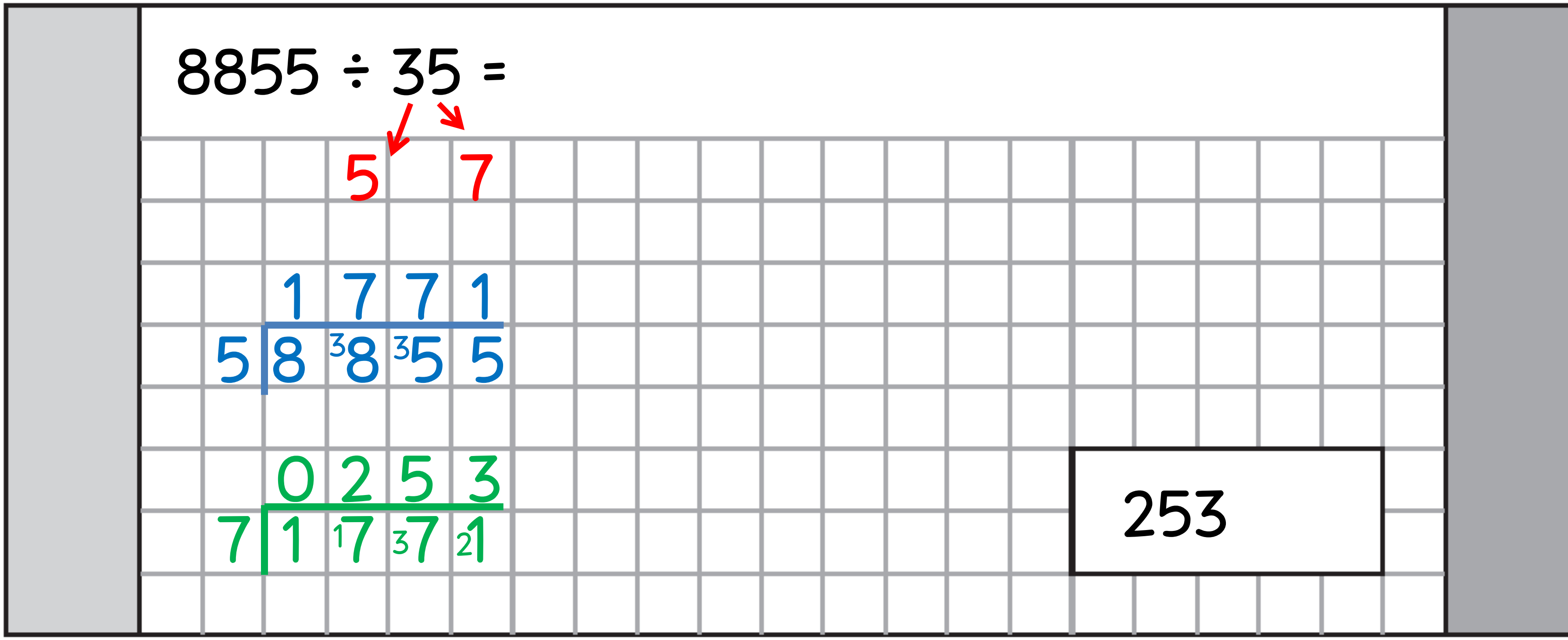


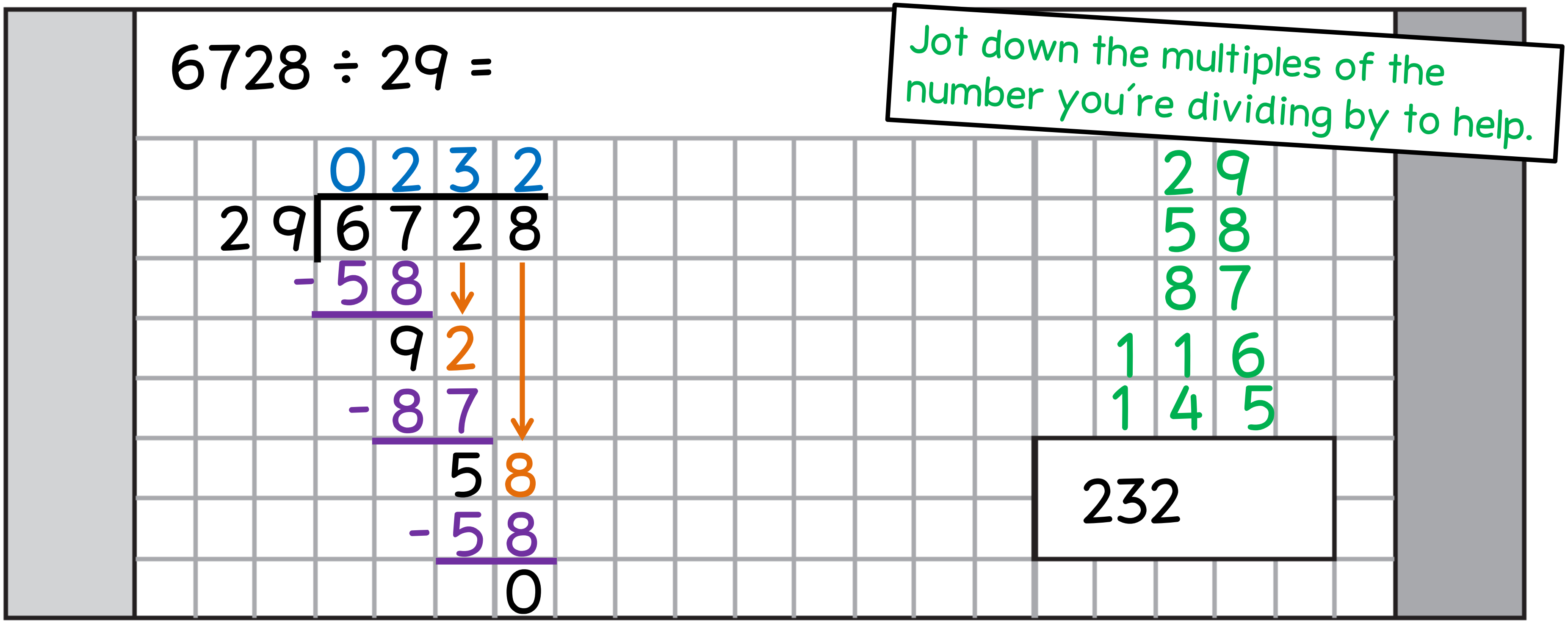

# Long Division - Can you cheat?

Sometimes we can use a short division method to divide big numbers... We need to look to see if we can find any factors of the number we are dividing by. Factors of a number are two whole numbers which can be multiplied together to make it. 5 and 2 are factors of 10 because 5 x 2 = 10. 3 and 4 are factors of 12 because 4 x 3 = 12. Numbers can have more than two factors.

In this example, I know that the number 35 has the factors 7 and 5. I can now use this to solve the problem.

I begin by dividing 8,855 by one of the factors (rather than 35 itself).

Once you´ve done this, simply divide your answer by the other factor.




## Long Division - When you can't cheat

We won't always be able to find factors of the number we're dividing by...

**Divide!** What is 67 divided by 29? 2 (with some left over)

**Multiply and Subtract!** What is 2 lots of 29? 58. Now take this away from 67.

**Bring It On Down!** Drag the next digit down to join your answer.

**And Take It On Back!** Repeat the same method - this time we're looking at the number 92.

672 x 34 =

| | | | | |
|---|---|---|---|---|
| | 2 | 6 | 7 | 2 |
| | x | | 3 | 4 |
| | 2 | 6 | 8 | 8 |
| 2 | ~~2~~ 0 | 1 1 | 6 | 0 |
| 2 | 2 | 8 | 4 | 8 |

22,848

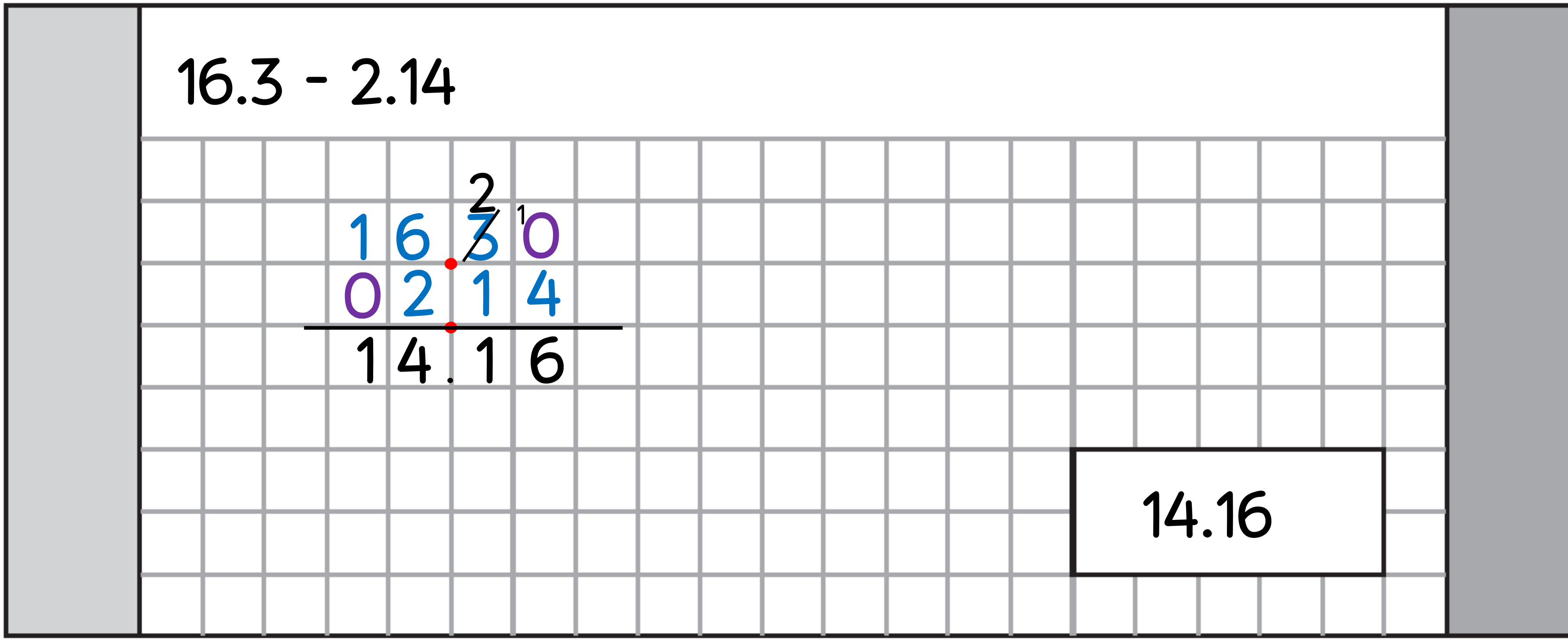
<u>Long Multiplication Top Tips:</u>

First, multiply all the digits on the top row by the ones digit (starting from the right).

If you're multiplying by a tens digit also, you will need to remember to add the zero on the next line to hold the place value.

Repeat the method in step, multiplying the numbers on the top row by the tens digit.

Add the two numbers to reach the final answer.



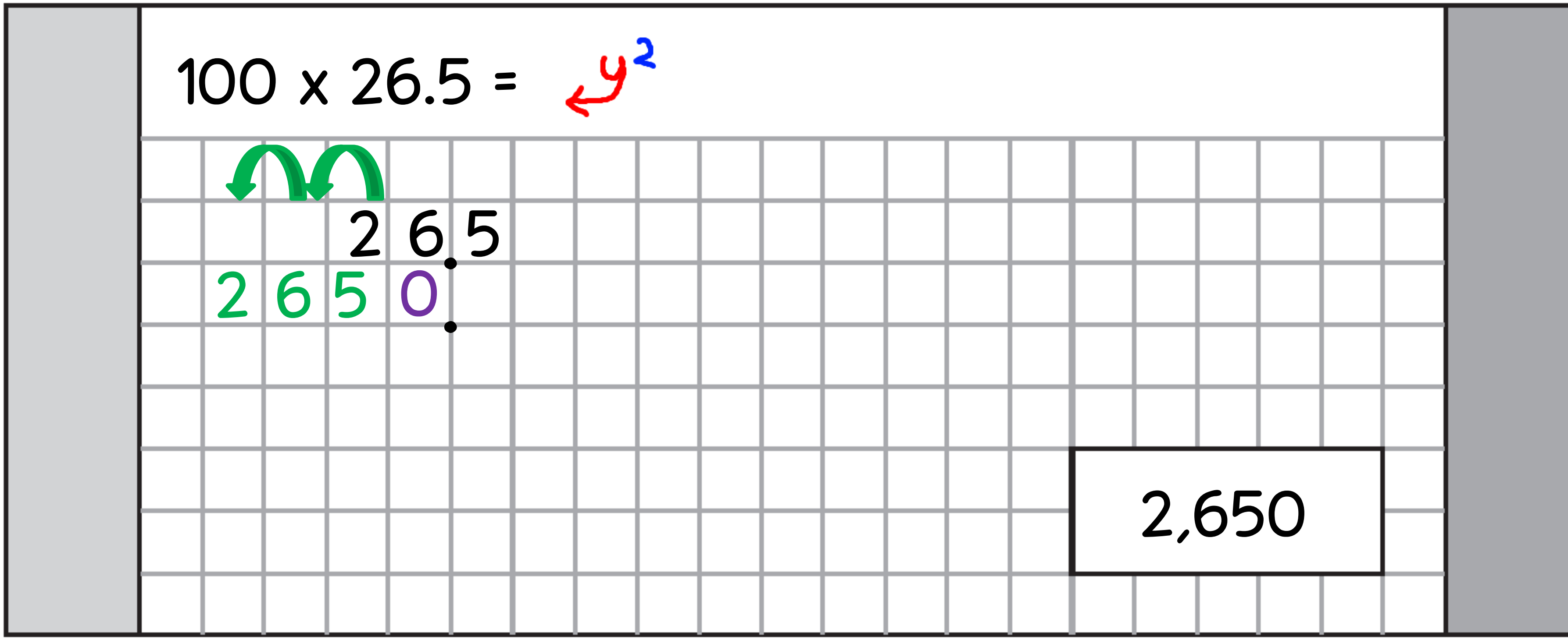

<u>Adding and Subtracting Decimals:</u>

Place the decimal points first to help you line up the numbers correctly.

Add in the numbers.

Fill any missing place values with zeros.

Complete the problem - not forgetting to include the decimal in your answer!



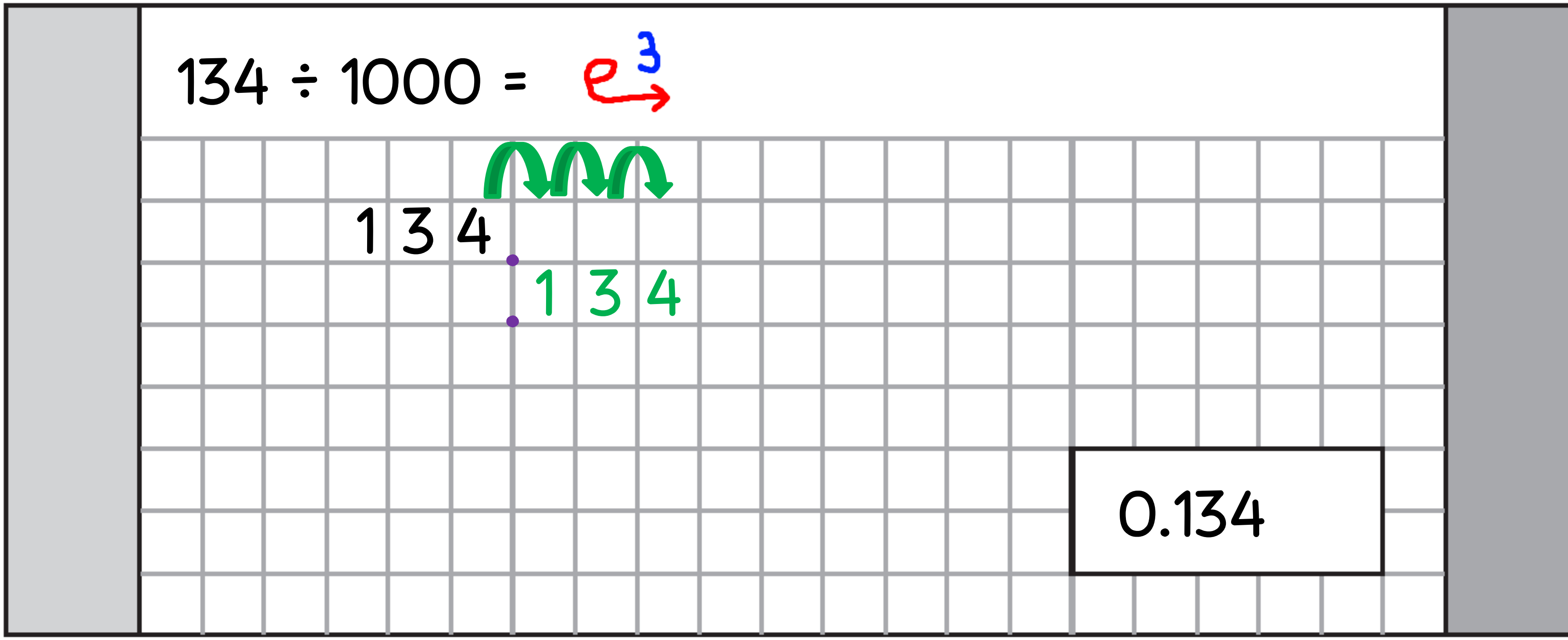

## Multiplying by 10,100 and 1000:

Jot down the following information to help: We need to multiply the numbers. The letter `y´ shows us which direction the numbers will need to travel. We put the number 2 because there are two zeros in 100. This shows us how many places we need to move each digit.

Copy the number in the working space - making sure to draw the decimal point into the row below.

Move the numbers using the instructions you worked out at the start, writing them in the correct place underneath.

Fill any missing place values with zeros.

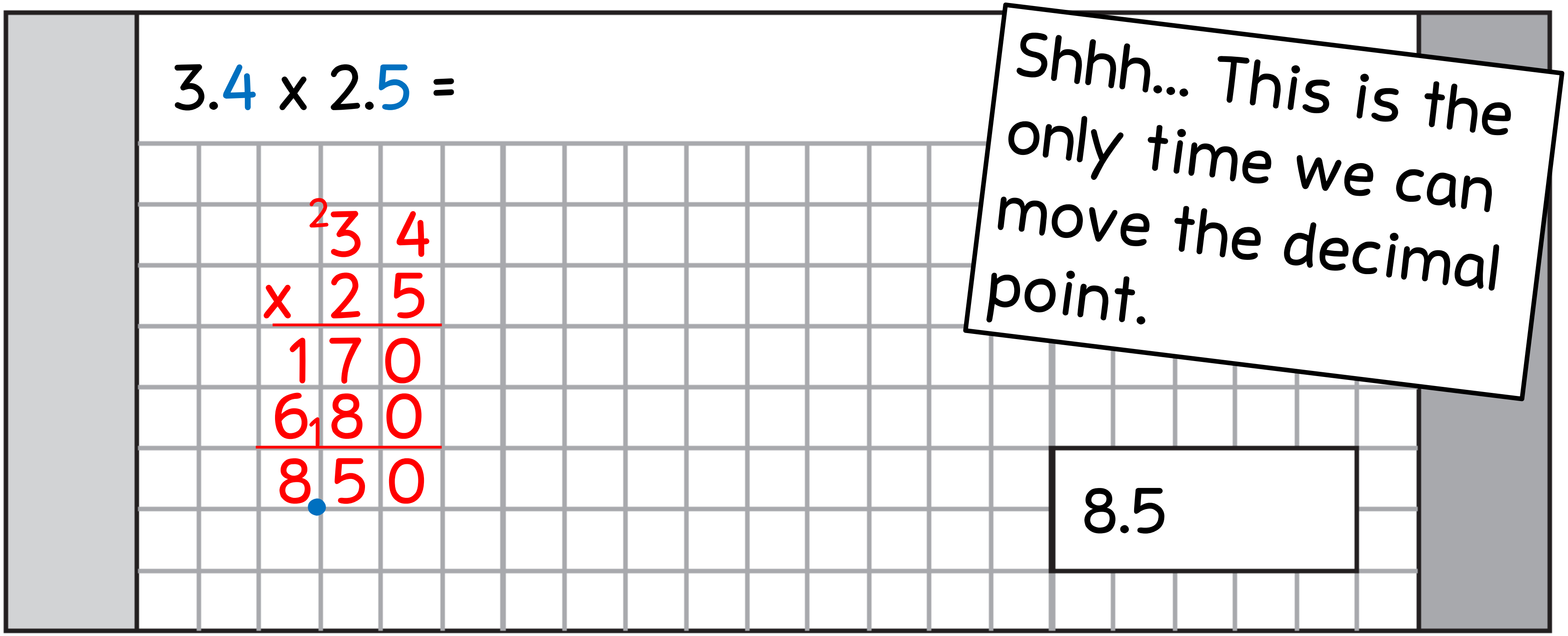



## Dividing by 10,100 and 1000:

Like when multiplying by 10,100 or 1000, jot down the following information to help: We need to divid<u>e</u> the numbers. The letter `e´ shows us which direction the numbers will need to travel. We put the number 3 because there are three zeros in 1000. This shows us how many places we need to move each digit.

Copy the number in the working space - in both multiplication and division, if you can´t see the decimal point add it to the end of the number - and draw the decimal point in the row below.

Move the numbers using the instructions you worked out at the start, writing them in the correct place underneath.




## Multiplying Decimals (not by 10,100 or 1000)

When we are multiplying a whole number and a decimal, or two decimal numbers, we can ignore the decimal point to start with.

First, multiply the numbers normally.

We now need to add the decimal point back in. In this question we can count two decimal places (two numbers after the decimal point - there's one in each number) so we need two have two decimal places in our answer. If there was only one decimal place in the question, we would only need one in our answer - if there were three in the question, we would need three in the answer and so on...

35% of 600 =

30% = 60 x 3 = 180

10% = 60

5% = 30

180 + 30 = 210

210

Finding Percentages (Method 1: Multiples of 5 and 10)

If you're finding a percentage which ends in a 5 or 0, it can be easier to first find 10%. To find 10% divide by 10.

Once you know 10%, you can halve it (divide by 2) to find 5%.

You should jot these two values down.

For this question I need to know 35%. I know that 30% is 3 lots of 10%, so I multiply 10% by 3. I can the add 5% to find 35%.

27% x 320 =

320.

3.20

1% = 3.2

$$\begin{array}{r} {}^{1}3.2 \\ \times\ 2\ 7 \\ \hline 2\ 2\ 4 \\ 6\ 4\ 0 \\ \hline 8\ 6.4 \end{array}$$

$\boxed{86.4}$

## Finding Percentages (Method 2: Any Value)

Notice how this time there's a multiplication symbol - don't panic this means 'of' - we work it out exactly the same as before.

To find a percentage which isn't a multiple of 5, you first need to find 1%. To do this divide by 100.

Once you know 1% you can then multiply it by the percentage you want to know (in this case 27).

# Simplifying Fractions

Simplifying fractions is where we make the digits in a fraction smaller. This is done by dividing both digits by the same number - you can´t subtract! Remember: Whatever you do to the bottom you need to do to the top.

$$\frac{3}{6} \xrightarrow{\div 3} \frac{1}{2}$$

$$\frac{8}{12} \xrightarrow{\div 4} \frac{2}{3}$$

$$\frac{20}{72} \xrightarrow{\div 2} \frac{10}{36} \xrightarrow{\div 2} \frac{5}{18}$$

Pupils are expected to give their answers in their simplified form in the test.

# Converting from Improper to Mixed Number Fractions

Improper fractions are when the top number is larger than the bottom number:

$\frac{7}{3}$ The bottom number shows us how many bits the object or number has been cut into. It is also how many pieces you need to make a whole.

Now that we know we need 3 parts to make a whole, we need to work out how many wholes we have... We have seven pieces. So can make 2 wholes (3x2=6) and we have one third left over.

We would write this as $2\frac{1}{3}$ This is called a mixed number fraction.

(A mix of whole numbers and fractions.)

Pupils are expected to give their answer as a mixed number fraction if the fraction is improper.

# Converting from Mixed Number to Improper Fractions

Occasionally, children may need to convert a mixed number to an improper fraction (normally to help with a difficult subtraction which we will look at later).

Take the fraction $2\frac{3}{4}$

We can see by looking at the bottom number that we are working with quarters. Like last time, this shows us how many pieces are needed to make a whole (4).

So, we know that one whole must be 4/4, but we don´t have one whole... we have two. 4/4 + 4/4 = 8/4

Finally, we need to add this to the fraction we already had (3/4)

$$\frac{8}{4} + \frac{3}{4} = \frac{11}{4}$$

$$\frac{2}{6} + \frac{1}{6} =$$

$$\frac{2}{6} + \frac{1}{6} = \frac{3}{6}$$

$$\boxed{\frac{3}{6} \quad \frac{1}{2}}$$

<u>Adding and Subtracting Fractions</u>- (Same denominator)

Add the numerators (top numbers) together - unless you´re doing a subtraction of course... in that case, you take away.

When adding and subtracting fractions, the denominators (bottom numbers) stay the same.

$$\frac{1}{3} - \frac{1}{4} =$$

$$\frac{1}{3} - \frac{1}{4}$$

x4 x3

$$\frac{4}{12} - \frac{3}{12}$$

$$\boxed{\frac{1}{12}}$$

<u>Adding and Subtracting Fractions</u>- (Different denominators)

First you need to make the denominators (bottom numbers) the same. The easiest way of doing this is to find a multiple of them both. In this example, 12 is in both the three and four times tables... We can multiply 3 by 4 to make 12 and 4 by 3 to make 12.

Next, you need to change the numerator - WHATEVER YOU DID TO THE BOTTOM NUMBER YOU NOW NEED TO DO TO THE TOP.

Finally, complete the problem like before - keeping the new denominator the same.

$$2\frac{3}{6} + \frac{2}{3} =$$

$$\frac{3}{6} + \frac{2}{3} = \frac{7}{6} = 1\frac{1}{6} + 2 = 3\frac{1}{6}$$

$$\frac{2}{3} \xrightarrow{\times 2} \frac{4}{6}$$

$$\boxed{3\frac{1}{6}}$$

<u>Adding Mixed Number Fractions</u>

First ignore the whole number and add together the fractions. If the denominators are different, you will need to make them the same like we´ve done before.

You then add this to the whole number. Be careful though - if your fraction is improper (has a bigger number at the top) you will first need to convert it to a mixed number fraction before adding it to your whole number.

$$3\frac{3}{6} - \frac{2}{3} =$$

$$\frac{3}{6} - \frac{2}{3}$$

$$\frac{4}{6}$$

$$3 = \frac{18}{6} + \frac{3}{6} = \frac{21}{6}$$

$$\frac{21}{6} - \frac{4}{6} = \frac{17}{6} \quad \boxed{2\frac{5}{6}}$$

## Subtracting Mixed Number Fractions

First, if the denominators are different, you will need to make them the same like we've done before.

Unfortunately, we can now see that you can't subtract four sixths from three sixths.

We will have to convert some of our whole numbers into an improper fraction to help. We could just borrow one whole, but the easiest way of explaining this is to turn all the wholes into an improper fraction (see earlier slide) then add it onto the 3/6. Our new question is now 21/6 - 4/6.

21/6 - 4/6 = 17/6. You will need to convert this to a mixed number fraction for your final answer.

$$\frac{4}{8} \times \frac{5}{9} =$$

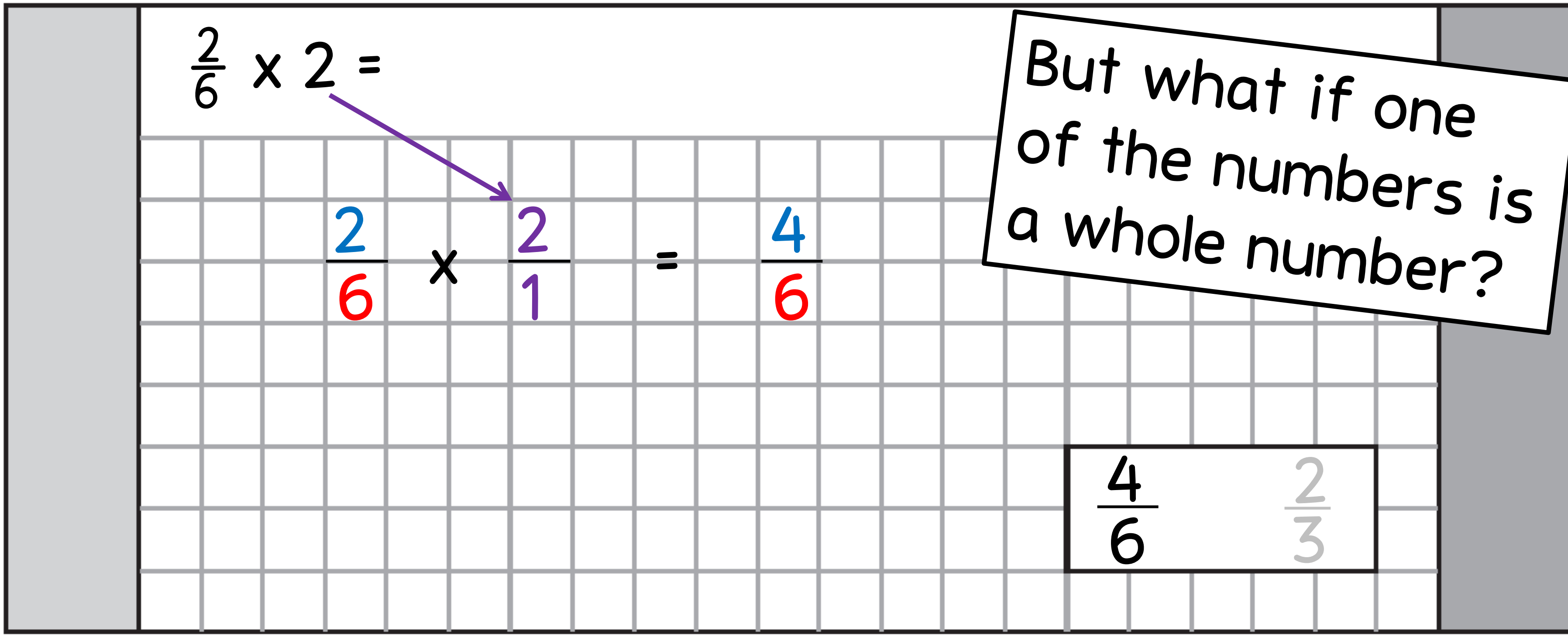
$$\frac{4}{8} \times \frac{5}{9} = \frac{20}{72}$$

$$\boxed{\frac{20}{72} \quad \frac{5}{18}}$$

<u>Multiplying Fractions</u> - Just follow the path!

Multiply the numerators (top numbers) together

Multiply the denominators (bottom numbers) together.




## Multiplying a Fraction and a Whole Number

We can write any whole number as a fraction simply by adding the denominator (bottom number) '1'. The number 5 for example would become $\frac{5}{1}$. Five is the same as saying five ones or five wholes.

Once you've done this, just multiply the two fractions as before.

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

$$4 \times 3 = 12$$

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

$$12 + \frac{3}{4} = 12\frac{3}{4}$$

$$\boxed{12\frac{3}{4}}$$

<u>Multiplying Mixed Number Fractions</u>

The trick to these problems is separating the numbers then putting them back together.

First multiply the whole numbers.

Then multiply the fraction (using the tips we´ve learnt for multiplying a fraction by a whole number).

Put the two values you´ve calculated together to make your final answer.

$$\frac{1}{3} \div \frac{3}{5} =$$

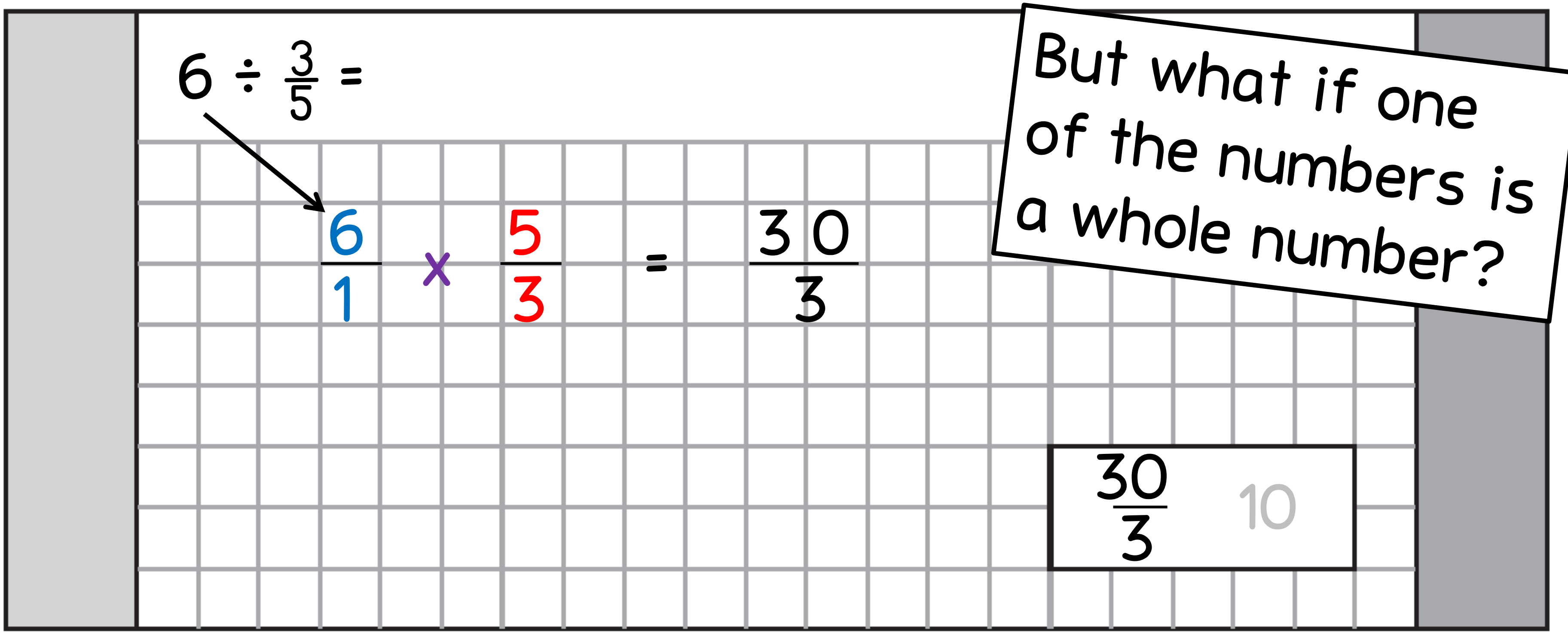
$$\frac{1}{3} \times \frac{5}{3} = \frac{5}{9}$$

$$\boxed{\frac{5}{9}}$$

<u>Dividing Fractions</u> - KEEP IT. CHANGE IT. FLIP IT.

Keep the first fraction the same.
Change the division to a multiplication.
Flip the second fraction round.

Then multiply the numbers just like before.




Dividing Fractions - KEEP IT. CHANGE IT. FLIP IT.

Just like with the multiplication, write your whole number as fraction by adding the denominator (bottom number) '1'. Then...

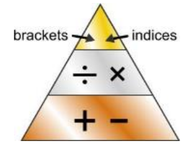
Keep the first fraction the same.

Change the division to a multiplication.

Flip the second fraction round.

Finally, multiply the numbers like before.

$2 + 3 \times 6 =$




$3 \times 6 = 18$

$2 + 18 = 20$

20

# BODMAS

RACKETS

F

POWER OF

IVISION

ULTIPLICATION

DDITION

UBTRACTION

If you see more than one operation in a question, you will need to use BODMAS. BODMAS (also known as BIDMAS) shows you the order the operations need to be carried out.

In this example, multiplication should be done before the addition. 3 x 6 = 18.

Once you have carried out the multiplication, you can now do the addition. 2 + 18 = 20.

$11 - 2^3$

$2 \times 2 \times 2 = 8$

$11 - 8 = 3$

3

## Squared and Cubed Numbers

Where squaring a number means multiplying it by itself (e.g. $5^2$ = 5x5 = 25), cubing a number means we have to multiply it again - we use the digit three times... 2 x 2 = 4 multiplied by 2 again is 8

In this question, we also use have to use our knowledge of BODMAS - carrying out the subtraction once we have cubed the number.