Calculation Policy

Rainbow Forge Primary School

Calculation Policy Overview 2015/2016

This policy contains an overview of the key written methods of calculation that are to be taught throughout the school. It has been written to ensure consistency and progression throughout the school and is in line with the school's *Calculation Policy* and *National Expectations.*

The overall aim is that when children leave primary school they:

• have a secure knowledge of number facts and a good understanding of the four operations;

• make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;

• have an efficient, reliable, <u>formal</u>, written method of calculation for each operation that they can apply with confidence when undertaking calculations that they cannot carry out mentally.

They can select the method by asking themselves:

'Can I do this in my head?'

'Can I do this in my head using drawings or jottings?' 'Do I need to use a written method?'

How to watch the Tutorial Videos (internet access required)

Method 1
1. Download a QR Code Reader application for your smart phone or tablet.
2. Open the app and scan the QR code next to the required operation.
3. A link will open directing you to the tutorial video.
4. Click on the video to play.

Method 2
In this document, you will see this symbol [▲]. If you have a smart phone or tablet, you can watch a video explaining how each method is taught using examples wherever you see this symbol.

You will need to:
1. Download the free app *Aurasma* to your tablet or smart phone.

2. Open up the app, click the [▲] symbol then press the username button.

3. Search for Rainbow Forge and 'Follow' us.

4. Press the square button at the bottom to open the viewer window

5. Hover your smart phone or tablet over the calculation method you want to view. This is designated by the purple outline. Sit back and watch! (Pressing the video whilst it's playing will open it up in a separate window)
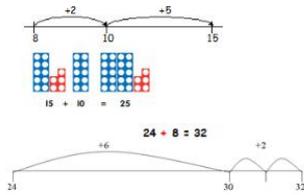
Addition: written calculations

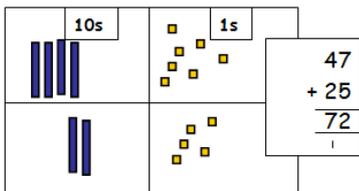## Year 1: Numbered number line

and makes 5

$3 + 2 = 5$

Year 2: Blank number line to count on in multiples of 10 and ones
Using dienes to combine values

$15 + 10 = 25$

$24 + 8 = 32$

$15 + 13 = 28$

Year 3: Column addition with carrying using place value mat alongside

10s	1s

```
  47
+ 25
----
  72
   1
```

Year 4: Column addition using carrying

$442 + 335 = 777$

$7872 + 541 = 8413$

```
  442
  335 +
  ----
  777
```

```
  7872
   541 +
  -----
  8413
   1 1
```

Year 5: Column addition (including decimals upto 2 decimal places)

$7176 + 6147 = 13323$

$4.28 + 7.99 = 12.27$

```
  7176
  6147 +
 ------
 13323
   11
```

```
  4.28
  7.99 +
 ------
 12.27
  11
```

Year 6: Column addition (including decimals upto 3 decimal places)

```
  53753
   4883 +
 -------
 _____
```

```
  4.136
  6.658 +
 -------
 _____
```

Subtraction: written calculations

Year 1: Numbered number line

$10 - 4 = 6$

Year 2: Blank number line to count back in multiples of 10 and ones
Using dienes to combine values

The difference between 11 and 14 is 3.
$14 - 11 = 3$
$11 + \square = 14$

$15 - 7 = 8$

$28 - 13 = 15$

(physically remove 10 and 3 to leave the answer 15)

Year 3: Column subtraction with carrying using place value mat alongside

Year 4: Column subtraction using carrying

$263 - 125 = 138$

$3675 - 1234 = 2441$

$$\begin{array}{r} 2\,6\,3 \\ -\,1\,2\,5 \\ \hline 1\,3\,8 \end{array}$$

$$\begin{array}{r} 3675 \\ -\,1234 \\ \hline 2441 \end{array}$$

Year 5: Column subtraction (including decimals upto 2 decimal places)

$563 - 271 = 292$

$4.31 - 4.1 = 0.221$

$$\begin{array}{r} 5\,6\,3 \\ -\,2\,7\,1 \\ \hline 2\,9\,2 \end{array}$$

$$\begin{array}{r} 4.321 \\ -\,4.1 \\ \hline 0.221 \end{array}$$

Year 6: Column subtraction (including decimals upto 3 decimal places)

$563 - 278 = 285$

$402.10 - 243.86 = 158.24$

$$\begin{array}{r} 5\,6\,3 \\ -\,2\,7\,8 \\ \hline 2\,8\,5 \end{array}$$
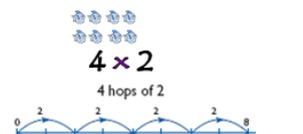
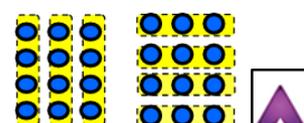$$\begin{array}{r} 402.10 \\ -\,243.86 \\ \hline 158.24 \end{array}$$

Multiplication: written calculations

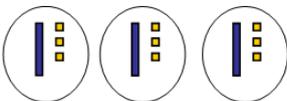## Year 1: Grouping / Counting in steps / Arrays
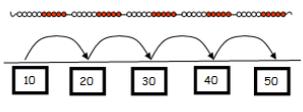
Making sets: eg 3 sets / lots of... leading to...
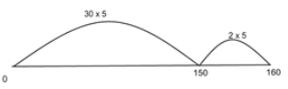
4×2

4 hops of 2

$3 \times 4 = 12$ $4 \times 3 = 12$

Year 2: Using dienes / Number lines / Repeated addition

Eg $13 \times 3 =$

Regroup to form...   = 39

$32 \times 5 =$ 160

$4 \times 6 =$
$6 \times 4 =$
$6 + 6 + 6 + 6 =$
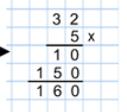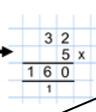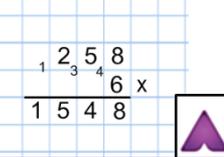$4 + 4 + 4 + 4 + 4 + 4 = 24$

Year 3: Number lines and grid method used concurrently

X	30	2
5	150	10

Year 4: Grid method and Standard Written method used concurrently

X	30	2
5	150	10

```
   3 2
     5 x
   1 0
 1 5 0
 1 6 0
```

```
   3 2
     5 x
 1 6 0
   1
```

```
   2 5 8
     6 x
 1 5 4 8
```

Year 5: Formal written layout

```
 6 4 2 1
     9 x
5 7 7 8 9
 5   3 1
```

```
 3 4 7
   1 6 x
2 0 8 2
3 4 7 0
5 5 5 2
    1
```
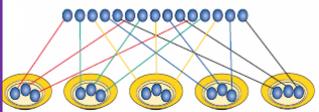
Year 6: Formal written layout (including decimals in context)
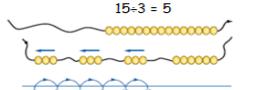
```
     6 4 2 1
       2 9 x
   5 7 7 8 9
 1,2 8 4 2 0
 1 8 6 2 0 9
     1 1 1
```
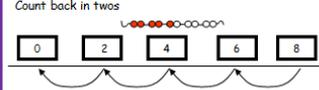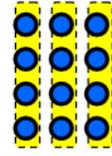
Division: written calculations

Year 1: Sharing leading to Grouping/ Counting back / Arrays
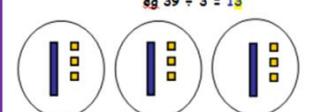
$15 \div 5 = 3$

15 shared between 5

$15 \div 3 = 5$

Count back in twos

| 0 | 2 | 4 | 6 | 8 |

$12 \div 3 = 4$

Year 2: Using dienes / Number lines / Repeated subtraction

eg $39 \div 3 = 13$

×10   ×3
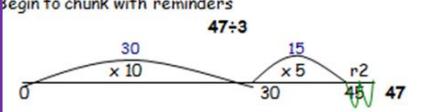
0   30   39
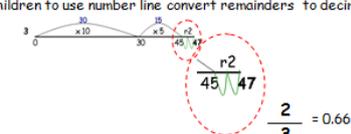
$12 \div 3 =$
$12 - 3 - 3 - 3 - 3 = 4$
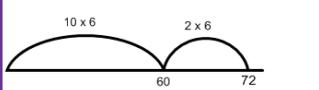
Year 3: Chunking on a number line (including remainders)

Begin to chunk with reminders

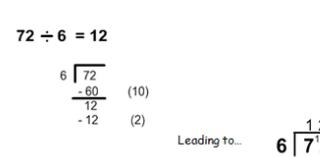$47 \div 3$

30
× 10

15
× 5   r2

0   30   45   47

Children to use number line convert remainders to decimals

r2
45   47

$\frac{2}{3} = 0.66$

Year 4: Number lines leading to short division

10 x 6   2 x 6

60   72

$72 \div 6 = 12$

6 ⌐ 72
- 60   (10)
12
- 12   (2)

Leading to... $6 \overline{7^12}$ 1 2

$98 \div 7 = 14$
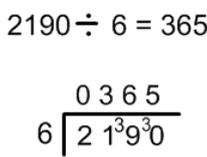
1 4
7 ⌐ 9 ²8
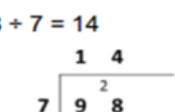
$432 \div 5 = 86 \ r2$

8 6 r 2
5 ⌐ 4 3 ³2
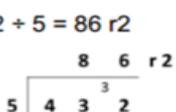
Year 5: Short division – dividing by a one-digit number (Including decimal division in context)

$2190 \div 6 = 365$

0 3 6 5
6 ⌐ 2 1 ³9 ³0

Year 6: Short and Long division - dividing by a two-digit number (Including decimal numbers in context)

432 ÷ 15 r12

```
              2   8  r 12
        ┌─────────────
   1  5 │ 4   3   2
          3   0   0
        ─────────────
          1   3   2
          1   2   0
        ─────────────
              1   2
```

496 ÷ 11 = 45 r1

```
                  4    5   r 1
        ┌──────────────────
                     5
   1  1 │ 4    9    6
```

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