UNSWORTH PRIMARY SCHOOL

CALCULATION POLICY

AIMS

The overall aim is that when learners leave Unsworth Primary School, they:

- Have a good *understanding* of the four operations, how they work, how they are related and *contexts* within which each operation can be used;
- Have an understanding of *the likely effect* on a number when applying each operation;
- Have a secure *knowledge* of appropriate number facts;
- Are able to *calculate mentally,* using known number facts and a variety of strategies, solutions to calculations involving one-digit and two-digit numbers (and larger numbers as appropriate);
- Make use, where appropriate, of *informal notes and/or diagrams* to support their mental calculations;
- Have *one efficient, reliable, compact written method* of calculation for each operation that the learner can apply accurately and with confidence for calculations that they cannot easily carry out mentally;
- Are able to *estimate* the answer to a more difficult calculation;
- *Use a calculator effectively,* making appropriate informal records and using their mental skills to check the legitimacy of intermediate and final answers.
- Are able to use their knowledge of estimation and/or inverse operations to *check their answer.*
- When faced with any calculation, the learner will be able to make an appropriate decision about how to approach the problem – mentally, in writing or with the aid of a calculator.

*See **Appendix 1** – Flow chart 'General Principles for Calculation'.*

UNDERLYING PRINCIPLES

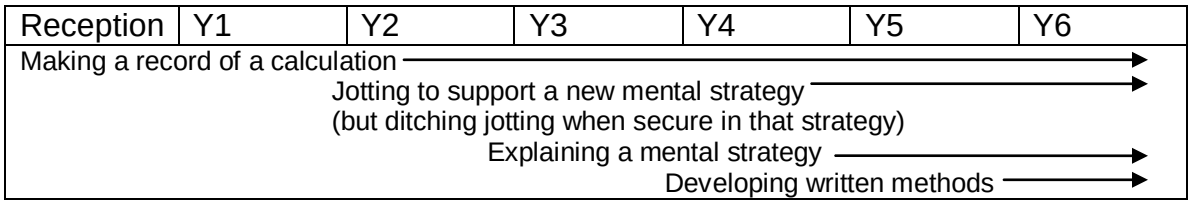
1. Children will be introduced to the processes of calculation through practical, oral and mental activities.

Their early learning of each operation will be supported by the use of models, images and practical equipment in ways that are clearly understood by all staff in the school. Hence when extending the learning of an operation, or where individual pupils/groups of pupils are finding difficulty, the model can be revisited as a support.

2. All staff and learners should be overtly aware of whether a method of calculation is a mental or a written method.

The aim is for each learner to ultimately have *one formal written* strategy, but a variety of mental strategies that *may* be supported by informal notes and/or diagrams.

In particular, caution should be used when using texts that indicate a standard way of writing down steps for a mental calculation. Recording parts of a mental strategy is not always necessary (particularly for one-step calculations), but where necessary, each learner should record informally in a form suited to their style of learning.
For young learners, there is a considerable emphasis on the learning of mental calculation strategies with formal written methods following when the child is able to use a wide range of mental strategies accurately and with confidence.



3. There is one standard written method used in the school. Written methods used in years before standard written method is introduced are expansions of the standard method, or preliminary stages of the standard method.

4. All staff and parents are aware of, and understand the standard methods of written calculation that are the aim for all pupils in the school.

Parents are made aware of strategies specific to their child's year group.
Formal recording of written methods (i.e. for presentation to others) will follow the examples provided in the guidelines.
Informal recording or jottings i.e. for the learner's personal use, will develop according to children's own style, but should be encouraged by teachers as appropriate.

5. Learners will be actively encouraged to *know* number facts appropriate to their age group.

'Knowing a number fact', means that a learner can give the answer within two seconds, having not needed to do any calculating.
E.g. once a learner clearly understands that 7 x 6 means '7 lots of 6' and has learned to attempt the calculation by counting up in sixes (or sevens), then it becomes more efficient (and accurate) for them to know the answer rather than to calculate the answer.
This does not just apply to 'times tables', but also includes;

- Subitising – looking at a small group of objects and knowing that it contains 2, 3, 4, 5 or 6 objects without having to count;
- Adding any pair of one-digit numbers;
- Subtracting any one-digit number from a greater one-digit number or two-digit number.
- 'Division tables'.

In some cases, learners will begin to know facts purely by having experienced them regularly. If the calculation is appropriate and a child tells you that they 'just knew it' then this will be encouraged – if the teacher is not sure, then the learner will be encouraged to 'check' their answer by calculating.

Where pupils do not know facts they will need to be *given strategies to help them learn the facts* 'off by heart'. We will share with parents what their child should be learning and ways to help them learn.

6. When approaching a new calculation where possible learners will be encouraged to use facts that they already know, rather than start from scratch.

Examples:

- When learning to use a formal column addition method to add 68 and 27, learners are overtly encouraged to use the facts they know, 8 + 7 and 6 + 2, not to work them out from scratch;
- If a learner is trying to calculate 7 x 6, they are encouraged to start from a fact that they know (e.g. 3 x 6 = 18), rather than start counting up from zero.
- 6 + 6 = 12 therefore 6 + 7 = 13
- 24 + 10 = 34 therefore 24 + 9 = 33

7. Links (and differences) between aspects of calculation will be made overtly clear to the learner;

Examples.

- When mentally adding two two-digit numbers we start with the 'tens'. When adding two two-digit numbers in a vertical written method we start with the 'units' (or 'ones'). Rather than being 'glossed over', this point should be directly addressed. This fits in with the general rule that addition is *commutative* – two numbers can be added in either order to achieve the same result.
- The links between counting on and addition, counting back and subtraction.
- The ordinal and cardinal meaning of a number.
- Use of inverse operations, and links between multiplication/addition and division/subtraction.
- Each time a written method is 'contracted', the link to previous methods will be made overtly.

8. The guidelines that accompany this policy have been produced to assist the teaching and learning of the four operations of calculation. As a school we have agreed to use as a minimum the strategies as detailed below to ensure progression and continuity throughout the Key Stages.

Where additional strategies are also used, the teacher concerned will first consider whether it is a written or mental strategy and how it fits in with and/or enhances the methods outlined.

Additional strategies used will be shared with teachers that take the class in the future. Annually the strategies included in the guidelines will be reviewed, changed, increased or reduced.

These guidelines are mainly to support the written calculations, and there are likely to be a variety of mental calculations that may be used appropriately, but are not included here.

The monitoring of written calculations will be done through work scrutiny, monitoring of plans, learning conversations with pupils and test/assessment analyses. This will be done

to ensure progression through calculations, and that pupils are being taught appropriate methods for their age and ability, which are in line with the agreed policy.

9. Most learners will be working at age appropriate levels for most of the time, and will be able to follow the approaches shown in the guidelines.

Some children, however, may require support to achieve age-related objectives; in such cases, practitioners may need to look at the previous stages. In some cases certain children may not be able to cope with the different stages of written calculation. These children may be taught one method for each of the four operations which they stay with. Staff should consult with the SENCO if they judge this to be the case.
Similarly, the needs of more able children can be met by referring to a stage above.
In particular, the way in which more able learners record their mental methods may indicate that they are ready to 'skip' some stages.

10. Opportunities to use calculations in context and to apply calculation skills will be a key feature throughout the learning process.

Examples.

- At the beginning of a unit of work a problem may be investigated requiring learners to multiply numbers that they have not yet had the experience of multiplying. At the end of the unit of work the problem is revisited – the pupils now have the required skills.
- While practising and consolidating a particular calculation method, word questions in context (including calculation related vocabulary) are part of the work set.
- After a new calculation has been learned successfully, problems are used that require the learners to apply their new skills.

11. Calculators will occasionally be used as an aid to calculation in all years.

- As a way to investigate with numbers and symbols.
- Where a real-life problem is used. Learners know which operation to use, but are unable to solve the calculation with a mental or written method.

12. Calculator skills will be overtly taught and practised in years 4, 5 and 6.

Clear guidance about 'what to teach' and 'how to teach it' is set out in the Primary Framework.

*In **Appendix 2** there are guidelines to accompany our calculation policy.*

*In **Appendix 3** there are summary sheets for methods of calculation for addition, subtraction, multiplication and division. The longer versions of these can be found on the Learning Platform in the numeracy area – see policies folder.*

Policy compiled by: Christine Reynolds March 2010

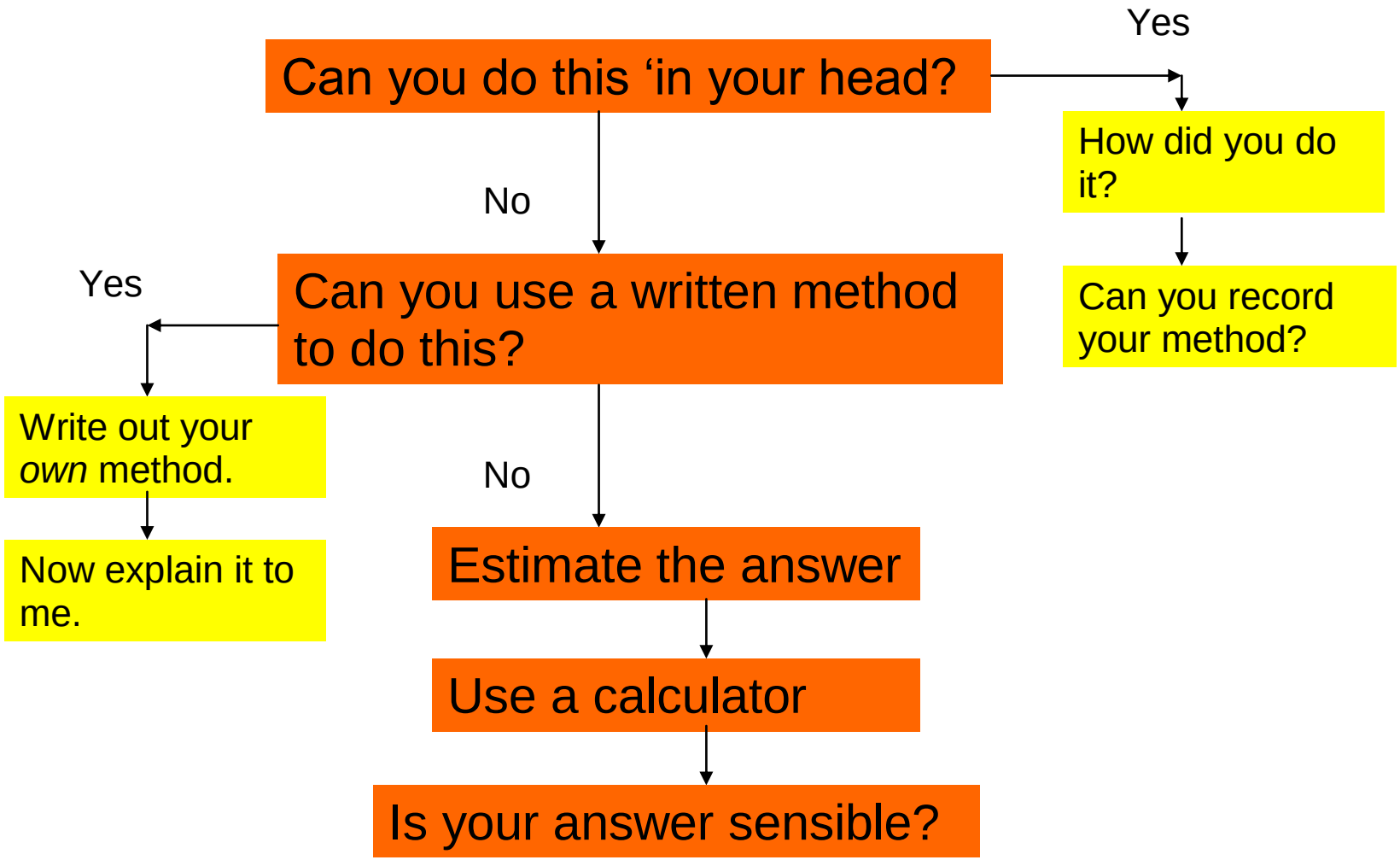
Agreed at staff meeting March 2010

APPENDICES

1. Calculation flowchart
2. Calculation guidelines:
   - Addition
   - Subtraction
   - Multiplication
   - Division
3. Summaries of methods

Appendix 1

General Principles for Calculation



Appendix 2

Calculation Guidelines

Written Method for ADDITION

Consistent principles

- Set numbers in a vertical layout.
- Addition symbols to be placed on the left of the calculation before each number except the first.
- Careful attention should continue to focus on the correct placement of each digit corresponding to its place value.
- Work from right to left i.e. start with the units' column.
- 'Carries' to be recorded **beneath** the answer box, below the correct column (the next column to the left), and added to the results of the next calculation.
- For calculations involving decimals, all decimal points will be lined up beneath each other and the decimal point will be placed in the answer box first.
- Language must refer to the **value** of each digit, and not its number name.

Examples

37	438	682	286	52.6	394
+ 49	+ 65	+ 45	+ 37	+ 3.7	+ 1823
86	493	727	323	66.3	+ 98
1	1	1	1 1	1	1315
					1 2 1

Language

```
  47
+ 35
  82
  1
```

- 7 add 5 makes 12 which is made up of 10 and 2 units.
- Write down the 2 units and write the 10 beneath the tens column.
- 40 add 30 makes 70.
- Add on the 10 you carried, that makes 80.
- Write down 8 tens in the tens column.

Prior Knowledge

The Primary Framework guidance outlines that to successfully complete a written addition, learners need to be able to:

- recall all addition pairs to 9 + 9 and complements in 10;
- add mentally a series of one-digit numbers, such as 5 + 8 + 4;
- add multiples of 10 (such as 60 + 70) or of 100 (such as 600 + 700) using the related addition fact, 6 + 7, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways.

Through the Foundation Stage and early Year 1, learners will gain a feel for number and:

- Begin to use the vocabulary involved in adding;
- Develop an understanding for numbers in their cardinal and ordinal forms;
- Use 'more' or 'less' to compare numbers;
- Combine groups of objects and understand that there are more in the combined group;

- Partition and recombine groups of objects;
- Begin to relate addition to comparing two groups of objects;
- Learners use number lines, number tracks and practical resources develop their understanding of the number system;
- Adults *demonstrate* the use of the number line;
- Children are encouraged to develop a mental picture of the number system in their heads to use for calculation.

Written Method for SUBTRACTION

Consistent principles

- Set numbers in a vertical layout.
- Subtraction symbols to be placed on the left of the calculation before the second number.
- Careful attention should continue to focus on the correct placement of each digit corresponding to its place value.
- Work from right to left i.e. start with the units' column.
- Any exchanges will be recorded by striking out the tens, hundreds or thousands digit, and replacing it with one less
- The equivalent value is then added to the column to the right (see example)
- For calculations involving decimals, the decimal point will be placed in the answer box first.
- Where decimals do not have the same number of decimal places, zero placeholders will be written.
- Language must refer to the **value** of each digit, and not its number name.

Examples

	7 1		7 1	3 1	5 11 1	2 13 1
87	~~8~~ 3	686	2 ~~8~~ 6	~~4~~ 2 8	~~6~~ ~~2~~ 5	6 ~~3~~. ~~4~~ 0
- 42	- 6 5	- 143	- 1 3 7	- 1 8 5	- 2 6 7	- 2 1. 7 3
45	1 8	543	1 4 9	2 4 3	3 5 8	4 1. 6 7

Language

7 1
82
- 47
35

- I can't take 7 units away from 2 units.
- Partition 82 into 70 and 12.
- 12 take away 7 equals 5.
- Write 5 in the units column.
- 70 take away 40 equals 30
- Write down 7 tens in the tens column.

Prior Knowledge

The Primary Framework guidance outlines that to successfully complete a written subtraction, learners need to be able to:

- recall all addition and subtraction facts to 20;
- subtract multiples of 10 (such as 160 – 70) using the related subtraction fact,16 – 7, and their knowledge of place value;

- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways (e.g. partition 74 into 70 + 4 or 60 + 14).

Towards the written method

Through the Foundation Stage and early Year 1, learners will gain a feel for number and:

- Begin to use the vocabulary involved in subtracting;
- Develop an understanding for numbers in their cardinal and ordinal forms;
- Use 'more' or 'less' to compare numbers;
- Separate groups of objects and understand that there are less in each separate group;
- Understand the concept of 'taking away' from a group of objects, and begin to relate this to subtraction;
- Partition and recombine groups of objects;
- Learners use number lines, number tracks and practical resources develop their understanding of the number system;
- Adults *demonstrate* the use of the number line;
- Children are encouraged to develop a mental picture of the number system in their heads to use for calculation.

Written Method for MULTIPLICATION

Consistent principles

- Set numbers in a vertical layout.
- Multiplication symbol to be placed on the left of the calculation before the second number.
- Careful attention should continue to focus on the correct placement of each digit corresponding to its place value.
- Work from right to left i.e. start with the units' column.
- 'Carries' to be recorded **beneath** the answer box, below the correct column (the next column to the left), and added to the results of the next calculation.
- For calculations involving decimals, the decimal point will be placed in the answer box first
- Language must refer to the **value** of each digit, and not its number name.

Examples

37	428	682	286	51.2
x 2	x 3	x 4	x 7	+ 7
74	1284	2728	2002	358.4
1	2	2	6 4	1

Language

47
x 5
235
3

- 7 times 5 makes 35 which is made up of 30 and 5 units.
- Write down the 5 units and write 3 tens beneath the tens column.
- 40 times 5 makes 200.
- Add on the 30 you carried, that makes 230.
- Write down 3 tens in the tens column.
- Write the two hundreds in the hundreds column.

Prior Knowledge

The Primary Framework guidance outlines that to successfully complete a written multiplication, learners need to be able to:

- Recall all multiplication facts to 10 × 10;
- Partition number into multiples of one hundred, ten and one;
- Work out products such as 70 × 5, 70 × 50, 700 × 5 or 700 × 50 using the related fact 7 × 5 and their knowledge of place value;
- Add two or more single-digit numbers mentally;
- Add multiples of 10 (such as 60 + 70) or of 100 (such as 600 + 700) using the related addition fact, 6 + 7, and their knowledge of place value;
- Add combinations of whole numbers using the column method (see above).

Through the Foundation Stage and early Year 1, learners will gain a feel for number and:

- Combine groups of objects of the same size and understand that there are more in the combined group;
- Count repeated groups of the same size;
- Arrange objects in repeated patterns, possibly rectangular;

Written Method for LONG MULTIPLICATION

Consistent principles

- Partition the numbers.
- Numbers are set out in a grid.
- Multiplication symbol to be placed in the top left hand corner of the grid.
- Products from the grid are written in one column addition.
- Language must refer to the **value** of each digit, and not its number name.

Example

34 x 23

x	20	3
30	600	90
4	80	12

600
+ 90
+ 80
+ 12
782
1

43 x 245

x	200	40	5
40	8000	1600	200
3	600	120	15

8000
+ 1600
+ 200
+ 600
+ 120
+ 15
10535

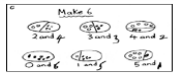
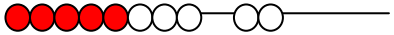
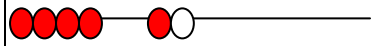
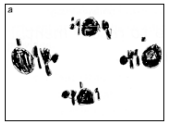
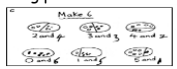
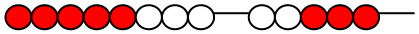
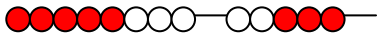
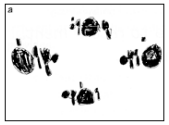
Written Method for DIVISION

- Set numbers in a horizontal layout, as shown.

$$3 \overline{)42}$$

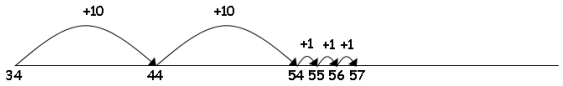
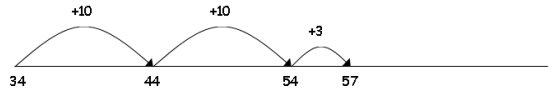
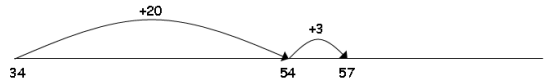
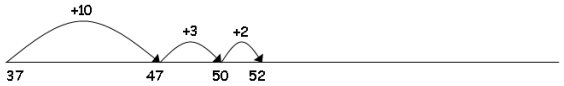
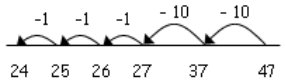
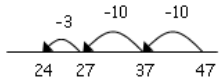
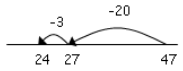
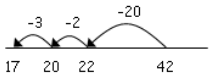
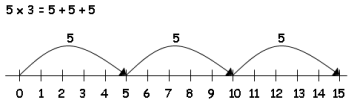
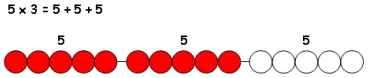
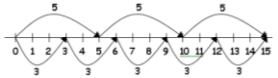
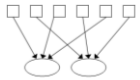
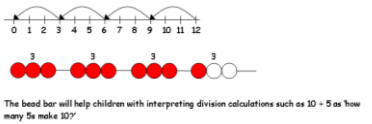
- This can be read as “42 divided by 3”. No division symbol is necessary.
- Digits need to be carefully aligned and in appropriate columns
- Work from left to right i.e. start with the most significant digit.
- During the calculation, the remainder to be written before (and slightly above) the digit in the next column to the right.
- Final remainders to be placed above the line and represented as ‘rem Y’ (see example)
- For calculations involving decimals, the decimal point will be placed above the answer line first.
- When this is first introduced, language must make it clear regarding the value of each digit. However, once children are using this method they may find it easier to use the number name when calculating.

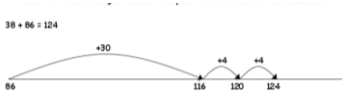
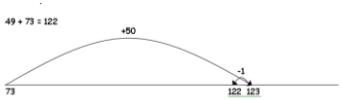
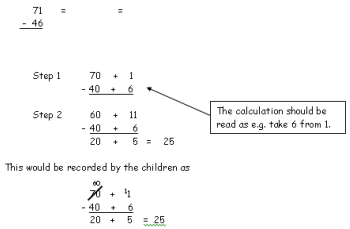
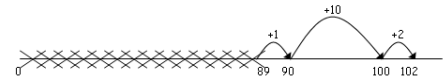
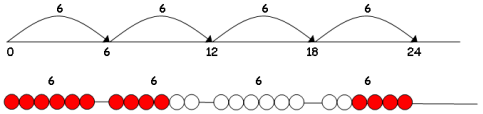
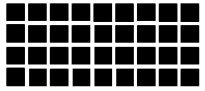
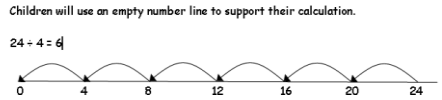
Appendix 2

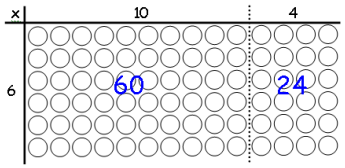
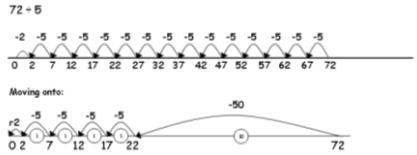
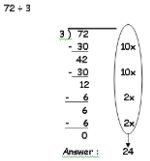
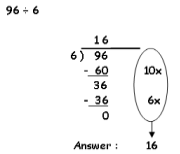
	Addition	Subtraction	Multiplication	Division
Rec	Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.  Bead strings or bead bars can be used to illustrate addition  8+2=10 They 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. 

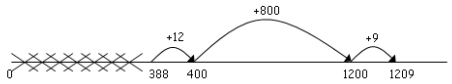
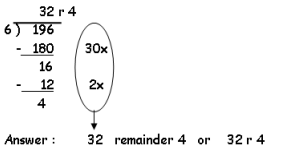
Appendix 3

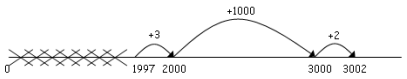
Appendix 2

	Addition	Subtraction	Multiplication	Division
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: 5 x 3 = 5 + 5 + 5  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.  	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. 102 – 89 = 13  	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.  9 x 4 = 36 9 x 4 = 36 ✓ **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

	Addition	Subtraction	Multiplication	Division
Y4	✓ Carry below the line. 625 + 48 = 673 (1) 783 + 42 = 825 (1) 367 + 85 = 452 (11) *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** 754 − 86 = Step 1: 700 + 50 + 4 − (80 + 6) Step 2: 700 + 40 + 14 − (80 + 6) *(adjust from T to U)* Step 3: 600 + 140 + 14 − (80 + 6) *(adjust from H to T)* 600 + 60 + 8 = 668 This would be recorded by the children as ~~600~~ 140 14 ~~7~~ ~~5~~ ~~4~~ − 80 + 6 600 + 60 + 8 = 668 ✓ **Decomposition** 614 1 7 ~~5~~ 4 − 86 668 *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.* £8.95 − £4.38 = 8 + 0.9 + 0.05 − (4 + 0.3 + 0.08) = 8 + 0.8 + 0.15 − (4 + 0.3 + 0.08) *(adjust from T to U)* 4 + 0.5 + 0.07 = £4.57 leading to 1 8.85 − 4.38	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 = 400 + 60 + 8 = 468 *(adjust from H to T)* This would be recorded by the children as: 600 140 754 = 700 + 50 + 4 − 200 + 80 + 6 400 + 60 + 8 = 468 **Decomposition** 614 1 754 − 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) Use a formal column method to multiply two or three digit numbers by a one-digit number(use expanded if necessary to start) 30 + 7 X 4 = 28 + 120 = 148 then 37 x 4 = 148 (2) *See the final written method.* **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  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. Move to a formal method for short division. 2 7 3) 8 2 1 *See final method.*

	Addition	Subtraction	Multiplication	Division
Y6	Children should extend the carrying method to number with any number of digits. 7648 + 1486 + 9134 (111) 6584 + 5848 + 12432 (111) 42 + 786 + 3 + 4681 + 11944 (121) *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** 3 13 1 6467 - 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 *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.