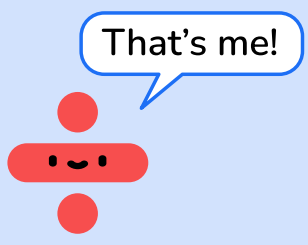
Remainders

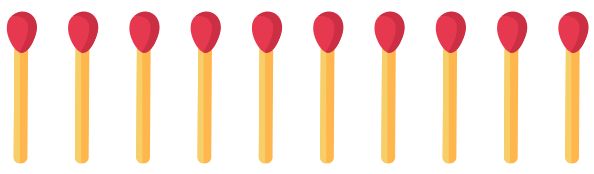
Division is the calculation we use to share an amount into equal groups. The result of a division is called a **quotient**.

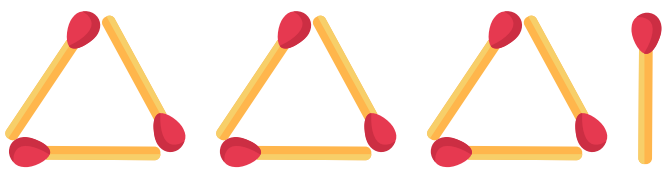


The **division** symbol looks like this: ÷

Sometimes a number **cannot** be exactly divided into **equal groups** by another number. When this happens, the amount left over is called **the remainder**.

Let's say we have **10 matches** and we want to make as many triangles as possible, where each triangle is made up of **3 matches**.





We can make **3 complete triangles** but then we have **one** match **left over**!

This means that 10 divided by 3 is equal to **3 with a remainder of 1**. In maths, we write 10 ÷ 3 = **3 r 1**.

Method

How can we solve a problem with **short division** when there is a **remainder**?

1 Start by writing the number we are dividing (the **dividend**) inside the 'bus stop' and the number we are dividing it by (the **divisor**) outside!

Here is an example with **93 ÷ 6**.

$$6\overline{)93}$$

2 We start with the **first digit** inside the bus stop. This is in the tens column.

How many times does 6 go into 9? In other words, what is **9 ÷ 6**?

6 goes into 9 only **once** so we write a **1** on top of the 'bus stop' over the 9.

When we divide 9 by 6, we get a **remainder of 3**. We can **exchange** this remainder (3 tens) for 30 ones. We show this exchange with a **little 3**.

$$\begin{array}{r} 1 \\ 6\overline{)9^{3}3} \end{array}$$

3 Then, we move on to the next digit to the right, in the ones column.

The 3 tens we exchanged are added on to the 3, so our next step is to figure out how many times 6 goes into **33**. Or, **33 ÷ 6**.

We know that **30 ÷ 6 = 5** so we can figure out...

33 ÷ 6 = 5, with 3 remaining.

We write a 5 over the line above the 3.

$$\begin{array}{r} 1\,5 \\ 6\overline{)9^{3}3} \end{array}$$

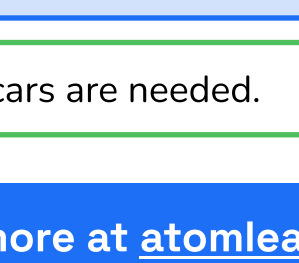
4 We still have 3 left over from our last step. We show this in our short division by adding the **remainder** to the right of the answer!

$$\begin{array}{r} 1\,5\ \mathbf{r\ 3} \\ 6\overline{)9^{3}3} \end{array}$$

We have reached the answer! 93 divided by 6 is equal to **15 with a remainder of 3**. This means that we can make **6 equal groups** of 15 out of 93 but that there are 3 more that we cannot group!

Example Question

A school of 650 students goes to a theme park. On Doom Fall, the fastest roller coaster at the park, each car seats 4 children.



How many cars are needed for the whole school to go on Doom Fall?

1 To answer this question we need to **divide 650 by 4**.

2 We can use short division to do this.

6 ÷ 4 = **1**, with 2 remaining.

25 ÷ 4 = **6**, with 1 remaining.

10 ÷ 4 = **2**, with 2 remaining.

$$\begin{array}{r} 1\,6\,2\ \mathrm{r}\ 2 \\ 4\overline{)6^{2}5^{1}0} \end{array}$$

3 Dividing 650 by 4 has given us an answer of **162 with a remainder of 2**.

This means that the students would fill 162 cars of the roller coaster completely, and after that there would be 2 students left over.

4 For the **whole school** to go on the ride, we need to count one **extra car** for the remaining 2 students.

162 + 1 = **163**

For everyone to ride, **163** cars are needed.