



## Long division

A written method that could be used to divide a number by another number. There is more than one way to set out a long division. For example:

$$86\ 894 \div 25 = ?$$

Firstly write it down.

$$\text{So } 86\ 894 \div 25 = \begin{array}{r} 25 \overline{)86894} \end{array}$$

Then work out how many times 25 goes into 86.

$$\begin{array}{r} 25 \overline{)86894} \end{array}$$

$4 \times 25 = 100$ , which is too large. Let's try 3.  $3 \times 25 = 75$ .

So, 25 goes into 86 three times, with a little left over. Put the 3 right above the 6:

$$\begin{array}{r} 3 \\ 25 \overline{)86894} \end{array}$$

Multiply the 25 by 3 and place that under the 86.

$$25 \times 3 = 75 \quad \longrightarrow \quad \begin{array}{r} 3 \\ 25 \overline{)86894} \\ \underline{75} \end{array}$$

Then subtract the 75 from 86.

$$\begin{array}{r} 3 \\ 25 \overline{)86894} \\ \underline{-75} \\ 11 \end{array}$$

Now we repeat the **division, multiplication and subtraction cycle** for the rest of the number to reach our answer.

25 doesn't go into the remaining 11, so we bring the 8 down to make 118.

$$\begin{array}{r} 3 \\ 25 \overline{)86894} \\ \underline{-75} \downarrow \\ 118 \end{array}$$

How many times does 25 go into 118? We know from our working out earlier that  $25 \times 4 = 100$ . So 4 is probably the best fit. Place 4 above the 8.

$$\begin{array}{r} 34 \\ 25 \overline{)86894} \\ \underline{-75} \phantom{0} \\ 118 \end{array}$$

$$\begin{array}{r} 34 \\ 25 \overline{)86894} \\ \underline{-75} \phantom{0} \\ 118 \end{array}$$

$25 \times 4 = 100 \rightarrow 100$

Now subtract.

$$\begin{array}{r} 34 \\ 25 \overline{)86894} \\ \underline{-75} \phantom{0} \\ 118 \\ \underline{-100} \\ 18 \end{array}$$

$118 - 100 = 18 \rightarrow 18$

Let's continue repeating the steps. 25 won't go into 18 so let's bring down the 9.

$$\begin{array}{r} 34 \\ 25 \overline{)86894} \\ \underline{-75} \phantom{0} \\ 118 \\ \underline{-100} \\ 189 \end{array}$$

How many times does 25 go into 189? Let's try 8.  $25 \times 8 = 200$ , which is too large.

$7 \times 25 = 175$ .

Place 7 above the 9.

$$\begin{array}{r} 347 \\ 25 \overline{)86894} \\ \underline{-75} \phantom{0} \\ 118 \\ \underline{-100} \\ 189 \end{array}$$

Place the 175 under the 189.

$$\begin{array}{r}
 347 \\
 25 \overline{)86894} \\
 \underline{-75} \downarrow \\
 118 \\
 \underline{-100} \downarrow \\
 189 \\
 \underline{-175}
 \end{array}$$

$25 \times 7 = 175$  →

Now subtract

$$\begin{array}{r}
 347 \\
 25 \overline{)86894} \\
 \underline{-75} \downarrow \\
 118 \\
 \underline{-100} \downarrow \\
 189 \\
 \underline{-175} \\
 14
 \end{array}$$

$189 - 175 = 14$  →

Divide

25 won't go into 14, so bring the 4 down.

$$\begin{array}{r}
 347 \\
 25 \overline{)86894} \\
 \underline{-75} \downarrow \\
 118 \\
 \underline{-100} \downarrow \\
 189 \\
 \underline{-175} \downarrow \\
 144
 \end{array}$$

$144 \div 25 = 5$ , with some remaining. Place the 5 above the 4.

$$\begin{array}{r}
 3475 \\
 25 \overline{)86894} \\
 \underline{-75} \downarrow \\
 118 \\
 \underline{-100} \downarrow \\
 189 \\
 \underline{-175} \downarrow \\
 144
 \end{array}$$

Multiply, place under the 144 and subtract.

$$\begin{array}{r}
 3475 \\
 25 \overline{)86894} \\
 \underline{-75} \phantom{00} \\
 118 \phantom{00} \\
 \underline{-100} \phantom{00} \\
 189 \phantom{00} \\
 \underline{-175} \phantom{00} \\
 144 \phantom{00} \\
 \underline{-125} \phantom{00} \\
 19
 \end{array}$$

$$\begin{array}{r}
 31 \\
 144 \\
 \underline{-125} \\
 19
 \end{array}$$

So the answer to  $86\,894 \div 25 = 3475$  with a remainder of 19.