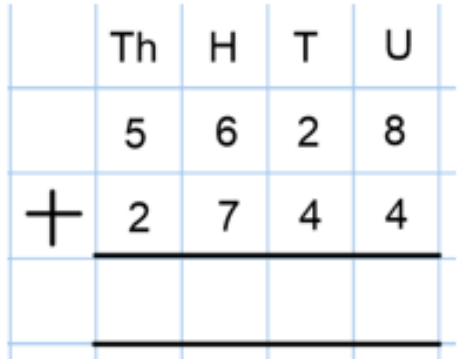
Year 6 Arithmetic strategies and support.

Addition and subtraction

Steps to Success – Column Addition

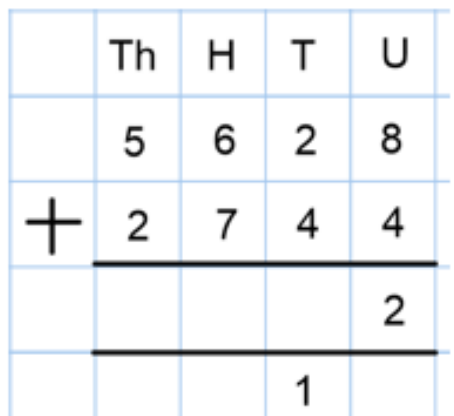
Step 1

Write out the numbers underneath a place value grid making sure the numbers are lined up correctly.



Step 2

Start by adding the units first. If you have 10 or more, you will need to 'exchange' to the next column to the left. As the 1 is in the 'tens' column, it is worth 10.



Steps to Success – Column Subtraction

Step 1

Write out the numbers underneath a place value grid making sure the numbers are lined up correctly.

	Th	H	T	U
	6	8	2	4
—	3	3	1	8

Step 2

Start by subtracting the units first. If the number on the top is smaller than the number underneath, you will need to 'exchange' from the next column to the left. On the example, you need to exchange one ten for ten units.

	Th	H	T	U
	6	8	1 ~~2~~	14
—	3	3	1	8
				6

Step 3

Keep subtracting the numbers until you have subtracted all of the columns.

	Th	H	T	U
	6	8	1 ~~2~~	14
—	3	3	1	8
	3	5	0	6

To add decimals, follow these steps:

- Write down the numbers, one under the other, with the **decimal points lined up**
- **Put in zeros** so the numbers have the same length (see below for why that is OK)
- **Then add** using column addition, remembering to put the decimal point in the answer

Example: Add 1.452 to 1.3

Line the decimals up:

```
  1.452
+ 1.3
```

"Pad" with zeros:

```
  1.452
+ 1.300
```

Add:

```
  1.452
+ 1.300
-------
  2.752
```

Putting In Zeros

Why can we put in extra zeros?

A zero is really saying "there is no value at this decimal place".

- In a number like 10, the zero is saying "no ones"
- In a number like 2.50 the zero is saying "no hundredths"

So it is safe to take a number like 2.5 and make it 2.50 or 2.500 etc

To subtract, follow the same method: line up the decimals, then subtract.

Example: What is 7.368 − 1.15 ?

Line the decimals up:

$$\begin{array}{r} 7.368 \\ -\ 1.15 \end{array}$$

"Pad" with zeros:

$$\begin{array}{r} 7.368 \\ -\ 1.150 \end{array}$$

Subtract:

$$\begin{array}{r} 7.368 \\ -\ 1.150 \\ \hline 6.218 \end{array}$$

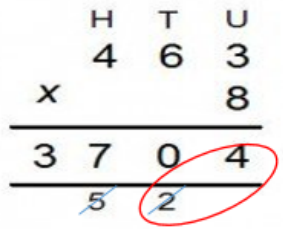
Multiplication and division

Steps to success- multiplication short method.

463 x 8 = 3704

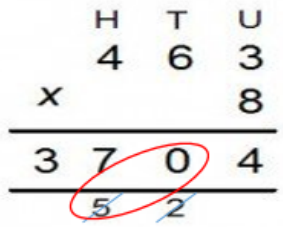
Step1

8 x 3 = 24 so place the 2 underneath the tens column and the 4 in the units column as shown in red.



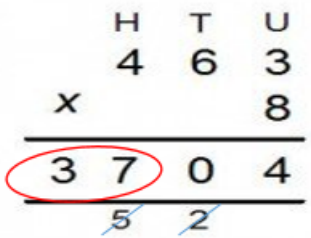
Step 2

Then do 8 x 60 (6 tens). This equals 480 (48tens). Then you add the 20 (2 tens which makes 50 tens. The 5 is placed underneath the hundreds column and the zero in the tens column as shown in red.



Step 3

8 x 400 (4 hundreds) = 3200 (32 hundred) then add the 5 hundred onto the 32 hundred which equals 37 hundred. The 3 goes in the thousands column and the 7 goes in the hundreds column as shown as shown in red.



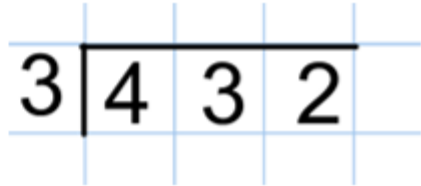
To check your answer take your answer and divide it by the second number in your starting question. The answer (if you are correct) will be the first number. E.g. 3704 divided by 8 = 463.

Steps to success – short method.

432 ÷ 3 = 144

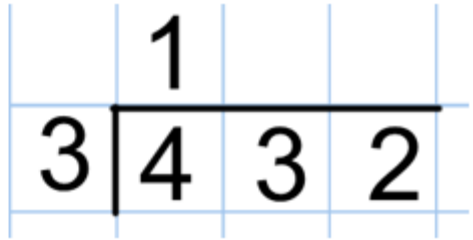
Step 1

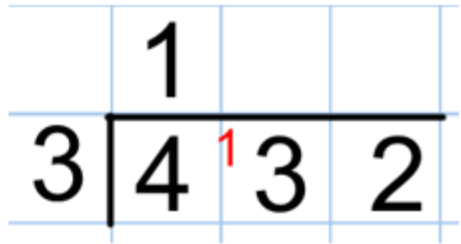
Write out the question. Place the divisor (the number you are dividing by) outside the long division bar. Place the number you are sharing inside the division bar.



Step 2

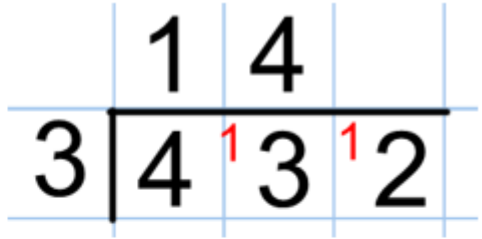
How many groups of 3 hundred are there in 4 hundred? There is 1 group of hundred left over. Exchange the 1 hundred for 10 tens.





Step 3

There are 4 groups of 3 tens (120) and 1 ten left over. Exchange 1 ten for 10 ones. Now there are 12 ones.



Step 4

How many groups of 3 ones are there in 12? There are 4 groups and there are no left over.

To check your answer take your answer and multiply it by the number you are dividing by. The answer will be the second number in the original question. E.g. 144 x 3 = 432. Don't forget if you have any remainders to add this onto your answer.

Steps to success long multiplication

4362 x 26 = 113412

Step1

Write out the question where you have the biggest number at the top and the smallest number at the bottom. Remember to line up your columns so that everything that is a unit is in the units column, everything in the tens column is in the tens column and so on.

	HTh	TTh	Th	H	T	U
			4	3	6	2
X					2	6

Step 2

Individually, multiply 6 by the numbers in the top row. And record these answers underneath. For example, 6 x2 = 12 so the 1 goes underneath the tens column and the 2 goes in the unit column. Remember to add any numbers that are carried over.

	HTh	TTh	Th	H	T	U
			4	3	6	2
X					2	6
		2	6	1	7	2
		2		3	1	

Step 3

Now, you need to add a zero underneath the units column on a new line. This a place holder as you will now be multiplying by a multiple of 10 in this case 20 (2x10).

	HTh	TTh	Th	H	T	U
			4	3	6	2
X					2	6
		2	6	1	7	2
		2		3	1	
	8	7	2	4	0	

Steps to success – long division.

2461 ÷ 14 = 175 r 11

Step 1

Write out the question. Place the divisor (the number you are dividing by) outside the long division bar. Place the number you are sharing inside the division bar.

$$14\overline{)2461}$$

Step 2

Write out your times table bank. Remember to find 1 x 14, 10 x 14 and 5x 14 first (1, 10, 5 derive). Then fill in any gaps using the answers you find. E.g. To find 2 x you would double 1x. To find 6 x add the answer for 1x and 5x together.

Bank
1x 14 = 14
2 x 14 = 28
3 x 14 = 42
4 x 14 = 56
5 x 14 = 70
6 x 14 = 84
7 x 14 = 98
8 x 14 = 112
9 x 14= 126
10x 14 = 140

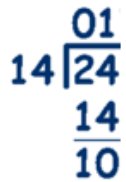
$$14\overline{)2461}$$

Step 3

Then you see how many groups of 14 go into 24. One lot goes into 24 so you place 14 (one lot of 14) underneath the 24 and place a 1 above the 24 (how many lots of 14 have been used).

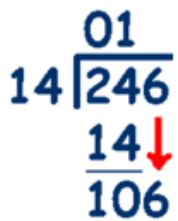
Step 4

Then you subtract 14 from 24 which leaves you with 10.



Step 5

Next, you bring down the six so the 10 becomes 106.



Step 6

Now, you need to see how many lots of 14 go into 106. The answer is 7 so you place a 7 next to the 1 and record underneath 106 the number 98 because 14 x 7 = 98.

Step 7

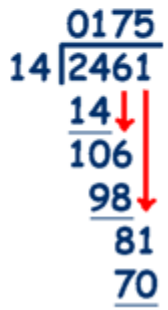
Now you need to subtract 98 from 106. This leaves you with 8.

Step 8

Now, you bring the one down so you have 81.

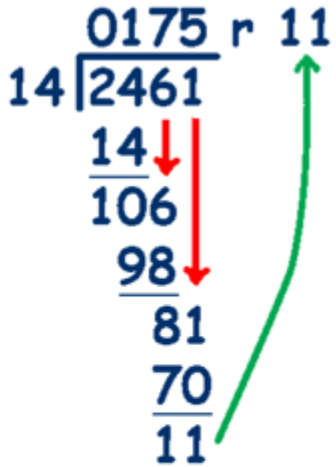
Step 9

You now need to see how many lots of 14 go into 81. 5 lots do so this number is placed next to the 7 and you write 70 underneath 80 because 14 x 5 = 70.



Step 10

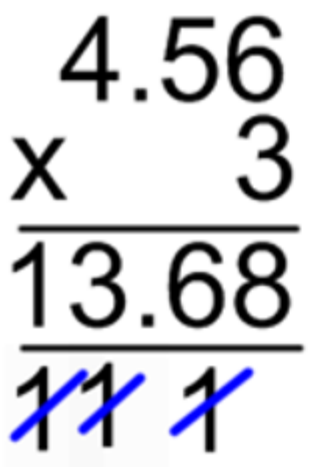
You then subtract 70 from 81 which leaves you with 11. Because 11 is less than 14 you know that you cannot take any more lots of 14 away therefore 11 is your remainder.



To check your answer take your answer and multiply it by the number you are dividing by.
E.g. 175 x 14= 2450. Then if you have any remainders, add them next e.g. 2450 + 11 = 2461.

Steps to success- multiplying decimals.

4.56 x 3 = 13.68



Step 1: 3 x 0.06 = 0.18

0.1 placed beneath the tenths column

Step 2: 3 x 0.5 (5 tenths) = 1.5 (15 tenths) Then add the 0.1 (1 tenths)

15 tenths (1.5) + 1 tenth (0.1) = 16 tenths (1.6) 1 placed beneath the ones column

Step 3: 3 x 4 (4 ones) = 12 (12 ones) Then add the 1 one placed beneath the ones column

12 ones (12) + 1 one (1) = 13 ones (13)

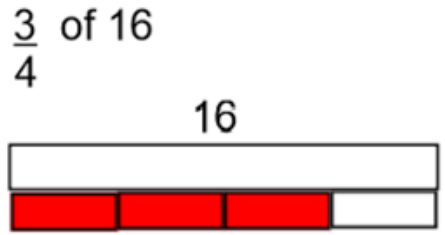
Fractions and percentages

Steps to Success – Fraction of an amount

¾ of 16

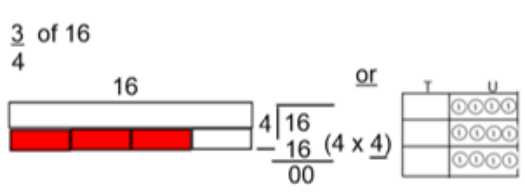
Step 1

Draw a whole number. This is the show the full amount so in the example, the bar represents 16. Draw another bar underneath and using the denominator, split the bar into this amount. Colour in the number the numerator says.



Step 2

Divide the whole number by the denominator (numbers on the bottom of the fraction. You can use your times table knowledge or a formal method.



Step 2

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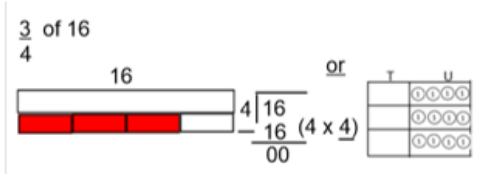
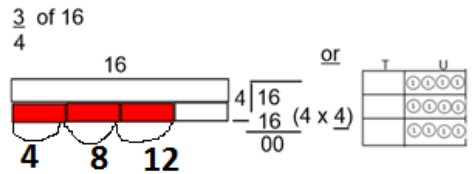


Step 3

Once you have found what one part of the bar is worth, times this by the numerator (number on the top of the bar). So ¾ of 16 = 12

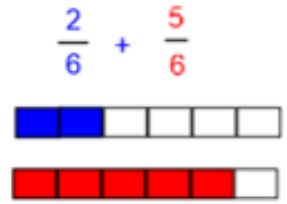


Steps to Success – Adding fractions with the same denominator.

2/6 + 5/6

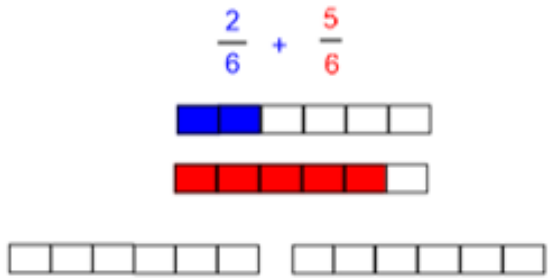
Step 1

Draw out a bar to show both fractions.



Step 2

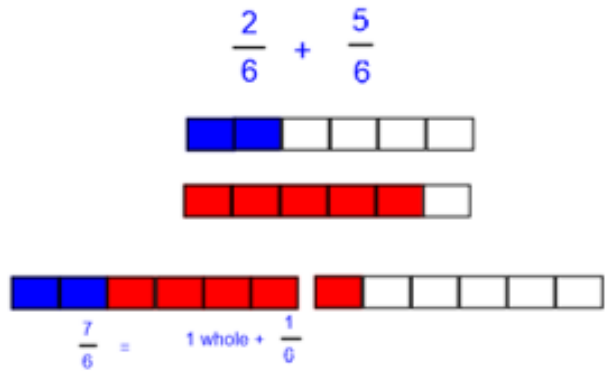
Now draw out two blank bars that are split into 6 equal pieces.



Step 3

Now add the coloured pieces from both bars into the same bars. To work out the answer count out how many coloured in pieces you have. This becomes your numerator. The denominator is the number the each bar is spilt into.

So 2/6 + 5/6 = 7/6 or 1 whole and 1/6

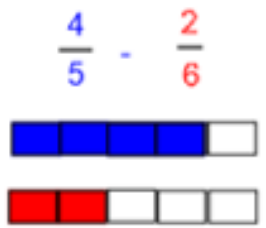


Steps to Success – subtracting fractions with the same denominator.

4/5 – 2/5

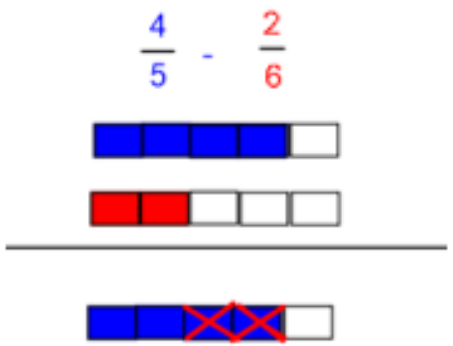
Step 1

Draw out a bar to show both fractions.



Step 2

Now draw out the bar on the largest fraction. And colour it in. Cross out the amount of pieces that are coloured in the second fraction. On the example, you need to cross out two of them. Count how many coloured in pieces are left. This is your answer. So 4/5 – 2/5 = 2/5



Steps to Success – Adding fractions with a different denominator.

Question: 2 6/7 + 3 5/14

Step 1:

Find a common denominator.

2 6/7 is the same as 2 12/14

Step 2:

Add the whole numbers first.

2 +3 = 5

Step 3:

Add the fractions and convert to a mixed number if needed.

12/14 + 5/14 = 17/14 = 1 3/14

Step 4:

Add your whole numbers and fractions together.

5 + 1 3/14 = 6 3/14

Step 5:

Check to see if your answer needs to be simplified.

6 3/14 3 is a prime number and not a factor of 14 so therefore 3/14 can't be simplified.

Steps to Success – Subtract fractions with a different denominator.

$2\ 5/6 - 1\ 7/12$

Step 1: Find a common denominator

(Both can be made as fractions of 12).

$2\ 5/6$ by multiplying the numerator and denominator by 2 this becomes $2\ 10/12$

$2\ 10/12 - 1\ 7/12$

Step 2: Convert to an improper fraction

$2\ 10/12 = 34/12$

12/12 = 1 whole

24/12 = 2 wholes

34/12 = 2 wholes and 10/12

$1\ 7/12 = 19/12$

12/12 = 1 whole

19/12 = 1 whole and 7/12

Step 3: Subtract your improper fractions

34/12 – 19/12 = 15/12

Step 4: Convert your answer to a mixed number and simplify if needed.

15/12 = 1 whole (12/12) and 3/12 = $1\ 3/12$

3 is a factor of 12 and 3 so we can simplify by dividing our fraction by 3.

$1\ 3/12 = 1\ 1/4$

Steps to success- multiplying fraction by whole number.

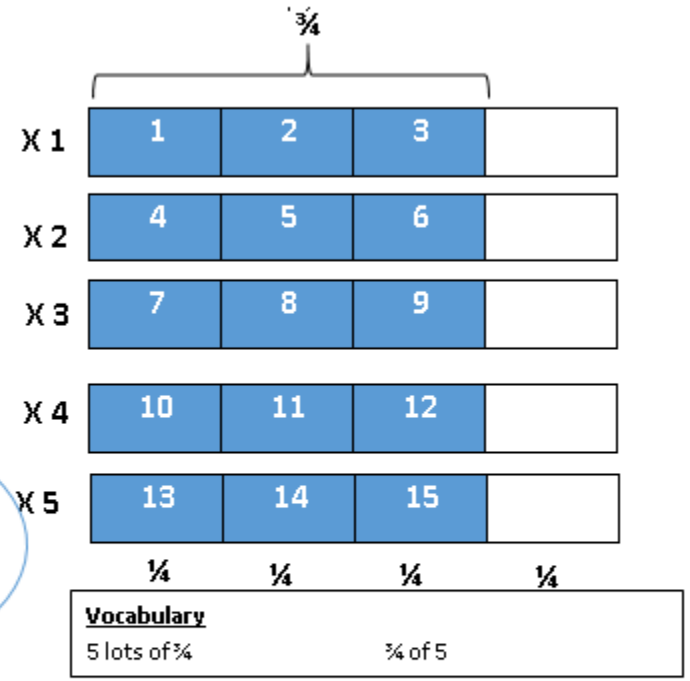
Example-

$\frac{3}{4}$ x 5 = $\frac{15}{4}$

$\frac{15}{4} = 3\frac{3}{4}$

The denominator stays the same.

Check to see if you can find a simplified answer.



Vocabulary

5 lots of ¾ ¾ of 5

You also can solve this by using the following steps:

Step 1

3 x 5 = 15 this answer becomes your new numerator.

Step 2

The denominator stays the same which in this case is 4. So your answer is $\frac{15}{4}$

Step 3

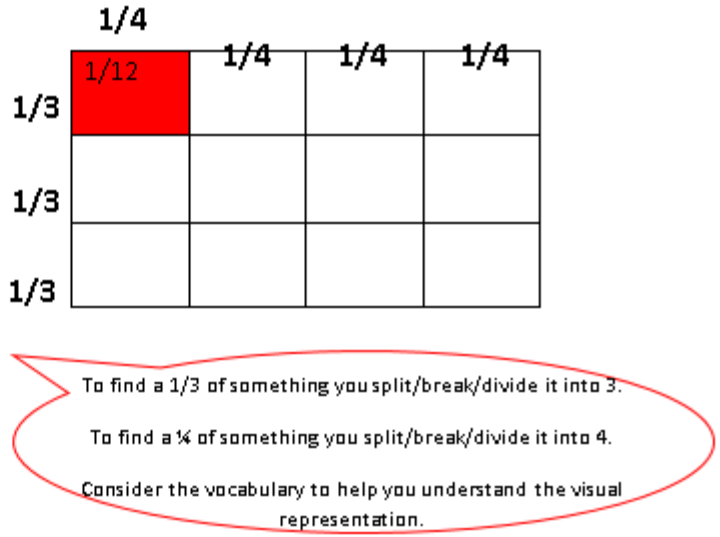
You need to simplify this fraction into its lowest form. There are 3 lots of 4 that go into 15 so this becomes your whole number. There are 3 left over so your numerator is 3 and the denominator stays the same. Therefore, the answer is:

$3\frac{3}{4}$

Steps to success- multiplying fraction by fraction.

Example-

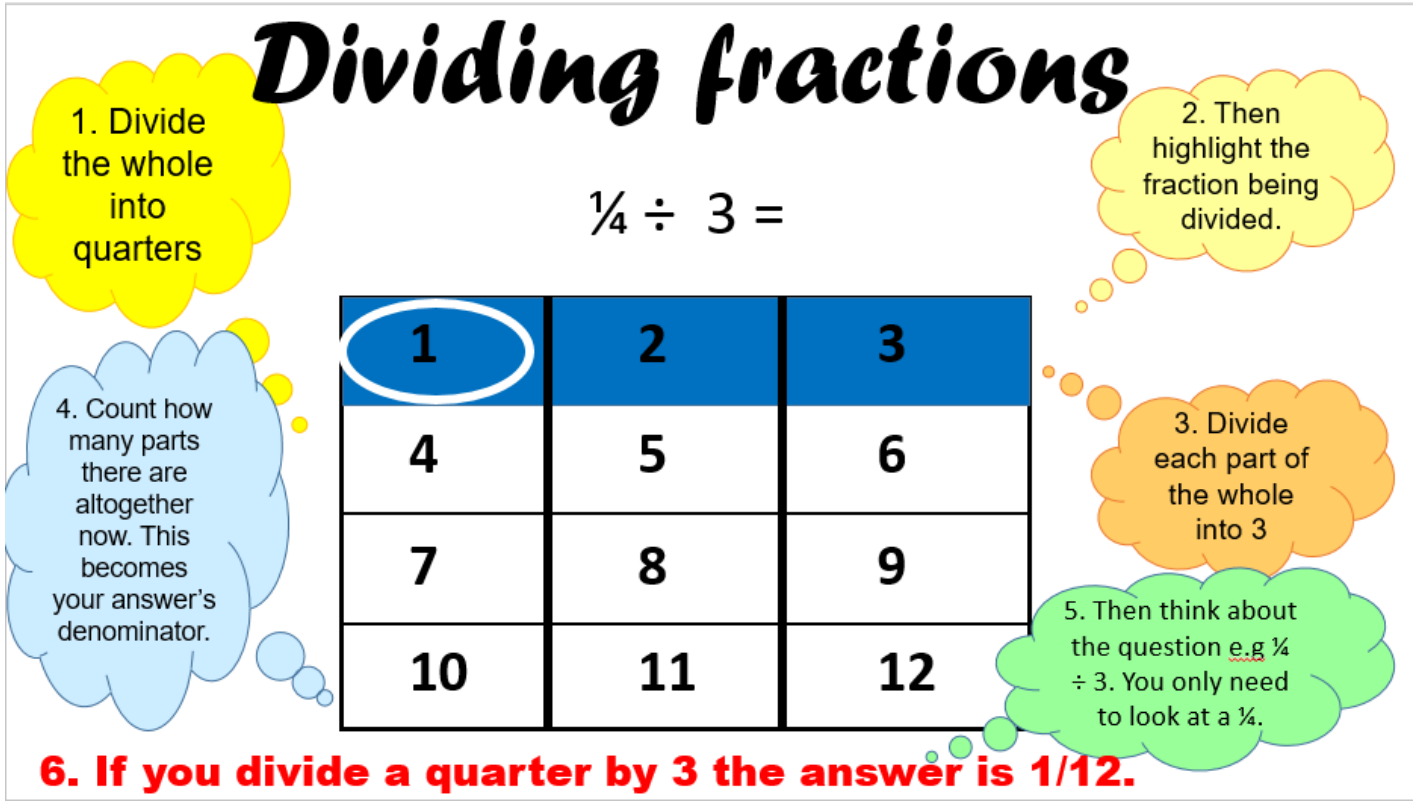
$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$



You also can solve this by doing 1 x 1 = 1 (this is your numerator) then 3 x 4 = 12 (this is your denominator). Always remember to simplify your fractions to their lowest form.

You also can solve this by doing 1 x 1 = 1 (this is your numerator) then 3 x 4 = 12 (this is your denominator). Always remember to simplify your fractions to their lowest form.

$$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$$



You also can solve this by following these steps.

Step 1

The numerator stays the same so for this question it is 1.

Step 2

Multiply the denominator by the whole number e.g. 4 x 3 = 12. This is your new denominator.

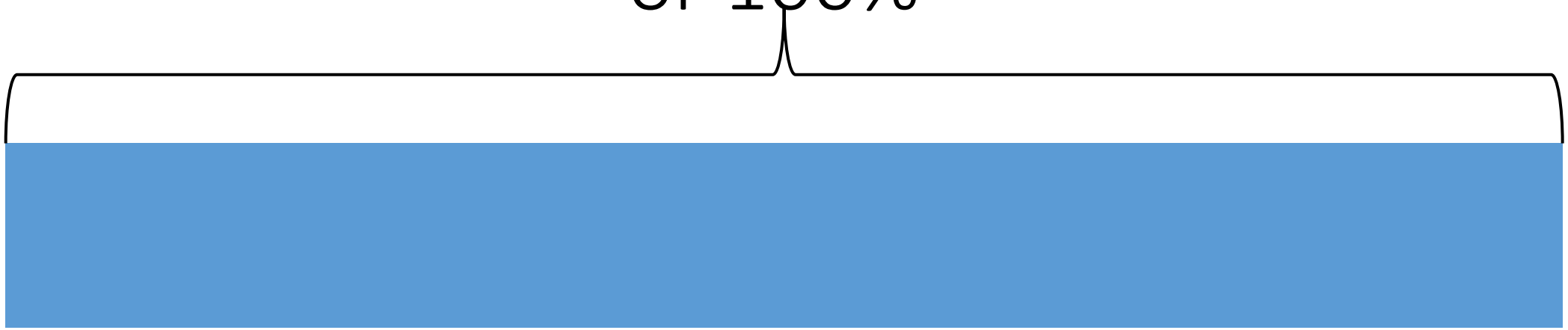
So the answer is 1/12.

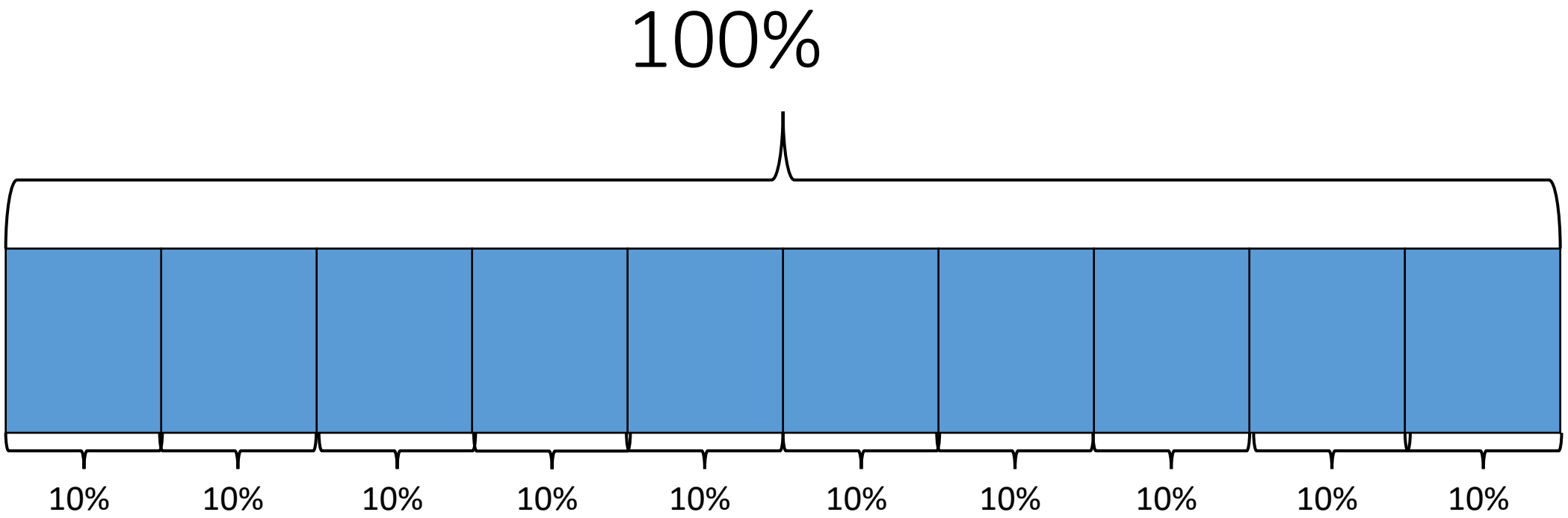
Do not forget to always simplify your fraction to its lowest form where possible.

1. Divide the whole into quarters
2. Highlight the fraction being divided
3. Divide each part of the whole into 3
4. Count how many parts there are altogether now. This becomes your answer's denominator.
5. Then think about the question eg ¼ of 3. You only need to look at ¼.

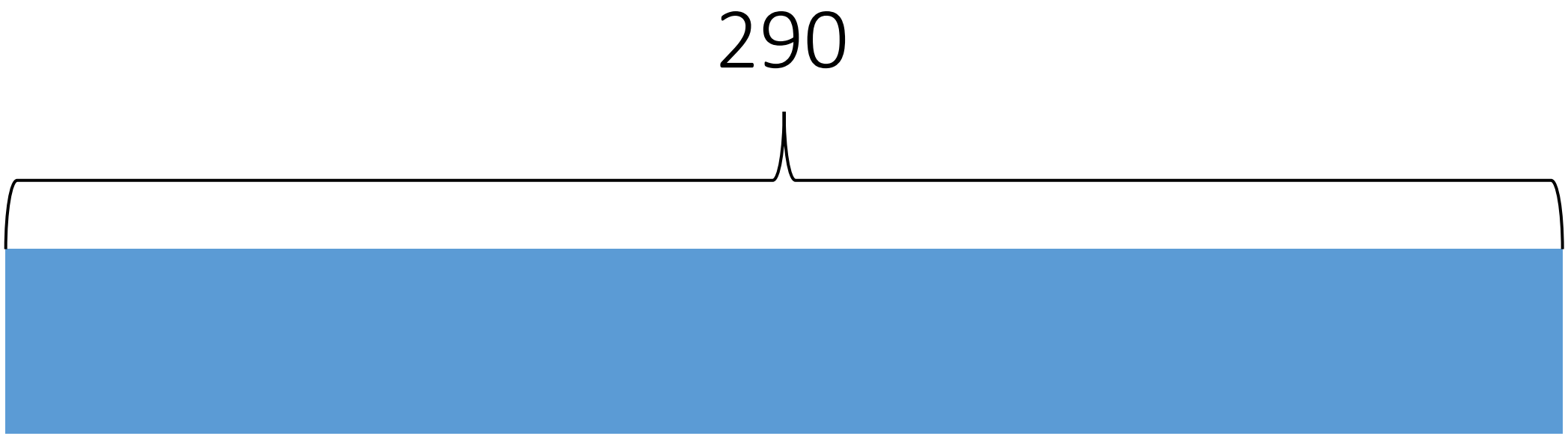
Finding percentages of amounts

1 whole
or 100%



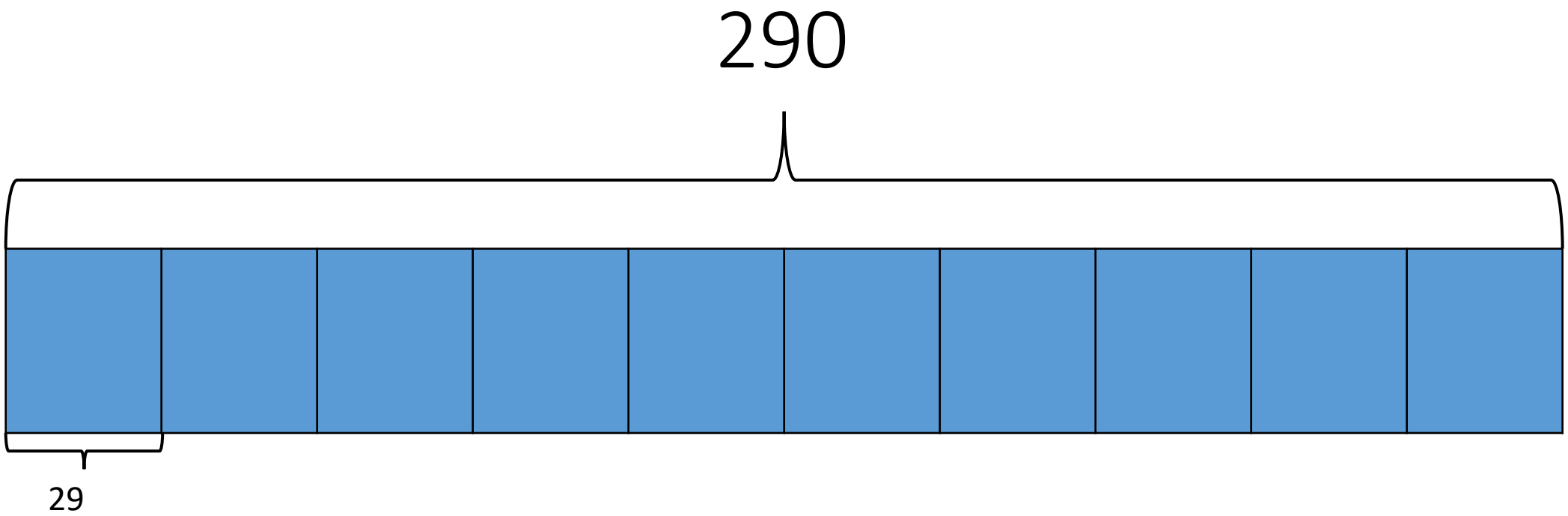


To find 10% of a number, you need to divide that number by 10.



For example:

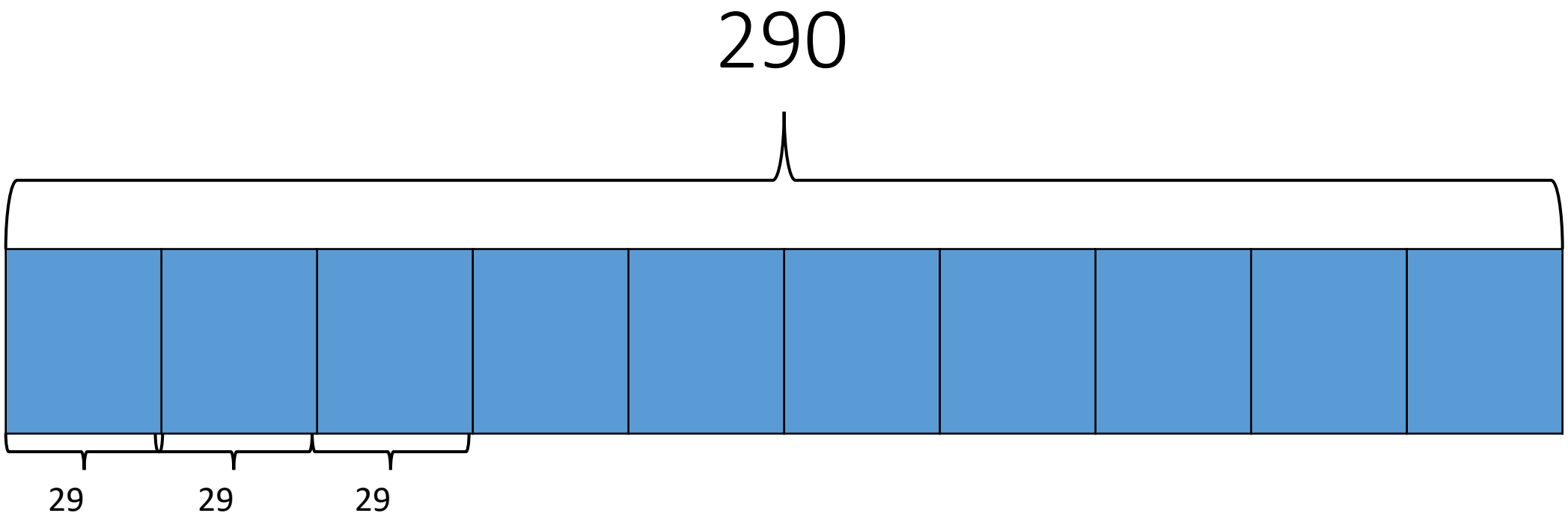
Find 10% of 290



For example:

Find 10% of 290

290 ÷ 10 = 29



If 10% of 290 is 29, what would 30% of 290 be?

29 + 29 + 29 = 87

To find 1% of a number, we need to divide that number by 100.

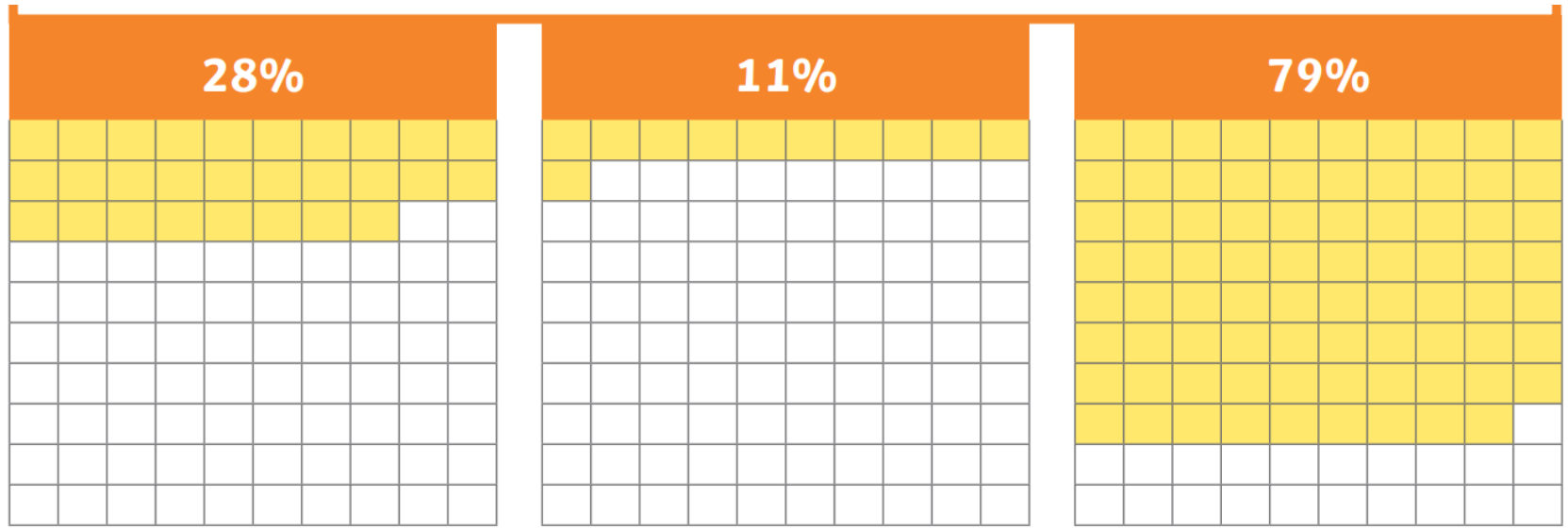
For example:

Find 1% of 530

530 ÷ 100 = 5.3

So 1% of 530 is 5.3

If I know what 1% of 530 is, can I figure out what 8% would be?


28%
11%
79%

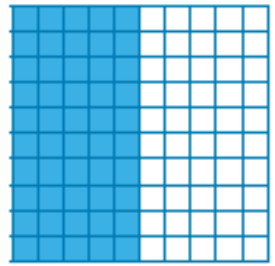
Percentages

Knowledge Organiser

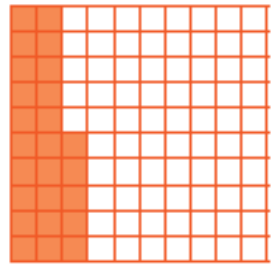
Key Vocabulary

- per cent (%) = 'out of 100'
- percentage
- discount
- equivalent fraction
- equivalent decimal
- convert
- compare
- order
- the whole

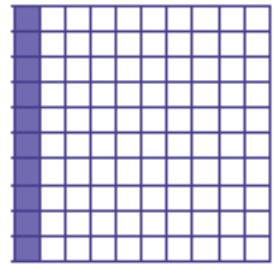
Equivalent Fractions, Decimals and Percentages



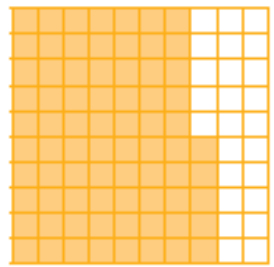
$\frac{50}{100} = \frac{1}{2} = 0.5 = 50\%$



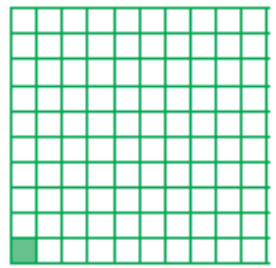
$\frac{25}{100} = \frac{1}{4} = 0.25 = 25\%$



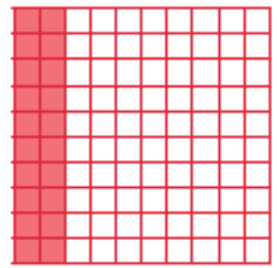
$\frac{10}{100} = \frac{1}{10} = 0.1 = 10\%$



$\frac{75}{100} = \frac{3}{4} = 0.75 = 75\%$

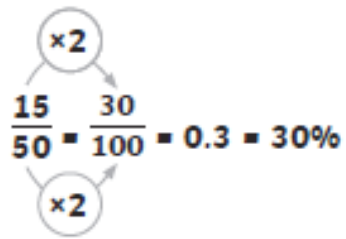


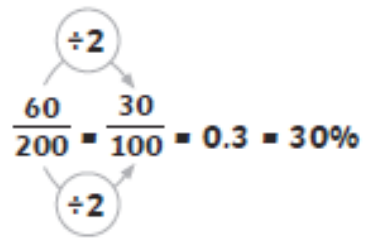
$\frac{1}{100} = 0.01 = 1\%$



$\frac{20}{100} = \frac{2}{10} = 0.2 = 20\%$

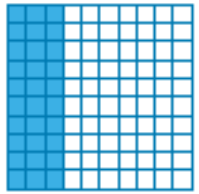
Fractions to Percentages



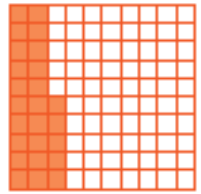


Order Fractions, Decimals and Percentages

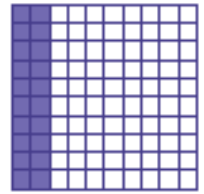
$\frac{3}{10} > 25\% > 0.2$



$\frac{30}{100} = 30\%$

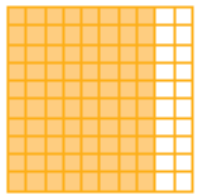


$\frac{25}{100} = 25\%$

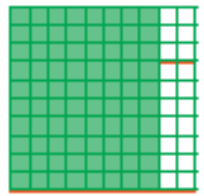


$\frac{20}{100} = 20\%$

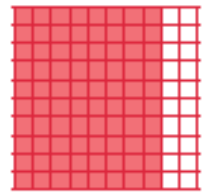
$80\% = 0.8 = \frac{4}{5}$



$\frac{80}{100} = 80\%$



$\frac{80}{100} = 80\%$



$\frac{80}{100} = 80\%$

Other useful information

Brackets

Orders

Division

Multiplication

Addition

Subtraction

1st

Start with anything inside brackets.

2nd

Are there any powers or square roots?

3rd

Division and multiplication rank equally.

Working from left to right, calculate them in the order they appear.

4th

Addition and subtraction also rank equally.

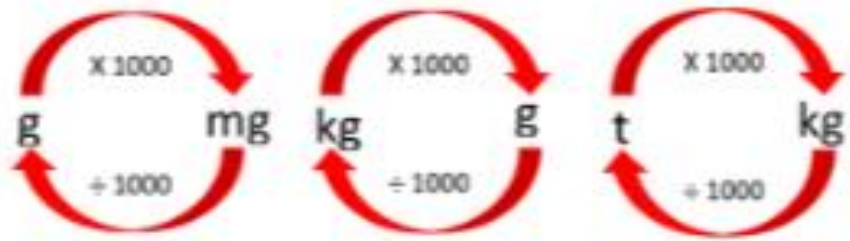
Again, start from the left and work your way across the equation.

PAPERZIP

Converting Between Metric Units

Length:

Mass:



Volume: