

WASPS

**Methods of Calculating
with the Four Operations**

(+ - x ÷)

Lower KS2

Progression from mental to written strategies - KS2
Addition (Years 3 and 4)

Mental methods using partitioning:

eg

$$\begin{aligned}
 76 + 47 &= (70 + 40) + (6 + 7) \\
 &= 110 + 13 \\
 &= 123
 \end{aligned}$$

Using a blank number line:



Vertical layout ("ones/units" first):

eg

$$\begin{array}{r}
 76 \\
 + 47 \\
 \hline
 13 \\
 110 \\
 \hline
 123
 \end{array}$$

"six add seven"
"seventy add forty"

Compact written method:

eg

$$\begin{array}{r}
 76 \\
 + 47 \\
 \hline
 123 \\
 \hline
 r \quad r
 \end{array}$$

Progression from mental to written strategies - KS2
Division - continued (Years 3 and 4)

Repeated subtraction ("under the arch")

$$\begin{array}{r}
 4 \text{ r}3 \\
 7 \overline{) 31} \\
 \underline{- 7} \quad \downarrow \times 7 \\
 24 \\
 \underline{- 7} \quad \downarrow \times 7 \\
 17 \\
 \underline{- 7} \quad \downarrow \times 7 \\
 10 \\
 \underline{- 7} \quad \downarrow \times 7 \\
 3
 \end{array}$$

③ \uparrow + remainder 3

Compact method for dividing by a single digit:

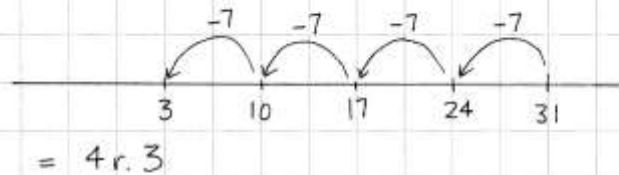
$$\begin{array}{r}
 12 \\
 6 \overline{) 72}
 \end{array}$$

With a remainder:

$$\begin{array}{r}
 15 \text{ r}3 \\
 5 \overline{) 78}
 \end{array}$$

Progression from mental to written strategies - KS2
 Division (Years 3 and 4)

Division as repeated subtraction, on the number line:
 $31 \div 7$



Repeated subtraction (chunking)

$$\begin{array}{r}
 31 \div 7 = \\
 \begin{array}{r}
 31 \\
 - 7 \quad \underline{1} \times 7 \\
 \hline
 24 \\
 - 7 \quad \underline{1} \times 7 \\
 \hline
 17 \\
 - 7 \quad \underline{1} \times 7 \\
 \hline
 10 \\
 - 7 \quad \underline{1} \times 7 \\
 \hline
 3
 \end{array}
 \end{array}$$

3
 ↑
 4 remainder 3

continued...

Progression from mental to written strategies - KS2
 Subtraction (Years 3 and 4)

Subtraction as "taking away" using the number line:

eg $86 - 59$



Subtraction using compact written method:

eg

$$\begin{array}{r}
 \cancel{7}8 \overset{10+6}{6} \\
 - 59 \\
 \hline
 27
 \end{array}$$

$$\begin{array}{r}
 78 \overset{1}{6} \\
 - 59 \\
 \hline
 27
 \end{array}$$

Progression from mental to written strategies - KS2
Multiplication (Years 3 and 4)

Multiplication as repeated addition:

eg $7 + 7 + 7 = 3 \times 7$ (or 7×3)

Vertical method:

eg

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 56 \quad (7 \times 8) \\ 210 \quad (7 \times 30) \\ \hline 266 \end{array}$$

2-digit \times 2-digit:

$$\begin{array}{r} 45 \\ \times 23 \\ \hline 15 \quad (3 \times 5) \\ 120 \quad (3 \times 40) \\ 100 \quad (20 \times 5) \\ 800 \quad (20 \times 40) \\ \hline 1035 \\ + \end{array}$$