Unity Federation Parent Information: Maths

What is the Mathematics Programme of Study?

The Programme of Study is a list of what should be taught in each year from Year 1 to Year 6 (5 to 11 years old). Originally called the Numeracy Strategy, it was launched by the Government in 1999 to improve children's mathematical ability. It has undergone several changes since then, the latest occurring in 2014.The Programme of Study is divided into year groups under several headings:

- Numbers
- Addition and subtraction
- Multiplication and division
- Fractions
- Measurement
- Geometry
- Statistics

And in Year 6 two further categories: Ratio and Proportion and Algebra. Within these categories there are a number of sub-headings. For example, Geometry is sub-divided into Properties of Shapes and Position and Direction.

Number

Understanding of numbers and the number system goes hand in hand with calculating. The number system means concepts such as place value, ordering numbers, estimating and rounding, Roman numerals etc.
In Year 1 this may be reading and writing numbers or learning to count to 100. By Year 3, children will be comparing and ordering numbers up to 1 000, whilst by Year 5, children will be expected to read and write in millions and round large numbers to the nearest 100 000.

Calculating (addition, subtraction, multiplication and division)

The approach to calculation has seen a significant shift with the introduction of the latest Programme of Study. Formal written methods of addition are expected to be used in Year 3, and multiplying a 3-digit number by a 1-digit number in Year 4. By Year 5, children will be taught to use the short division method to divide 4-digit numbers by a 1-digit number. However, much of the Programme is very similar to the way teachers have taught previously.

Mental Arithmetic

A great deal of emphasis is placed on mental methods of calculating in the Programme of Study. Time and time again attention is drawn to the fact that a range of mental methods needs to be taught and that for any sum, children should ask whether it can be done mentally before resorting to pencil and paper methods.
There are two aspects to this: knowing by heart and figuring out. So, it is expected that children would know by heart that 6 x 7 is 42, but it is also expected that this knowledge can be used to quickly work out that 60 x 7 is 420. Pencil and paper methods should not be necessary for this.

Solving Problems

Problem solving is a very important part of the new Programme. Many children find this kind of work very hard as they are unsure of the mathematical processes to use to achieve the correct result. It is rather like solving a puzzle, working out what the puzzle means and then what maths is needed to solve it.
In Year 1 this might be a question such as, "What coins can I use to pay for a sweet costing 5p?", whilst by Year 6 the problem may involve carrying out several different calculations - multi step operations as they are known. Often there is more than one way to answer these questions, and discussing the problem with your children is a really good approach to take.

Fractions

There is a much greater emphasis on fractions in the new Programme, with it now being a category all of its own. In Year 1, children will be expected to recognise and name halves and quarters. By Year 3, children will be taught to count in

tenths and add or subtract fractions with the same denominator (e.g. 2/7 + 1/7 = 3/7). Year 6 children will be multiplying a pair of fractions, writing the answer in its simplest form.

Measurement

Children are expected to learn to measure length, area, mass and volume, and to know what units to use. Also, telling the time in Years 1, 2, and 3 is important, whilst in later years there are more difficult problems involving time and the 24 hour clock. Money is also considered as part of measurement, with children in Year 1 expected to be able to recognise and know the value of different denominations of coins and notes.
For example, by Year 2, children are expected to know that there are 100 centimetres in one metre. Measurement, in particular, is an area of maths which can easily be developed at home, where practical exercises can be carried out when cooking, in the garden, going on a day out - the list is endless, but don't forget that we now live in a metric world!

Statistics

We are all relying more and more on data held on the computer. This data can help us find information, but it needs to be understood and processed correctly. There is slightly less emphasis on Statistics and it is not introduced as a statutory requirement until Year 2. As children progress they will use terms such as average, mean and mode to extract and interpret data.

Year 6 Ratio and Proportion

A new category just for Year 6 children which looks at solving problems involving the relative sizes of two quantities, calculating percentages and scale.

Year 6 Algebra

Another new category, with children being taught to use simple formulae expressed in words and make number sequences. This might sound hard but is good fun!

Investigations

Whilst not a formal category anymore, investigations are still an important way to give children the opportunity to develop their knowledge of number and to explore the interrelationships and patterns within Mathematics. They are 'open ended' tasks, challenging children to reason effectively and explain what they are doing. To do this successfully they need to be asked the right kinds of questions. Good questions include:

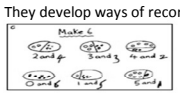
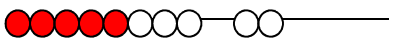
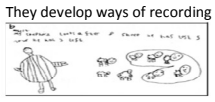
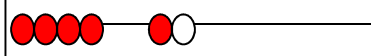
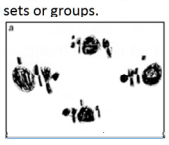
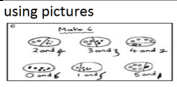
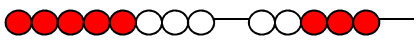
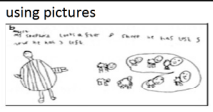
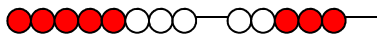
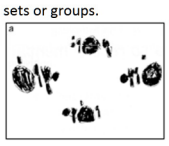
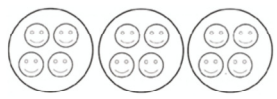
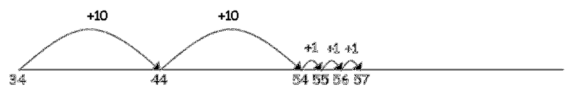
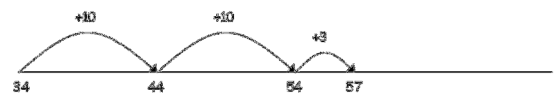
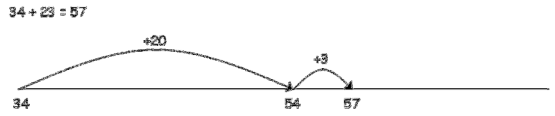
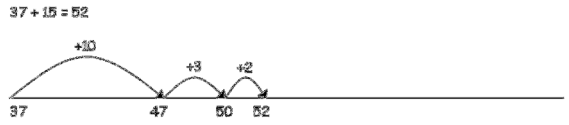
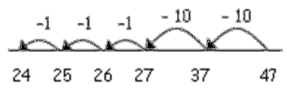
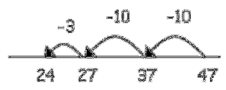
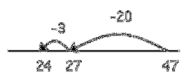
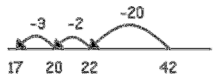
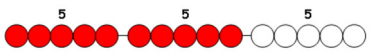
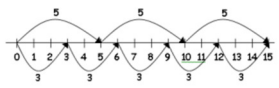
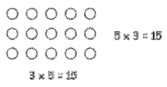
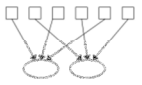
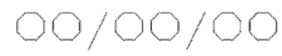
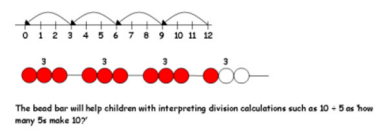
- Is there a pattern?
- What would happen if.....?
- Does it always happen?
- What happens if you use different numbers?

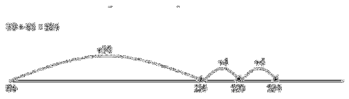
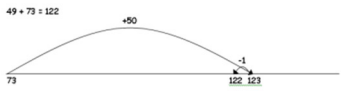
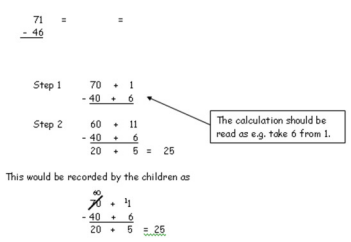
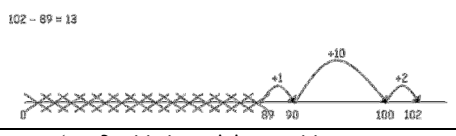
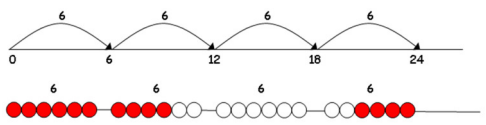
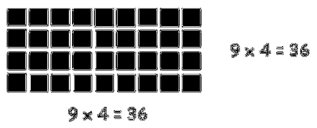
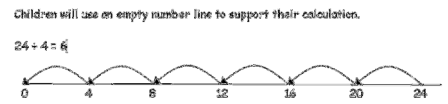
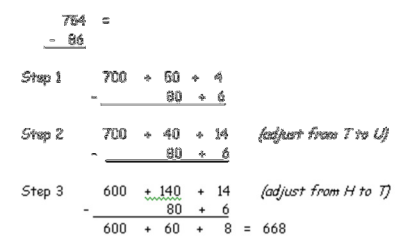
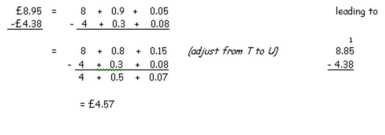
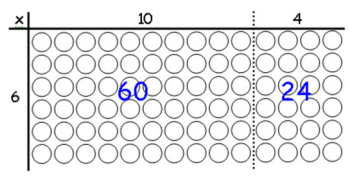
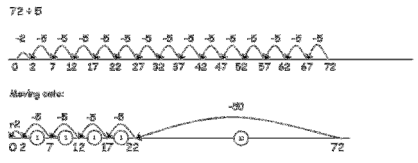
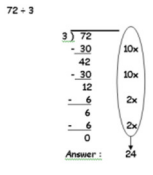
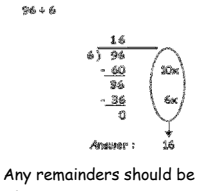
Useful Websites to Help at Home

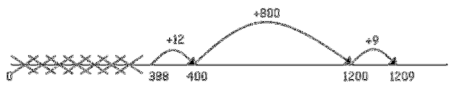
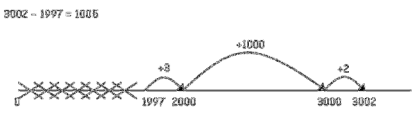
Ten minutes a day or three twenty minute sessions a week on these sites below could really boost your child's understanding in maths:
http://www.mathschamps.co.uk

http://www.coolmath-games.com/

http://resources.woodlands-junior.kent.sch.uk/maths/index.html

	Addition	Subtraction	Multiplication	Division
Rec	Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.  Bead strings or bead bars can be used to illustrate addition  8+2=10 **They use numberlines and practical resources to support calculation and teachers *demonstrate* the use of the numberline.**	Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures etc.  Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.  6-2 They use numberlines and practical resources to support calculation. Teachers *demonstrate* the use of the numberline.	Children will experience equal groups of objects. They will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups. 	Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s. 
Y1	using pictures  Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.  They use numberlines and practical resources to support calculation and teachers *demonstrate* the use of the numberline. Children then begin to use numbered lines to support their own calculations using a numbered line to count on in ones.	using pictures  Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.  13-5 Children then begin to use numbered lines to support their own calculations - using a numbered line to count back in ones. The numberline should also be used to show that 6 - 3 means the 'difference between 6 and 3' or 'the difference between 3 and 6' and how many jumps they are apart.	Children will experience equal groups of objects. They will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups. 	Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s. 
Y2	Children will begin to use 'empty number lines' themselves starting with the larger number and counting on. ✓ First counting on in tens and ones. 34 + 23 = 57  ✓ Then helping children to become more efficient by adding the units in one jump (by using the known fact 4 + 3 = 7). 34 + 23 = 57  ✓ Followed by adding the tens in one jump and the units in one jump. 34 + 23 = 57  ✓ Bridging through ten can help children become more efficient. 37 + 15 = 52 	Children will begin to use empty number lines to support calculations. **Counting back:** ✓ First counting back in tens and ones. 47 – 23 = 24  ✓ Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4). 47 – 23 = 24  ✓ Subtracting the tens in one jump and the units in one jump. 47 – 23 = 24  ✓ Bridging through ten can help children become more efficient. 42 – 25 = 17  Counting on: The number line should still show 0 so children can cross out the section from 0 to the smallest number. They then associate this method with 'taking away'.	Children will develop their understanding of multiplication and use jottings to support calculation: ✓ **Repeated addition** 3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x3 Repeated addition can be shown easily on a number line:  and on a bead bar: 5 x 3 = 5 + 5 + 5  ✓ **Commutativity** Children should know that 3 x 5 has the same answer as 5 x 3. This can also be shown on the number line.  ✓ **Arrays** Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.  5 x 3 = 15 3 x 5 = 15	Children will develop their understanding of division and use jottings to support calculation ✓ **Sharing equally** 6 sweets shared between 2 people, how many do they each get?  ✓ **Grouping or repeated subtraction** *There are 6 sweets, how many people can* have 2 sweets each?  ✓ **Repeated subtraction using a number line or bead bar** 12 ÷ 3 = 4  The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?' ✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations** ☐ ÷ 2 = 4 20 ÷ △ = 4 ☐ ÷ △ = 4

	Addition	Subtraction	Multiplication	Division
Y3	Children will continue to use empty number lines with increasingly large numbers, including compensation where appropriate. ✓ Count on from the largest number irrespective of the order of the calculation.  ✓ Compensation  Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies. Adding the least significant digits first 67 + 24 11 (7 + 4) 80 (60 + 20) 91 267 + 85 12 (7 + 5) 140 (60 + 80) 200 352	Children will continue to use empty number lines with increasingly large numbers. Children will begin to use informal pencil and paper methods (jottings). ✓ **Partitioning and decomposition** • Partitioning – demonstrated using arrow cards • Decomposition - base 10 materials **NOTE** When solving the calculation 89 – 57, children should know that 57 **does NOT EXIST AS AN AMOUNT** it is what you are subtracting from the other number. Therefore, when using base 10 materials, children would need to count out only the 89. 89 = 80 + 9 - 57 = 50 + 7 30 + 2 = 32 ✓ **Begin to exchange.**  Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.  	Children will continue to use: ✓ **Repeated addition** 4 times 6 is 6 + 6 + 6 + 6 = 24 or 4 lots of 6 or 6 x 4 Children should use number lines or bead bars to support their understanding.  ✓ **Arrays** Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.  ✓ **Scaling** e.g. Find a ribbon that is 4 times as long as the blue ribbon  ✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations** ☐ x 5 = 20 3 x △ = 18 ☐ x O = 32 ✓ **Partitioning** 38 x 5 = (30 x 5) + (8 x 5) = 150 + 40 = 190	Ensure that the emphasis in Y3 is on grouping rather than sharing. Children will continue to use: ✓ **Repeated subtraction using a number line**  Children should also move onto calculations involving remainders.  ✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations** 26 ÷ 2 = ☐ 24 ÷ △ = 12 ☐ ÷ 10 = 8
Y4	✓ Carry below the line. 625 + 48 = 673 783 + 42 = 825 367 + 85 = 452 *Using similar methods, children will:* ✓ *add several numbers with different numbers of digits;* ✓ *begin to add two or more three-digit sums of money, with or without adjustment from the pence to the pounds;* ✓ *know that the decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. £3.59 + 78p.*	✓ **Partitioning and decomposition**  ✓ **Decomposition**  *Children should:* ✓ *be able to subtract numbers with different numbers of digits;* ✓ *using this method, children should also begin to find the difference between two three-digit sums of money, with or without 'adjustment' from the pence to the pounds;* ✓ *know that decimal points should line up under each other.*  	Children will continue to use arrays where appropriate leading into the grid method of multiplication.  (6 x 10) + (6 x 4) 60 + 24 84 ✓ **Grid method** **TU x U** (Short multiplication – multiplication by a single digit) 23 x 8 Children will approximate first 23 x 8 is approximately 25 x 8 = 200 x 20 3 8 160 24 160 + 24 184	Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s – numbers with which the children are more familiar.  Then onto the vertical method: **Short division TU ÷ U**  Leading to subtraction of other multiples.  Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2. Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division.

	Addition	Subtraction	Multiplication	Division
Y5	Children should extend the carrying method to numbers with at least four digits. 587 + 475 = 1062 (1 1) 3587 + 675 = 4262 (1 1 1) *Using similar methods, children will:* ✓ *add several numbers with different numbers of digits;* ✓ *begin to add two or more decimal fractions with up to three digits and the same number of decimal places;* ✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 3.2 m – 280 cm.*	**Partitioning and decomposition** Step 1: 754 = 700 + 50 + 4; − 286 = − 200 + 80 + 6 Step 2: 700 + 40 + 14 − 200 + 80 + 6 *(adjust from T to U)* Step 3: 600 + 140 + 14 − 200 + 80 + 6 = 468 *(adjust from H to T)* This would be recorded by the children as 600 140 754 − 200 80 6 = 400 60 8 = 468 **Decomposition** 754 − 286 = 468 *Children should:* ✓ *be able to subtract numbers with different numbers of digits;* ✓ *begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places;* *know that decimal points should line up under each other* Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used. 1209 – 388 = 821 	**Grid method** **HTU x U** (Short multiplication – multiplication by a single digit) 346 x 9 Children will approximate first 346 x 9 is approximately 350 x 10 = 3500 x: 300 40 6; 9: 2700 360 54 2700 + 360 + 54 = 3114 (1 1) **TU x TU** (Long multiplication – multiplication by more than a single digit) 72 x 38 Children will approximate first 72 x 38 is approximately 70 x 40 = 2800 x: 70 2; 30: 2100 60; 8: 560 16 2100 + 560 + 60 + 16 = 2736 (1) *Using similar methods, they will be able to multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up under each other.* e.g. 4.9 x 3 Children will approximate first 4.9 x 3 is approximately 5 x 3 = 15 x: 4 0.9; 3: 12 2.7 12 + 2.7 = 14.7	Children will continue to use written methods to solve short division TU ÷ U. Children can start to subtract larger multiples of the divisor, e.g. 30x **Short division HTU ÷ U** 196 ÷ 6 32 r 4 6) 196 − 180 (30x) 16 − 12 (2x) 4 Answer: 32 remainder 4 or 32 r 4 Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2. Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division.
Y6	Children should extend the carrying method to number with any number of digits. 7648 + 1486 = 9134 (1 1 1) 6584 + 5848 = 12432 (1 1 1) 42 × 786 = 6432 × 3 = 11944 (1 2 1) *Using similar methods, children will* ✓ *add several numbers with different numbers of digits;* ✓ *begin to add two or more decimal fractions with up to four digits and either one or two decimal places;* ✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 401.2 + 26.85 + 0.71.*	**Decomposition** 5631 − 2684 = 3783 *Children should:* ✓ *be able to subtract numbers with different numbers of digits;* ✓ *be able to subtract two or more decimal fractions with up to three digits and either one or two decimal places;* ✓ *know that decimal points should line up under each other.* Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used. 3002 – 1997 = 1005 	**ThHTU x U** (Short multiplication – multiplication by a single digit) 4346 x 8 Children will approximate first 4346 x 8 is approximately 4346 x 10 = 43460 x: 4000 300 40 6; 8: 32000 2400 320 48 32000 + 2400 + 320 + 48 = 34768 **HTU x TU** (Long multiplication – multiplication by more than a single digit) 372 x 24 Children will approximate first 372 x 24 is approximately 400 x 25 = 10000 x: 300 70 2; 20: 6000 1400 40; 4: 1200 280 8 6000 + 1400 + 1200 + 280 + 40 + 8 = 8928 (1) *Using similar methods, they will be able to multiply decimals with up to two decimal places by a single digit number and then two digit numbers, approximating first. They should know that the decimal points line up under each other.* *For example:* 4.92 x 3 Children will approximate first 4.92 x 3 is approximately 5 x 3 = 15 x: 4 0.9 0.02; 3: 12 2.7 0.06 12 + 0.7 + 0.06 = 12.76	Children will continue to use written methods to solve short division TU ÷ U and HTU ÷ U. **Long division HTU ÷ TU** 972 ÷ 36 27 36) 972 − 720 (20x) 252 − 252 (7x) 0 Answer: 27 Any remainders should be shown as fractions, i.e. if the children were dividing 32 by 10, the answer should be shown as $3\ ^{2}/_{10}$ which could then be written as $3\ ^{1}/_{5}$ in it's lowest terms. Extend to decimals with up to two decimal places. Children should know that decimal points line up under each other. 87.5 ÷ 7 12.5 7) 87.5 − 70.0 (10x) 17.5 − 14.0 (2x) 3.5 − 3.5 (0.5x) 0 Answer: 12.5

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.
Children should not be made to go onto the next stage if:
they are not ready.
they are not confident.
Children should be encouraged to approximate their answers before calculating.
Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.