Giles Brook Primary Calculation Policy

Introduction

The aim of this policy is to deliver a consistent approach which shows clear progression to the teaching of written calculations in Giles Brook Primary.

Mental calculation and an understanding of place value are at the core of all calculation work. The methods have not been attributed Giles Brook assessment steps or matched with age related expectations. This is to allow individual children to progress through the methods at their own rate. This progression must be based on clear place value understanding. When new methods are introduced practical equipment (base ten, visual images, sliders, counters, multilink, Numicon) is used throughout the school to demonstrate why the algorithm works rather than just learnt by rote.

At Giles Brook Primary School, children are encouraged to develop independence in selecting the method which works best for them (even if it is a method taught in previous year group).

Teachers should encourage children to ask themselves the following when faced with any calculation:

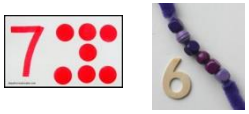
- Can I work it out in my head?
- Can I work it out in my head with jottings to support?
- Do I need a pencil and paper written method?

Methods and skills

The written methods for each operation are attached and draw on the strategies outlined in the National Curriculun 2014. This progression shows only details of the methods for each calculation type. It does not cover the range of skills which are also taught alongside each operation to refine and develop understanding. For example: missing number equations, word problems, inverse calculations, related division facts, doubling/halving strategies etc.

Giles Brook Primary Written Methods: Addition

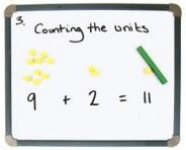
1) I can count with 1:1 correspondence

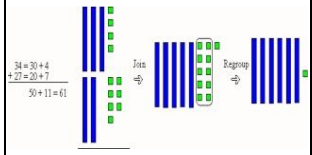


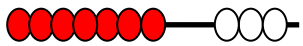
2) I can add using pictures and objects

3 + 4 = 7

3) I can use practical apparatus to illustrate addition

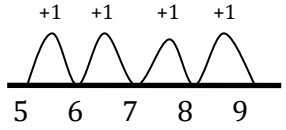




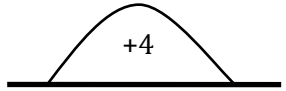


7 + 3 = <u>10</u>

4) I can use a number line in units



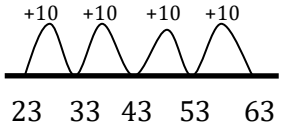
5 + 4 = 9



12 + 4 = 16

Count on in 1s to begin with, then children choose their own sized 'jumps'

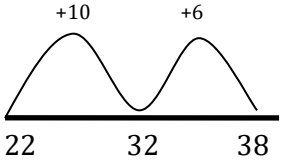
5) I can use a number line to count on in tens



23 + 40 = 63

Count on in 10s from any starting number.

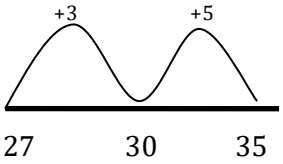
6) I can use a number line to partition tens and units



22 + 16 = 38

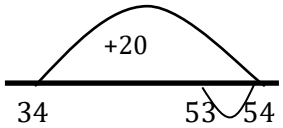
Count on in 10s and 1s to begin with, then children choose their own sized 'jumps'

7) I can use a number line to bridge through a multiple of ten

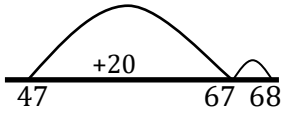


27 + 8 = 35

8) I can add a near multiple of ten by adding in tens and adjusting



34 + 19 = 53



47 + 21 = 68

9) I can partition without a number line

78 + 56 = 134
70 + 50 = 120
8 + 6 = 14
120 + 14 = 134

129 + 145 = 274
100 + 100 = 200
20 + 40 = 60
9 + 5 = 14
200 + 60 + 14 = 274

10) I can use column addition with integers

$$\begin{array}{r} 129 \\ +145 \\ \hline 274 \\ \hline {\scriptstyle 1} \end{array}$$

11) I can use column addition with decimals

$$\begin{array}{r} 12.9 \\ +14.5 \\ \hline 27.4 \\ \hline {\scriptstyle 1} \end{array}$$

$$\begin{array}{r} 12.91 \\ +14.5 \\ \hline 27.41 \\ \hline {\scriptstyle 1} \end{array}$$

12) I can add fractions and mixed numbers using a common denominator

$$\frac{2}{5} + \frac{3}{10} =$$

$$\frac{4}{10} + \frac{3}{10} = \frac{7}{10}$$

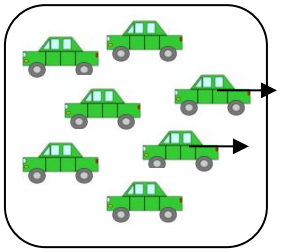
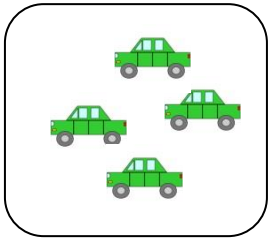
Giles Brook Primary Written Methods: Subtraction

1) I can count with 1:1 correspondence

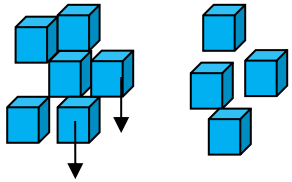



2) I can subtract using pictures and objects

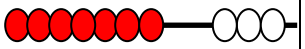
7 – 2 = 5

3) I can use practical apparatus to illustrate subtraction

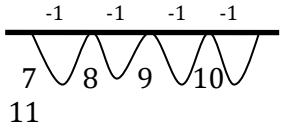


6 – 2 = 4



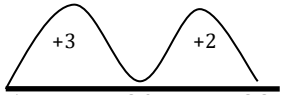
10 – 3 = 7

4) I can use a number line in units (less than 20)



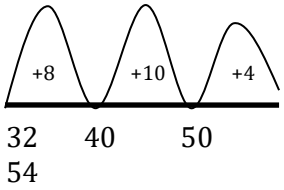
11 – 4 = 7

5) I can use a number line to count on and find a small difference



22 – 17 = 5

6) I can use a number line to count on and find a larger difference

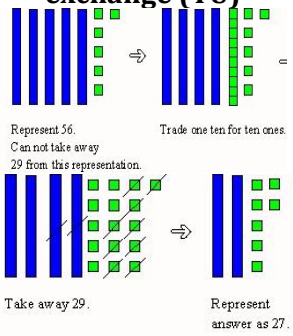


54 – 32 = 22

8) I can use column subtraction using integers without exchange (TU)

$$\begin{array}{r} 49 \\ -25 \\ \hline 24 \end{array}$$

9) I can use column subtraction using integers with exchange (TU)

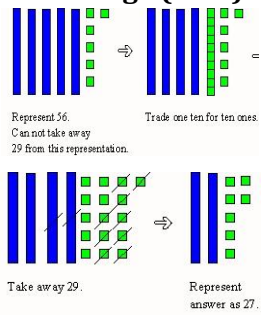


$$\begin{array}{r} {}^{4}\cancel{5}6 \\ -29 \\ \hline 27 \end{array}$$

10) Column subtraction using integers without exchange (HTU)

$$\begin{array}{r} 249 \\ -125 \\ \hline 124 \end{array}$$

11) Column subtraction using integers with exchange (HTU)



$$\begin{array}{r} 2{}^{4}\cancel{5}6 \\ -129 \\ \hline 127 \end{array}$$

11) Column subtraction using integers and decimals with exchange using 0 (HTU)

$$\begin{array}{r} {}^{1}\cancel{2}{}^{1}06 \\ -123 \\ \hline 83 \end{array}$$

12) Subtraction of fractions and mixed numbers using common denominator

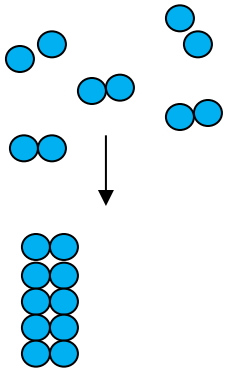
$$\frac{8}{9} - \frac{2}{3} =$$

$$\frac{8}{9} - \frac{6}{9} = \frac{2}{9}$$

Giles Brook Primary Written Methods: Multiplication

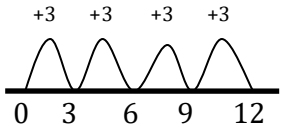
1) Counting in 2s, 5s and 10s using objects and images

2) Repeated addition with objects or images



2 + 2 + 2 +2 + 2 = 10

3) Repeated addition on a number line

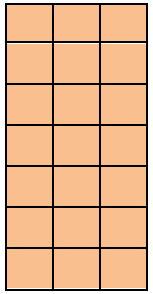


3 + 3 + 3 + 3 = 12

so

4 x 3 = 12

4) Arrays



7 rows
3 columns

7 x 3 = 21
3 x 7 = 21

5) Multiply by powers of 10

H	T	U
	2	7
2	7	0

27 x 10 = 270

H	T	U	.	t
		7		4
7	4	0		

7.4 x 100 = 740

6) Multiply using multiples of 10 (extend to multiples of 100)

2 x 4 = 8
so 20 x 4 = 80

3 x 6 = 18
so 3 x 600 = 1800

7) Multiply TU by U using partitioning (extend to HTU by U)

24 x 3 =72
20 x 3 = 60
4 x 3 = 12
60 + 12 = 72

135 x 4 = 540
100 x 4 = 400
30 x 4 = 120
5 x 4 = 20
400 + 120 + 20 = 540

8) Short multiplication to multiply (H)TU by U

$$\begin{array}{r} 24 \\ \times\ 3 \\ \hline 72 \\ {\scriptstyle 1} \end{array}$$

24 x 3 = 72

$$\begin{array}{r} 227 \\ \times\ 4 \\ \hline 908 \\ {\scriptstyle 1\ \ 2} \end{array}$$

227 x 4 = 908

9) Long multiplication to multiply (H)TU by TU

24 x 26 = 624

$$\begin{array}{r} 24 \\ \times\ 26 \\ \hline 144 \\ 480 \\ \hline 624 \\ {\scriptstyle 1} \end{array}$$

10) Multiply decimals using knowledge of times tables

2 x 4 = 8
so 0.2 x 4 = 0.8

3 x 6 = 18
so 3 x 0.06 = 0.18

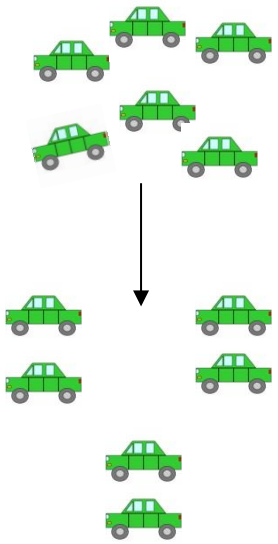
11) Multiply simple fractions

$$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20}$$

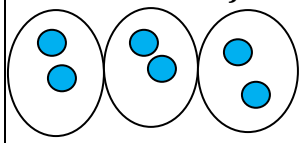
$$\frac{12}{20} = \frac{3}{5}$$

Giles Brook Primary Written Methods: Division

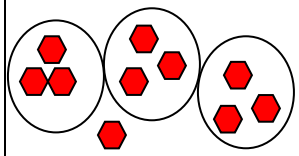
1)Grouping objects into 2s, 3s, 4s and 5s



2) Sharing and grouping equally (including remainders)



6 ÷ 3 = 2

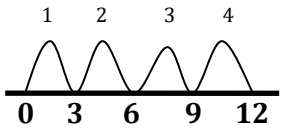


"When you share 10 sweets between three people, there is one left over."

10 ÷ 3 = 3 r1

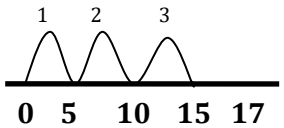
3) Number line to show repeated addition

12 ÷ 3 = 4



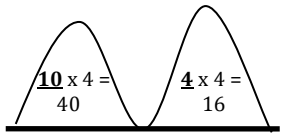
4) Number line to show repeated addition (including remainders)

17 ÷ 5 = 3 r2



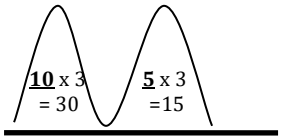
5) Blank number line to divide (TU ÷ U) without remainders

56 ÷ 4 = 14



6) Blank number line to divide (TU ÷ U) with remainders

47 ÷ 3 = 15 r2



7) Short division with integers

362 ÷ 4 = 90 r 2

$$4\overline{)362} = 90\text{ r }2$$

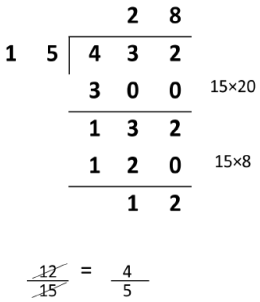
8) Short division showing remainder as a decimal

$$4\overline{)362.^{2}0} = 90.5$$

Calculations completed to a maximum of 3dp

9) Long division with integers (remainder as a fraction)

432 ÷ 15 =

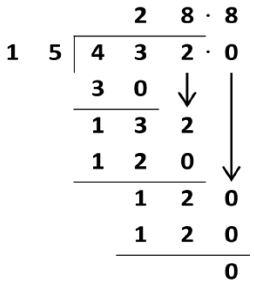


$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

10) Long division with integers (remainder as a decimal)

432 ÷ 15 =



Answer: 28·8

11) Divide simple fractions by integers

$\frac{3}{4} \div 4 =$

$\frac{1}{4} \times \frac{3}{4} = \frac{3}{16}$