Netherthong Primary School

Y5/6 Mathematics

Handbook

Maths – it's changing!

Many parents want to help their children with their maths work, but with so many curriculum changes over the years, they can sometimes struggle to know the correct methods to use to support their kids.

With this in mind, this booklet has been produced to support the parents of year 5 and 6 pupils, and help them to help their children to become maths stars!!! The good news is – that the new curriculum is going back to the methods that you probably learned when you were at school!

Adding

Vocabulary for adding!

add altogether total sum increase
plus and more score addition

Children within year 5 and 6 will need to use both efficient mental strategies and formal written methods to work out addition calculations.

Mental calculations:

Children can use partitioning to add numbers.

For example:

345 + 285 =

300 + 200 = 500

40 + 80 = 120

5 + 5 = 10

500 + 120 + 10 = 630

3.8 + 2.7 =

3 + 2 = 5

0.8 + 0.7= 1.5

5 + 1.5 – 6.5

Numbers which are close to tens numbers can be rounded and adjusted to make mental calculations easy.

89 + 37 = (89 + 1 = 90)

90 + 37 = 127 (then take away the 1 you added 127 – 1 = 126)

21 + 47 = (21 – 1 = 20)

20 + 47 = 67 (then add on the one you took away 67 + 1 = 68)

Written methods for addition

To add larger numbers, they need to be written in a column (see below). Firstly, the numbers need to be lined up, with the digits in the correct columns. Then the numbers in each column can be added, starting from RIGHT to LEFT.

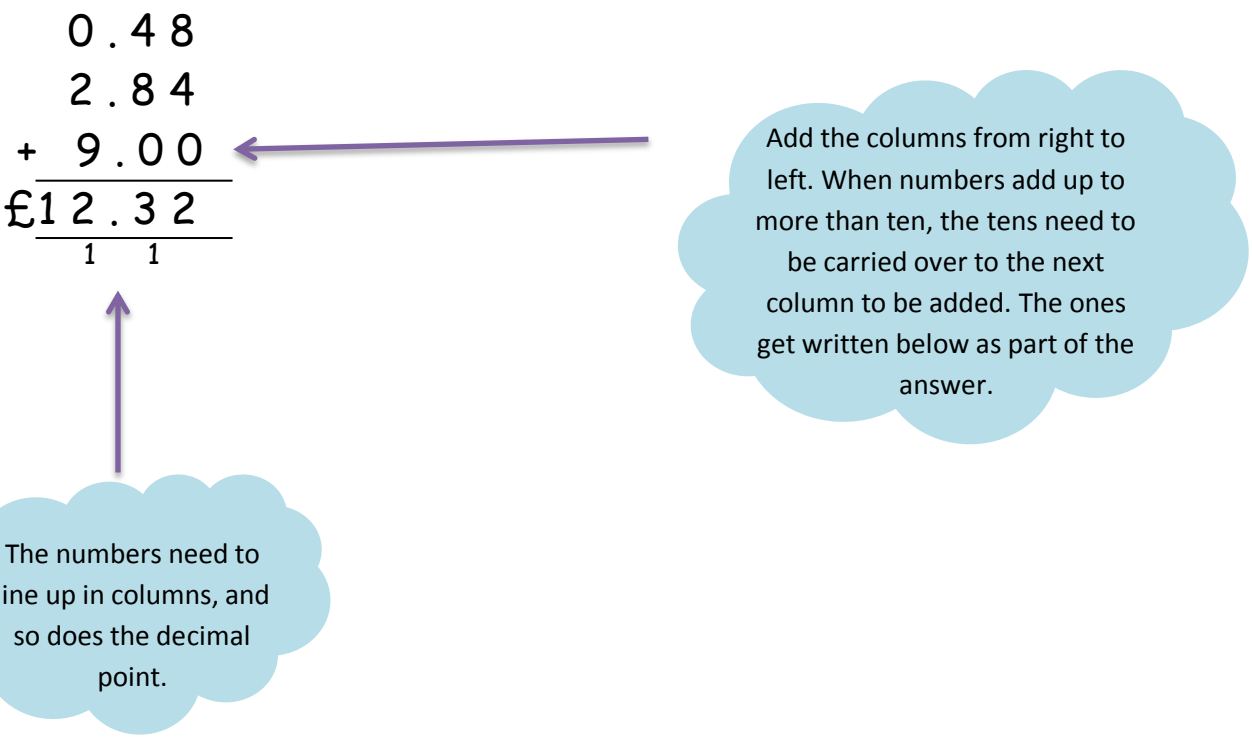
For example:

48 + 284 + 9

	H	T	U
		4	8
	2	8	4
+			9
	3	4	1
	1	2	

By year six, they will be confident with doing this and their calculations will need to include decimals!

For example: 48p + £2.84 + £9



Subtraction

Vocabulary for subtracting!

Minus less difference take away

how much change what's left how many more

Just like when they add, pupils in years five and six will need to use both mental and written calculations to subtract.

Mental methods for subtraction

Partitioning is again the best method for some numbers, as with the one below, splitting it into its tens and ones makes it easier to do.

For example:
56 – 32
56 – 30 – 2

56 – 30 = 26 – 2 = 24

Another example is:
1236 - 415
1236 - 400 - 10 - 5
1236 – 400 = 836 – 10 = 826 – 5 = 821

Numbers close to tens numbers can again be rounded to make mental calculations quick and simple!
For example:

374 – 239 = (239 + 1 = 240)
374 – 200 = 174
174 – 40 = 134
Then take away the one you added: 134 – 1 = 133

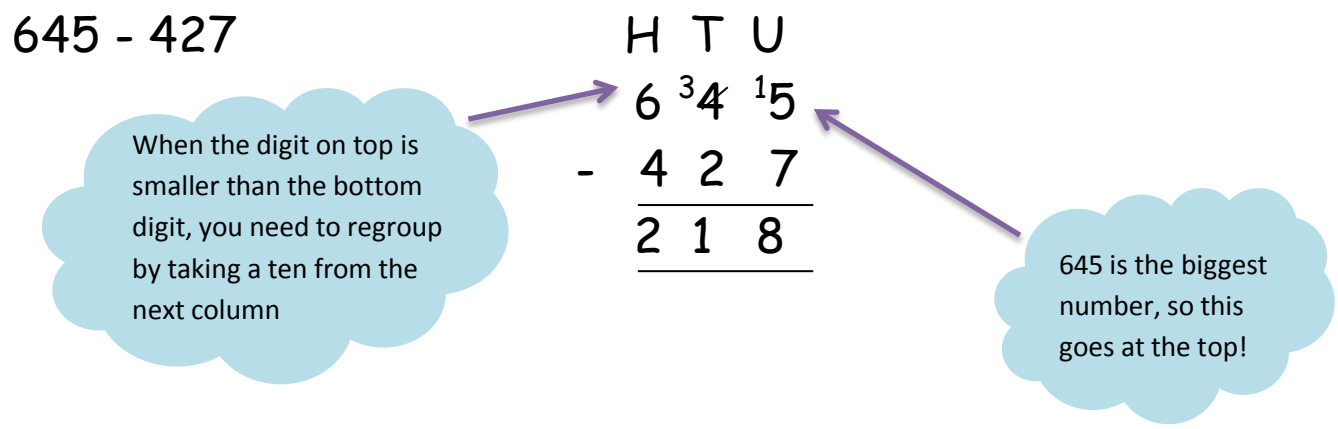
Written methods for subtraction

In the same way as with adding, when we subtract more difficult numbers, we need to do it using what is known as a formal written method. Firstly, just like when we add, we need to line up the digits in the correct columns (all of the units in a column, then the tens etc). With subtraction, the largest number needs to go at the top, go from right to left, taking the number(s) below, away from the top number. Although the biggest number is at the top, sometimes, there will be a smaller digit at the top, which we will need to take a larger digit away from – in the calculation below, in the units column, we need to take 5 (the bottom number) away from 2 (the top number). We can solve this by making the top number bigger by regrouping (what used to be called borrowing).

	H	T	U
		$^{2}\cancel{3}$	$^{1}2$
-		1	5
		1	7

32 is made from 3 tens and 2 ones (or units) which can be regrouped to 2 tens and 12 ones or units

Another example of this is shown below:



Multiplying

Vocabulary for multiplying!

double lots of groups of times multiply multiplication multiplied by multiple of product once, twice, three times …….. ten times … times as (big, long, wide….. and so on) repeated addition array

Multiplying by different numbers needs to be done in a variety of different ways – of course there are some quick tricks to help with mental calculations!

Because our number system is in base 10, that makes it easy to multiply by 10, 100 and 1000.

If we multiply any number by 10, we make it 10 times bigger, so the number needs to move over to the next place value column, with a zero on the end – as the number is now a multiple of 10!

For example:

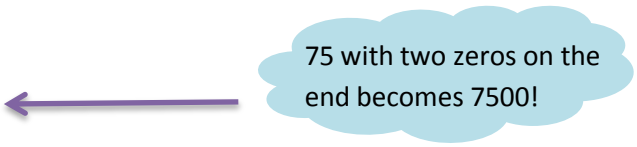
75 x 10 = 750

75 with a zero on the end is 750!!!

When we multiply by 100, the original number needs to move two place value places and be ended with two zeros as it's now a multiple of 100!

So:

75 x 100 = 7500



Multiplying by 1000 follows the same process, but this time the original number moves three places and because the answer will be a multiple of 1000, it will have 3 zeros on the end!

75 x 1000 = 75000

We can multiply decimals in the same way, the number still moves one place value column when we multiply by 10, two places when we multiply by 100 and three places when we multiply by 1000, but we only add zeros as place holders when numbers move into the tens, hundred, thousands columns etc.

0.75 x 10 = 7.5

0.75 x 100 = 75 (or 75.0)

0.75 x 1000 = 750 (or 750.0)

When we multiply by 2 it is exactly the same as doubling. You can double either whole numbers, or it might be easier to partition numbers into their different parts, for example:

876 x 2 (double 876) can be done by partitioning

Double 800 = 1600

Double 70 = 140

Double 6 = 12

Then add the three parts together, giving you 1752.

When we multiply by 4, it is the same as doubling, then doubling again!

For example:

327 x 4 =

Double 300 = 600, double it again = 1200

Double 27 = 54, double it again = 104

Then add them together to give you 1304

You can of course just double the whole numbers, only partition when necessary.

You may have already guessed the easy way to multiply by 8 would be to double, double it again, and then double it again!

For example:

254 x 8 =

Double 254 = 508

Double it again = 1016

Double it again = 2032

As these are all calculation which can be done in your head, this is a much quicker way of multiplying these numbers!

Similarly, you can do the same with other numbers.

To multiply by 5, it's easy to multiply by 10 (because that's an easy calculation) then halve it (because 5 is half of 10!).

75 x 5 =

75 x 10 = 750 halve it = 375

To multiply by 50, you can follow a similar process, firstly multiplying by 100, then halving it (because 50 is half of 100!)

75 x 50 =

75 x 100 = 7500 halve it 3750

To multiply by 25, it's easier to multiply by 100, then ÷ 4 (because there are 4 25s in 100) which we do by halving, and halving again.

75 x 25 =

75 x 100 = 7500 halve it = 3750, then halve it again = 1875

By year six, pupils will be expected to use these mental strategies to make multiplying quick and easy!

That's a whole lot of mental methods, but for some numbers, pupils need to use a formal written method!

Written methods for multiplying

As part of SATs testing at the end of year six, children all over the country will be expected to multiply using the same method, which again involves writing a column calculation.

When multiplying a large number by a single digit, the calculation needs to be done this way:

	H	T	U
		3	7	4
X			7
	2	6	1	8
		5	2	

Starting with the units column, every number on the top needs to be multiplied by the number on the bottom. In this calculation, firstly 7 x 4, writing the answer under the units column, carrying any tens over to the next column to be added on. Next, 7 x 7 following the same process, finally 7 x 3.

When multiplying by a 2 digit number, it gets a little more complicated, so we'll do it step by step!

374 x 27 =

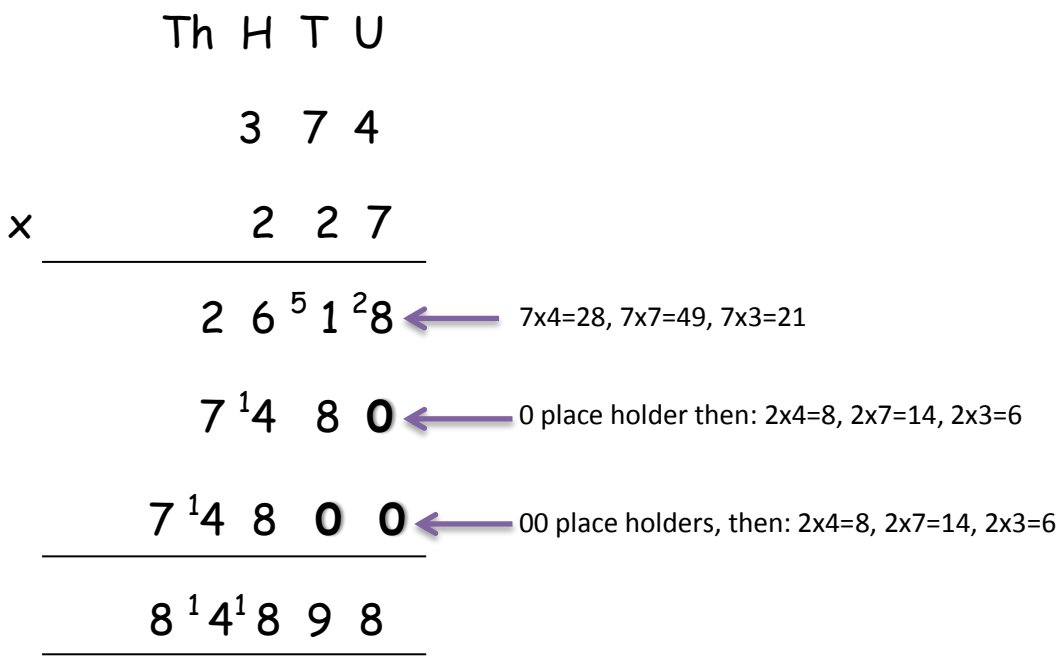
Th	H	T	U	
	3	7	4	
X		2	7	
	2	6	$^{5}1^{2}$	8
	7	^{1}4	8	0
1	0	^{1}0	9	8

Firstly, you need to multiply each digit in the top number by the units digit in the bottom number in the same way as above. So 7 x 4, then 7 x 7, finally 7 x 3 - recording your answers below.

Next, each of the digits on the top need to be multiplied by the tens digit on the bottom. We can do this my adding a zero placeholder in the units column (because the answers in this column will be a multiple of 10 because we're multiplying by 10), then multiplying the 3 digits by 2. 2 x 4, then 2 x 7, finally 2 x 3.

Finally, add the two rows of numbers together in the same way as when we add in column method.

You would do the same to multiply by a 3 digit number, this time you'd get 3 rows of numbers, and when multiplying by the hundreds digit, the answers will be multiples of 100, so there will be two zeros as place holders.



Dividing

Vocabulary for dividing!

halve share share equally One each, two each, three each ….. group in pairs threes tens equal groups of divide division divided by

Division is the inverse of multiplication, which means the opposite. Many of the mental division strategies involve basically doing the opposite steps that are done when multiplying!

When dividing by 10, 100 and 1000 the number gets one place value place smaller, by moving 1 place to the right for each 10.

750 ÷ 10 = 75 move each digit 1 place to the right

750 ÷ 100 = 7.5 move each digit 2 places to the right

750 ÷ 1000 = 0.75 move each digit 3 places to the right

As numbers get smaller, they may become decimals by passing the decimal point!

To divide by 2, just halve the number: 842 = 421

To divide by 4, halve it, then halve it again:

842 = 421 = 210.5

To divide by 8, halve it, halve it, then halve it again!

842 = 421 = 210.5 = 105.25

To divide by 5, first divide by 10, then double it.

842 ÷ 10 = 84.2 double it = 168.4

To divide by 50, first divide by 100, then double it!

842 ÷ 100 = 8.42 double it = 16.84

To divide by 25, first divide by 100, then times by 4.

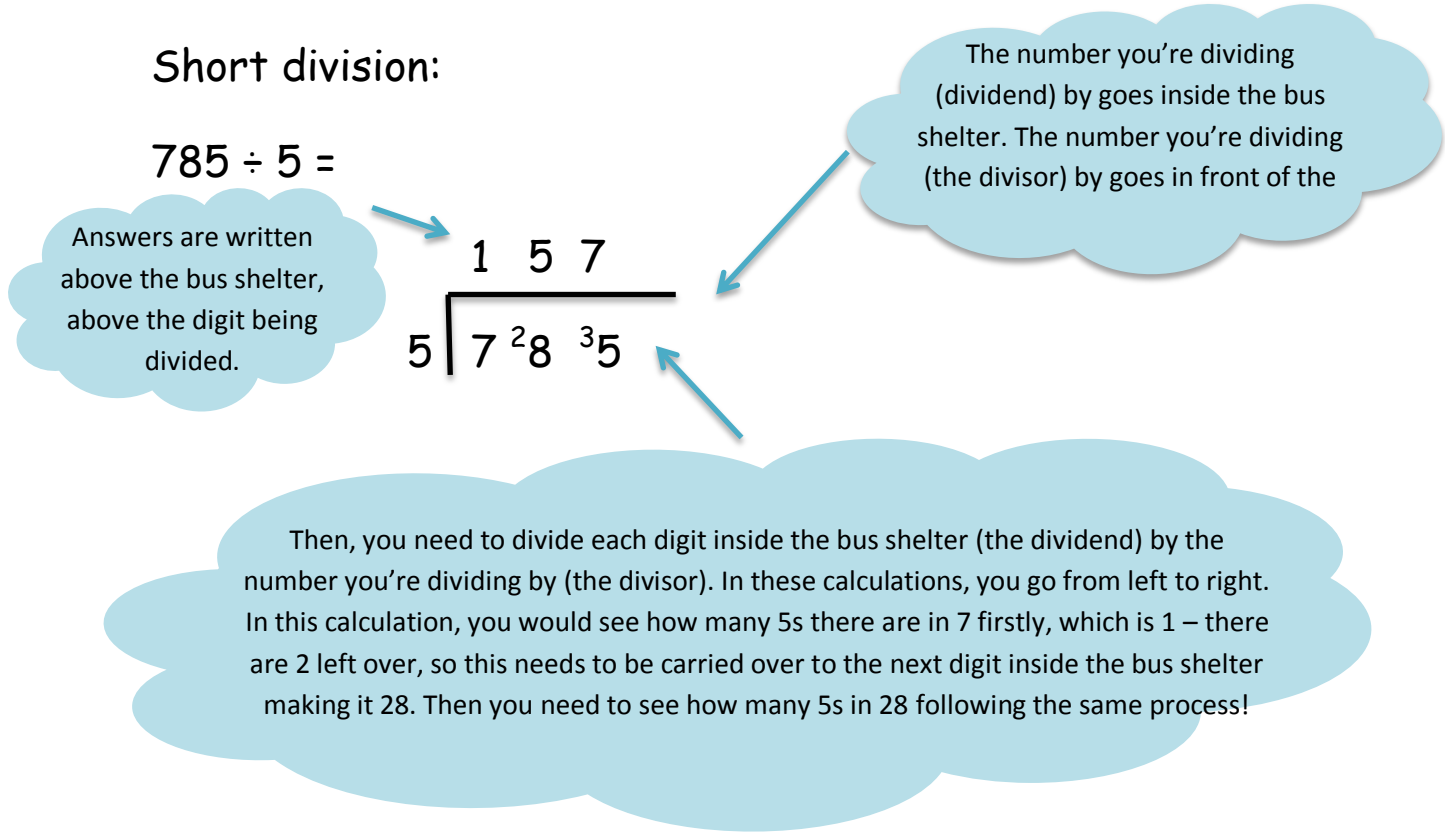
842 ÷ 100 = 8.42 double it = 16.84 double it again = 33.68

Written methods for dividing

Unlike the other calculations we've looked at so far, division isn't done in a column calculation. The method used is known as bus shelter (because it looks a bit like a bus shelter!). There are two different methods to use: short division, which is used when dividing by a single digit, and long division (which the children are a bit frightened of!).

Short division:

785 ÷ 5 =



Another example would be:

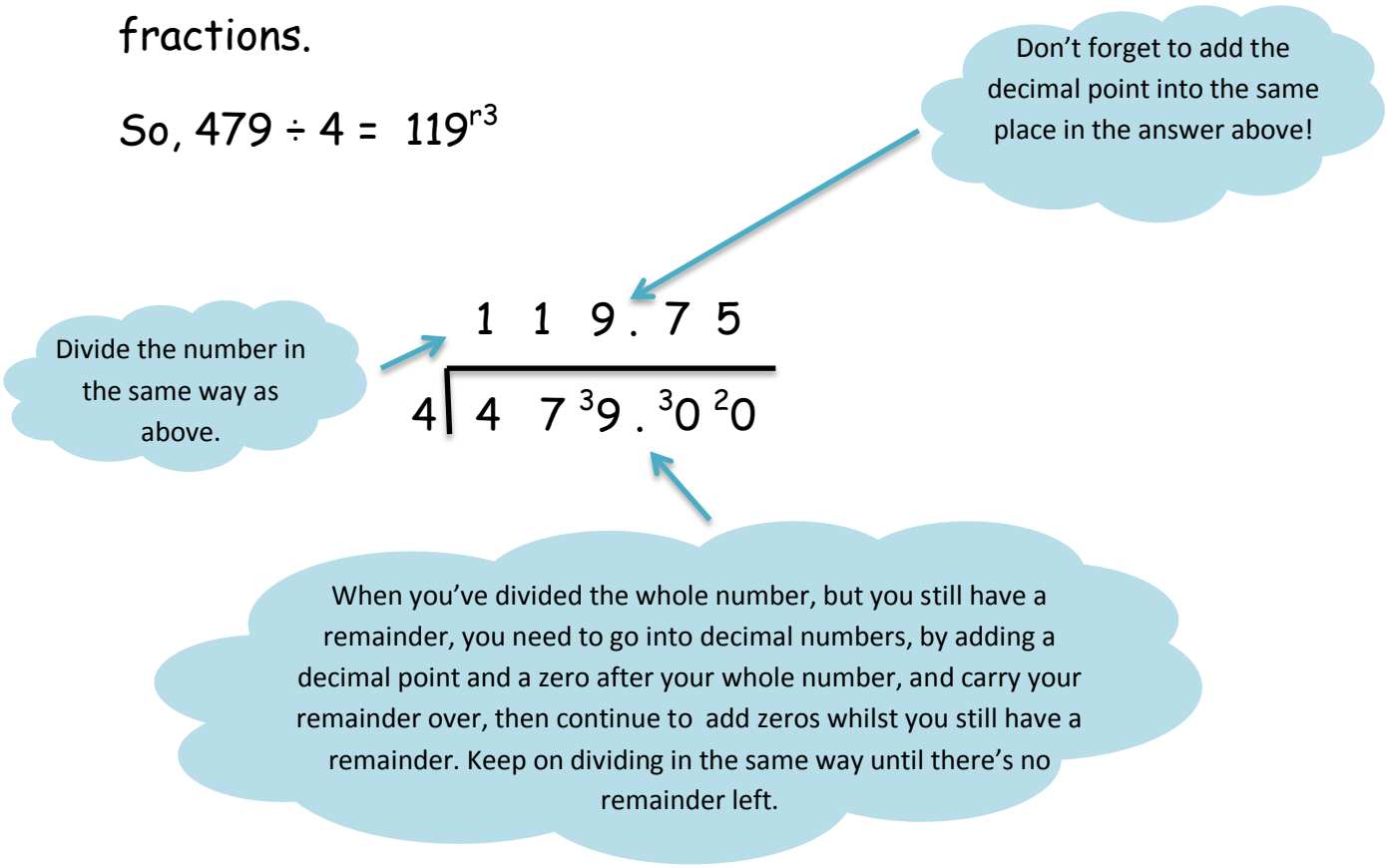
936 ÷ 6 =

1 5 6

6 | 9 ³3 ³6

Sometimes there will be a remainder left over when we divide. We can either leave our remainders as decimals or fractions.

So, 479 ÷ 4 = 119^{r3}



To leave a remainder as a fraction is easy! With the same calculation as above, you get the answer 112 with a remainder of 1. This means that you have 1 part of the 4 you were dividing by, which give you a fraction of $\frac{1}{4}$!

Another example of this is:

$$\begin{array}{r} 0\ 5\ 9\ ^{r8} \\ 9\overline{)\ 5\ ^{5}3\ ^{8}7} \end{array}$$

So, 537 ÷ 9 = $59\ ^{8}/_{9}$ (8 remaining out of the 9 dividing by).

We need to use long division when we're dividing by 2 digit numbers.

For example:

7294 ÷ 24 =

Firstly, you need to know (work out) your 24 times table.

1 x 24 =24

2 x 4 = 48

3 x 24 = 72

4 x 24 = 96

5 x 24 = 120

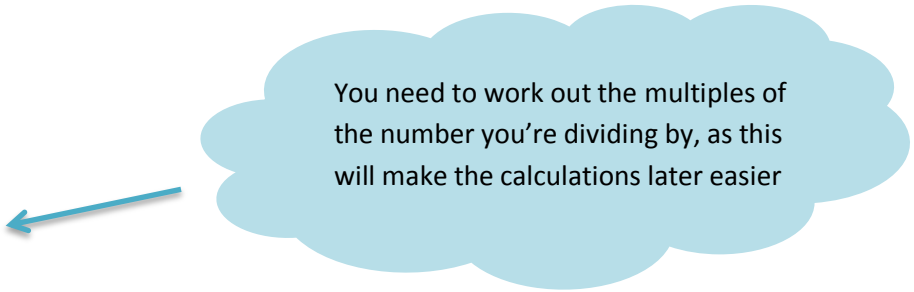
6 x 24 = 144

7 x 24 = 168

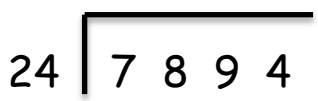
8 x 24 = 192

9 x 24 = 216

10 x 24 = 240

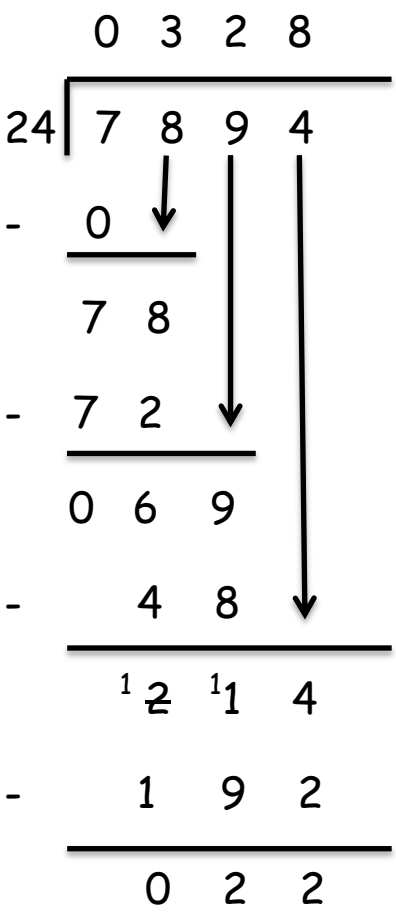


You then need to place the numbers into a bus shelter, just like with short division:



After this, it becomes a bit different.

Step by step, this is what you do!



Firstly, divide the first digit, in this calculation: how many 24s are there in 7. Record the answer above (0) then write how much 0 lots of 7 is below, and take this away from 7.

Take away the number (in this case 7 – 0) then move down the next digit which is being divided. This give us the number 78 which we now need to divide by 24, we can do this by looking at our 24 times tables and seeing how many 24s there are in 78 – which is 3 which adds up 72, record the 3 lots of 24 above the bus shelter, and take the amount of 3 lots of 24 away from the 78 – then move down the next digit to be divided, giving us 69, which we then divide by 24.

Repeat this process, how many 24s in 69? 2 x 24 = 48 – record the 2 above, and take the 48 away from the 69, which leaves 21, then move the next digit to be divided down.

Repeat again, how many 24s in 214? 24 x 8 = 192. Write the 8 lots of 24 above the bus shelter, and take the 192 away from 214. This gives us our answer of: 7894 ÷ 24 = 328 r22

Another example: 5457 ÷ 17 =

0 3 2 1 17 | 5 4 5 7 - 0 5 4 - 5 1 0 3 5 3 4 - 0 1 7 1 7 0 0	1 x 17 = 17 2 x 17 = 34 3 x 17 = 51 4 x 17 = 68 5 x 17 = 85 6 x 17 = 102 7 x 17 = 119 8 x 17 = 136 9 x 17 = 153 10 x 17 = 170

The different areas of maths

In Upper Key Stage 2 – years 5 & 6 – the maths curriculum is broken down into different sections: **Number, measurement, geometry, ratio** and **proportion, algebra and statistics**. What each of these sections involves and what your child should be able to do by the end of year six is explained below.

Number:

- ✓ Read and write numbers up to ten million 10,000,000
- ✓ Understand the place value of numbers up to 10,000,000
- ✓ Round a number to the nearest hundredth, tenth, whole number, hundred, ten, thousand etc.
- ✓ Use negative numbers, counting backwards through zero
- ✓ Read and write Roman Numerals (including reading years)
- ✓ Add, subtract, multiply and divide using formal written methods (including solving multi-step problems)
- ✓ Recognise factors, multiples and prime numbers
- ✓ Simplify, add, subtract, multiply and divide fractions
- ✓ Know the equivalences between fractions, decimals and percentages
- ✓ Understand numbers to three decimal places.

Measurement:

- ✓ Convert between metric units of measurement (centimetres to meters, millimetres to metres etc)
- ✓ Convert between metric and imperial units (km to miles, litres to pints etc)
- ✓ Measure and calculate the perimeter of rectangles, parallelograms, triangles and compound shapes in mm, cm and m.
- ✓ Measure and calculate the area of rectangles, triangles and compound shapes – understanding that we measure the space within a shape in squares – mm^2, cm^2, m^2
- ✓ Measure and calculate the volume of 3D shapes – understanding that we measure the space within a 3D shape in cubes – mm^3, cm^3, m^3
- ✓ Solve problems involving measurement

Geometry:

- ✓ Recognise regular and irregular 2D shapes by their properties
- ✓ Recognise 3D shapes by 2D representations and by their properties
- ✓ Recognise nets of 3D shapes
- ✓ Draw 2D shapes using given dimensions and angles
- ✓ Build simple 3D shapes, creating nets
- ✓ Classify and compare geometric shapes based upon their properties
- ✓ Understand and name the parts of a circle, naming the radius, diameter and circumference
- ✓ Find missing angle sizes
- ✓ Use and understand the language of position and how to read and record coordinates

Ratio and Proportion (year 6):

- ✓ Solve problems involving finding percentages of amounts (e.g. 15% of 360)
- ✓ Recognise the ratio of two different amounts (e.g. 3:2)
- ✓ Use ratios to solve problems involving scale
- ✓ Use ratio and proportion to understand unequal sharing and grouping of numbers

Algebra (year 6):

- ✓ Use simple formulae
- ✓ Generate and describe number sequences
- ✓ Solve missing number problems algebraically
- ✓ Find pairs of missing numbers that satisfy an equation with two missing numbers
- ✓ Finding possible variables

Statistics:

- ✓ Interpreting pie charts and line graphs, including finding fractions and percentages
- ✓ Draw graphs which show two variables
- ✓ Convert km to miles, showing this in graph form
- ✓ Find the mean and range of sets of data