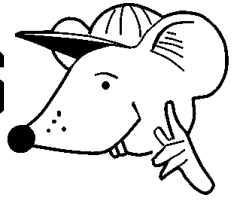# MATHEMATICS

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**Develop and refine written methods
for division.**

Equipment

Pencil, paper.

MathSphere

Concepts

Children should understand that approximating an answer is important in many contexts and may be used to see if the answer to a problem looks reasonable.

In many cases, an approximate answer is all that is needed. Eg. If a garage base needs 3.7 cubic metres of concrete, it is sufficient to know that the answer is just under 4 cubic metres, as this is probably the amount that will need to be purchased anyway.

In this module, we are looking at estimating an answer and then using ideas that lead to a formal, written method of division.

Method 1.

Eg. $458 \div 8$
First an approximate answer.

The answer to **$458 \div 8$** lies between **$400 \div 8$** and **$480 \div 8$**, ie between **50** and **60**.
_____

Now perform the sum by using **multiples of the divisor** (ie multiples of **8**) and 'nibbling' away at the dividend (first number in the division sum).

We can write this out like this:

$$
\begin{array}{rl}
458 & \\
-\underline{400} & (50 \times 8) \\
58 & \\
-\underline{40} & (5 \times 8) \\
18 & \\
-\underline{16} & (2 \times 8) \\
\underline{2} & \\
\end{array}
$$

Multiples of 8

So the answer is **<u>57 remainder 2</u>**

Concepts (Contd)

Method 2.

Eg. $586 \div 7$

First an approximate answer.

The answer to **$586 \div 7$** is a little more than **$560 \div 7 = 80$**.

_____

Lay the sum out in a more conventional manner, firstly taking away a tens multiple of the divisor (7 in this case).

```
   83          This is equivalent to:        ____
 7)586                                      7)586
   56                                         560        (80 × 7)
   26                                          26
   21                                          21        (3 × 7)
    5                                           5  ←——  Remainder
```

The answer to **$586 \div 7$** is therefore **83** remainder **5**

Children will continue to need a lot of help and encouragement with this topic.

In this module, we lead the children through the operation using sums involving hundreds, tens and units divided by units and then some examples for them to try.

It would probably be better to try just a few examples at a time and spread the work out to allow time for assimilation.

Now that you can do some division sums in your head, we are going to see how you can write down more difficult ones.

Always begin with an estimate of the answer.

Let's say we want to divide **655** by **9**.

First, we estimate the answer: **655 ÷ 9 is about 700 ÷ 10 = 70**

We can do this by taking away **large multiples of 9** and **then smaller multiples of 9** until only the remainder is left:

$$
\begin{array}{r}
655 \\
-\ \underline{360} \qquad (40 \times 9) \\
295 \\
-\ \underline{180} \qquad (20 \times 9) \\
115 \\
-\ \underline{90} \qquad (10 \times 9) \\
25 \\
-\ \underline{18} \qquad (2 \times 9) \\
7
\end{array}
$$

Multiples of 9

The answer to 655 ÷ 9 = <u>72 remainder 7</u>

(Check this with the estimate!)

It doesn't really matter which multiples of 9 we choose, but it is easier to begin with the larger ones first.

Let's try one together.

You fill in the boxes.

Let's divide 836 by 7

First, the estimate: 836 ÷ 7 is roughly 840 ÷ 7 = 120

$$
\begin{array}{r}
\mathbf{836} \\
-\ \boxed{} \quad (\mathbf{100 \times 7}) \\
\hline
\mathbf{136} \\
-\ \boxed{} \quad (\mathbf{10 \times 7}) \\
\hline
\mathbf{66} \\
-\ \boxed{} \quad (\mathbf{9 \times 7}) \\
\hline
\mathbf{3}
\end{array}
$$

Multiples of 7

The answer to 836 ÷ 7 = <u>119 remainder 3</u>
(Check this with the estimate!)

Now try these on your own. Don't forget to do an estimate first.

a. $637 \div 5$ **b.** $974 \div 7$ **c.** $476 \div 3$ **d.** $422 \div 5$
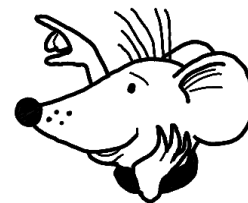
e. $592 \div 8$ **f.** $712 \div 6$ **g.** $725 \div 4$ **h.** $665 \div 5$

We can also set these sums out by starting the division with the left digit, like this:

Let's divide **658** by **9**

First, the estimate:　658 ÷ 9 is roughly 700 ÷ 10 = 70

$$
\begin{array}{r}
73 \\
9\overline{)658} \\
\underline{63} \\
28 \\
\underline{27} \\
1 \\
\end{array}
$$

← **Answer**

← **Remainder**

Here we see that **9** divides into **6** no times, so we see if **9** will divide into **65**.

It divides **7** times, so we write this at the top and work out the remainder, which is **2**.

Bring the **8** down to make **28** and divide this by **9**.

This divides **3** times with remainder **1**.

Let's try another one.

Let's divide **857** by **6**

First, the estimate:　857 ÷ 6 is a little less than 900 ÷ 6 = 150

$$
\begin{array}{r}
142 \\
6\overline{)857} \\
\underline{6} \\
25 \\
\underline{24} \\
17 \\
\underline{12} \\
5 \\
\end{array}
$$

← **Answer**

← **Remainder**

Here we see that **6** divides into **8** once, so we put 1 in the answer space.

This leaves a remainder of **2**, so we bring down the **5** to make **25**.

6 divides into **25** four times, so we put **4** in the answer space.

This leaves a remainder of **1**, so we bring down the **7** and divide **6** into **17**. This goes **2** times with a remainder of **5**.

Now try these on your own. Don't forget to do an estimate first.

Be careful how you set these sums out. It is very easy to make mistakes, so make sure you put all the digits in the correct columns.

a. $845 \div 4$ **b.** $638 \div 7$ **c.** $612 \div 9$ **d.** $831 \div 8$

e. $946 \div 3$ **f.** $844 \div 5$ **g.** $736 \div 9$ **h.** $749 \div 6$

i. $774 \div 5$ **j.** $834 \div 9$ **k.** $375 \div 7$ **l.** $749 \div 5$

m. $965 \div 4$ **n.** $184 \div 9$ **o.** $757 \div 5$ **p.** $835 \div 5$

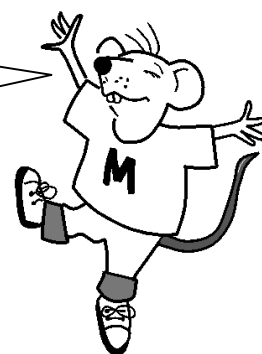I expect your brain is strained after that!

Take a break and answer this riddle:

A man was lying in the middle of a ploughed field. He was dead.

He had a pack on his back.

There were no footprints anywhere around.

What was in the pack?

Answers

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The numbers in the boxes are 700, 70 and 63 respectively.

a. 127 r 2   **b.** 139 r 1   **c.** 158 r 2   **d.** 84 r 2
e. 74 r 0   **f.** 118 r 4   **g.** 181 r 1   **h.** 133 r 0

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a. 211 r 1   **b.** 91 r 1   **c.** 68 r 0   **d.** 103 r 7
e. 315 r 1   **f.** 168 r 4   **g.** 81 r 7   **h.** 124 r 5
i. 154 r 4   **j.** 92 r 6   **k.** 53 r 4   **l.** 149 r 4
m. 241 r 1   **n.** 20 r 4   **o.** 151 r 2   **p.** 167 r 0

What's in the backpack? A parachute, of course!