1 ÷ 10 =** $\frac{1}{10}$ **All multiplication and division facts for 8x (4x)** **count up and down in hundredths** **recognise that hundredths arise when dividing an object by one hundred** **recognise that hundredths arise when dividing tenths by ten**	**Fluency Spring** **1 ÷ 100 =** $\frac{1}{100}$ **= 0.01; 2 ÷ 100 =** $\frac{2}{100}$ **= 0.02; 3 ÷ 100 =** $\frac{3}{100}$ **= 0.03; 4 ÷ 100 =** $\frac{4}{100}$ **= 0.04; 5 ÷ 100 =** $\frac{5}{100}$ **= 0.05; 6 ÷ 100 =** $\frac{6}{100}$ **= 0.06; 7 ÷ 100 =** $\frac{7}{100}$ **= 0.07; 8 ÷ 100 =** $\frac{8}{100}$ **= 0.08; 9 ÷ 100 =** $\frac{9}{100}$ **= 0.09 10 ÷ 100 =** $\frac{10}{100}$ **= 1 10 = 0.1** **recognise mixed numbers and improper fractions** **convert between mixed numbers and improper fractions** **write mathematical statements > 1 as a mixed number, e.g. $^2/_5 + ^4/_5 = ^6/_5 = 1^1/_5$**	**Fluency Autumn** **25% = 0.25 =** $\frac{2}{8} = \frac{1}{4}$**; 50% = 0.5 =** $\frac{4}{8} = \frac{1}{2}$**; 75% = 0.75 =** $\frac{6}{8} = \frac{3}{4}$**; 100% = 1.0 =** $\frac{8}{8}$ move freely between numerical and pictorial representations, e.g. equivalent fractions, fractions and decimals

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					recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators			
Compare			recognise the equivalence of two halves and four quarters, using objects or shapes	**recognise the equivalence of $^{2}/_{4}$ and $^{1}/_{2}$**	**recognise equivalent fractions with small denominators** **use diagrams to show equivalent fractions with small denominators** **compare and order unit fractions** **compare and order fractions with the same denominators**	**recognise families of common equivalent fractions** **Use diagrams to show families of common equivalent fractions**	**identify, name and write equivalent fractions of tenths and hundredths, represented visually** **identify, name and write equivalent fractions of other given fractions, represented visually** **compare and order fractions whose denominators are all multiples of the same number**	**use common factors to simplify fractions** **use common multiples to express fractions in the same denomination** **compare and order fractions <1** **compare and order fractions >1**
Calculations			**recognise that two halves, or four quarters, make a whole**	**write simple fractions, e.g. $^{1}/_{2}$ of 6 = 3**	**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 denominators that are multiples of the same number** **multiply proper fractions by whole numbers,** (supported by materials and diagrams) **multiply mixed numbers by whole numbers,** (supported by materials and diagrams)	**use equivalent fractions to add and subtract fractions with different denominators** **use equivalent fractions to add and subtract mixed numbers** **multiply simple pairs of proper fractions, writing the answer in its simplest form, e.g. 1/4 × 1/2 = 1/8** **divide proper fractions by whole numbers, e.g. 1/3 ÷ 2 = 1/6**
Reasoning and Problem Solving (refer to skills at the end of the document)					**solve problems that involve all of the above**	**solve problems involving increasingly harder fractions to calculate quantities** **solve problems involving fractions to divide quantities, including non-unit fractions where the answer is a whole number**	**solve problems involving scaling by simple fractions**	**use knowledge of fractions and multiples to solve ratio and proportion problems involving unequal sharing and grouping**

Decimals

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recognise and Write					connect tenths to place value	**Fluency Spring** **1 ÷ 10 = $\frac{1}{10}$ = 0.1; 2 ÷ 10 = $\frac{2}{10}$ = 0.2;** **3 ÷ 10 = $\frac{3}{10}$ = 0.3; 4 ÷ 10 = $\frac{4}{10}$ = 0.4;** **5 ÷ 10 = $\frac{5}{10}$ = 0.5; 6 ÷ 10 = $\frac{6}{10}$ = 0.6;** **7 ÷ 10 = $\frac{7}{10}$ = 0.7; 8 ÷ 10 = $\frac{8}{10}$ = 0.8;** **9 ÷ 10 = $\frac{9}{10}$ = 0.9; 10 ÷ 10 = $\frac{10}{10}$ = 1.0; $\frac{1}{4}$ = 0.25; $\frac{1}{2}$ = 0.5; $\frac{3}{4}$ = 0.75** **Fluency Summer** **All the complements to 10,000 using multiples of 1000, and the related subtraction facts, e.g. $x + y = 10{,}000$, therefore x =? and y = ?; 1 + 9 = 10 (Y1); 10 + 90 = 100 (Y2); 100 + 900 = 1000 (Y3); 1000 + 9000 = 10,000 (Y4)**	**Fluency Spring** **10% = 0.1 = $\frac{1}{10}$ = $\frac{10}{100}$ = $\frac{100}{1000}$; 50% = 0.5 = $\frac{1}{2}$ = $\frac{5}{10}$ = $\frac{50}{100}$; 25% = 0.25 = $\frac{1}{4}$ = $\frac{25}{100}$; 75% = 0.75 = $\frac{3}{4}$ = $\frac{75}{100}$;** **20% = 0.2 = $\frac{1}{5}$ = $\frac{2}{10}$ = $\frac{20}{100}$; 40% = 0.4 = $\frac{2}{5}$ = $\frac{4}{10}$ = $\frac{40}{100}$** **Fluency Summer** **Prime numbers up to 100: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89,97** **read and write decimal numbers as fractions (e.g. 0.71 = 71/100)**	**Fluency Spring** **12.5% = 0.125 = $\frac{1}{8}$; 37.5% = 0.375 = $\frac{3}{8}$; 62.5% = 0.625 = $\frac{5}{8}$; 82.5% = 0.825 = $\frac{7}{8}$; 112.5% = 1.125 = $\frac{9}{8}$; 125% = 1.25 = $\frac{10}{8}$** **identify the value of each digit in numbers given to three decimal places**

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						recognise and write decimal equivalents of any number of tenths **recognise and write decimal equivalents of any number of hundredths** **recognise and write decimal equivalents to $^1/_4$ $^1/_2$ $^3/_4$**	**recognise and use thousandths** **relate thousandths to tenths, hundredths and decimal equivalents**	
Compare					connect tenths to decimal measures and to division by 10	**round decimals with one decimal place to the nearest whole number** **compare numbers with the same number of decimal places (up to two decimal places)**	**round decimals with two decimal places to one decimal place** **round decimals with two decimal places to the nearest whole number** **read, write, order and compare numbers with up to three decimal places**	round decimals, including those within measure, with three decimal places to the nearest whole number round decimals, including those within measure, with three decimal places to one decimal place
Calculations						**find the effect of dividing a one- or two-digit number by 10** **identify the value of the digits in answers as ones and tenths** **find the effect of dividing a one- or two-digit number by 100** **identify the value of the digits in answers as tenths and hundredths**		**multiply one-digit numbers with up to two decimal places by whole numbers** **use written division methods in cases where the answer has up to two decimal places**
Fractions, Decimals and Percentages							**recognise the percent symbol (%)** **understand that per cent relates to "number of parts per hundred"** **write percentages as a fraction with denominator 100** **write percentages as a decimal**	**Fluency Spring** **33.3% = 0.333… = $\frac{1}{3}$; 66.6% = 0.666… = $\frac{2}{3}$; 100 % = 1.0 = $\frac{3}{3}$; 133.3% = 1.333… = $\frac{4}{3}$; 266.6% = 2.666… = $\frac{8}{3}$** **associate a fraction with division** **calculate decimal equivalents for a simple fraction, e.g. $^3/_8$ = 0.375** **recall equivalences between simple fractions, decimals and percentages,** **use equivalences between simple fractions, decimals and percentages in different contexts**
Reasoning and Problem Solving (refer to skills at the end of the document)						**solve simple measure and money problems involving fractions and decimals to two decimal places**	**solve problems involving numbers up to three decimal places** **solve problems which require knowing percentage and decimal equivalents of $^1/_2$, $^1/_4$, $^1/_5$, $^2/_5$, $^4/_5$** **solve problems which require knowing percentage and decimal equivalents of fractions with a multiple of 10 or 25 as the denominator**	**solve problems involving the calculation of percentages [for example, of measures, such as 15% of 360]** **solve problems involving the use of percentages for comparison**

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Terminology	share	share equally, half	whole, equal parts, four equal parts, one half, two halves, a quarter, two quarters	three quarters, one third, a third, equivalence, equivalent	numerator, denominator, unit fraction, non-unit fraction, compare and order, tenths	equivalent decimals and fractions	proper fractions, improper fractions, mixed numbers, percentage, half, quarter, fifth, two fifths, four fifths, ratio, proportion	degree of accuracy, simplify

Algebra

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Algebra			**solve missing number problems such as □ - 9 = 7** **solve missing number problems by guessing and checking**	**use the inverse relationship between addition and subtraction to solve missing number problems**	**solve missing number problems in addition and subtraction, with the range of numbers known so far** **solve missing number problems in multiplication and division, with the range of numbers known so far** **use the inverse relationship between multiplication and division to solve missing number problems**	**solve more complex missing number problems**	**recognise simple formulae given in words** Start to recognise the same formulae in symbols **describe simple linear number sequences in words** (e.g. sequences like 2n, 2n+1) identify what a later term, in simple linear number sequences, might be without identifying the term before, e.g. 2, 4, 6, -, ?,	**Fluency Spring** **Derive new % facts from known facts** **BIDMAS** **use simple formulae such as for angles and areas,** and speed **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**
Terminology			split, separate, explain, problem missing number	predict, describe, record, order	rule	solution	formulae	linear number sequence, substitute, variables, symbol, known values

Measurement

Note: In this section, problem solving and reasoning are integrated into the different themes, separated by a dotted line. See progression at the end of the document when teaching problem solving and reasoning.

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Length	**make comparisons between objects relating to size and length**	**compare length, using comparative language, such as 'than'**	**Fluency Spring** **3 + 8; 3 + 9** **Multiples of 2 up to 20 (in order)** **measure and begin to record lengths and heights** **compare and describe lengths and heights,** e.g. long/short, longer/shorter, tall/short, double/half	**Fluency (Summer)** **Count in steps of 10 from any number** **choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm** **estimate and measure length/height (m/cm), to the nearest appropriate unit, using rulers** **compare and order lengths and record the results using >, < and =**	**Fluency Spring** **All multiplication and division facts for 6x (3x)** **measure and compare lengths (m/cm/mm)** **add and subtract lengths (m/cm/mm)** **measure the perimeter of simple 2-D shapes**	**Fluency Autumn** **All multiplication and division facts for 7x** **start to convert between different units of measure, e.g. kilometre to metre;** **estimate and compare in mm, cm and m** **calculate in mm, cm and m** **measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres**	**Fluency Summer** **1mm = $\frac{1}{10}$ cm; 1mm = $\frac{1}{1000}$ m; 1kg ≈ 2.2 lbs; 1litre ≈ 1.76 pints; 1m ≈ 39.4 inches; 1cm ≈ 2.54 inches** **convert between km & m, cm & m, cm & mm** **understand and use approximate equivalences between inches and cm, and feet and metres** **measure the perimeter of composite rectilinear shapes in centimetres and metres** **calculate the perimeter of composite rectilinear shapes in centimetres and metres**	**Fluency Spring** **1 km ≈ $\frac{5}{8}$ mile** **1 mile ≈ $\frac{8}{5}$ km = 1.6 km** **use, read and write standard units of length using decimal notation to up to three decimal places** **convert between standard units of length using decimal notation to up to three decimal places** **convert between miles and km**
		use comparative language to group objects	**solve practical problems for lengths and heights**				**use all four operations to solve problems involving length using decimal notation** **solve scaling problems involving length**	**solve problems involving the calculation and conversion of units of length using decimals**

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Area and Volume	make comparisons between objects relating to capacity	compare capacity, using comparative language, such as 'than'	**Fluency Spring** **4 + 5; 4 + 7** **Multiples of 5 up to 50 (in order)** measure and begin to record capacity and volume **Compare and describe capacity and volume,** e.g. full/empty, more than, less than, half, half full, quarter	choose and use appropriate standard units to estimate and measure capacity (litres/ml) using measuring vessels estimate and measure capacity (litres/ml), to the nearest appropriate unit, using measuring vessels compare and order volume/capacity and record the results using >, < and =	measure and compare volume/capacity (l/ml) add and subtract volume/capacity (l/ml)	**Fluency Spring** **Know related multiplication and division facts linked to 1000, e.g. 500 x 2 = 1000; 1000 ÷ 2 = 500; 250 x 4 = 1000; 1000 ÷ 4 = 250; 200 x 5 = 1000; 1000 ÷ 5 = 200** find the area of rectilinear shapes by counting squares	**Fluency Autumn** **Associated facts, such as 10,000 = 9500 + 500; 10,000 = 5000 + 5000; 10,000 = 2500 + 2500 + 2500 + 2500; 10,000 ÷ 2 = 5000; 10,000 ÷ 4 = 2500; 10,000 ÷ 5 = 2000; 10,000 ÷ 10 = 1000; 10,000 ÷ 100 = 100** **Fluency Summer** **Cubed numbers up to 10^3: 1, 8, 27, 64, 125, 216, 343, 512, 729, 1000** convert between l & ml understand and use approximate equivalences between pints and litres calculate the area of rectangles (including squares), in cm^2 and m^2 compare the area of different shaped rectangles (including squares estimate the area of irregular shapes estimate volume, e.g. using 1 cm^3 blocks to build cuboids (including cubes) estimate capacity, e.g. using water	**Fluency Spring** **All conversions of units of measure** **Multiplying integers by 0.5** use, read and write standard units of volume using decimal notation to up to three decimal places convert between standard units of volume using decimal notation to up to three decimal places recognise that shapes with the same areas can have different perimeters and vice versa recognise when it is possible to use formulae for area of shapes calculate the area of triangles calculate the area of parallelograms recognise when it is possible to use formulae for volume of shapes estimate, calculate and compare volume of cubes and cuboids using cm^3 and m^3 calculate volume of cubes and cuboids using mm^3 and km^3
		use comparative language to group objects	solve practical problems for lengths and heights solve practical problems for capacity and volume				use all four operations to solve problems involving volume using decimal notation solve scaling problems involving volume	solve problems involving the calculation and conversion of units of volume using decimals reason about connections between area of a triangle and area of rectangles and trapezium.
Temperature			compare and describe temperature e.g. hot/warm/cold, hotter/colder	**Fluency (Summer)** **Revision of all multiplication and division facts for 1x; 2x; 3x; 5x; 10x; 0x** estimate and measure temperature (°C), using thermometers			measure temperature when negative	add and subtract temperatures that include negatives
Mass and Weight	make comparisons between objects relating to weight	compare weight, using comparative language, such as 'heavier than'	Compare and describe mass and weight, e.g. heavy/light, lighter than measure and begin to record mass/weight	choose and use the appropriate standard unit to estimate mass (kg/g) measure mass (kg/g) to the nearest appropriate unit, using scales compare and order mass, and record the results using >, < and =	**Fluency Summer** **Revision of all multiplication and division facts for 3x; 4x; 8x; 6x; 9x** **1000 ÷ 2 = 500; 1000 ÷ 4 = 250** **½ L/kg/km = 500 ml/g/m; ¼ L/kg/km = 250 ml/g/m; ¾ L/kg/km = 750 ml/g/m** compare mass (using kg/g) add and subtract mass (kg/g)	start to convert between different units of measure, e.g. kilogram to gram with simple numbers calculate in grams and kilograms	convert between different units of metric measure - gram and kilogram understand and use approximate equivalences between grams and pounds, kg and stone	use, read and write standard units of mass using up to three decimal places convert between standard units of mass, using up to three decimal places
		use comparative language to group objects	solve practical problems for mass/weight				use all four operations to solve problems involving mass, using decimal notation solve scaling problems including mass	solve problems involving the calculation and conversion of units of mass

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MATHS PROGRESSION

Money	include counting money and change in role-play games	**begin to use everyday language related to money in role play**	**Fluency** **6 + 8; 6 + 9** **Number bond knowledge with coins, e.g. 10p+1p=11p; 10p+2p=12p** **recognise and know the value of different denominations of coins and notes**	**Fluency** **All multiplication and division facts for 5x** **recognise and use symbols for pounds (£) and pence (p)** **combine amounts to make a particular value** **find different combinations of coins that equal the same amounts of money**	**Fluency Spring** **All multiplication and division facts for 8x (4x)** **50p x 2 = £1.00; £50 x 2 = £100; 25p x 4 = £1.00; £25 x 4 = £100; 20p x 5 = £1.00; £20 x 5 = £100**	**Fluency Summer** **£5.00 x 2 = £10.00; £50 x 2 = £100; £500 x 2 = £1000; £2.50 x 4 = £10.00; £25 x 4 = £100; £250 x 4 = £1000; £2.00 x 5 = £10.00; £20 x 5 = £100; £200 x 5 = £1000** **Revise all multiplication and division facts up to 12x** **estimate, compare and calculate money in pounds and pence**		
				solve simple problems in a practical context involving addition of money of the same unit **solve simple problems in a practical context involving subtraction of money of the same unit, including giving change**	**add and subtract amounts of money to give change, using both £ and p in practical contexts**		**use all four operations to solve problems involving money, using decimal notation** **solve scaling problems with money**	**use all four operations to solve more complex problems involving money and decimals** **solve scaling problems with money and decimals**
Time	**begin to describe a sequence of events, real or fictional, using words such as 'first', 'then...'**	**use everyday language related to time** order and sequence two or three familiar events measure short periods of time in simple ways	**Fluency** **7 + 8; 7 + 9; 8 + 9** **Revision of counting forwards and backwards in multiples of 2, 5 and 10** **compare and describe time, e.g. quicker, slower, earlier, later** **sequence events in chronological order using language** e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening **recognise and use language of dates - days of the week, weeks, months and years** **tell the time to the hour and half past the hour** **draw the hands on a clock face to show the time to the hour and half past the hour** **measure and begin to record time (hours, minutes, seconds)**	**Fluency** **Revision of 2 x 11; 2 x 12** **Recite the months of the year in the correct order** **compare and sequence intervals of time** **tell and write the time to five minutes, including quarter past/to the hour** **draw the hands on a clock face to show the times to five minutes, including quarter past/to the hour** **know the number of minutes in an hour and the number of hours in a day**	**Fluency Summer** **The amount of days in each month / year / leap year** **Complements to 60, e.g. 25 + 35 = 60** **tell and write the time from an analogue clock with normal numbers** **tell and write the time from an analogue clock with Roman numerals from I to XII** **tell and write the time from an analogue 24 hour clock** **use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight** **estimate and read time with increasing accuracy to the nearest minute** **record and compare time in terms of seconds, minutes and hours** **know the number of seconds in a minute** **know the number of days in each month, year and leap year** **compare durations of events** e.g. to calculate the time taken by particular events or tasks	**Fluency Summer** **Revise all multiplication and division facts up to 12x** **convert between minutes and seconds** **convert between hours and minutes** **convert between years and months, weeks and days** **estimate in seconds, minutes and hours** **compare and calculate in seconds, minutes and hours** **convert time between analogue and digital 12-hour and 24-hour clocks**	**understand the difference between writing hours and minutes e.g. 2:15, and writing hours as a decimal e.g. 2.25 hours**	**convert between standard units of time as needed, using up to three decimal places**
			solve practical problems for time			**solve simple problems involving converting units**	**solve problems involving 1 or 2 step conversion between units**	

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Terminology	day, week, month, year, weekend, birthday, holiday, morning, afternoon, evening, night, midnight, bedtime, dinnertime, playtime, today, yesterday, tomorrow	days of the week, before, after, next, last, now, soon, early, late, quick, quicker, quickest, quickly, fast, faster, fastest, slow, slower, slowest, slowly, old, older, oldest, new, newer, newest, once, twice, first, second, third, etc., money, coin, penny, pence, pound, measure	time, seasons, hour, o'clock, half past, clock, watch, hands, always, never, often, sometimes, usually, estimate, close to, about the same as, just over, just under, too many, too few, not enough, enough, length, width, height, depth, long, longer, longest, short, shorter shortest, tall, taller, tallest, high, higher, highest, Low, wide, narrow, deep, shallow, thick, thin, far, near, close, metre, ruler, metre stick, price, cost, buy, sell, spend, spent, pay, change, costs more, costs less, cheaper, costs the same as	quarter past/to, centimetres, metres, kilometres, grams, kilograms, millimetres, litres, temperature, degrees	leap year, twelve-hour/twenty-four-hour clock, Roman numerals I to XIII	convert, perimeter, area	volume, imperial units, metric units conversion	

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MATHS PROGRESSION

Shapes

Note: In this section, problem solving and reasoning are integrated into the different themes, separated by a dotted line. See progression at the end of the document when teaching problem solving and reasoning.

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
2D Shapes	**talk about and explore circles, rectangles and triangles** using language like 'sides', 'corners'; 'straight', 'flat', 'round' **combine shapes to make new ones,** e.g. a bigger triangle etc.	**see how a shape can have other shapes within it** e.g. two triangles can make a square	Fluency Autumn 2 + 4; 2 + 5 All number bonds and related subtraction facts for all numbers to 5, *e.g.* 4+0=4; 4-0= 4; 3+1=4; 4-1=3; 2+2=4; 4-2=2; 1+3=4; 4-3=1; 0+4=4; 4-4=0 **recognise and name rectangles (including squares), circles and triangles**	Fluency All multiplication and division facts for 2x, 5x, 10x **recognise and name quadrilaterals, pentagons, hexagons, octagons** **describe the number of sides of shapes met so far** **identify any line symmetry in a vertical line for shapes met so far**	Fluency Summer 50 x 2 = 100 ; 25 x 4 = 100 ; 20 x 5 = 100 Revision of all multiplication and division facts for 3x; 4x; 8x; 6x; 9x **draw 2-D shapes** **identify whether polygons are regular or irregular** identify line symmetry as a property of regular polygons	Fluency Summer Revise all multiplication and division facts up to 12x **recognise and name rhombus, parallelogram, trapezium** **identify equilateral, isosceles and scalene triangles** **identify lines of symmetry in 2-D shapes in different orientations**	Fluency Summer 360 ÷ 4 = 90; ¼ of 360 = 90; 360 ÷ 2 = 180; ½ of 360 = 180; ¾ of 360 = 270 Complements, such as 70 + 110 = 180; 95 + 85 = 180 **understand that in a rectangle opposite sides are parallel and equal** **understand the difference between interior and exterior angles** **understand that in a rectangle interior angles are 90°** **understand that in a rectangle interior angles add up to 360°** understand that in a rectangle diagonals are same length and bisect (halve) each other	Fluency Summer Multiples, factors, common multiples and common factors of numbers Square numbers, prime numbers and cubed numbers **understand that in a triangle angles add up to 180°** **understand that in an equilateral triangle each angle is 60°** **understand that in an isosceles triangle two angles are equal** **understand that in a quadrilateral, interior angles add up to 360°** **understand that in a regular polygon, exterior angles add up to 360°** **draw 2-D shapes using given dimensions and angles** **illustrate and name radius, diameter and circumference** **know that the diameter is twice the radius**
		develop spatial reasoning skills by selecting, rotating and manipulating shapes		**compare and sort common 2-D shapes and everyday objects**		**compare and classify different quadrilaterals based on their properties** **compare and classify different triangles, based on their properties** **complete a simple symmetric figure with respect to a specific line of symmetry**	**use the properties of rectangles to find missing lengths** **use reasoning about equal sides and angles to distinguish between regular and irregular polygons**	**compare and classify geometric shapes based on their properties and sizes** **find unknown angles in any triangles, quadrilaterals,** and regular polygons
3D Shapes	**talk about and explore solid shapes** such as cuboids and balls *(round is an acceptable description at this age)* **select shapes appropriately** e.g. flat surfaces for building, a triangular prism for a roof etc. **Combine shapes to make new ones** e.g. an arch, a bigger cuboid etc.	copy increasingly complex 2D pictures and patterns with these 3D resources **see how a shape can have other shapes within it** e.g. squares on the faces of a cube	**recognise and name cubes, pyramids and spheres** identify that circles are round, but really spheres are spherical	**recognise and name cuboids, cylinders, other prisms and cones** **describe the number of edges, vertices and faces** **identify 2-D shapes on the surface of 3-D shapes,** e.g. a circle on a cylinder and a triangle on a pyramid	**make 3-D shapes using modelling materials** **recognise and name regular pyramid (tetrahedron) seen in 3D** **recognise and name hexahedron and octahedron seen in 3D** **recognise 3-D shapes in different orientations and describe them** **identify whether polyhedra seen in 3D are regular or irregular**		**identify cubes and other cuboids, from 2-D representations** **identify pyramids, cylinders, cones and prisms from 2-D representations** identify hexahedron and octahedron from 2-D representations	**recognise, describe and build simple 3-D shapes, including making nets**
	begin to categorise objects according to properties, such as shape or size	**select, rotate and manipulate shapes in order to develop spatial reasoning skills.**		**compare and sort common 3-D shapes and everyday objects**		compare and classify 3-D shapes based on their properties		

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Angles and Lines					**recognise angles as a description of a turn** **recognise angles as a property of shape** **identify right angles** **recognise that two right angles make a half-turn, three a three-quarter turn and four a complete turn** **identify whether angles are greater than or less than a right angle** **identify horizontal and vertical lines** **identify pairs of perpendicular and parallel lines**	**identify acute and obtuse angles**	**know angles are measured in degrees** **draw given angles, and measure them in degrees (°)** **understand angles at a point make one whole turn (total 360°)** **understand angles at a point on a straight line make half a turn (total 180°)** **identify other multiples of 90°**	**understand vertically opposite angles are equal**
						compare and order angles up to two right angles by size	**estimate and compare acute, obtuse and reflex angles** **use the properties of rectangles to deduce related facts and find missing angles**	**find unknown angles in any triangle, in quadrilaterals, and in regular polygons** **find unknown angles using angles at a point, angles on a straight line and vertically opposite angles**
Position and Direction	**understand position through words alone,** e.g. "The bag is under the table," – with no pointing describe a familiar route start to use words like 'in front of' and 'behind'	use positional language such as top, bottom, middle, between, inside describe their relative position such as 'behind' or 'next to' or 'in front'	**Fluency** **5 + 6; 5 + 7** **Revision of counting in twos** **describe position, using words like** left, right**, top, middle, bottom, on top of, in front of, above, between around, near, close, far, inside, outside** **describe their own movement using words like forwards, backwards,** sideways, left, right, **up, down** **describe their own turning movement, including whole, half, quarter and three-quarter turns**	**Fluency Summer** **All multiplication and division facts for 10x** **describe movement of another person or robot using mathematical words like straight line, rotation, left, right** **describe rotation of another person or robot as clockwise or anti-clockwise** **describe rotation of another person or robot as a number of right angles for quarter, half and three-quarter turns**		**Fluency Summer** **Revise all multiplication and division facts up to 12x** **describe positions on a 2-D grid using coordinates in the first quadrant** **describe movements between positions as translations of a unit to the left/right and up/down** **plot specified points and draw sides to complete a given polygon**	**Fluency Summer** **Multiples: 90 , 180 , 270 , 360 , 450 , 540** **identify and draw the position of a shape following a reflection in lines parallel to the axes** **describe the position of a shape reflected in lines parallel to the axes, using language like coordinates, mirror line, image** **understand that reflection does not change a shape** (the shape is 'flipped') **identify and draw the position of a shape following a translation** **describe the position of a translated shape, using language like coordinates, translated _ left and _ down** **understand that translation does not change a shape** (the shape slides to a new position)	**Fluency Autumn** **All prime numbers up to 100** **describe positions on the full coordinate grid (all four quadrants)** **draw and translate rectangles, parallelograms and rhombuses** **draw and reflect rectangles, parallelograms and rhombuses in the axes**
Terminology	up, down, forwards, backwards, sideways	before, after, beside, next to, opposite, apart, between, middle, make, build, draw	edge, centre, direction, journey, left, right, across, close, far, near, along, through, to, from, towards, away from, movement, slide, roll, turn, whole turn, half turn, stretch, bend, corner (point, pointed), face, side, edge,	rotation, clockwise, anticlockwise, straight line, ninety degree turn, right angle, size, bigger, larger, smaller, symmetrical, line of symmetry, fold, match, mirror line, reflection	horizontal, perpendicular and parallel lines, greater/less than ninety degrees, orientation (same orientation, different orientation)	quadrilaterals, triangles, right angle, acute and obtuse angles, co-ordinate, translate, quadrant, X-axis, Y-axis	regular and irregular polygons, reflex angle, dimensions, vertices, mirror line, reflect, image	vertically opposite (angles), circumference, radius, diameter, four quadrants (for co-ordinates)

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Statistics

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Present and Interpret		count how many objects share a particular simple property **present results using practical resources, pictures, drawings or numerals**	**interpret simple tables** **present results using lists and simple tables, with support**	**Fluency (Spring)** **All number bonds and related subtraction facts to 20** **interpret tally charts,** e.g. how many ___ are there? **interpret simple pictograms with simple ratios 1, 2**, e.g. how many of x are there? **interpret simple pictograms with simple ratios 10,** 5, e.g. how many of x are there? **interpret block diagrams** **count objects in different categories showing the results in a simple table** **construct tally charts** **construct simple pictograms (ratio 2 or 10)** **construct block diagrams**	**Fluency Spring** **Revisit 4x6; 4x9; 4x12; 8x6; 8x9; 8x12** **Sequence of counting in 100s** **interpret data in more complex tables** **interpret pictograms with ratio 3, 5,** 20 **interpret bar charts with a scale of 2 units per cm** **interpret bar charts with scales of 5 or 10 units per cm** **present data using bar charts with a scale of 2 units per cm** present data using bar charts with a scale of 5 or 10 units per cm **present data using pictograms with a ratio of 2, 5 or 10** **present data using tables**	**Fluency Summer** **Revise all multiplication and division facts up to 12x** **understand that bar charts and pictograms show discrete data** **interpret bar charts with more complex scales** e.g. scales of 20, 100 **present data using bar charts with a scale of 5 or 10 units per cm** **understand that time graphs show continuous data** **interpret simple time graphs** **present continuous data in time graphs**	**Fluency Autumn** **Derive new facts from known facts, e.g. 12 x 5 = 60; 60 ÷ 5 = 12; 5.2 x 5 = 6.0; 6 ÷ 5 = 1.2; 5 x 7 = 35; 5 x 0.7 = 3.5; 5 x 0.07 = 0.35** **read and interpret information in complex tables, including timetables** **read information presented in a line graph** e.g. conversion between known imperial and metric measures or temperature at different times of day	**Fluency Summer** **Rounding numbers with up to 3 decimal places** **interpret pie charts** **construct pie charts** **construct line graphs with two variables** **interpret the mean as an average** **calculate the mean** **identify when it is appropriate to calculate the mean and when not**
Reasoning and Problem Solving (refer to skills at the end of the document)			**compare how many objects there are in simple categories shown in a table** e.g. are there more apples or more oranges?	**solve problems that need adding up of objects in different categories** **compare how many objects there are in different categories,** e.g. which fruit is there most of? **ask a friend a question that needs adding up or comparing** **sort objects in different categories by quantity**	**use information from tables to solve one-step and two-step questions**, e.g. 'How many more?' and 'How many fewer?' **use information from pictograms to solve one-step and two-step questions** **use information from scaled bar charts to solve one-step and two-step questions**	**solve a mix of comparison, sum and difference problems using information from bar charts or pictograms** **solve simple comparison, sum and difference problems using information from time graphs** make links between a time graph and a story e.g. tell a story to match a simple graph	**solve multi step problems using information presented in a line graph** **complete missing information in complex tables, including timetables**	**use pie charts to solve problems** **use line graphs to solve problems** **identify simple relationships in line graphs** e.g. the line shows that __ is double __
Terminology	sort, group, same, different	set, list, information, order, count,	table, label, title, tally, match	vote, graph, block graph, pictogram, represent, most popular, most common, least popular, least common	chart, bar chart, frequency table, Carroll diagram, Venn diagram, axis, axe	discrete data, continuous data, time graph	line graph	mean, pie chart, construct

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Reasoning and Problem Solving

Themes within subject	Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Reasoning	**recognise and extend ABAB patterns, e.g. stick, leaf, stick, leaf** create new ABAB patterns notice and correct an error in a repeating ABAB pattern **talk about and identify the patterns around them, for example: stripes on clothes, designs on rugs and wallpaper** **begin to compare objects according to properties, such as shape or size** **sort familiar objects into two groups, making choices,** e.g. teddy bears and dolls, apples and bananas **say why they chose to put an object in the group they did**	**recognise and describe simple repeating patterns involving numbers or shapes e.g. AABBAABB, ABCABC** **continue simple repeating patterns involving numbers or shapes** **create simple repeating patterns involving numbers or shapes** **say what they are trying to find out** **sort familiar objects into three or more obvious groups e.g. different colours** sort familiar objects into two or more groups based on comparisons e.g. long/short/dark/light **describe ways they have sorted objects using comparative language e.g. longer/shorter**	**recognise, describe and continue more complex patterns involving numbers or shapes** **create more complex patterns involving numbers or shapes** **give reasons to justify what might come next in a simple sequence of shapes or numbers** **make predictions and test these with examples, using mathematical language** **with support, answer a question by recording information in lists and simple tables** **say what they have found out** **explain why an answer is correct or incorrect** **use diagrams** (e.g. three separate circles) **to sort objects into three or more separate groups according to a given criterion** **suggest a different criterion for grouping the same objects**	**respond to 'What if…?' questions, making predictions based on mathematical knowledge** **justify their reasoning logically, using phrases, such as 'I know that… so… ' or 'I am sure of that because…'** **describe and explain decisions and methods chosen** **explain what they have found out using mathematical language** **record work and results in lists and simple tables** **use a simple Venn diagram (two overlapping circles) to sort objects into three groups – x; y; and both x and y**	**suggest a line of enquiry (questions that could be asked)** **start to understand a general statement by finding particular examples that match that statement** **identify examples for which the statement is true or false** **test out a statement or prediction further, with examples that are checked systematically to make sure none are missed** **record work and results in tables, bar charts or diagrams** **check work and justify answers/conclusions logically**	**make a prediction or general statement involving numbers or shapes** **systematically collect and organise information to test out statements or questions** **find a counter example to disprove a statement** **provide a logical argument that has a complete chain of reasoning to it, using phrases and words, such as 'because…', 'therefore…', 'and so…', 'that leads to…', 'which means that…'** **explain reasoning using diagrams, graphs and text** **in making conclusions, spot patterns in results and suggest generalisations and rules** **use a Venn diagram of two overlapping circles inside a rectangle to show x; y; x and y; and neither x nor y**	**suggest, plan and develop lines of enquiry and hypotheses** **identify patterns within linear number sequences** **express generalisations and proofs using symbolic notation as well as words** **search for a solution by trying out own ideas and justifying solutions** **use both examples and counter-examples to justify conclusions, explaining use** **use simple known facts (e.g. properties of rectangles) to calculate answers, explaining the method clearly.** **use simple known facts (e.g. properties of rectangles) to generalise further, explaining the method clearly.**	**generate sequences and start to understand the idea of an expression, such as 2n, 2n+1 and n^2** **express generalisations algebraically** **develop and evaluate lines of enquiry** **decide how best to represent conclusions** decide what further questions to ask **explain reasoning using precise mathematical language** **give mathematical justifications and proof, using logical arguments** **make use of complex Venn diagrams to illustrate classifying, e.g. geometry** **apply known mathematical facts, e.g. properties of angles, lines and shapes to calculate answers**
Problem Solving	**While solving real-world mathematical problems…**							
	make links to real-life, through role play and through helping adults **use a range of practical resources and equipment** **understand a question or instruction that has two parts, e.g. 'Get your coat and wait at the door.'** talk about what they have done	**think aloud how to work things out** **answer questions by choosing and using suitable equipment** **record simple numerical and pictorial representations** **use concrete objects to work out the answer** explain to an adult how they worked out the answer	**identify what the question means** **identify the key information given in a one-step puzzle or word problem** **identify the operation needed to solve a one-step puzzle or word problem** **use concrete objects or pictures to help work out the answer** **use arrays to help work out the answer with support of an adult** **check the answer in the context of the problem to be sure it makes sense** **show the working out and the answer clearly** try a range of possible solutions to solve problems	**identify the key information in a two-step puzzle or word problem, where the two steps are shown in the question** **identify the operations needed to solve a two-step word problem, where the two steps are shown in the question** suggest a way to solve a problem **apply their increasing knowledge of mental and written methods** **use multiplication and division methods as needed,** e.g. arrays, repeated addition, mental methods and facts. **adopt a suggestion by an adult or their peers** **use lists and tables to organise and interpret given information, with support**	**identify the key information in a two-step puzzle or word problem** **identify and order the operations needed to solve a two-step word problem** **identify any resources needed** **re-phrase a problem in their own words** **represent a puzzle or problem using number sentences, statements and diagrams** **use lists and tables to organise and interpret information** **recognise and use connections between current and past problems** **use diagrams to find a solution** **record with a clear ordered structure** search for a solution by trying out own ideas	**break down a problem into steps** **explain why particular information is key, in two-step problems** **explain why particular operations are the right ones to use, in two-step problems** **identify the method to use and why, in two-step problems** **tabulate systematically the information in a puzzle or problem** **pose similar problems to a partner** **choose resources appropriate to the task** **find more than one solution, where appropriate, and check their work in the context of the problem** **check results independently, looking for errors and ways to improve**	**choose the best way to represent the information in a problem,** e.g. verbal description, tables, charts, pictures, database, diagrams etc. **decide which operations to use and why, for multi-step problems** **decide which methods to use and why, for multi-step problems** **make connections to previous work to suggest ways to tackle complex problems** **record the steps or calculations needed to solve a problem, using symbols where appropriate** **present information/results in a clear and organised way, including using ICT if appropriate** **check methods and work independently, looking for errors and ways to improve** **use the meaning of the equals sign as equivalence in laying out a problem, e.g. 4x35 = 2x2x35**	**solve problems by breaking down complex problems into simpler steps or tasks** **try alternative approaches and resources to overcome difficulties, including ICT** **turn simple expressions and formulae from symbols to words and vice-versa** **round answers to specific degrees of accuracy using a wide range of units** **estimate and give solutions to an appropriate degree of accuracy** **use letters and symbols to represent unknown numbers and variables, e.g. in a table, formula or equation**

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				use diagrams to find a solution, with support begin to work systematically **check work for mistakes, including considering appropriate units**	**understand there can be different viable solutions to the same problem**	develop their own methods of logically recording	**reflect on others' explanations, methods and strategies, and use these to improve their own work**	
Terminology	pattern, make, correct	create, continue, copy, repeat, repeating pattern, carry on, answer	justify, sequence, word problem, operation, working out	two-step, list, table, organise, reasoning, logical	general statement, systematic, diagram, number sentence	errors, test out, chain of reasoning, conclusion	symbol, generalisation, counter-example, proof	general term, algebraic

Appendices:

*Progression of representations and written methods / calculations (school specific, linked to scheme)

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