Trinity Church of England/Methodist Primary School
— Buckshaw Village —
Headteacher: Mrs Jill R Wright head@trinitybuckshaw.lancs.sch.uk

Maths Calculation Policy 2015

Trinity is a Christian school with a caring environment in which each individual is valued as special and is encouraged to reach their full potential while enjoying life in all its fullness.

PROGRESSION THROUGH CALCULATIONS FOR ADDITION

MENTAL CALCULATIONS
These are a selection of mental calculation strategies:

Mental recall of number bonds

6 + 4 = 10
25 + 75 = 100
□ + 3 = 10
19 + □ = 20

Use near doubles

6 + 7 = double 6 + 1 = 13

Addition using partitioning and recombining

34 + 45 = (30 + 40) + (4 + 5) = 79

Counting on or back in repeated steps of 1, 10, 100, 1000

86 + 57 = 143 (by counting on in tens and then in ones)
460 - 300 = 160 (by counting back in hundreds)

Add the nearest multiple of 10, 100 and 1000 and adjust

24 + 19 = 24 + 20 – 1 = 43
458 + 71 = 458 + 70 + 1 = 529

Use the relationship between addition and subtraction

36 + 19 = 55
55 – 19 = 36
19 + 36 = 55
55 – 36 = 19

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THE FOLLOWING ARE STANDARDS THAT WE EXPECT THE MAJORITY OF CHILDREN TO ACHIEVE.

PROGRESSION THROUGH CALCULATIONS FOR ADDITION

- These standards are age-related expectations and therefore we expect the majority of children to achieve them.
- New learning is likely to be taught to groups rather than the whole class to acknowledge the different learning stages of the children.
- Children should understand that addition is commutative and therefore calculations can be rearranged, e.g. 4 + 13 = 17 is the same as 13 + 4 = 17.
- Ensure that children understand the = sign means is the same as, not makes, and that children see calculations where the equals sign is in a different position, e.g. 3 + 2 = 5 and 5 = 3 + 2.
- Children should be encouraged to approximate before calculating and check whether their answer is reasonable.

YR

NB YR ARE ENCOURAGED TO USE BASE 10 AS OPPOSED TO NUMBER LINES. OUR POLICY DOES NOT REFLECT ONE STRAND ON THE NEW EARLY YEARS FRAMEWORK.

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, e.g. small world play, role play, counters, cubes etc. They develop ways of recording calculations using pictures, etc.

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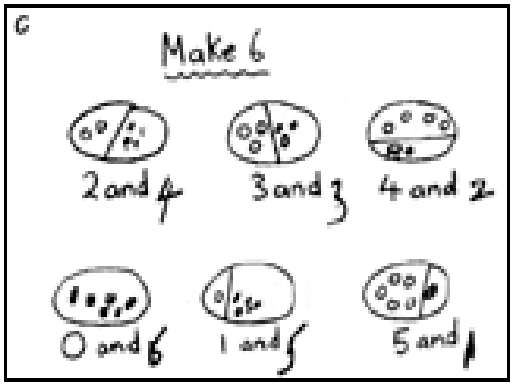

Y1:

Add with numbers up to 20

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line

Key skills for addition at Y1:

- Read and write numbers to 100 in numerals, incl. 1—20 in words
- Recall bonds to 10 and 20, and addition facts within 20
- Count to and across 100
- Count in multiples of 1 2, 5 and 10
- Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations.

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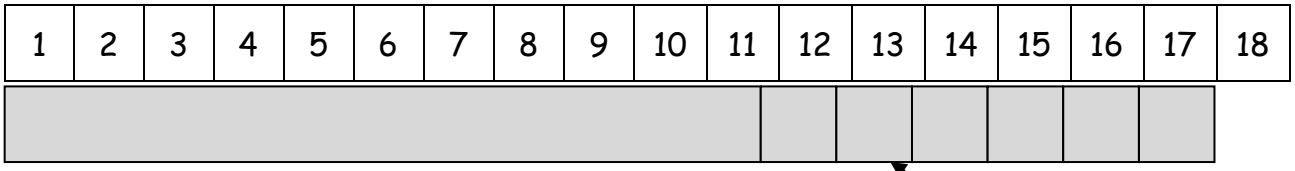
Children will initially use practical equipment to combine groups of objects to find the total. They will move on to the use of number tracks and Base 10 equipment to support their developing understanding of addition.

11 + 5 =



11 + 5 = 16

Model of Base 10 equipment

Y2:

Add with 2-digit numbers

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary

Key skills for addition at Y2:

- Add a 2-digit number and ones (e.g. 27 + 6)
- Add a 2-digit number and tens (e.g. 23 + 40)
- Add pairs of 2-digit numbers (e.g. 35 + 47)
- Add three single-digit numbers (e.g. 5 + 9 + 7)
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100 (30 + 70 etc.)
- Count in steps of 2, 3 and 5 and count in tens from any number.
- Understand the place value of 2-digit numbers (tens and ones)
- Compare and order numbers to 100 using < > and = signs.
- Read and write numbers to at least 100 in numerals and words.

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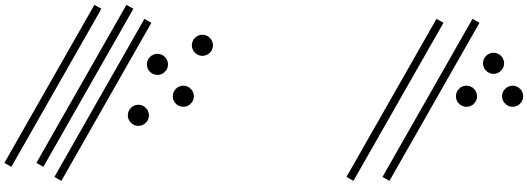
- Solve problems with addition, using concrete objects, pictorial representations, involving numbers, quantities and measures, and applying mental and written methods.

Children will continue to use the Base 10 equipment to support their calculations. They will record the calculations using their own drawings of the Base 10 equipment (as lines for the 10 rods and dots for the unit blocks)

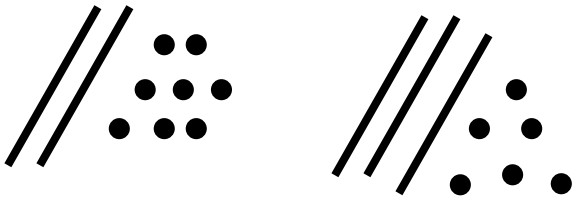
e.g. 34 + 23 =



34 + 23 = 57

They would add the tens first and then count on the units.

e.g. 28 + 36 =



28 + 36 = 64

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Y3

Add numbers with up to 3-digits

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, **hundreds boundary, increase, vertical, _carry', expanded, compact**

Key skills for addition at Y3:

- Read and write numbers to 1000 in numerals and words.
- Add 2-digit numbers mentally, incl. those exceeding 100.
- **Add a three-digit number and ones mentally (175 + 8)**
- **Add a three-digit number and tens mentally (249 + 50)**
- **Add a three-digit number and hundreds mentally (381 + 400)**
- Estimate answers to calculations, using inverse to check answers.
- Solve problems, including missing number problems, using
- number facts, place value, and more complex addition.
- Recognise place value of each digit in 3-digit numbers (hundreds, tens, ones.)
- Continue to practise a wide range of mental addition strategies, ie. number bonds, adding the nearest multiple of 10, 100, 100 and adjusting, using near doubles, partitioning and recombining.

Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use this to support with the transition into a vertical method.

Children should add the least significant digits first as preparation for the compact method.

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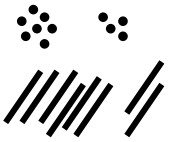
TU

67
+ 24
11 *(7 + 4)*
80 *(60 + 20)*
91



HTU

267
+ 85
12 *(7 + 5)*
140 *(60 + 80)*
200
352

The Base 10 equipment should be used alongside to model the transition to the vertical method.
NB The text in italics is modelled by the teacher but should not be written by pupil in their answer.

Y4

Add numbers with up to 4 digits

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, „carry", expanded, compact, **thousands, hundreds, digits, inverse**

Key skills for addition at Y4:

- Select most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in a four-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use inverse operations to check answers.
- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies, ie. number bonds, add the nearest multiple of 10, 100, 1000 and adjust, use near doubles, partitioning and recombining.

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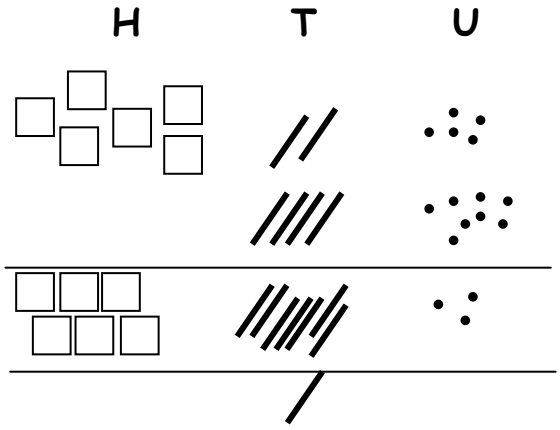
- Add numbers with up to 4 digits using the formal written method of column addition
- Solve 2-step problems in contexts, deciding which operations and methods to use and why.
- Estimate and use inverse operations to check answers to a calculation.

Based on their experiences in Y3, children will then begin to carry below the line.

The best way to model this would be using Base 10 equipment to show how units would transfer to tens.

HTU

625
\+ 48
673
1



Teacher model

783
\+ 42
825
1

367
\+ 85
452
1 1

321
\+ 7
\+ 48
376
1

£3.48
\+ £0.78
£4.26
1 1

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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.*

Y5

Add numbers with more than 4 digits

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, „carry", expanded, compact, vertical, thousands, hundreds, digits, inverse & **decimal places, decimal point, tenths, hundredths, thousandths**

Key skills for addition at Y5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies ie. add the nearest multiple of 10, 100, 100 and adjust; use near doubles, inverse, partitioning and re-combining; using number bonds.
- Use rounding to check answers and accuracy.
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.
- Add numbers with more than 4 digits using formal written method of columnar addition.

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Children should extend the carrying method to numbers with at least four digits.

$$\begin{array}{r} 587 \\ +\ 475 \\ \hline 1062 \\ {\scriptstyle 1\ 1} \end{array} \qquad \begin{array}{r} 3587 \\ +\ 675 \\ \hline 4262 \\ {\scriptstyle 1\ 1\ 1} \end{array}$$

$$\begin{array}{r} 3121 \\ +\ 37 \\ +\ 148 \\ \hline 3306 \\ {\scriptstyle 1\ 1} \end{array} \qquad \begin{array}{r} 3.20 \\ +2.88 \\ \hline 6.08 \\ {\scriptstyle 1} \end{array}$$

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.*

Y6

Add several numbers of increasing complexity

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, „carry", expanded, compact, vertical, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths

Key skills for addition at Y6:

- Perform mental calculations, including with mixed operations and large numbers, using and practising a range of mental strategies.

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- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.

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
  6432
   786
     3
+ 4681
 11944
 1 2 1
```

```
  401.20
+  26.85
+   0.71
 428.76
     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.*

+ - + - + - + - + - + - +

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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:

1) **they are not ready.**
2) **they are not confident.**

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

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PROGRESSION THROUGH CALCULATIONS FOR SUBTRACTION

MENTAL CALCULATIONS
(ongoing)
These are a selection of mental calculation strategies:

Mental recall of addition and subtraction facts

10 – 6 = 4 17 - □ = 11
20 - 17 = 3 10 - □ = 2

Find a small difference by counting up

82 – 79 = 3

Counting on or back in repeated steps of 1, 10, 100, 1000

86 - 52 = 34 (by counting back in tens and then in ones)
460 - 300 = 160 (by counting back in hundreds)

Subtract the nearest multiple of 10, 100 and 1000 and adjust

24 - 19 = 24 - 20 + 1 = 5
458 - 71 = 458 - 70 - 1 = 387

Use the relationship between addition and subtraction

36 + 19 = 55 19 + 36 = 55
55 – 19 = 36 55 – 36 = 19

PROGRESSION THROUGH CALCULATIONS FOR SUBTRACTION

- These standards are age-related expectations and therefore we expect the majority of children to achieve them.
- New learning is likely to be taught to groups rather than the whole class to acknowledge the different learning stages of the children.

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- Children should understand that subtraction is the removing or taking away one quantity from another (not necessarily the smaller number from the larger one).
- Children should understand that, unlike addition, subtraction is **not** commutative.
- Ensure that children understand the = sign means is the same as, not makes, and that children see calculations where the equals sign is in a different position, e.g. 9 – 5 = 4 and 4 = 9 – 5.

Children should be encouraged to approximate before calculating and check whether their answer is reasonable.

YR

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, e.g. small world play, role play, counters, cubes etc. They develop ways of recording calculations using pictures, etc.

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Y1

Subtract from numbers up to 20

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_?

Key skills for subtraction at Y1:

- Given a number, say **one more or one less.**
- Count to and over 100, **forward and back**, from any number.
- Represent and use **subtraction facts to 20 and within 20**.
- Subtract with **one-digit and two-digit** numbers to 20, including zero.
- Solve one-step problems that involve addition and subtraction, using concrete objects (ie bead string, objects, cubes) and pictures, and missing number problems.
- Read and write numbers from 0 to 20 in numerals and words.

Children will use practical equipment for subtraction by taking away (counting back).

13 – 5 =

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Count out 13 cubes along the number track followed by removal of 5 cubes to give answer:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

13 – 5 = 8

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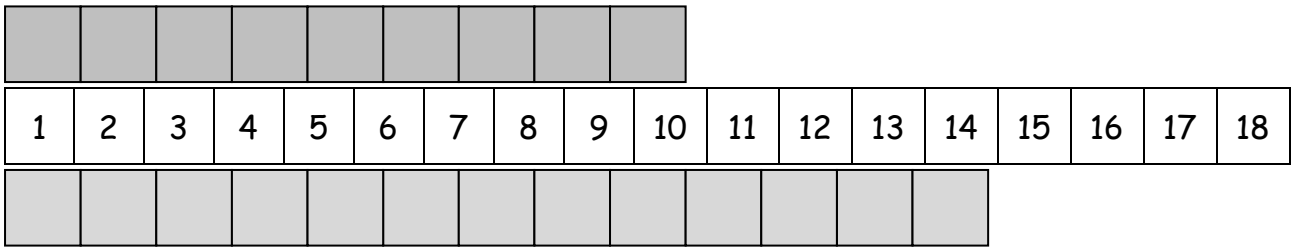
Subtraction as finding the difference

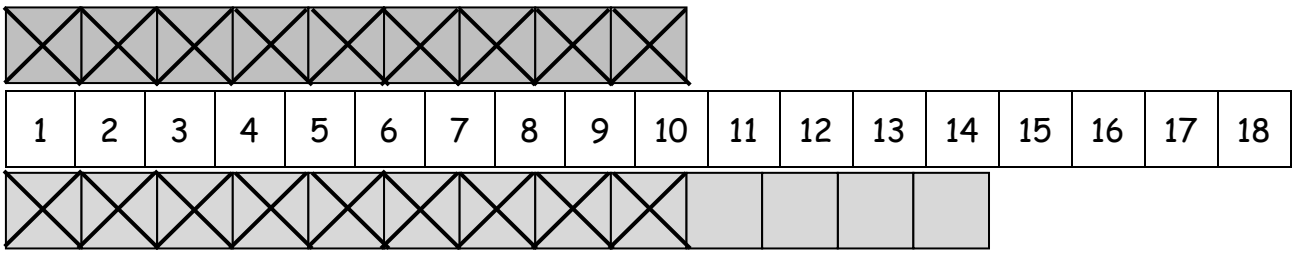
In preparation for understanding how to find the difference by counting up, children should be shown that finding the difference is linked to subtraction and the teacher should ensure the children know that it is an appropriate strategy to use when the numbers are close together.

e.g. 13 – 9



Children should use the Base 10 unit cubes and count out the correct amounts, placing one set above the number track and one below.

To find the difference, children need to identify what is the same for each amount and remove those cubes, i.e. the 9 cubes and the first 9 cubes of the 13.



Children can then count how many are left, e.g. 13 – 9 = 4 (the difference between 13 and 9 is 4).

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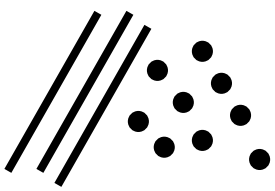
Y2

Subtract with 2-digit numbers

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_?
difference, count on, strategy, partition, tens, units
Key skills for subtraction at Y2:

- Recognise the place value of each digit in a two-digit number.
- Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100.
- Subtract using concrete objects, pictorial representations, 100 squares and mentally, including: a two-digit number and ones, a two-digit number and tens, and two two-digit numbers.
- Show that subtraction of one number from another cannot be done in any order.
- Recognise and use inverse relationship between addition and subtraction, using this to check calcula-tions and missing number problems.
- Solve simple addition and subtraction problems including measures, using concrete objects, pictorial representation, and also applying their increasing knowledge of mental and written methods.
- Read and write numbers to at least 100 in numerals and in words.

Children will move on to using the Base 10 equipment to support their calculations. They need to understand that the number being subtracted does not appear as an amount on its own, but rather as part of the larger amount.
e.g. 39 -17 =



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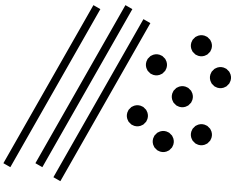
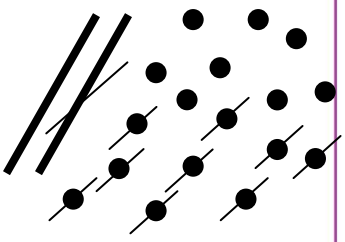
Children would count out 39 using the Base 10 equipment (3 tens and 9 units) and would remove 7 units and then one ten, counting up the answer of 2 tens and 2 units to give 22.

When exchange is required:

37 - 19 =



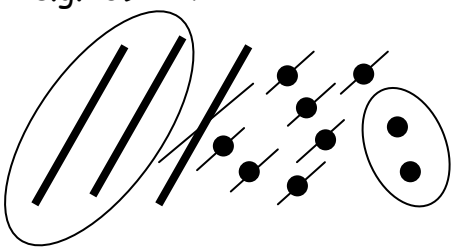
Children can see that they cannot subtract 9 units from 7 units so they need to exchange a ten for ten units. This will become:



Children would count out how many tens and units are left to give the answer (18).

At the end of Y2, children will be encouraged to record this by drawing representations of the Base 10 material and crossing out those pieces that they are subtracting. If children are representing exchange, they should be encouraged to cross out a 10 rod line in a different colour (to avoid confusion between the exchange and the subtraction) and replace with 10 unit dots.

e.g. 39 - 17 =



Circling the tens and units that remain will be modelled by the teacher but does not have to be written by pupil in their answer.

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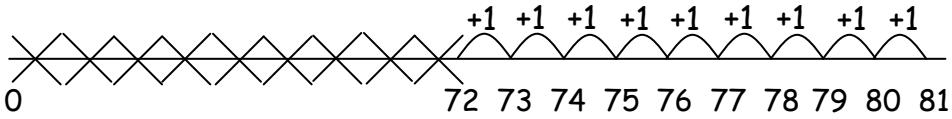
Subtraction as finding the difference

If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, children should be encouraged to recognise that it is more efficient to find the difference by counting up.

e.g. 81 - 72

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 subtraction or 'taking away'.

81 - 72



Help children to become more efficient with counting on by:

- Subtracting the units in one jump.

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Y3

Subtracting with 2 and 3-digit numbers.

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units **exchange, decrease, hundreds, value, digit**

Key skills for subtraction at Y3:

- Subtract mentally a: **3-digit number and ones, 3-digit number and tens, 3-digit number and hundreds** .
- Estimate answers and use inverse operations to check.
- Solve problems, including missing number problems.
- Find 10 or 100 more or less than a given number.
- Recognise the place value of each digit in a 3-digit number .
- Counting up differences as a mental strategy when numbers are close together or near multi-ples of 10 (see examples above)
- Read and write numbers up to 1000 in numerals and words.
- Practise mental subtraction strategies, such as subtracting near multiples of 10 and adjusting (e.g. subtracting 19 or 21), and select most appropriate methods to subtract, explaining why.

Children should begin the method of expanded decomposition with, initially, TU – TU calculations. This process should be demonstrated using arrow cards to show the partitioning and Base 10 materials to show the decomposition of the number.

When solving the calculation 89 – 57, children need to understand that the number being subtracted (57) does not appear as an amount on its own, but rather as part of the larger amount. Therefore, when using Base 10 materials, children would need to count out only the 89.

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89 = 80 → 9
- 57 50 → 7
30 → 2 = 32

The calculation should be read as subtract 7 from 9 or 9 subtract 7.

Children should use the Base 10 materials to represent the first number and remove the units and tens as appropriate (as with the more informal method in Y2).

Initially, the children will be taught using examples that do not need the children to exchange. Emphasise that the bottom number is being subtracted from the top number rather than the smaller number from the bigger.

From this the children will begin to solve problems which involve exchange:

71
- 46

Step 1 70 → 1
- 40 → 6

The calculation should be read as subtract 6 from 1 or 1 subtract 6.

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Children can see that they cannot subtract 6 units from the 1 unit so they need to exchange a ten for ten units. This will become:

Step 2

60 → 11
- 40 → 6
20 → 5 = 25

This would be recorded by the children as

60
~~7~~0 → ^{1}1
- 40 → 6
20 → 5 = 25

Children should know that units line up under units, tens under tens, and so on.

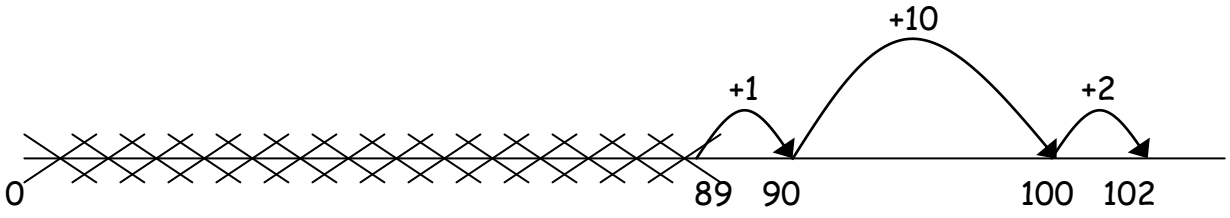
Subtraction as finding the difference

If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, children should be encouraged to recognise that it is more efficient to find the difference by counting up.

e.g. 102 – 89 = 13

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 subtraction or 'taking away'.

102 – 89 = 13



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Help children to become more efficient with counting on by:

- Subtracting the units in one jump;

Subtracting the tens in one jump and the units in one jump

Y4

Subtract with up to 4-digit numbers

Vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, **inverse**

Key skills for subtraction at Y4:

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use and why.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.
- Find 1000 more or less than a given number.
- Count backwards through zero, including negative numbers.
- Recognise place value of each digit in a 4-digit number Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve the above, with increasingly large positive numbers.

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754 =
- 86

Step 1 700 → 50 → 4
- 80 → 6

Step 2 700 → 40 → 14 *(adjust from T to U)*
- 80 → 6

Step 3 600 → 140 → 14 *(adjust from H to T)*
- 80 → 6
600 → 60 → 8 = 668

This would be recorded by the children as

600 140
~~7~~00 → ~~5~~0 → ^{1}4
- 80 → 6
600 → 60 → 8 = 668

When children are ready, this leads on to the compact method of 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.*

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For example:

£8.95 = 8 → 0.9 → 0.05
leading to
-£4.38 - 4 → 0.3 → 0.08

= 8 → 0.8 → 0.15
- 4 → 0.3 → 0.08
4 → 0.5 → 0.07

= £4.57

(adjust from T to U)

$$\begin{array}{r} {\scriptstyle 1} \\ 8.85 \\ -\ 4.38 \end{array}$$

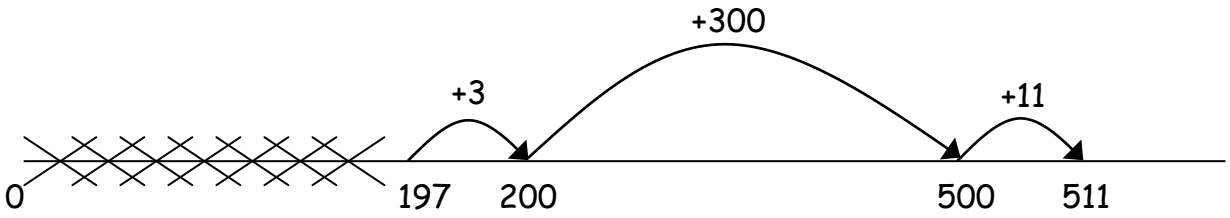
Subtraction as finding the difference

If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, children should be encouraged to recognise that it is more efficient to find the difference by counting up.

e.g. 511 – 197

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 subtraction or 'taking away'.

511 – 197 = 314



Help children to become more efficient with counting on by:

- Subtracting the units in one jump;
- Subtracting the tens in one jump and the units in one jump;

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- Subtracting the hundreds in one jump, the tens in one jump and the units in one jump.

Y5

Subtract with at least 4-digit numbers7

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse, **tenths, hundredths, decimal point, decimal**

Key skills for subtraction at Y5:

- Subtract numbers mentally with increasingly large numbers .
- Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy .
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
- Interpret negative numbers in context, counting forwards and backwards with positive and negative in-tegers through 0.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.

NB If children have not reached the stage of compact method of decomposition then they will continue at this point with the expanded method.

```
 614 1          2 13 1
 1754           3.42
-  286         -1.76
```

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1468 1.66

Children should:

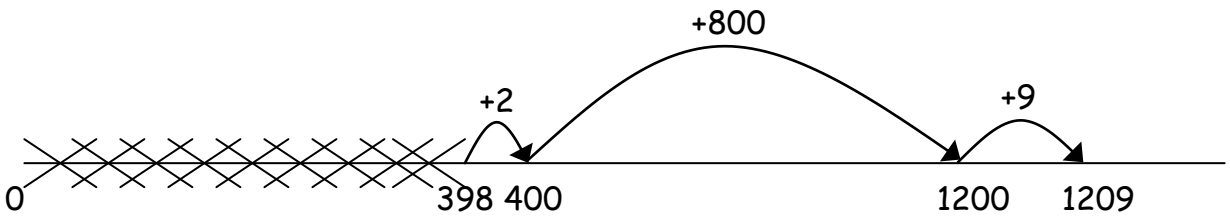
- *be able to subtract numbers with different numbers of digits;*
- *begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places;*
- *know that decimal points should line up under each other.*

If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, children should be encouraged to recognise that it is more efficient to find the difference by counting up.

e.g. 1209 – 398 =

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 subtraction or 'taking away'.

1209 – 398 = 811



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Y6

Subtracting with increasingly large and more complex numbers and decimal values.

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, dis-tance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

Key skills for subtraction at Y6:

- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit
- Round any whole number to a required degree of accuracy
- Use negative numbers in context, and calculate intervals
- across zero.
- Children need to utilise and consider a range

```
  5 13 1
  1 4 ~~3~~ 67
- 2 6 8 4
  1 3 7 8 3
```

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.*

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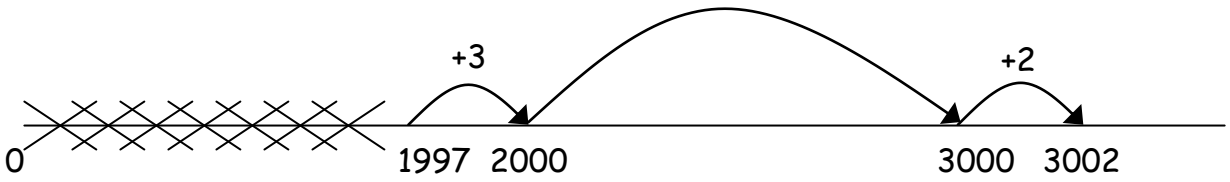
If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, children should be encouraged to recognise that it is more efficient to find the difference by counting up.

e.g. 3002 - 1997 =

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 subtraction or 'taking away'.

3002 – 1997 = 1005



+ - + - + - + - + - + - +

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:

1) **they are not ready.**
2) **they are not confident.**

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

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PROGRESSION THROUGH CALCULATIONS FOR MULTIPLICATION

MENTAL CALCULATIONS
(ongoing)
These are a selection of mental calculation strategies:
See NNS Framework Section 5, pages 52-57 and Section 6, pages 58-65

Doubling and halving
Applying the knowledge of doubles and halves to known facts.
e.g. 8 x 4 is double 4 x 4

Using multiplication facts

Tables should be taught everyday from Y2 onwards, either as part of the mental oral starter or other times as appropriate within the day.

Year 2	2 times table
	5 times table
	10 times table
Year 3	2 times table
	3 times table
	4 times table
	5 times table
	6 times table
	10 times table
Year 4	Derive and recall all multiplication facts up to 10 x 10
Years 5 & 6	Derive and recall quickly all multiplication facts up to 10 x 10.

Using and applying division facts
Children should be able to utilise their tables knowledge to derive other facts.
e.g. If I know 3 x 7 = 21, what else do I know?

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30 x 7 = 210, 300 x 7 = 2100, 3000 x 7 = 21 000, 0.3 x 7 = 2.1 etc

Use closely related facts already known

13 x 11 = (13 x 10) + (13 x 1)
= 130 + 13
= 143

Multiplying by 10 or 100

Knowing that the effect of multiplying by 10 is a shift in the digits one place to the left.
Knowing that the effect of multiplying by 100 is a shift in the digits two places to the left.

Partitioning

23 x 4 = (20 x 4) + (3 x 4)
= 80 + 12
= 102

Use of factors

8 x 12 = 8 x 4 x 3

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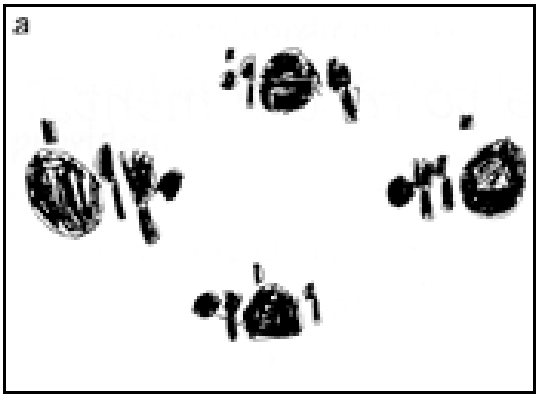
- These standards are age-related expectations and therefore we expect the majority of children to achieve them.
- New learning is likely to be taught to groups rather than the whole class to acknowledge the different learning stages of the children.
- Children need to understand that multiplication is commutative and use this information to rearrange calculations knowing that 4 x 6 = 24 gives the same answer as 6 x 4 = 24.
- Children need to understand that multiplication is repeated addition.
- Ensure that children understand the = sign means is the same as, not makes, and that children see calculations where the equals sign is in a different position, e.g. 3 x 5 = 15 and 15 = 3 x 5.
- Children should be encouraged to approximate before calculating and check whether their answer is reasonable.

YR

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities involving equal sets or groups using a wide variety of equipment, e.g. small world play, role play, counters, cubes etc. They develop ways of recording calculations using pictures, etc.



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Y1

Multiply with concrete objects, arrays and pictorial representations.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count
Key skills for multiplication at Y1:

- Count in multiples of 2, 5 and 10.
- Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Make connections between arrays, number patterns, and counting in twos, fives and tens.
- Begin to understand doubling using concrete objects and pictorial representations.

Children will use practical equipment to make groups of objects to represent multiplication. They should see everyday versions of arrays, e.g. egg boxes, baking trays, ice cube trays, wrapping paper etc and use this in their learning answering questions such as 'How many eggs would we need to fill the egg box? How do you know?'

Y2

Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times...
Key skills for multiplication at Y2:

- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- Recall and use multiplication facts from the **2, 5 and 10** multiplication tables, including recognising odds and evens.

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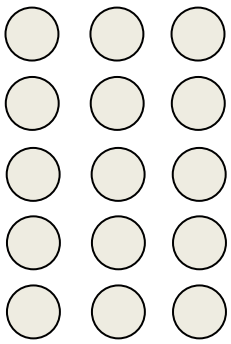
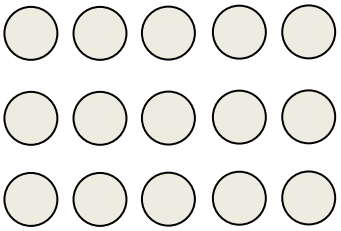
- Write and calculate number statements **using the x and = signs**.
- Show that multiplication can be done in any order (commutative).
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.
- Pupils use a variety of language to discuss and describe multiplication.

Children should utilise multiplication as repeated addition - linked to arrays **(as this knowledge will support with the development of the grid method)**. They should also use jottings to support their calculation. These should be supported by the use of counters/cubes.

e.g. 3 x 5 can be represented as an array in two forms (as it has commutativity):



3 + 3 + 3 + 3 + 3 = 15



5 + 5 + 5 = 15

Y3

Multiply 2-digits by a single digit number

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated ad-dition, column, row, commutative, sets of, equal groups, times, _times as big as, once, twice, three times..., **partition, grid method, multiple, product, tens, units, value**
Key skills for multiplication:

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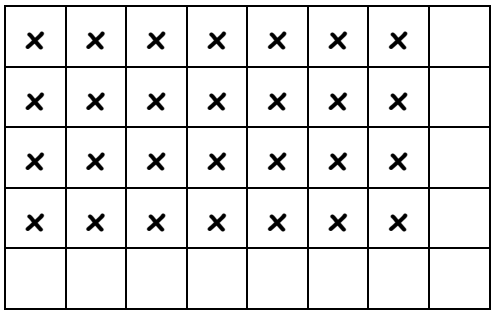
- Recall and use multiplication facts for the **2, 3, 4, 5, 8 and 10** multiplication tables, and multiply multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including **2-digit x single-digit**, drawing upon mental methods, and progressing to reliable written methods.
- Solve multiplication problems, including missing number problems.
- Develop mental strategies using commutativity (e.g. 4 x 12 x 5 = 4 x 5 x 12 = 20 x 12 = 240)
- Solve simple problems in contexts, deciding which operations and methods to use.
- Develop efficient mental methods to solve a range of problems e.g using commutativity (**4 × 12 × 5** = 4 × 5 × 12 = **20 × 12** = 240) and for missing number problems x 5 = 20, 3 x = 18, x = 32

Children should continue to utilise multiplication as repeated addition linked to arrays **(as this knowledge will support with the development of the grid method)** and use jottings to support their calculation. These should be supported by the use of crosses on squared paper, e.g.

4 x 7 =



4 x 7 = 7 + 7 + 7 + 7 = 28

(For mathematical accuracy the above example is actually 7 x 4 -> Seven, four times, however, because we use terms such as 'groups of' or 'lots of', children are

more familiar with the initial notation. Once children understand the commutative order of multiplication the order is irrelevant).

Y4

Multiply 2 and 3-digits by a single digit,

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... partition, grid method, total, multiple, product, sets of, **inverse**

Key skills for multiplication at Y4:

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall multiplication facts for **all multiplication tables up to 12 x 12.**
- Recognise place value of digits in up to 4-digit numbers
- Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.
- Use commutativity and other strategies mentally 3 x 6 = 6 x 3 , 2 x 6 x 5 = 10 x 6 , 39x7 = 30 x 7 + 9 x 7.
- Solve problems with increasingly complex multiplication in a range of contexts.
- Count in multiples of 6, 7, 9, 25 and 1000
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)

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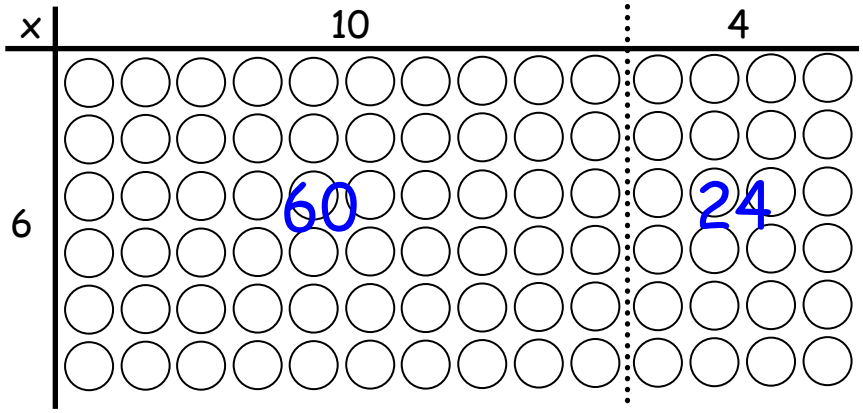
Children will continue to use arrays where appropriate leading into the grid method of multiplication.



(6 x 10) + (6 x 4)

60 + 24

84

TU x U (Short multiplication – multiplication by a single digit)

23 x 8

x	20	3
8	160	24

160
+ 24
184

Y5

Multiply up to 4-digits by 1 or 2 digits.

Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., partition, grid method, total, multiple, product, inverse, **square, factor, integer, decimal, short/long multiplication, 'carry'**

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Key skills for multiplication at Y5:

- Identify multiples and factors, using knowledge of **multiplication tables to 12x12.**
- Solve problems where larger numbers are decomposed into their factors
- Multiply and divide integers and decimals by 10, 100 and 1000
- Recognise and use square and cube numbers and their notation
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

HTU x U (Short multiplication – multiplication by a single digit)
346 x 9

x	300	40	6
9	2700	360	54

2700
+ 360
+ 54
3114
1 1

4.9 x 3

x	4	0.9
3	12	2.7

12
+ 2.7
14.7

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Y6

Short and long multiplication as in Y5, and multiply decimals with up to 2d.p by a single digit.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times… partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short / long multiplication, "carry", **tenths, hundredths, decimal**

Key skills for multiplication at Y6:

- Recall multiplication facts for all times tables up to **12 x 12 (as Y4 and Y5)**.
- Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.
- Perform mental calculations with mixed operations and large numbers.
- Solve multi-step problems in a range of contexts, choosing appropriate combinations of opera-tions and methods.
- Estimate answers using round and approximation and determine levels of accuracy.
- Round any integer to a required degree of accuracy.

ThHTU x U

(Short multiplication – multiplication by a single digit)

4346 x 8

x	4000	300	40	6
8	32000	2400	320	48

32000
+ 2400
+ 320
+ 48

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34768

4.92 x 3

x	4	0.9	0.02
3	12	2.7	0.06

12
+ 0.7
+ 0.06
12.76

TU x TU (Long multiplication – multiplication by more than a single digit)

TU x TU (Long multiplication – multiplication by more than a single digit)

72 x 38

x	70	2
30	2100	60
8	560	16

2100
+ 560
+ 60
+ 16
2736
1

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Short multiplication

24 × 6 becomes

$$\begin{array}{r} 2\ 4 \\ \times\quad 6 \\ \hline 1\ 4\ 4 \\ \hline \quad 2 \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} 3\ 4\ 2 \\ \times\quad\quad 7 \\ \hline 2\ 3\ 9\ 4 \\ \hline \quad 2\ 1 \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{r} 2\ 7\ 4\ 1 \\ \times\quad\quad\quad 6 \\ \hline 1\ 6\ 4\ 4\ 6 \\ \hline \quad 4\ 2 \end{array}$$

Answer: 16 446

Long multiplication

24 × 16 becomes

$$\begin{array}{r} {\scriptstyle 2}\ \ \ \\ 2\ 4 \\ \times\ 1\ 6 \\ \hline 2\ 4\ 0 \\ 1\ 4\ 4 \\ \hline 3\ 8\ 4 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\ 2}\ \ \\ 1\ 2\ 4 \\ \times\quad 2\ 6 \\ \hline 2\ 4\ 8\ 0 \\ 7\ 4\ 4 \\ \hline 3\ 2\ 2\ 4 \\ \hline {\scriptstyle 1\ 1}\ \ \ \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\ 2}\ \ \\ 1\ 2\ 4 \\ \times\quad 2\ 6 \\ \hline 7\ 4\ 4 \\ 2\ 4\ 8\ 0 \\ \hline 3\ 2\ 2\ 4 \\ \hline {\scriptstyle 1\ 1}\ \ \ \end{array}$$

Answer: 3224

When mathematically ready, children can progress onto HTU x TU.

+ - + - + - + - + - + - +

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:

1) **they are not ready.**
2) **they are not confident.**

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

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PROGRESSION THROUGH CALCULATIONS FOR DIVISION

MENTAL CALCULATIONS
These are a selection of mental calculation strategies:
See NNS Framework Section 5, pages 52-57 and Section 6, pages 58-65

Doubling and halving
Knowing that halving is dividing by 2

Deriving and recalling division facts

Tables should be taught everyday from Y2 onwards, either as part of the mental oral starter or other times as appropriate within the day.

Year 2	2 times table
	5 times table
	10 times table
Year 3	2 times table
	3 times table
	4 times table
	5 times table
	6 times table
	10 times table
Year 4	Derive and recall division facts for all tables up to 10 x 10
Year 5 & 6	Derive and recall quickly division facts for all tables up to 10 x 10

Using and applying division facts
Children should be able to utilise their tables knowledge to derive other facts.
e.g. If I know 3 x 7 = 21, what else do I know?
30 x 7 = 210, 300 x 7 = 2100, 3000 x 7 = 21 000, 0.3 x 7 = 2.1 etc

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Dividing by 10 or 100

Knowing that the effect of dividing by 10 is a shift in the digits one place to the right.

Knowing that the effect of dividing by 100 is a shift in the digits two places to the right.

Use of factors

378 ÷ 21 378 ÷ 3 = 126 378 ÷ 21 = 18

126 ÷ 7 = 18

Use related facts

Given that 1.4 x 1.1 = 1.54

What is 1.54 ÷ 1.4, or 1.54 ÷ 1.1?

- These standards are age-related expectations and therefore we expect the majority of children to achieve them.
- New learning is likely to be taught to groups rather than the whole class to acknowledge the different learning stages of the children.
- Children need to understand that division is repeated subtraction.
- Children should understand that, unlike multiplication, division is **not** commutative.
- Ensure that children understand the = sign means is the same as, not makes, and that children see calculations where the equals sign is in a different position, e.g. 12 ÷ 3 = 4 and 4 = 12 ÷ 3.
- Children should be encouraged to approximate before calculating and check whether their answer is reasonable.

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YR

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities involving equal groups and sharing items using a wide variety of equipment, e.g. small world play, role play, counters, cubes etc. They develop ways of recording calculations using pictures, etc.

Y1

Group and share small quantities

Key Vocabulary: share, share equally, one each, two each…, group, groups of, lots of, array
Key number skills needed for division at Y1:

- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations arrays with the support of the teacher
- Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

In problem solving contexts, children will use practical equipment to share out objects equally and to group objects to represent division.

6 football stickers are shared between 2 people, how many do they each get? Children may solve this by using a 'one for you, one for me' strategy until all of the cards have been given out.

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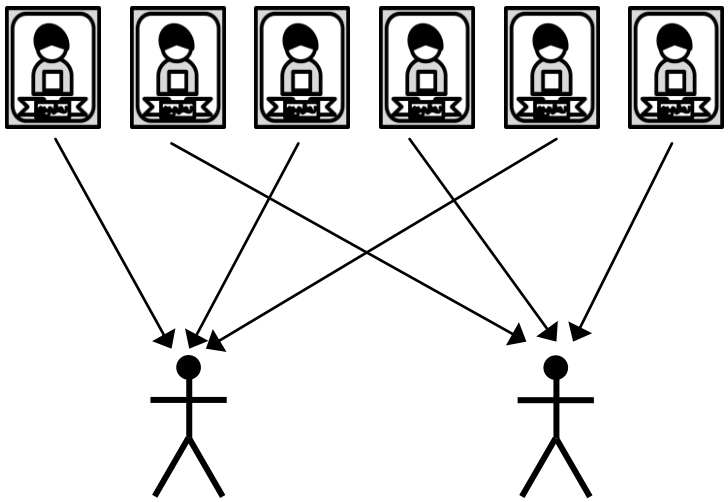
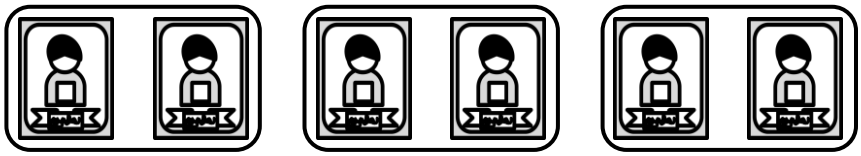


Children should find the answer by counting how many cards **1 person** has got.

There are 6 football stickers, how many people can have 2 stickers each?



Children should find the answer by counting how many **groups of 2** there are.

The teacher can model the link between sharing and grouping in the following way by relating back to the first football sticker question:

Placing the football stickers in a bag or box, the teacher can ask the children how many stickers would need to be taken out of the box to give each person one sticker each (i.e. 2) and exemplify this by putting the cards in groups of 2 until all cards have been removed from the bag.

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Y2

Group and share, using the ÷ and = sign

Key Vocabulary: share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over
Key number skills needed for division at Y2:

- Count in steps of 2, 3, and 5 from 0
- Recall and use multiplication and division facts for the **2, 5 and 10** multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the x, ÷ and = signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Children will utilise practical equipment to represent division calculations as grouping (repeated subtraction) and use jottings to support their calculation, e.g.

12 ÷ 3 =

Children need to understand that this calculation reads as 'How many groups of 3 are there in 12?'

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Children should also move onto calculations involving remainders.

13 ÷ 4 =

13 ÷ 4 = 3 remainder 1

Y3

Divide 2-digit numbers by a single digit (where there is no remainder in the final answer)

Key Vocabulary: share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, **inverse, short division, _carry', remainder, multiple**

Key number skills needed for division at Y3:

- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s).
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to for-mal written methods.
- Solve problems, in contexts, and including missing number problems, involving multiplication and division.
- Pupils develop efficient mental methods, for example, using multiplication and division facts (e.g. using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (30 × 2 = 60, so 60 ÷ 3 = 20 and 20 = 60 ÷ 3).
- Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit numbers and progressing to the formal written method of short division.

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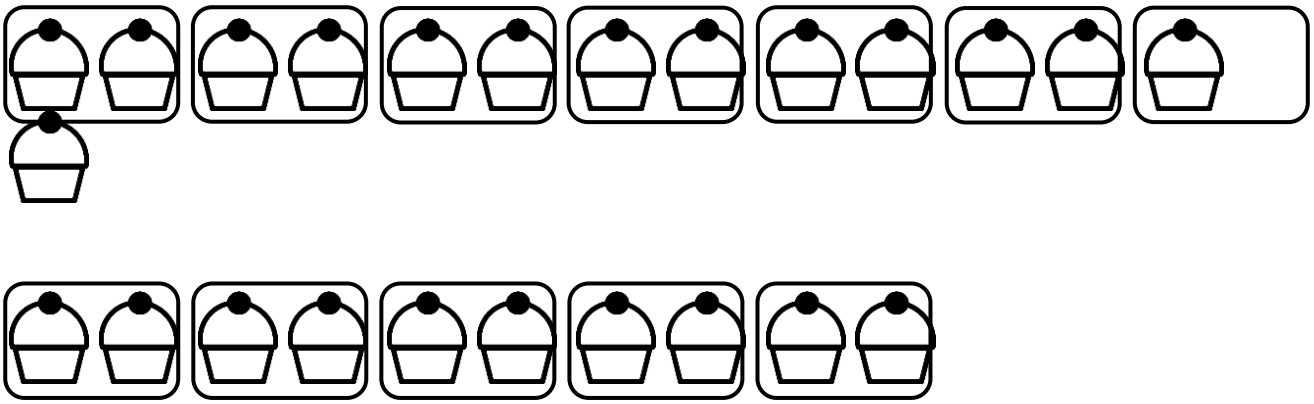
Children will continue to use grouping (repeated subtraction) to represent their calculations, answering questions such as:

24 ÷ 2 =

or

There are 24 cupcakes, how many people can have 2 cupcakes each?



Children need to be able to decide what to do with remainders after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division. For example 62 ÷ 8 is 7 remainder 6, but whether the answer should be rounded up to 8 or rounded down to 7 depends on the context.

e.g. I have 62p. Sweets are 8p each. How many can I buy?
Answer: 7 (the remaining 6p is not enough to buy another sweet)

Apples are packed into boxes of 8. There are 62 apples. How many boxes are needed?
Answer: 8 (the remaining 6 apples still need to be placed into a box)

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Y4

Divide up to 3-digit numbers by a single digit (without remainders initially)

Key Vocabulary: share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, „carry", remainder, multiple, **divisible by, factor**

Key number skills needed for division at Y4:

- **Recall multiplication and division facts for all numbers up to 12 x 12.**
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example 200 × 3 = 600 so 600 ÷ 3 = 200
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

Children will develop their use of grouping (repeated subtraction) to be able to subtract multiples of the divisors, developing the use of the 'chunking' method.

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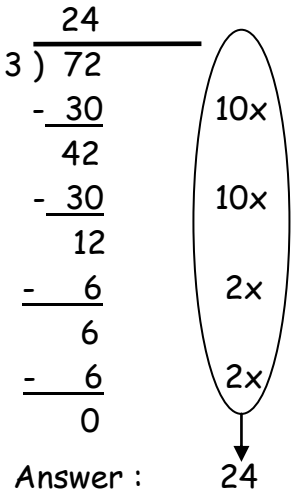
Short division (TU ÷ U)

72 ÷ 3



1x	3
2x	6
5x	15
10x	30

Children should write key facts in a menu box. This will help them in identifying the largest group they can subtract in one chunk.

Children should write their answer above the calculation to make it easy for them and the teacher to distinguish.

Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.

Y5

Divide up to 4 digits by a single digit, including those with remainders.

Key Vocabulary: share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, „carry", remainder, multiple, divisible by, factor, inverse, **quotient, prime number, prime factors, composite number (non-prime)**
Key number skills needed for division at Y5:

- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.

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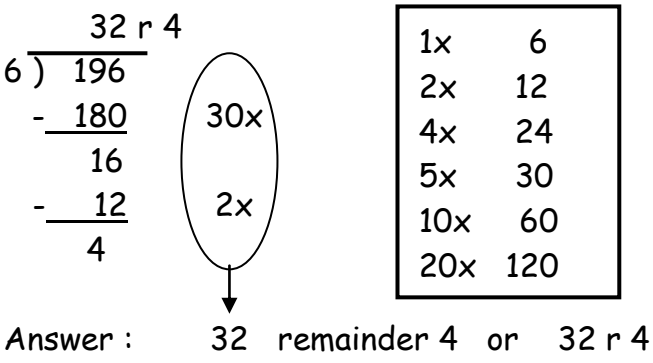
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and inter-pre remainders appropriately for the context
- Use multiplication and division as inverses.
- Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. 98 ÷ 4 = 24 r 2 = 241/2 = 24.5 ≈ 25).
- Solve problems involving combinations of all four operations, including understanding

Children can start to subtract larger multiples of the divisor (e.g. 20x).

Short division (HTU ÷ U)

196 ÷ 6



The key facts in the menu box should be extended to include 4x and 20x.

Answer : 32 remainder 4 or 32 r 4

Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.

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Short division

98 ÷ 7 becomes

$$\begin{array}{r} 1\ 4 \\ 7\overline{)\,9^{2}\ 8} \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 8\ 6\ \text{r}\,2 \\ 5\overline{)\,4\ 3^{3}\ 2} \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 4\ 5\ \text{r}\,1 \\ 1\ 1\overline{)\,4\ 9^{5}\ 6} \end{array}$$

Answer: $45\frac{1}{11}$

Long division

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8\ \text{r}\,12 \\ 1\ 5\overline{)\,4\ 3\ 2} \\ 3\ 0\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8 \\ 1\ 5\overline{)\,4\ 3\ 2} \\ 3\ 0\ 0 \quad 15\times20 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \quad 15\times8 \\ \hline 1\ 2 \end{array}$$

$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8\cdot 8 \\ 1\ 5\overline{)\,4\ 3\ 2\cdot 0} \\ 3\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2\ 0 \\ 1\ 2\ 0 \\ \hline 0 \end{array}$$

Answer: 28·8

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. For example 240 ÷ 52 is 4 remainder 32, but whether the answer should be rounded up to 5 or rounded down to 4 depends on the context.

Y6

Divide at least 4 digits by both single-digit and 2-digit numbers (including decimal numbers and quantities)

Key Vocabulary: As previously, & common factor

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Key number skills needed for division at Y6:

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Use short division where appropriate.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Solve problems involving all 4 operations.
- Use estimation to check answers to calculations and determine accuracy, in the context of a problem.
- Use written division methods in cases where the answer has up to two decimal places.
- Solve problems which require answers to be rounded to specified degrees of accuracy.

Children may still use the menu box if required, but would also be expected to use larger multiples of the divisor (e.g. 20x, 30x, 40x).

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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 its lowest terms.

This method should be extended to be used with decimals with up to two decimal places. Children should know that decimal points line up under each other.

e.g. 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

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Short division

98 ÷ 7 becomes

$$\begin{array}{r} 1\ 4 \\ 7\overline{)\,9^{2}\ 8} \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 8\ 6\ r2 \\ 5\overline{)\,4\ 3^{3}\ 2} \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 4\ 5\ r1 \\ 1\ 1\overline{)\,4\ 9^{5}\ 6} \end{array}$$

Answer: $45\frac{1}{11}$

Long division

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8\ r12 \\ 1\ 5\overline{)\,4\ 3\ 2} \\ 3\ 0\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8 \\ 1\ 5\overline{)\,4\ 3\ 2} \\ 3\ 0\ 0 \quad 15\times20 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \quad 15\times8 \\ \hline 1\ 2 \end{array}$$

$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

$$\begin{array}{r} 2\ 8\cdot8 \\ 1\ 5\overline{)\,4\ 3\ 2\cdot0} \\ 3\ 0\ \downarrow \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0\ \downarrow \\ \hline 1\ 2\ 0 \\ 1\ 2\ 0 \\ \hline 0 \end{array}$$

Answer: 28·8

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:

1) **they are not ready.**
2) **they are not confident.**

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Policy written by: Ean Quirk (Numeracy Subject Leader)
Policy was correct as at: February 2014