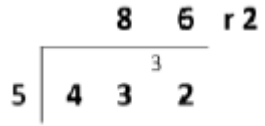
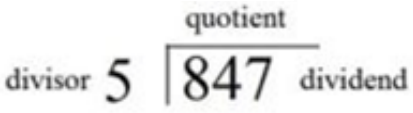
Year 5

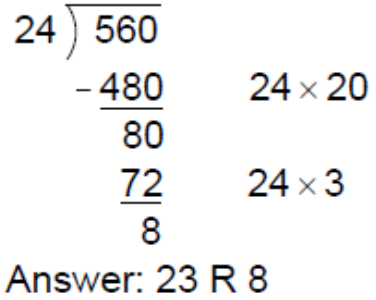
- Short division:

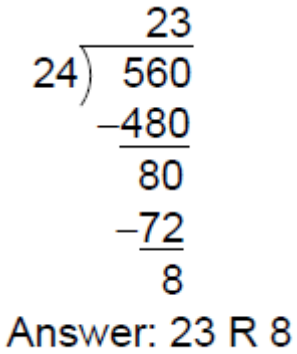




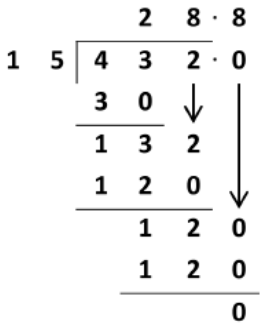
Year 6

- Extend short division to expressing the quotient as a fraction or decimal
- Long division, using the chunking method where necessary:





- Moving to conventional recording:



Meadowside School

Making a Difference for our Future

Calculation Policy

Our aims

Children will leave Meadowside with:

- a secure knowledge of number facts and a good understanding of the four operations;
- the ability to use this knowledge and understanding to carry out calculations mentally;
- the ability to use diagrams and informal notes to help record steps and support mental methods;
- an efficient and reliable written method of calculation for each operation that they can apply with confidence when undertaking calculations that they cannot carry out mentally.

Reviewed: May 2017

At Meadowside, we believe that children should be introduced to the process of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas they explore ways of recording to support their thinking and calculation methods, select and use particular methods that are most suited to particular cases, and learn to interpret and use the signs and symbols involved. Children learn how to use models and images, such as empty number lines, to support their mental and informal written methods of calculation. As children's mental methods are strengthened and refined, so too are their informal written methods. These methods become more succinct and lead to efficient written methods that can be used more generally. By the end of Year 6 children are equipped with mental and written methods that they understand and can use correctly. When faced with a calculation, children are able to decide which method is most appropriate and have strategies to check its accuracy.

It is vital that all methods and approaches are underpinned by a secure and appropriate knowledge of number facts, along with those mental skills that are needed to carry out the process and judge its success.

This policy contains the key pencil and paper models, methods and procedures that are taught throughout the school. The year group indicated refers to where the method is formally introduced. It may be introduced earlier in some cases and will certainly be referred to and developed in subsequent years.

Many of the more formal methods of calculation are illustrated on our website.

Glossary

Array: Systematic arrangement of objects, usually in rows and columns to show groups of something. 3 groups of 4 would be 3 rows and 4 columns, 3x4

'**Bridging through 10**': Add/ subtract a number to the nearest 10, then add/ subtract the remainder. So 17+5 would be 17+3, (to make 20) then add the 2. 55-9 would be 55-5, (to make 50) then subtract the 4. Relies on knowing number bonds.

Factor: Factors are numbers you can multiply together to get another number. Eg: 2 and 3 are factors of 6 because 2 x 3 = 6

Partition: To split a number into smaller groups, usually Hundreds, Tens and Units. 8 could be 5 and 3, 57 would be 50 and 7, 489 would be 400, 80 and 9.

Product: The result of multiplying one number by another. Eg: The product of 2 and 3 is 6.

Quotient: The result of a division. Eg: $46 \div 3 = 15\frac{1}{3}$ so $15\frac{1}{3}$ is the quotient .

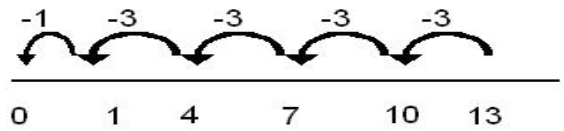
Division

Key vocabulary: lots of, groups of, share, group, halve, divide, division, divided by, remainder, factor, quotient, divisible.

Year 3

- Number lines: 16 ÷ 3 = 5 r1
  Sharing - 16 shared between 3, how many left over?
  Grouping – How many 3's make 16, how many left over?
  e.g.

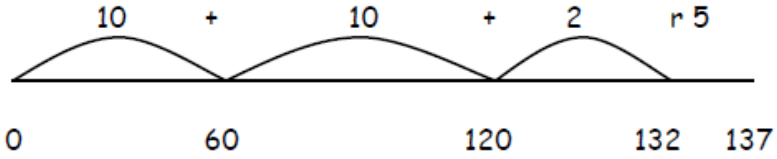
- Counting back:
  13÷3=4r1



Year 4

- Divide on a number line by chunking:

137 / 6 = 22 r 5



- Short division using repeated subtraction or chunking:

$$
\begin{array}{rl}
6\overline{)196} & \\
-\ 60 & 6\times10 \\
\hline
136 & \\
-\ 60 & 6\times10 \\
\hline
76 & \\
-\ 60 & 6\times10 \\
\hline
16 & \\
-\ 12 & 6\times\ 2 \\
\hline
4 & 32 \\
\text{Answer:} & 32\,\text{R}\,4
\end{array}
$$

Year 5

- Compact short multiplication up to ThHTU x U:

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

- Expanded long multiplication:

THTU	
56	
X 27	
42	
350	
120	
1000	
1512	
1	

- Moving to compact long multiplication:

THTU	
56	
X 27	
392	
1120	
1512	
1	

Year 6

- Extend compact written methods to up to ThHTU x TU:

124 x 26
= 3224

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

- Multiply decimal with one decimal place by whole numbers:

4.7 x 8 = 37.6
(estimate 5 x 8 = 40)

$$\begin{array}{r} 4.7 \\ \times \quad 8 \\ \hline 37.6 \\ \hline 5 \end{array}$$

Addition

Key vocabulary: add, addition, plus, and, count on, more, sum, total, altogether, increase.

Foundation Stage

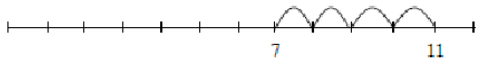
- Make a record in pictures, words or symbols of addition activities carried out.
- Count on in their heads.
- Progress to using a number line. Jump forward along the number line using fingers:

- Construct number sentences to go with practical activities.
- Solve simple word problems using a variety of methods.

Year 1

- Progress from numbered lines to blank number lines. Start at the biggest number and count on:

7 + 4 = 11



- Use a number square to add by counting on in ones and then tens.

Year 2

- Partition to add units, then tens.

24 + 27
20 7

24 + 7 = 31
31 + 20 = 51

- The empty number line.

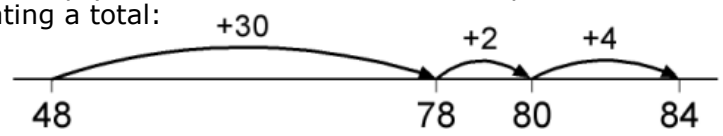
The steps in addition often bridge through a multiple of 10.

e.g.

Children should be able to partition the 7 to relate adding the 2 and then the 5:

8 + 7 = 15

- Use the empty number line to record the steps involved in calculating a total:



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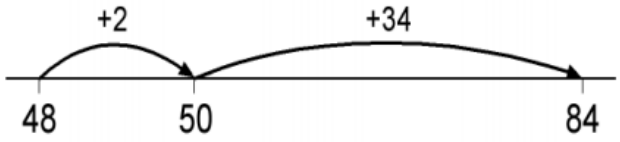


Year 3

- Recording mental methods using partitioning. Add the tens and then the units to form partial sums and then add the partial sums:

47 + 76

40 + 70 = 110

7 + 6 =13

110 + 13 = 123

47 = 40+ 7
+76 70+ 6
110+13 =123

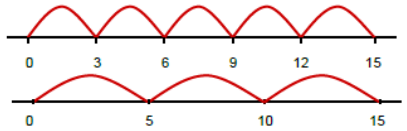
Multiplication

Key vocabulary: lots of, groups of, times, multiply, multiplication, multiple, product, array, double, repeated addition.

Year 2

- Use arrays

- Use repeated addition:



Year 3

- The grid method of multiplication:

23 x 7 is approximately 20 x 10 = 200

x	20	3	
7	140	21	= 161

36 x 4 = 144

- Column recording:

36
x 4
(6 x 4) 24
(30 x 4) 120
144

Year 3 &4

- Compact written method up to HTU x U:

342 x 7 = 2394

3 4 2
× 7
2 3 9 4
2 1

Year 4

- Compact column method with up to 4 digits:

$$\begin{array}{r} {}^{6}\not{1}\,{}^{1}\not{3}\,{}^{1}\not{7}4 \\ -\ 9\,6\,8 \\ \hline 4\,0\,6 \end{array}$$

Year 5

- Compact column method for numbers with more than 5 digits and decimals:

72.5 - 45.7 = 26.8

$$\begin{array}{r} {}^{6}\not{7}\,{}^{11}\not{2}.{}^{1}5 \\ -\ 4\ 5.7 \\ \hline 2\ 6.8 \end{array}$$

Year 6

- Extend calculations using 0 as a place holder.
- Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places.

- Expanded written method in columns:

367 + 185 = 431

either	**or**
367	300 + 60 + 7
+185	100 + 80 + 5
12	400 +140+12 = 552
140	
400	
552	

- Compact written method:

$$\begin{array}{r} 367 \\ +185 \\ \hline 552 \end{array}$$

Year 4

- Extend compact method to numbers with at least four digits and decimals.

Year 5

- Compact written method with more than 5 digits and decimals.

Year 6

- Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places.

Compact vertical

$$\begin{array}{r} 3.243 \\ +\ 18.070 \\ \hline 21.313 \\ \hline 1\ \ 1 \end{array}$$

Subtraction

Key vocabulary: subtract, take away, minus, count back, less, fewer, difference between.

Foundation Stage

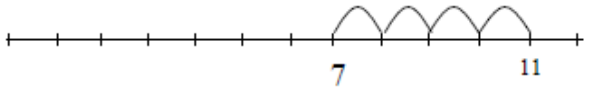
- Make a record in pictures, words or symbols of subtraction activities carried out.
- Relate subtraction to taking away and counting how many objects are left.

- Progress to counting backwards along a number line using finger:

- Construct number sentences to go with practical activities.

Year 1

- Progress from numbered lines to blank number lines. The difference between 7 and 11 (counting on). Record on prepared lines and on lines constructed themselves:



- Use a number square to subtract by counting back in ones and then tens.

Year 2

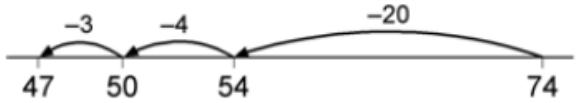
- Partition to subtract units, then tens.

74 - 4 = 70
70 – 50 = 20

- The empty number line.

Counting back. The steps in subtraction often bridge through a multiple of 10:

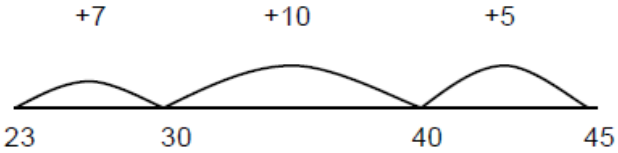
e.g. 15-7=8



Year 3

- Subtract two digit numbers by counting on:

45-23=



10+7+5=22

- Expanded written method for subtraction. This allows children to see what happens to the numbers in the standard written method:

74-27=47

$$\begin{array}{r} 70 + 4 \\ -\ 20 + 7 \\ \hline \end{array} \qquad \begin{array}{r} {}^{60}\cancel{70} + {}^{14}\cancel{4} \\ -\ 20 + 7 \\ \hline 40 + 7 \end{array}$$

- 3 digit column subtraction:

932 - 457 = 475

$$\begin{array}{r} {}^{8}\cancel{9}\,{}^{12}\cancel{3}\,{}^{1}2 \\ -\ 4\ 5\ 7 \\ \hline 4\ 7\ 5 \end{array}$$