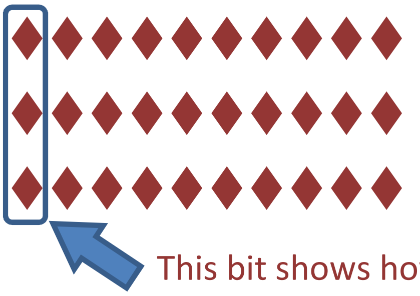
Divide by 10 using place value.  *Stg 5 x/÷* Name: ________________

Divide by 10? *What, you must be kidding, sounds really hard!* Nah, not at all. Have a look at this:
In the number 30 you can imagine it as 3 sets of 10:



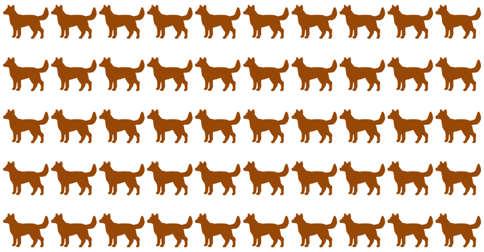
= 10
= 10
= 10

30 **So, when you ÷ 10, you are saying how many 10s fit in the whole set.**

This bit shows how many sets you've got. **30 ÷ 10 = 3**

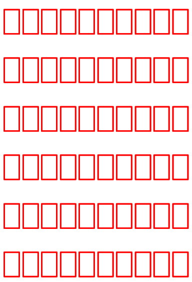
What you'll notice now is that **'3'** and **'30'** look similar. Thirty just has a zero glued on to it. This is handy because to find out how many groups of 10 are in a big number we can unglue that zero. Try some – you can circle a set to help figure out how many sets of 10 you have:

Here are 40 boxes. They need to be sent to 10 different places. How many boxes go to each place? 40 ÷ 10 = _____



Here are 50 police dogs. They need to be trained in 10 different cities. How many dogs go to each city? 50 ÷ 10 = _____

Here are Mrs Denne's 20 pet scorpions. She wants to terrify 10 kids in her class. How many scorpions can she put in each of their desks? 20 ÷ 10 = _____



In this game of snap there are 60 cards. There are 10 players. How many cards do they get each? 60 ÷ 10 = _____

OK, let's review. To chop a big number into sets of 10 we can find a clue in the big number. 30 has 3 tens, 20 has __ tens and so on. We don't really need to see the sets anymore though – we can just use the number. **Have a go:**

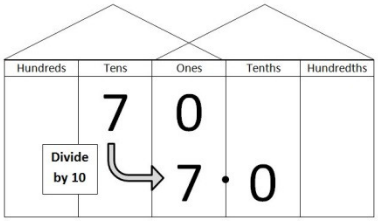
a.	70 ÷ 10 = ____	b.	90 ÷ 10 = ____	c.	50 ÷ 10 = ____
d.	10 ÷ 10 = ____	e.	40 ÷ 10 = ____	f.	30 ÷ 10 = ____
g.	20 ÷ 10 = ____	h.	100 ÷ 10 = ____	i.	60 ÷ 10 = ____
j.	80 ÷ 10 = ____	j.	110 ÷ 10 = ____	l.	130 ÷ 10 = ____
m.	190 ÷ 10 = ____	n.	150 ÷ 10 = ____	o.	120 ÷ 10 = ____
p.	170 ÷ 10 = ____	q.	200 ÷ 10 = ____	r.	180 ÷ 10 = ____

Q: What did one maths book say to the other?
A: Don't bother me I've got my own problems!

Dave Moran v2 2016

Divide by 10 using place value.  *Stg 5/E6 x/÷* Name: ____________

When we need to divide something by 10, we can go back to our old friend – **place value!** Understanding place value allows us to divide by 10, or 100 or even 1000 without even having to 'do' much maths! *(Yay, I can let my poor brain have a rest!)* True, but you do need to know what's going on. Say if you are asked to divide **70** by **10** (**70 ÷ 10**, how many **10s in 70**, or how many **groups of 10** are in **70** – all the same question). You might be tempted to say 'take away the zero!' to get the answer. But if you take nothing away from something, you still have the same something right? So what is really happening?



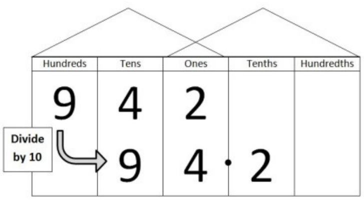
Alright, I'll tell you. The number is shifting it's place values – in 70, the 'ones' place is being kept by a zero (that's its job in this case). When we divide that big number we're 'downgrading' it, so that each number is 10 times smaller, and so now fits in the column for smaller values. The zero that was place holding in the ones column, is now holding a place in the tenths column, and looks like 7.0 - we usually don't show the 'point zero' though, it's not really needed. **E.g. 70 ÷ 10 = 7,**

There is a bit of a trick though – you must not change the order of your original number!

E.g. 4320 ÷ 10 = 432, **20050 ÷ 10 = 2005** Have a try for yourself:

1.	90 ÷ 10 = __.	900 ÷ 10 = ___ .	9000 ÷ 10 = **900**
2.	80 ÷ 10 = __.	800 ÷ 10 = **80** .	8000 ÷ 10 = ______
3.	60 ÷ 10 = __.	600 ÷ 10 = ___ .	6000 ÷ 10 = ______
4.	30 ÷ 10 = __.	300 ÷ 10 = ___ .	3000 ÷ 10 = ______
5.	120 ÷ 10 = __.	1200 ÷ 10 = ___ .	12000 ÷ 10 = ______
6.	340 ÷ 10 = __.	3400 ÷ 10 = ___ .	34000 ÷ 10 = ______
7.	630 ÷ 10 = __.	6300 ÷ 10 = ___ .	63000 ÷ 10 = ______
8.	780 ÷ 10 = __.	7800 ÷ 10 = ___ .	78000 ÷ 10 = ______
9.	910 ÷ 10 = __.	9100 ÷ 10 = ___ .	91000 ÷ 10 = ______
10.	880 ÷ 10 = __.	8800 ÷ 10 = ___ .	88000 ÷ 10 = ______
11.	470 ÷ 10 = __.	4700 ÷ 10 = ___ .	47000 ÷ 10 = ______
12.	560 ÷ 10 = __.	5600 ÷ 10 = ___ .	56000 ÷ 10 = ______

Ok, but what if the number you start with has a value in the **ones**? No worries:

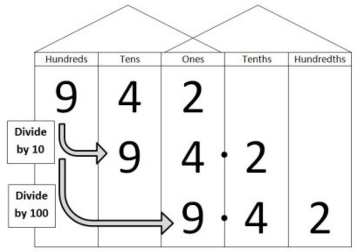


12 ÷ 10 = **1.2**	56 ÷ 10 = ___	84 ÷ 10 = __
304 ÷ 10 = ___	762 ÷ 10 = ___	7892 ÷ 10 = ___
697 ÷ 10 = ___	809 ÷ 10 = ___	559 ÷ 10 = ___
321 ÷ 10 = ___	419 ÷ 10 = ___	7509 ÷ 10 = ___

Dave Moran v2 2016

Divide by 10 using place value.  *Stg 6/E7 x/÷* Name: ____________

We've learned that dividing by 10 is pretty easy right? (*Yep, with you there*) So, naturally the next question is; 'can we use the same trick for bigger or more complicated numbers?'
Answer: Y'all are darn-tootin' y'can! (That's old-west for 'yes')

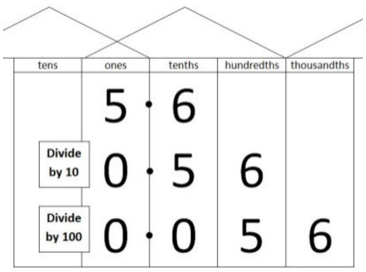


As always with place value, the main trick is to **keep the number in order.** Especially when you are dividing or multiplying by 10s, 100s, 1000s or bigger.

Let's have a bit of a go with some easy ones to start with:

E.g **1234 ÷ 10 = 123.4** **1234 ÷ 100 = 12.34** **1234 ÷ 1000 = 1.234**

1. 2435 ÷ 10 = _____ 2435 ÷ 100 = ______ 2435 ÷ 1000 = ______
2. 2089 ÷ 10 = _____ 2089 ÷ 100 = ______ 2089 ÷ 1000 = ______
3. 6507 ÷ 10 = _____ 6507 ÷ 100 = ______ 6507 ÷ 1000 = ______
4. 5923 ÷ 10 = _____ 5923 ÷ 100 = ______ 5923 ÷ 1000 = ______
5. 9890 ÷ 10 = _____ 9890 ÷ 100 = ______ 9890 ÷ 1000 = ______
6. 1000 ÷ 10 = _____ 1000 ÷ 100 = ______ 1000 ÷ 1000 = ______



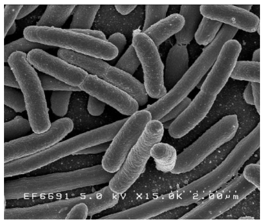
Tip: count the zeros in the 'divisor' (the number you're dividing by) and just shift your place value that many times. E.g. divide by 1**00**? Slide the number along **2** places to the right!

You can use this technique with small decimal numbers too. You might get asked something like 5.6 ÷ 100. You can use the same trick – just slide it along two places to the right. 5.6 ÷ 100 = 0.056 - just remember to put a zero in the ones column as a place holder (yes, we do really need to)

7. 3.7 ÷ 10 = 0.___ 3.7 ÷ 100 = 0.0___ 3.7 ÷ 1000 = **0.0037**
8. 4.2 ÷ 10 = _____ 4.2 ÷ 100 = **0.042** 4.2 ÷ 1000 = 0.00__
9. 3.0 ÷ 10 = _____ 3.0 ÷ 100 = ______ 3.0 ÷ 1000 = ______
10. 6.9 ÷ 10 = _____ 6.9 ÷ 100 = ______ 6.9 ÷ 1000 = ______
11. 7.5 ÷ 10 = _____ 7.5 ÷ 100 = ______ 7.5 ÷ 1000 = ______
12. 54.6 ÷ 10 = _____ 54.6 ÷ 100 = ______ 54.6 ÷ 1000 = ______
13. 0.3 ÷ 10 = _____ 0.3 ÷ 100 = ______ 0.3 ÷ 1000 = ______
14. 0.8 ÷ 10 = _____ 0.8 ÷ 100 = ______ 0.8 ÷ 1000 = ______
15. 98.7 ÷ 10 = _____ 98.7 ÷ 100 = ______ 98.7 ÷ 1000 = ______
16. 613 ÷ 10 = _____ 613 ÷ 100 = ______ 613 ÷ 1000 = ______
17. 23.4 ÷ 10 = _____ 23.4 ÷ 100 = ______ 23.4 ÷ 1000 = ______
18. 7.89 ÷ 10 = _____ 7.89 ÷ 100 = ______ 7.89 ÷ 1000 = ______

Dave Moran v2 2016

Divide by 10 using place value.  *Stg E7 x/÷* Name: _____________



What about **super tiny numbers**? Numbers that make dust look big. The distance between a flea's whiskers. Microscopic stuff? Have a think about bacteria for example. Most bacteria are between 0.5 of a micrometre (1/1000th of a millimetre) to 2 microns long. Check out the picture: *Escherichia coli bacteria using an electron microscope showing just **2 micrometres**.* Invisible to the naked eye. **2 micrometres** (microns in the old language) **= 0.000002 m, or we could say 2 x 10^{-6}**
Decimal numbers can show us extremely accurate fractions. Have a look at these:

prefix		**decimal**	Scientific notation
deci	d	0.1	10^{-1}
centi	c	0.01	10^{-2}
milli	m	0.001	10^{-3}
micro	µ	0.000001	10^{-6}
nano	n	0.000000001	10^{-9}
pico	p	0.000000000001	10^{-12}
femto	f	0.000000000000001	10^{-15}

Some of these you are familiar with. We use **centi**metres and **milli**metres when measuring things all the time. This chart shows the names for even smaller parts. The 'scientific notation' is a shorter way to write very small fractions that would have a lot of zeroes otherwise. (It looks like a negative number, but in this case shows a decimal)

Teeny tiny numbers **research assignment:** You won't be able to measure any of these things yourself. See if you can get access to the internet to find the answers to these unusually small problems. Make sure all of your answers are metric!

1. What is the width of a human hair ___________________________
2. The weight of a dust mite ___________________________
3. The length of a flu virus ___________________________
4. The volume of blood in a flea _________________________
5. The distance between the peaks of an ultraviolet light wave ____________________
6. The weight of a single grain of sand ____________________
7. The thickness of a layer of paint _____________________
8. The weight of 1 litre of helium at 20 degrees celcius ____________________
9. The weight of 1 litre of oxygen at 20 degrees celcius ____________________
10. The length of the world's smallest insect ________________
11. The length of a human DNA molecule ___________________
12. The weight of a single gold atom ___________________
13. The width of a hair on the leg of a daddy-long-legs spider ____________________
14. The length of the smallest thing visible to the human eye ____________________
15. The length of the smallest thing visible to an electron microscope __________________
16. The weight of a mustard seed __________________
17. The gap in the world's smallest electric switch _________________
18. The fastest ever camera shutter speed __________________
19. The amount of time light takes to travel 1 kilometre __________________
20. The thickness of 'bible paper' _____________________