

- Short division using repeated subtraction or chunking:

$$\begin{array}{r}
 6 \overline{)196} \\
 \underline{-60} \quad 6 \times 10 \\
 136 \\
 \underline{-60} \quad 6 \times 10 \\
 76 \\
 \underline{-60} \quad 6 \times 10 \\
 16 \\
 \underline{-12} \quad 6 \times 2 \\
 4 \quad 32 \\
 \text{Answer: } \quad 32R4
 \end{array}$$



Calculation Policy

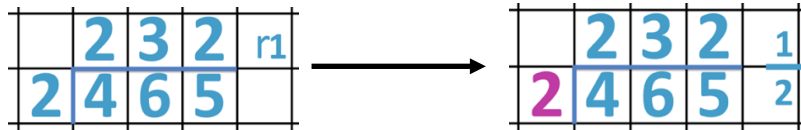
Year 5

- Short division:

$$\begin{array}{r}
 8 6 \text{ r}2 \\
 5 \overline{)432} \\
 \underline{20} \\
 23 \\
 \underline{15} \\
 8 \\
 \underline{10} \\
 2
 \end{array}$$

Year 6

- Extend short division to expressing the quotient as a fraction or decimal:



- Use derived facts for 2 digit divisors to carry out formal written methods of division:

1	27	20	7
2	54	40	14
4	108	80	28
5	135	100	35
6	162		
8	216	160	56
9	243		
10	270	200	70

$$\begin{array}{r}
 0.259 \\
 27 \overline{)6.6915943}
 \end{array}$$

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: January 2023

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 $2 \times 3 = 6$

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.

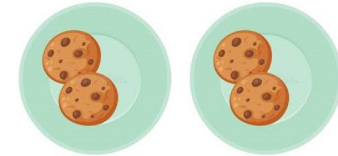
Division

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

$$\begin{array}{r} \text{quotient} \\ \text{divisor } 5 \overline{) 847} \text{ dividend} \end{array}$$

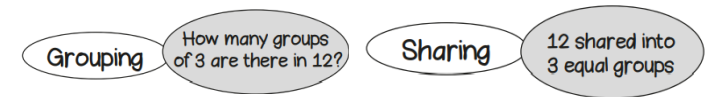
Foundation Stage

- Understanding half.
- Sharing into equal groups:



Years 1 and 2

- Grouping and sharing:



Year 3

- Use known facts and place value to divide mentally by 2, 3, 4, 5 and 8:

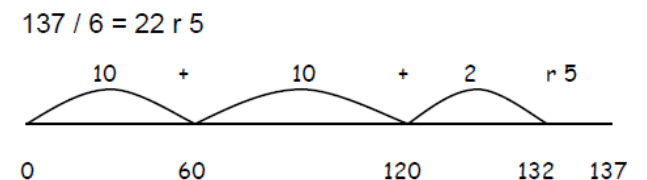
$$\begin{aligned} 24 \div 4 &= 6 \\ 240 \div 40 &= 6 \\ 240 \div 4 &= 60 \end{aligned}$$

- Use partitioning to divide by a single digit where the quotient is a teens number:

$$\begin{array}{r} 52 \div 4 \\ \swarrow \quad \searrow \\ 40 \quad 12 \\ \div 4 \quad \div 4 \\ 10 + 3 = 13 \end{array}$$

Year 4

- Divide on a number line by chunking:



Year 4

- Distributive law:

$$\begin{aligned}
 &7 \times 36 \\
 &= 7 \times 30 + 7 \times 6 \\
 &= 210 + 42 \\
 &= 252
 \end{aligned}$$

- Formal written method up to HTU x U:

$$\begin{array}{r}
 36 \\
 \times 7 \\
 \hline
 252 \\
 \hline
 \end{array}$$

Year 5

- Use factors and the distributive law:

$$\begin{aligned}
 &15 \times 48 \\
 &= 15 \times 6 \times 8 \\
 &= 90 \times 8 \\
 &= 720
 \end{aligned}$$

- Formal method of short multiplication up to 4 digits by 1 digit:

$$\begin{array}{r}
 2741 \\
 \times 6 \\
 \hline
 16446 \\
 \hline
 \end{array}$$

- Formal methods of long multiplication:

	400	20	7	
30	12,000	600	210	
8	3,200	160	56	

$$\begin{array}{r}
 427 \\
 \times 38 \\
 \hline
 3416 \\
 12810 \\
 \hline
 16226
 \end{array}$$

- Formal method for multiplying a 1 digit number by a decimal:

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

Year 6

- Extend formal methods up to 4 digit by 2 digits:

$$\begin{array}{r}
 2427 \\
 \times 38 \\
 \hline
 19416 \\
 72810 \\
 \hline
 92226 \\
 \hline
 \end{array}$$

- Formal method for multiplying a 2 digit number by a decimal:

Addition

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

$$8 + 3 = 11$$

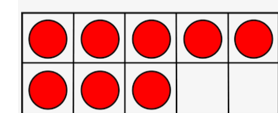
Addend Addend Sum or Total

Foundation Stage

- Make a record in pictures, words or symbols of addition activities carried out.

- Count on in their heads.

- Use five and tens frames to numbers. Begin to use for addition.



show

- Construct number sentences to go with practical activities.

- Solve simple word problems using a variety of methods.



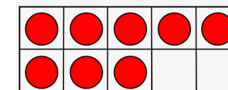
$$5 + 1 = 6$$

Year 1

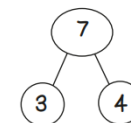
- Progress from numbered lines to blank number lines. Start at the biggest number and count on:

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

- Use the tens frame:



- Use the part-whole model:



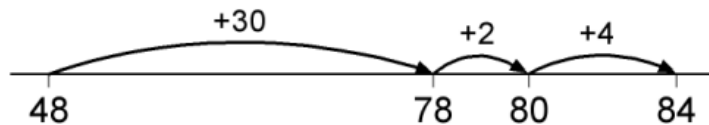
Year 2

- Partition to add tens, then ones: $25 + 43$
 $20 + 5 + 40 + 3$
 $60 + 8 = 68$
- 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:

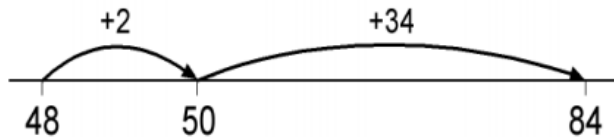
$$8 + 7 = 15$$



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



OR



Year 3

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

$$47 + 76$$

$$40 + 70 = 110$$

$$7 + 6 = 13$$

$$110 + 13 = 123$$

$$47 = 40 + 7$$

$$\begin{array}{r} +76 \\ 70+6 \end{array}$$

$$110 + 13 = 123$$

Multiplication

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

$$\text{Multiplier} \times \text{Multiplicand} = \text{Product}$$

OR

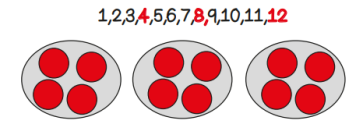
$$\text{Factor} \times \text{Factor} = \text{Product}$$

Year 1

- Begin to use arrays:

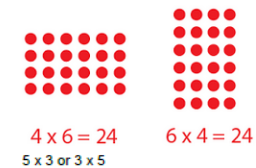


- Create equal groups and count in ones:

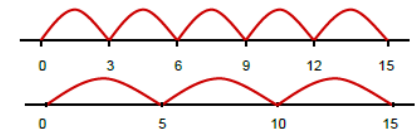


Year 2

- Use arrays:



- Use repeated addition:



Year 3

- Multiply 2 digit numbers by 10 and 1 digit numbers by a multiple of 10.
- Use the distributive law:

$$\begin{array}{c} 17 \times 4 \\ \text{Partition and recombine} \end{array}$$

$$10 \times 4 + 7 \times 4$$

$$40 + 28 = 68$$

- Formal written method:

$$\begin{array}{r} 17 \\ \times 4 \\ \hline 68 \\ \hline 2 \end{array}$$

Year 4

- Formal written method with up to 4 digits:
$$\begin{array}{r} ^4 ^1 ^4 ^1 \\ 5,352 \\ - 2,436 \\ \hline 2,916 \end{array}$$

Year 5

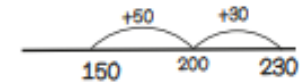
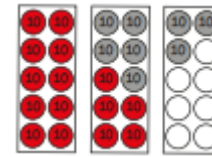
- Formal method for numbers with more than 5 digits and decimals:

$$\begin{array}{r} 72.5 - 45.7 = 26.8 \\ ^6 ^7 ^{11} ^2 ^{15} \\ - ^4 ^5 ^7 \\ \hline ^2 ^6 ^8 \end{array}$$

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.

- Add tens to 3 digit numbers using bridging:



- Compact written method:

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

Year 4

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

Year 5

- Formal 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

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

Subtraction


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

$$8 - 3 = 5$$

Minuend Subtrahend Difference

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.



$$5 - 1 = 4$$



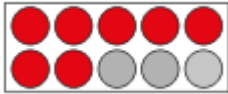
$$5 - 1$$



$$= 4$$

- Use five and tens frames to represent subtraction:

$$10 - 3 = 7$$



- Construct number sentences to go with practical activities.

Year 1

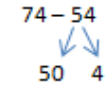
- Use a number square to subtract by counting back in ones and then tens:

100 Square									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Use tens frames.

Year 2

- Partition to subtract tens, then ones.

$$74 - 54$$


$$74 - 4 = 70$$

$$70 - 50 = 20$$

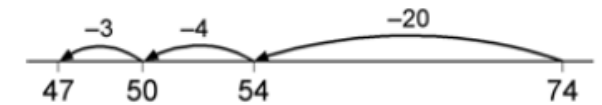
- The empty number line.

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

e.g. $15 - 7 = 8$



$74 - 27 = 47$

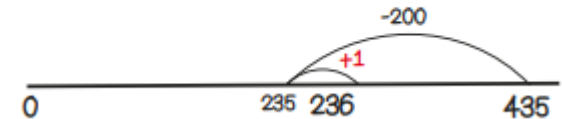


Year 3

- Mental subtraction using partitioning. Subtract and compensate.

E.g. $435 - 199$:

Take away 200 then **add 1**



- Formal written method:

$$\begin{array}{r} \overset{1}{\cancel{2}} \overset{1}{3} 4 \\ - 152 \\ \hline 82 \end{array}$$