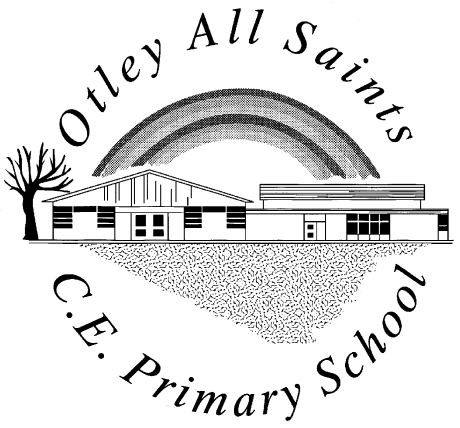


Calculation Guidance

Pencil and Paper Procedures

October 2011

Addition

Year 2

Don't partition the first number, keep it whole. This is intended to prevent errors in subtraction.

52 + 27
52 + 20 + 7 =

Year 3

Add by partitioning.

94 + 63

90 + 60 = 150
4 + 3 = 7 **150 + 7 = 157**

Year 4

287
+145
300 (200 + 100)
120 (80 + 40)
12 (7 + 5)
432

Begin by teaching this method, adding the largest number first. By the end of Year 4 pupils should be adding the units first.

Year 5

3596
+1874
10
160
1300
4000
5470

→

3596
+1874
5470
1 1 1

Standard method introduced to most children in Year 5.

Year 6

```
  6·25
  3·96
+ 2·47
 12·68
  1 1
```

```
  65·84
+ 58·48
 124·32
   1 1  1
```

Subtraction

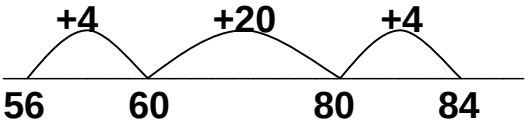
Year 2
Mental subtraction, keep the first number whole and partition the second number.

33 – 17 =

33 – 10 – 7 =

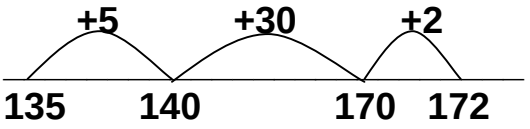
Year 3
Number line method – counting on.

84 – 56 = 28

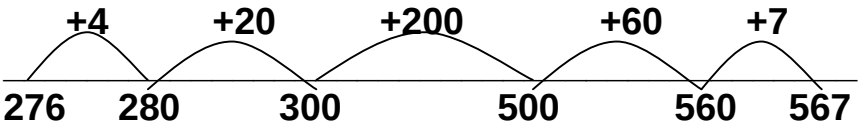


Year 4
Number line method.

172 – 135 = 37



567 – 276 = 291



Year 5

```
  754
- 286
      4  (290)
     10  (300)
    400  (700)
     54  (754)
    468
```

Level 5 mathematicians will be ready for decomposition method (see below).

Year 6

```
  1261
-  729
      1  (  730)
     70  (  800)
    200  (1000)
    200  (1200)
     60  (1260)
      1  (1261)
    532
```

Level 5 mathematicians will be ready for decomposition method.

$$\begin{array}{r} {}^{0}\cancel{1}^{\cancel{1}}\,{}^{5}\cancel{2}\,{}^{\cancel{6}}1 \\ -\;\;7\;2\;9 \\ \hline 5\;3\;2 \end{array} \qquad \begin{array}{r} {}^{7}\cancel{8}^{\cancel{12}}\,{}^{1}\cancel{3}\cdot 5 \\ -\;5\;4\cdot 9 \\ \hline 2\;8\cdot 6 \end{array}$$

Multiplication

Year 2 / 3

35 x 2 = 70

30 x 2 = 60
5 x 2 = 10

Using a number line:

4 x 5 = 20 (4 times / groups of 5)

5 x 4 = 20 (5 times / groups of 4)

Year 4
Grid method

23 x 7 = 161

x	20	3
7	140	21

= 161

Year 5
Grid method

72 x 38 = 2736

x	70	2
30	2100	60
8	560	16

2100
+ 576
2736

346 x 7 = 2422

x	300	40	6
7	2100	280	42

2100
280
+ 42
2422

Year 6

Grid method

4346 x 7 = 30422

x	4000	300	40	6
7	28000	2100	280	42

28000
2100
280
\+ 42
30422
1 1

4·92 x 3 = 14·76

x	4	0·9	0·02
3	12	2·7	0·06

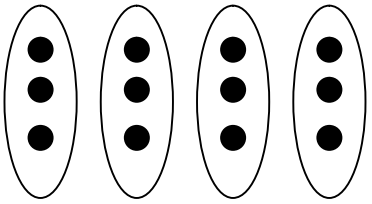
12·0
2·7
\+ 0·06
14·76

Division

Year 2

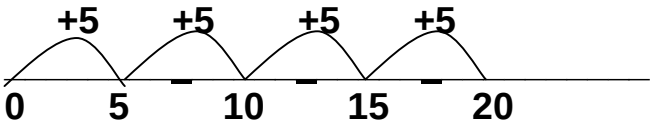
12 ÷ 3 = 4

How many groups of 3 make 12?



Using an open number line:

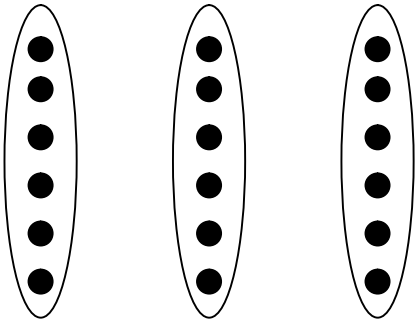
20 ÷ 5 = 4



Year 3

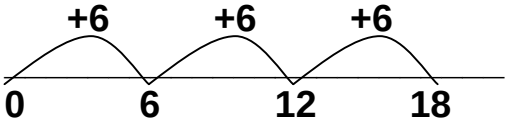
18 ÷ 6 = 3

How many groups of 6 make 18?

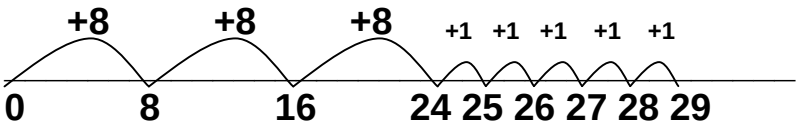


Using an open number line:

18 ÷ 6 = 3



29 ÷ 8 = 3 remainder 5



Divide by 2 by partitioning:

36 ÷ 2 = 18

½ of 30 = 15	**30**	**6**
	|	**|**
½ of 6 = 2	**15**	**3**

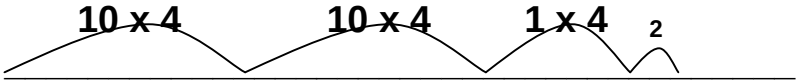
130 ÷ 2 = 65

½ of 100 = 50	**100**	**30**
	|	**|**
½ of 30 = 15	**50**	**15**

<u>Year 4</u>
'Chunking up' using a number line:

86 ÷ 4 =

How many 4s can we take out of 86?



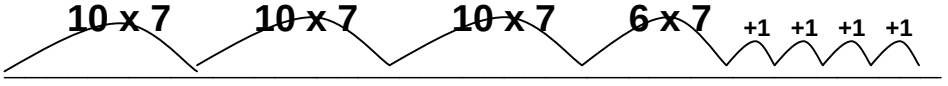
2 left over

10
10
+ 1
_21 r. 2

<u>Year 5</u>
'Chunking up' using a number line:

256 ÷ 7 =

How many 4s can we take out of 86?



4 left over

10
10
10
+ 6
_36 r. 4

Year 6

977
÷ 36
x 10 (360)
x 10 (360 → 720)
x 5 (720 → 900)
x 2 (900 → 972)
27 r. 5

moving on to shorter layouts:

1 9 **1 9 r. 3** **1 9 · 3 3** (or rec.)
9| 1 7^{8}1 **9| 1 7^{8}4** leading to **9| 1 7^{8}4 ·^{3}0^{3}0**

2 7 r. 5
36| 9 7 7
- 7 2 0
2 5 7
- 2 5 2
5

x | 30 | 6
7 | 210| 42 **= 252**