

Church Hill C of E Junior School



Calculation Policy

Approved by Governors

Date: 7th December 2017

Signed on behalf of the Governing Body:

.....

To be reviewed: December 2020

Church Hill C of E Junior School

Calculation Policy – Expectations by year group

Maths at Church Hill C of E Junior School is tailored to the individual needs of the pupil and adopts the mastery approach. Below maps the expectations of children who would be deemed to be working at the expected standard. Those working at mastery level would be expected to apply this at a deeper level.

Year 3

Addition – add numbers up to 3 digits using expanded column addition with calculations written alongside.

Subtraction – subtract numbers up to 3 digits using column subtraction (partitioning).

Multiplication – 2 digit numbers by 1 digit numbers using the grid method.

Division – 2 digit numbers by 1 digit numbers using number lines.

Year 4

Addition – add numbers up to 4 digits using full expanded column addition.

Subtraction – subtract numbers up to 4 digits using formal column subtraction.

Multiplication – multiply 2 and 3 digit numbers by a 1 digit number using long multiplication with the calculations written down the side.

Division – 2 digit numbers by 1 digit numbers using chunking.

Year 5

Addition – add numbers with more than 4 digits using compact column addition.

Subtraction – subtract numbers with more than 4 digits using formal column subtraction.

Multiplication – Multiply numbers up to 4 digits by a 1 or 2 digit number using short column multiplication.

Division – Divide numbers up to 4 digits by a 1 digit number using long division.

Year 6

Addition – add numbers with more than 4 digits using compact column addition.

Subtraction – subtract numbers with more than 4 digits using formal column subtraction.

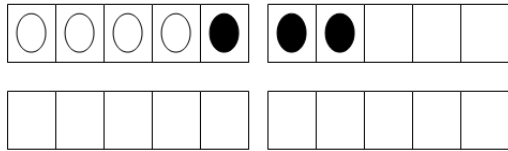
Multiplication – Multiply numbers up to 4 digits by a 2 digit number using short column multiplication.

Division – Divide numbers up to 4 digits by a 2 digit number using short division.

Church Hill C of E Junior School Calculation Policy – Addition

Step 1

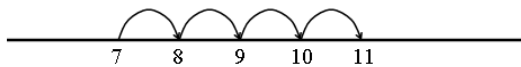
$$4 + 3 = \text{two more than } 5 = 7$$



Use of concrete resources and pictorial representations

Step 2

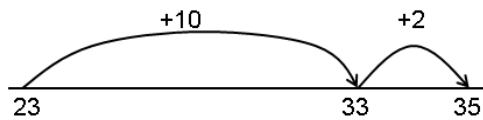
$$4 + 7 = 11 \quad \text{or} \quad 7 + 4 = 11$$



Jumps of 1 on a number line

Step 3

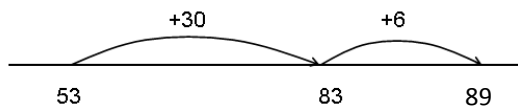
$$12 + 23 = 23 + 10 + 2 = 35$$



Start to partition on the number line

Step 4

$$53 + 36 =$$



Larger partitioned jumps on a number line

Step 5

200	60	8	200
+	80	5	+ 140
			+ 13
200	140	13	353

Partitioned numbers set out as a column

Step 6

$$\begin{array}{r}
 67 \\
 + 24 \\
 \hline
 11 \quad (7+4) \\
 80 \quad (60+20) \\
 \hline
 91
 \end{array}
 \qquad
 \begin{array}{r}
 267 \\
 + 85 \\
 \hline
 12 \quad (7+5) \\
 140 \quad (60+80) \\
 \hline
 200 \\
 352
 \end{array}$$

Expanded column addition, with calculations written alongside

Step 7

$587 + 475$ is approximately
 $600 + 500 = 1100$

$$\begin{array}{r}
 \text{HTU} \\
 587 \\
 + 475 \\
 \hline
 12 \\
 150 \\
 \hline
 900 \\
 1062
 \end{array}$$

Full expanded column addition

Step 8

$$\begin{array}{r}
 1 \\
 38 \\
 + 93 \\
 \hline
 131
 \end{array}$$

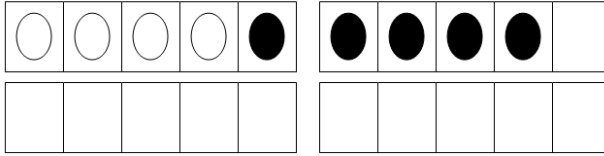
Compact column addition

Carry above the column

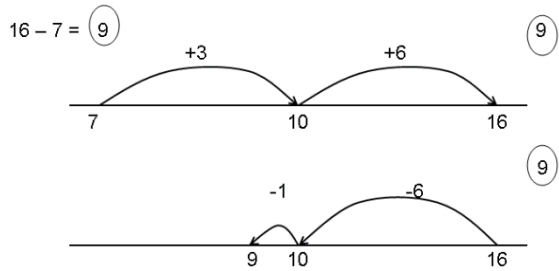
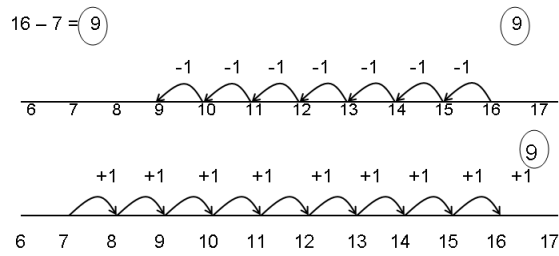
Church Hill C of E Junior School Calculation Policy – Subtraction

Step 1 – concrete objects and pictorial representations

$9 - 5 =$ Recognise that 4 is one less than 5



Step 2 - Number lines



Step 3 - partitioning

$$\begin{array}{r} 700 \quad 90 \quad 8 \\ - 400 \quad 50 \quad 2 \\ \hline 300 + 40 + 6 = 346 \end{array}$$

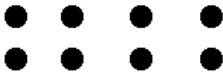
$$\begin{array}{r} 534 - 265 = 269 \\ \begin{array}{r} 400 \quad 120 \quad 20 \quad 14 \\ 500 + 30 + 4 \\ 200 + 60 + 5 \\ \hline 200 + 60 + 9 = 269 \end{array} \end{array}$$

Step 4 – Column subtraction

$$\begin{array}{r} 475 \\ -132 \\ \hline 343 \end{array} \longrightarrow \begin{array}{r} 501 \\ 563 \\ -247 \\ \hline 316 \end{array} \longrightarrow \begin{array}{r} 501 \\ 616 \\ -158 \\ \hline 458 \end{array}$$

Church Hill C of E Junior School Calculation Policy – Multiplication

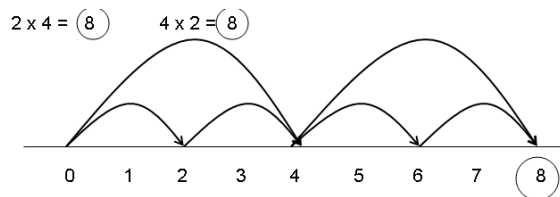
Step 1


 4×2 or $4 + 4$

Use of concrete objects and pictorial representations

2×4 or $2 + 2 + 2 + 2$

Step 2



Use of a number line

Step 3 – progression of grid method

$15 \times 2 = 30$ Demonstrate: $10 \times 2 + 5 \times 2$

Leading to the grid method:

X	10	5
2	20	10

 $20 + 10 = 30$



X	30	2
5	150	10

HTU

150
+ 10
60
100
<u>160</u>

→

123×4 is approximately $120 \times 4 = 480$

X	100	20	3
4	400	80	12

HTU

400
80
+ 12
2
90
<u>500</u>
<u>592</u>

→

72×38 is approximately $70 \times 40 = 2800$

X	70	2
30	2100	60
8	560	16

ThHTU

2160
+ 576
6
130
600
<u>2000</u>
<u>2736</u>

Step 4

$$\begin{array}{r} 32 \\ \times 24 \\ \hline 8 \quad (4 \times 2) \\ 120 \quad (4 \times 30) \\ 40 \quad (20 \times 2) \\ 600 \quad (20 \times 30) \\ \hline 768 \end{array}$$

Long column multiplication with calculations written down the side

Step 5

$$\begin{array}{r} 96 \\ \underline{32} \times \\ 192 \quad \leftarrow \text{this is } 96 \times 2 \\ 2880 \quad \leftarrow \text{this is } 96 \times 30 \\ \hline 3072 \quad \leftarrow \text{this is } 96 \times 32 \end{array}$$

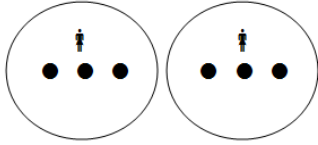
Short column multiplication

Remember to carry above and cross out

Church Hill C of E Junior School Calculation Policy – Division

Step 1 – use of concrete objects and pictorial representations

$6 \div 2$ can be modelled as sharing. Six sweets are shared between two people. How many do they have each?



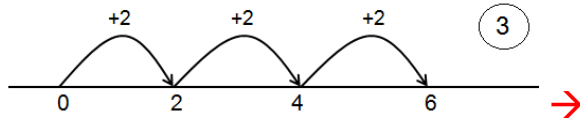
- ● Group 1
- ● Group 2
- ● Group 3

Also understand the difference of how $6 \div 2$ can be solved by grouping

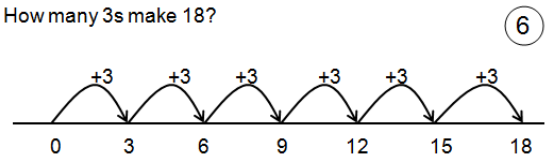
Step 2 – number lines

$6 \div 2 = 3$

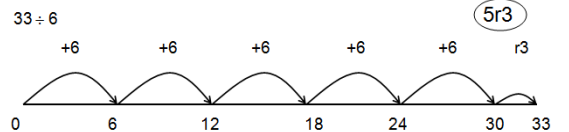
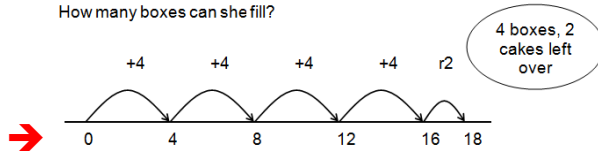
There are 6 sweets. How many people can have 2 each?



$18 \div 3 =$
How many 3s make 18?



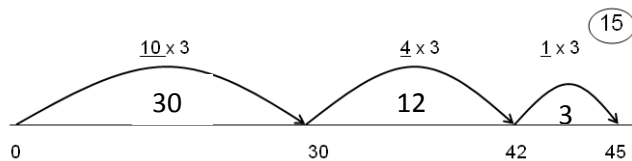
$18 \div 4 =$
A baker bakes 18 cakes. She puts 4 cakes in every box. How many boxes can she fill?



(Links should be learnt alongside times tables at this point)

Step 3

$45 \div 3 =$



Chunk together groups of your divisor

Step 4

$72 \div 5$ lies between $50 \div 5 = 10$ and $100 \div 5 = 20$

Chunking

$$\begin{array}{r}
 5 \overline{)72} \\
 \underline{50} \quad (10 \times 5) \\
 -22 \\
 \underline{20} \quad (4 \times 5) \\
 02 = 14r2
 \end{array}$$

Step 5 – long division

$$\begin{array}{r}
 193 \\
 5 \overline{)965} \\
 \underline{-5} \\
 46 \\
 \underline{-45} \\
 15 \\
 15
 \end{array}$$

Step 6 - short division

$$\begin{array}{r}
 5 \overline{)72} \quad \rightarrow \\
 \underline{50} \\
 22 \\
 \underline{20} \\
 2
 \end{array}$$

$$\begin{array}{r}
 0215 \\
 23 \overline{)4945} \\
 \underline{46} \\
 34 \\
 \underline{29} \\
 54 \\
 \underline{46} \\
 85 \\
 \underline{69} \\
 16 \\
 \underline{15} \\
 1
 \end{array}$$

Check: $23 \times 10 = 230$

$+ 23$	23
$+ 46$	46
$+ 69$	69
$+ 92$	92
$+ 115$	115
$+ 138$	138
$+ 161$	161
$+ 184$	184
$+ 207$	207
$+ 230$	230
$+ 184$	184