



Maths Calculation Policy

Updated March 2020

Contents

- Addition (EYFS – Year 6)
- Subtraction (EYFS – Year 6)
- Multiplication and Division (EYFS – Year 6)
- Fractions (Year 3 – Year 6)

Please Note

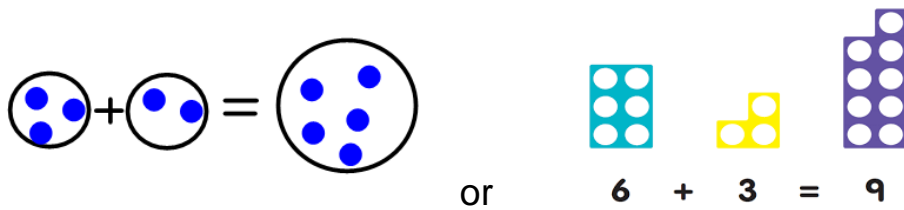
These strategies have been agreed among staff as the most supportive to children's mathematical development. This document has been written in an attempt to provide continuity and progression between year groups. However, the strategies listed are not exhaustive.

Addition

EYFS

- Count physical objects – combining two sets.
- Draw objects to aid addition.
- Make a record of objects added in pictures, words or symbols.

e.g.



- Count forwards along a simple number track.

e.g.

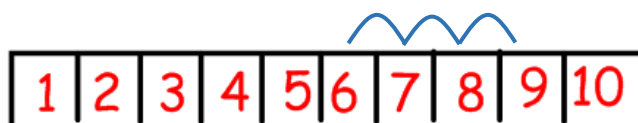


- Count on using fingers – put biggest number in head and fingers to count on from.

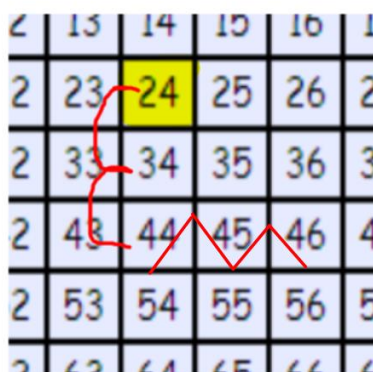
Year 1

Consolidate addition work from EYFS.

- To know mentally bonds to 10 and to 20, and be able to recall them rapidly.
- Continue to use concrete objects and pictorial representations.
- Use a simple number track for adding numbers. Find starting number (e.g. 3 in $3 + 7 =$) and count on / jump on (e.g. 7) As children progress encourage starting at the highest number. (e.g. start at 6 in $3 + 6 =$) Find 6 and count on 3.



- Begin to record addition calculations.
- Develop and transfer method of using a number track to a hundred square.
- Introduce addition with multiples of 10 using the hundred square. (e.g. $24 + 20 =$)
- Then, addition of multiples of tens plus units using a hundred square. (e.g. $24 + 22 =$)
Show tens as humps and ones as teeth.



Year 2

Consolidate addition work from Year 1.

- To know mentally bonds to 20 and be able to recall them rapidly.
- Continue to use concrete and pictorial representations.
- Introduce partitioning method (PTO)

$$\begin{array}{r} \text{P} \quad 23 + 46 \\ \quad \quad / \quad \backslash \\ \quad \quad 40 \quad 6 \end{array}$$

$$\text{T} \quad 23 + 40 = 63$$

$$\text{O} \quad 63 + 6 = 69$$

- Introduce standard written method for column addition.
Start with the ones column

$$\begin{array}{r} 53 \\ +24 \\ \hline 77 \end{array}$$

Year 3

Consolidate addition work from Year 2.

- Reinforce partitioning method, including bridging through 10.

$$\begin{array}{c} 60 \\ \frown \\ 23 + 46 = 69 \\ \smile \\ 9 \end{array}$$

$$\begin{array}{r} \text{P} \quad 36 + 28 \\ \quad \quad | \quad \backslash \\ \quad \quad 20 \quad 8 \end{array}$$

$$\text{T} \quad 36 + 20 = 56$$

$$\text{O} \quad 56 + 8 = 64$$

- Reinforce the standard written method for column addition.
Start with the ones column

$$\begin{array}{r} 53 \\ + 26 \\ \hline 79 \end{array}$$

- Introduce carrying ones to tens and tens to hundreds
Place the carry on the top line, to the right of the number.

$$\begin{array}{r} 367 \\ + 159 \\ \hline 526 \end{array}$$

See 'Grading of Difficulty' appendices for order of progression once this method has been taught.

Year 4

Consolidate addition work from Year 3.

- Reinforce standard written method introduced in year 3 and progress by adding the thousands column.

Start with the ones column.

Place the carry on the top line, to the right of the number.

$$\begin{array}{r} 2436 \\ + 227 \\ \hline 2663 \end{array}$$

Year 5/6

Consolidate addition work from Year 4.

- Reinforce standard written method introduced in year 3 and progress by adding the ten thousands column and beyond.

Start with the ones column.

Place the carry on the top line, to the right of the number.

$$\begin{array}{r} 62436 \\ + 5227 \\ \hline 67663 \end{array}$$

- Extend to decimals.

$$124.9 + 7.25 =$$

$$\begin{array}{r} 124.90 \\ + 7.25 \\ \hline 132.15 \end{array}$$

Place '0' to hold it open and maintain place value

See 'Grading of Difficulty' appendices for order of progression

Subtraction

EYFS

- Remove physical objects from a group.
- To make a record in pictures, words or symbols, crossing out objects removed e.g. $5 - 2 = 3$



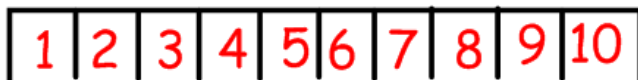
- Count backwards along a simple number track or by putting number in head and using fingers to count back.
e.g.



Year 1

Consolidate subtraction work from EYFS, continuing to use concrete and pictorial representations.

- To apply knowledge of bonds to 10 and 20 when subtracting e.g. $10 - 4 = 6$ and recall these facts rapidly.
- Use a number track e.g. a simple ruler. Find starting number (e.g. 7 in $7 - 3 =$) and count back (e.g. 3)



- Begin to record subtraction calculations.
- Develop and transfer subtraction method of using a number track to a hundred square.

- Introduce subtraction with multiples of 10 using the hundred square.

2	13	14	15	16	1
2	23	24	25	26	2
2	33	34	35	36	3
2	43	44	45	46	4
2	53	54	55	56	5
2	63	64	65	66	6

- **Find the difference** on a number track / number square by **counting on**

e.g. $16 - \underline{\quad} = 7$

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

Year 2

Consolidate subtraction work from Year 1, continuing to use concrete and pictorial representations.

- To apply knowledge of bonds to 20 when subtracting e.g. $20 - 4 = 16$ and recall these facts rapidly.
- Introduce subtraction of multiples of tens plus units using a hundred square.
e.g. $56 - 22 =$
Show tens as humps and units as teeth.

3	24	25	26	27	28
3	34	35	36	37	38
3	44	45	46	47	48
3	54	55	56	57	58
3	64	65	66	67	68
3	74	75	76	77	78

- Consolidate finding the difference from year 1 counting on using the hundred square/number line.
e.g. $52 - \underline{\quad} = 36$
- Introduce partitioning of the number to be subtracted.

$$\begin{array}{r} \text{P} \quad 88 - 56 \\ \quad \quad \quad \begin{array}{l} | \quad \backslash \\ 50 \quad 6 \end{array} \end{array}$$

$$\text{T} \quad 88 - 50 = 38$$

$$\text{O} \quad 38 - 6 = 32$$

- Introduce vertical method of subtraction.

$$\begin{array}{r} \text{e.g.} \quad 56 \\ \quad \quad - 23 \\ \quad \quad \hline \quad \quad 33 \end{array}$$

Year 3

Consolidate subtraction work from Year 2.

- Consolidate column subtraction from Year 2 up to 3-digit numbers, no exchanging.
- Introduce column subtraction with exchanging, including 3-digit numbers.

$$\begin{array}{r} \overset{4}{3} \overset{1}{5} 5 \\ - 17 \\ \hline 338 \end{array}$$

Year 4

Consolidate subtraction work from Year 3.

- Reinforce vertical method of subtraction with/without exchanging and up to 4-digit numbers.

$$\begin{array}{r} \overset{1}{2} \overset{13}{4} \overset{1}{1} 6 \\ - 423 \\ \hline 1993 \end{array}$$

Year 5/6

Consolidate subtraction work from Year 4.

- Consolidate formal vertical method using larger numbers and decimals, including exchanging.

$$\begin{array}{r} 1.9 \\ - 0.8 \\ \hline 1.1 \end{array}$$

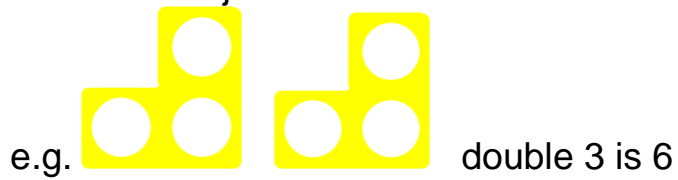
$$\begin{array}{r} \overset{0}{0} \overset{1}{0} 3 \\ - 0.007 \\ \hline 0.006 \end{array}$$

See 'Grading of Difficulty' appendices for order of progression

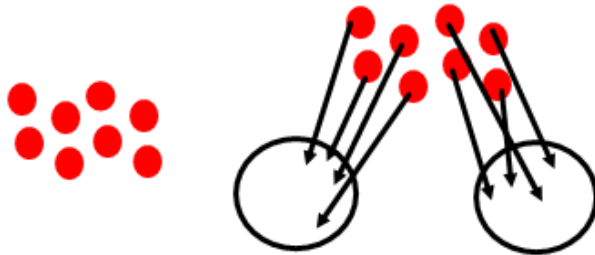
Multiplication/Division

EYFS

- Doubling by adding together two groups with the same number of objects in.



- Halving by sharing equally. 'One for you, one for me.'



Year 1


- Describe and extend number sequences, twos, fives, tens and threes using concrete and pictorial representations.
- Understand multiplication as repeated addition.





$2 + 2 + 2 = \underline{\hspace{2cm}}$

$3 \times 2 = \underline{\hspace{2cm}}$

- Describe multiplication in an array.


$$3 \times 2 = 6$$
$$2 \times 3 = 6$$


$$3 \times 2 = 6$$

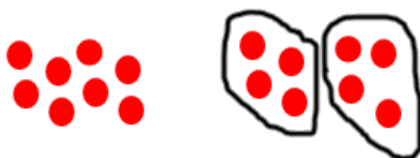

$$2 \times 3 = 6$$

- Half and double numbers up to 20.
(Half by sharing into 2 groups)

- Share objects equally
e.g. $8 \div 2 =$



- Group objects
e.g. $8 \div 2 =$



Year 2

Consolidate multiplication and division work from Year 1, continuing to use concrete and pictorial representations.

- Know by heart 2x, 5x and 10x tables.
In addition to being able to recite the above tables, children should also be able to answer random multiplication questions from them.
- Complete simple number sentences
e.g. $5 \times 3 = \underline{\quad}$ and $2 \times \underline{\quad} = 14$
- Understand the principle of doubling as reversing halving and halving as reversing doubling.
- Observe and describe the effect of multiplying and dividing by 10. (The numbers jump, 0 used as a place holder)

H T O .
 9
 9 0

- Begin to record simple division calculations, including those which have a remainder.

$$17 \div 2 = 8 \text{ r}1$$

Year 3

Consolidate multiplication and division work from Year 2.

- Know by heart 2x 5x10x **3x 4x and 8x** tables.
In addition to being able to recite the above tables, children should also be able to answer random multiplication questions from them.

- Understand the inverse relationship between multiplication and division.

e.g. $4 \times 5 = 20$

$$5 \times 4 = 20$$

$$20 \div 5 = 4$$

$$20 \div 4 = 5$$

- Observe and describe the effect of multiplying and dividing by 10 and 100

- Introduce a partitioning method of multiplication (TO x O)

e.g.

$$\begin{array}{r} 26 \\ \times 6 \\ \hline 6 \times 6 = 36 \\ 20 \times 6 = 120 \\ \hline 156 \end{array}$$

or

$$\begin{array}{r} 26 \times 6 \\ 20 \quad 6 \end{array}$$

$$\begin{array}{r} 6 \times 6 = 36 \\ 20 \times 6 = +120 \\ \hline 156 \end{array}$$

- Introduce the formal method of multiplication (TO x O)

e.g.

$$\begin{array}{r} 26 \\ \times 6 \\ \hline 156 \end{array}$$

- Record simple division calculations, continuing to use concrete and pictorial representations.

e.g. $69 \div 3 =$

Year 4

Consolidate multiplication and division work from Year 3.

- Know by heart all tables up to 12 x 12.
In addition to being able to recite the above tables, children should also be able to answer random multiplication questions from them.
- Consolidate the formal method of multiplication (TO x O, HTO x O)

e.g.

$$\begin{array}{r} 426 \\ \times 136 \\ \hline 2556 \end{array}$$

- Continue division work from Year 3 and develop method of recording to include bus stop method, including calculations which have a remainder.

e.g.

$$\begin{array}{r} 0463 \\ 3 \overline{) 1389} \end{array}$$

Year 5

Consolidate multiplication and division work from Year 4.
Introduce standard written method for multiplication.

- Standard written method
(start with TO x O then build to ThHTO x TO)

$$\begin{array}{r} 72 \\ \times 38 \\ \hline \end{array}$$

$$\begin{array}{r} 72 \\ \times 38 \\ \hline 576 \end{array}$$

Multiply by 8

Place the ten on the line to show the carry

$$\begin{array}{r} 72 \\ \times 38 \\ \hline 576 \\ 0 \end{array}$$

Place the zero to show you are multiplying
by a ten.

$$\begin{array}{r} 72 \\ \times 38 \\ \hline 576 \\ 2160 \\ \hline 2738 \end{array}$$

Multiply by 3

Year 6

- Consolidate standard written method for multiplication introduced in Year 5. Building work up to ThHTO x TO
- Introduce multiplying one digit numbers with up to 2 decimals by a whole number.

$$\begin{array}{r} 63.6 \\ \times 247 \\ \hline 445.2 \end{array}$$

Jump the decimal out, multiply, jump back in

- Continue the division method that has been taught since year 4. Build work up to HTO divided by O.
- Introduce long division for a two-digit divisor
Step one: Write multiples of the divisor down the right hand side of the working space

$$3 \overline{)46}$$

$$\begin{array}{r} 1 \\ 3 \overline{)46} \\ \underline{3} \end{array}$$

How many 3's in 4?

1

Put 1 on the top and 3 underneath because $1 \times 3 = 3$

$$\begin{array}{r} 1 \\ 3 \overline{)46} \\ \underline{3} \downarrow \\ 1 \end{array}$$

Calculate the remainder.

$$4 - 3 = 1$$

Then bring down the next digit

$$\begin{array}{r} 15 \\ 3 \overline{)46} \\ \underline{3} \downarrow \\ 16 \\ \underline{15} \end{array}$$

How many 3's in 16?

5

Put 5 on the top and 15 underneath because $3 \times 5 = 15$

$$\begin{array}{r} 15 \text{ r } 1 \\ 3 \overline{)46} \\ \underline{3} \downarrow \\ 16 \\ \underline{15} \\ 1 \end{array}$$

Calculate the remainder

$$16 - 15 = 1$$

This is then the remainder.

Answer 15 r 1

Once consolidated, introduce the use of long division with decimal remainders.

Fractions

Year 3/4

- Add and subtract fractions with the same denominator within one whole.

$$\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$$

Denominator stays the same, add/subtract the numerator only.

Year 5

- Add and subtract fractions with the same denominator and denominators that are multiples of the same number.

$$\begin{array}{r} \frac{5}{7} + \frac{3}{21} = \\ \left(\begin{array}{r} \frac{5}{7} \\ \frac{15}{21} \end{array} \right) \times 3 + \left(\begin{array}{r} \frac{3}{21} \\ \frac{3}{21} \end{array} \right) \times 1 = \frac{18}{21} \end{array}$$

- Multiply proper fractions and mixed numbers by whole numbers - supported with concrete and pictorial representations.

$$\frac{3}{4} \times 5 =$$

$$\frac{3}{4} \times \frac{5}{1} = \frac{15}{4}$$

Whole number placed over 1

Use language of 'just do it.'

To multiply with a mixed number, change to an improper fraction first, and then follow above method.

Year 6

- Add/subtract fractions with different denominators and mixed numbers.

$$4\frac{2}{3} - 1\frac{6}{7} =$$

$$\frac{14}{3} - \frac{13}{7} = \quad \text{Change to an improper fraction}$$
$$\begin{array}{l} \times 7 \left(\frac{14}{3} - \frac{13}{7} \right) \times 3 \\ \frac{98}{21} - \frac{39}{21} = \frac{59}{21} = 2\frac{17}{21} \end{array}$$

- Multiply pairs of proper fractions - learn to simplify.
- Divide proper fractions by whole numbers.

$$\frac{5}{8} \div 2 =$$

$$\frac{5}{8} \div \frac{2}{1} = \quad \text{"Keep it, change it, flip it"}$$

$$\frac{5}{8} \times \frac{1}{2} = \frac{5}{16}$$

Appendix 1

Grading of difficulty (Addition)

1. No carrying	$\begin{array}{r} 23 \\ + 42 \\ \hline \end{array}$	$\begin{array}{r} 315 \\ + 624 \\ \hline \end{array}$
2. Extra digit in the answer	$\begin{array}{r} 94 \\ + 73 \\ \hline \end{array}$	$\begin{array}{r} 561 \\ + 718 \\ \hline \end{array}$
3. Carrying one to tens	$\begin{array}{r} 47 \\ + 25 \\ \hline \end{array}$	$\begin{array}{r} 237 \\ + 516 \\ \hline \end{array}$
4. Carrying tens to hundreds	$\begin{array}{r} 371 \\ + 485 \\ \hline \end{array}$	$\begin{array}{r} 293 \\ + 541 \\ \hline \end{array}$
5. Carrying one to tens and tens to hundreds	$\begin{array}{r} 376 \\ + 485 \\ \hline \end{array}$	$\begin{array}{r} 295 \\ + 547 \\ \hline \end{array}$
6. More than two numbers to be added	$\begin{array}{r} 35 \\ 62 \\ + 24 \\ \hline \end{array}$	$\begin{array}{r} 237 \\ 148 \\ + 516 \\ \hline \end{array}$

Appendix 2

Grading of difficulty (Subtraction)

- | | |
|---|---|
| 1. 2 digits - no exchange needed | $47 - 23 =$ |
| 2. 2 digits - exchange tens to ones | $43 - 27 =$ |
| 3. 3 digits - no exchange needed | $469 - 246 =$ |
| 4. 3 digits - exchange tens to ones | $452 - 138 =$ |
| 5. 3 digits - exchange hundreds to tens | $537 - 163 =$ |
| 6. 3 digits - exchange hundreds to tens
and tens to ones | $532 - 273 =$ |
| 7. Numbers with zeros | $470 - 142 =$
$700 - 236 =$
$604 - 347 =$ |