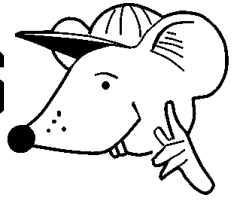


# MATHEMATICS



**N.S. Yr. 6 P.69**

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

## Equipment

Pencil, paper.

# MathSphere

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### 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.  $784 \div 47$**

First an approximate answer.

The answer to  $784 \div 47$  is close to  $800 \div 50 = 16$ .

Now perform the sum by using **multiples of the divisor** (ie multiples of **47**) and 'nibbling' away at the dividend (first number in the division sum).

We can write this out like this:

		<b>784</b>	
		<b>- 470</b>	<b>(10 × 47)</b>
		<b>314</b>	
<b>Multiples of 47</b>	→	<b>- 235</b>	<b>(5 × 47)</b>
		<b>79</b>	
	→	<b>- 47</b>	<b>(1 × 47)</b>
		<b>32</b>	

So the answer is **16 remainder 32, which we can write as  $16^{32}_{47}$**

Concepts (Contd)**Method 2.****Eg.  $867 \div 32$** 

First an approximate answer.

The answer to  $867 \div 32$  is roughly the same as  $900 \div 30 = 30$ .

\_\_\_\_\_

Lay the sum out in a more conventional manner, firstly taking away a tens multiple of the divisor (**32** in this case).

$\begin{array}{r} 27 \\ 32 \overline{)867} \\ \underline{64} \\ 227 \\ \underline{224} \\ 3 \end{array}$	This is equivalent to:	$\begin{array}{r} 32 \overline{)867} \\ \underline{640} \\ 227 \\ \underline{224} \\ 3 \end{array}$	$(20 \times 32)$  $(7 \times 32)$  $\leftarrow$ Remainder
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The answer to  $867 \div 32$  is therefore **27 remainder 3 which we can write as  $27^3/_{32}$** 

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 tens and units and then some examples for them to try. This can then be developed into the realm of decimals as follows:

**Eg.  $118.4 \div 8$** 

$$\begin{array}{r} 8 \overline{)118.4} \\ - \underline{80.0} \\ 38.4 \\ - \underline{32.0} \\ 6.4 \\ - \underline{6.4} \\ 0.0 \end{array}$$

$(10 \times 8)$   
  
 $(4 \times 8)$   
  
 $(0.8 \times 8)$

**So the answer is 14.8**



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 **855** by **23**.

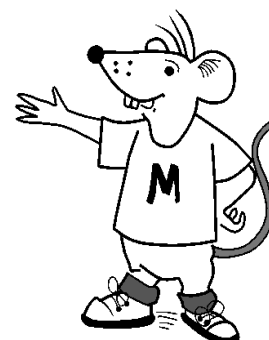
First, we estimate the answer:  **$855 \div 23$  is about  $800 \div 20 = 40$**

We can do this by taking away **large multiples of 23** and **then smaller multiples of 23** until only the remainder is left:

	<b>855</b>	
	<b>- 230</b>	<b>(10 × 23)</b>
	<b>625</b>	
	<b>- 460</b>	<b>(20 × 23)</b>
	<b>165</b>	
Multiples of 23	<b>- 115</b>	<b>(5 × 23)</b>
	<b>50</b>	
	<b>- 46</b>	<b>(2 × 23)</b>
	<b>4</b>	

**The answer to  $855 \div 23 = \underline{37 \text{ remainder } 4}$ , which is  $37\frac{4}{23}$**   
(Check this with the estimate!)

It doesn't really matter which multiples of **23** we choose, but it is easier to begin with the larger ones first if you can.



Let's try one together.

You fill in the boxes.



Let's divide 593 by 34

First, the estimate:  $593 \div 34$  is roughly  $600 \div 30 = 20$

Multiples of 34

593	-		(10 × 34)
253	-		(5 × 34)
83	-		(2 × 34)
15			

**The answer to  $593 \div 34 = 17$  remainder 15 which is  $17^{15}/_{34}$**   
 (Check this with the estimate!)

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



a.  $845 \div 38$

b.  $286 \div 15$

c.  $759 \div 62$

d.  $836 \div 73$

e.  $482 \div 62$

f.  $472 \div 66$

g.  $765 \div 82$

h.  $502 \div 27$

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



Let's divide **749** by **68**

First, the estimate:  $749 \div 68$  is roughly  $700 \div 70 = 10$

$$\begin{array}{r}
 15 \leftarrow \text{Answer} \\
 48 \overline{)749} \\
 \underline{48} \phantom{0} \\
 269 \\
 \underline{240} \\
 29 \leftarrow \text{Remainder}
 \end{array}$$

Here we see that **48** divides into **7** no times, so we see if **48** will divide into **74**.

It divides **1** time, so we write this at the top and work out the remainder, which is **26**.

Bring the **9** down to make **269** and divide this by **48**.

This divides **5** times with remainder **29**.

So, the answer is **15 remainder 29** which we write as  $15^{29}/_{48}$

Let's try another one.



Let's divide **775** by **23**

First, the estimate:  $775 \div 23$  is roughly the same as  $800 \div 20 = 40$

$$\begin{array}{r}
 33 \leftarrow \text{Answer} \\
 23 \overline{)775} \\
 \underline{69} \phantom{0} \\
 85 \\
 \underline{69} \\
 16 \leftarrow \text{Remainder}
 \end{array}$$

Here we see that **23** divides into **77** three times, so we put **3** in the answer space.

This leaves a remainder of **8**, so we bring down the **5** to make **85**.

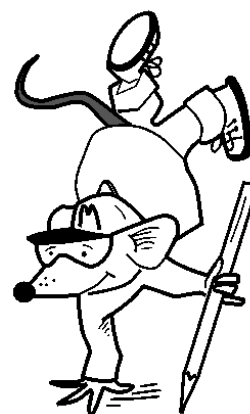
**23** divides into **85** three times, so we put **3** in the answer space.

This leaves a remainder of **16** and that's the end.

The answer is **33 remainder 16**, which we write as  $33^{16}/_{23}$

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.



1.

- a.  $794 \div 24$       b.  $834 \div 45$       c.  $385 \div 24$       d.  $593 \div 14$   
e.  $733 \div 43$       f.  $673 \div 28$       g.  $745 \div 35$       h.  $856 \div 17$   
i.  $845 \div 35$       j.  $276 \div 41$       k.  $575 \div 63$       l.  $856 \div 23$   
m.  $544 \div 31$       n.  $645 \div 45$       o.  $573 \div 26$       p.  $523 \div 27$

2.

Finally, why not try these divisions with decimals?

- a.  $34.4 \div 8$       b.  $114.5 \div 5$       c.  $109.2 \div 7$       d.  $204.6 \div 6$   
e.  $44.4 \div 3$       f.  $257.4 \div 9$       g.  $306.6 \div 7$       h.  $155.2 \div 8$

Well done! Have a lie down!



**Answers****Page 5**

The numbers in the boxes are 340, 170 and 68 respectively.

**a.**  $22\frac{9}{38}$     **b.**  $19\frac{1}{15}$     **c.**  $12\frac{15}{62}$     **d.**  $11\frac{33}{73}$

**e.**  $7\frac{48}{62}$     **f.**  $7\frac{10}{66}$     **g.**  $9\frac{27}{82}$     **h.**  $18\frac{16}{27}$

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**1.**

**a.**  $33\frac{2}{24}$     **b.**  $18\frac{24}{45}$     **c.**  $16\frac{1}{24}$     **d.**  $42\frac{5}{14}$

**e.**  $17\frac{2}{43}$     **f.**  $24\frac{1}{28}$     **g.**  $21\frac{10}{35}$     **h.**  $50\frac{6}{17}$

**i.**  $24\frac{5}{35}$     **j.**  $6\frac{30}{41}$     **k.**  $9\frac{8}{63}$     **l.**  $37\frac{5}{23}$

**m.**  $17\frac{17}{31}$     **n.**  $14\frac{15}{45}$     **o.**  $22\frac{1}{26}$     **p.**  $19\frac{10}{27}$

**2.**

**a.** 4.3    **b.** 22.9    **c.** 15.6    **d.** 34.1

**e.** 14.8    **f.** 28.6    **g.** 43.8    **h.** 19.4