Times Tables and Fractions (2)

In this set of tasks, we are going to look at the patterns you get when you change fractions to decimals and now you are going to be really glad you know your multiplication tables very well.

You may already know that fractions are really division sums.

So the fraction $\frac{1}{2}$ really means **1** divided by **2**.

The fraction $\frac{3}{4}$ means **3** divided by **4.**

We can use this fact to change any fraction to a decimal.

All we need to do is to divide the numerator by the denominator.

To change $\frac{1}{2}$ to a decimal, we do this sum:

$$2\overline{)1.0}$$
$$0.5$$

Notice that we needed to put one zero after the decimal point.

To change $\frac{3}{4}$ to a decimal, we do this sum:

$$4\overline{)3.00}$$
$$0.75$$

This time we needed to put two zeroes after the decimal point.

Make sure you can do these division sums.

Before we carry on, you might be wondering how we know how many zeroes we are going to need. The answer is that in most cases you don't know, so if you are not sure just put a few.

If you find you have not put enough, you can always add some more, and if you have put too many, you can ignore the extra ones. It's not a big problem you need to worry about.

Now let's try a more tricky one: Let's change $\frac{5}{7}$ to a decimal.

This time I am going to show all the working out, so you can follow what I am doing:

$$7\overline{)5.{}^{5}0{}^{1}0{}^{3}0{}^{2}0{}^{6}0000000}$$
$$0.71428\ldots.$$

<u>Before you go to the next page</u>, carry on with this division for 5 more decimal places. No cheating!

Okay, so what have you discovered? Well, you should have found that the digits in the answer begin to repeat themselves and if you carried on for more decimal places, you would have the answer:

0.714285714285714285….. with the digits **714285** repeating over and over again.

So we have two different types of answers, those that finish quite quickly like

$\mathbf{\frac{1}{2}}$ and $\mathbf{\frac{3}{4}}$ and those that repeat digits like $\mathbf{\frac{5}{7}}$.

You might think that some fractions could give you decimals that go on for ever, but don't repeat themselves. This is actually impossible, but I am not to explain why here – we have enough to be thinking about.

So, now it's your turn. What I would like you to do is to change lots of fractions into decimals and see if they stop quickly or if they produce a repeating decimal.

On the next page is a table with fractions in the left hand column and spaces for your decimal answer in the right hand column. As usual, I have put in the ones we have already done to give you the idea.

When you have done quite a few, you should be looking for patterns in the answers.

For those of you that like a bit more technical detail, I can tell you that repeating decimals are usually called 'recurring' decimals and as they go on forever, we can't write down all the digits.

To show they recur, we normally put a dot above the first and last digits that recur. So, for example, in the one we made earlier, we write:

$$\mathbf{0.\dot{7}1428\dot{5}}$$

with a dot over the **7** and the **5**. This is means **0.714285714285714285…..**

I think you can see this is not the same as just **0.714285.**

If there is only one recurring digit we just **one** dot over that, so $\mathbf{0.\dot{3}}$ means **0.3333…**

There is a lot to discover here if you are interested and not a calculator in sight!

In this table to save space I write $\frac{3}{4}$ as ¾ etc. I hope you don't mind!

1/2	**0.5**
1/3	
2/3	
1/4	
2/4	
3/4	**0.75**
1/5	
2/5	
3/5	
4/5	
1/6	
2/6	
3/6	
4/6	
5/6	
1/7	
2/7	
3/7	
4/7	
5/7	**0.714285714285714285…..**
6/7	

Now you have the idea you can make up some of your own fractions. Fractions with denominators of **9, 11** and **13** are very interesting ones, but I am sure you were just about to try those!