How we teach Maths at Ellingham

Year 5

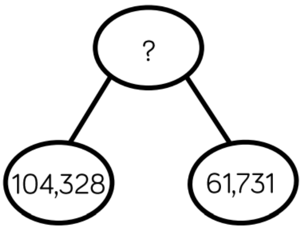
A helpful guide for parents

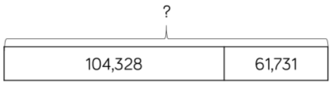
Addition

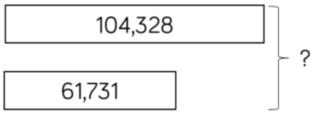
No new methods for addition are introduced in Year 5. We continue to consolidate skills with the column addition method used in Lower KS2, solving problems with numbers of 4 digits or more, up to 1 million.

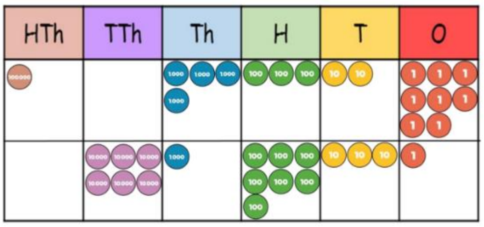
Representations

We continue to use a variety of representations (including part-whole models and bar models), and concrete resources such as place value counters where necessary, to aid understanding and to explain reasoning. However, concrete methods become increasingly unwieldy with large numbers, and children are encouraged to use the column method.





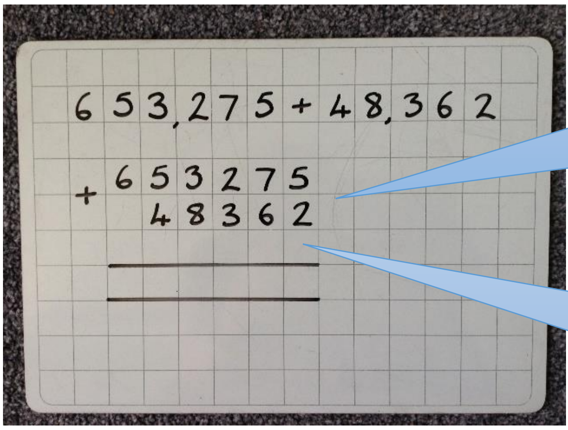




104,328 + 61,731 = 166,059

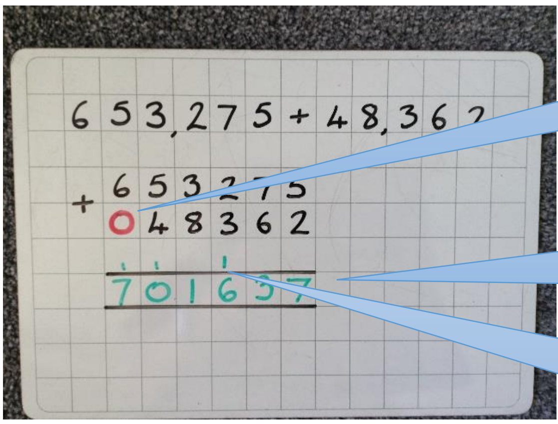
Column Addition Method

Column addition is the most efficient method of adding two or more larger numbers.



It is vital to set out the calculation correctly, with columns directly underneath each other.

'Mind the Gap!' Leave an extra row for writing digits which have been exchanged.



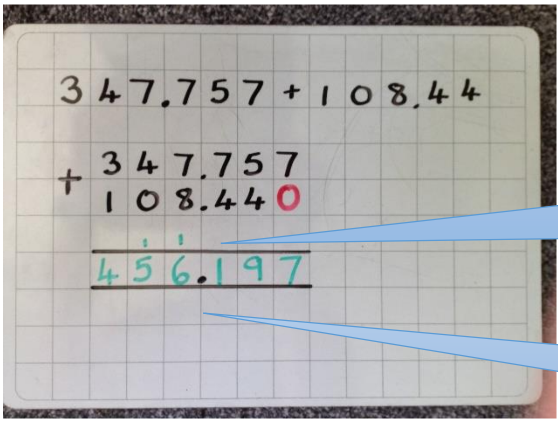
A zero can be added as a 'placeholder', to aid the correct layout and addition of columns.

Add the numbers in each column together, starting with the ones column and record the answer directly below in the answer row.

Exchange into the next column when the sum of the digits in a column is greater than 9. Write the 'tens' digit in the gap.

Column Addition with Decimal Numbers

In Year 5, children can be asked to solve problems with decimal numbers up to 3 decimal places (tenths, hundredths and thousandths). Decimal numbers are added using the column method. As always, it is vital to set out the calculation correctly, and adding a zero as a 'placeholder' can help ensure this is done effectively.



Add a zero as a placeholder.

Exchange into the next column when the sum of the digits in a column is greater than 9. Write the 'tens' digit in the gap.

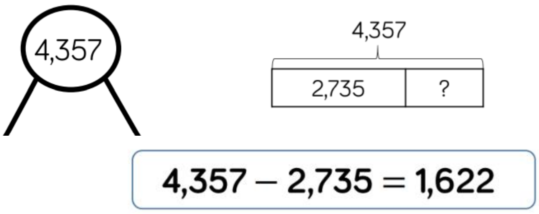
Decimal points must be lined up, including a decimal point in the answer box.

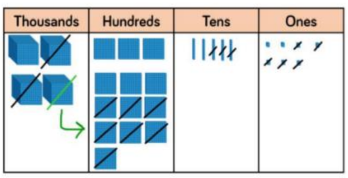
Subtraction

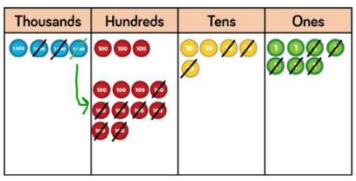
No new methods for subtraction are introduced in Year 5. We continue to consolidate skills in using the column subtraction method from Lower KS2, solving problems with numbers of 4 digits or more, up to 1 million.

Representations

We continue to use a variety of representations (including part-whole models and bar models), and concrete resources such as place value counters where necessary, to aid understanding and to explain reasoning. However, concrete methods become increasingly unwieldy with large numbers, and children are encouraged to use the column method.

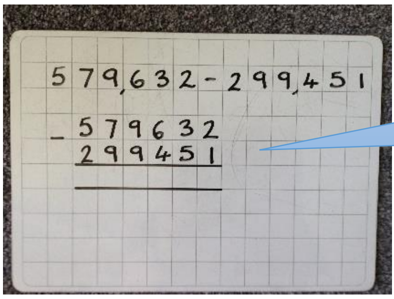




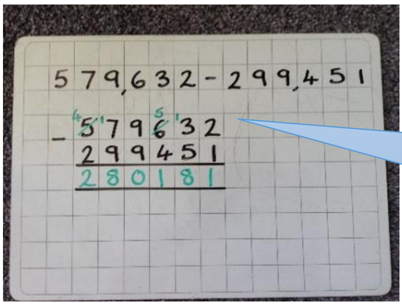


Column Subtraction Method

Column subtraction is the most efficient method of subtracting two larger numbers.



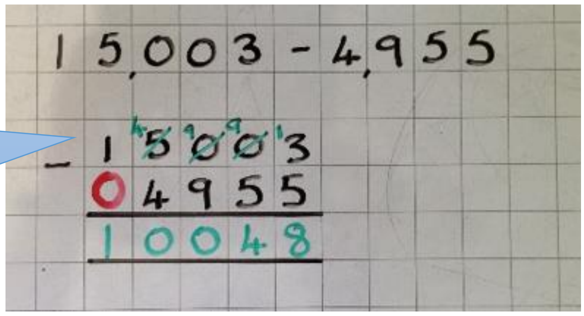
It is vital to set out the calculation correctly, with the largest number at the top, and columns directly underneath each other.



Start subtracting from the ones column, taking the lower digit away from the upper digit and recording the answer directly below in the answer box: 2 – 1 = 1. Then repeat with the tens column, working right to left through the columns.

If the upper digit is smaller than the lower digit, exchange from the column to the left, so here 3 – 5 becomes 13 – 5. The digit in the column to the left is crossed out and decreased by 1: 6 becomes 5.

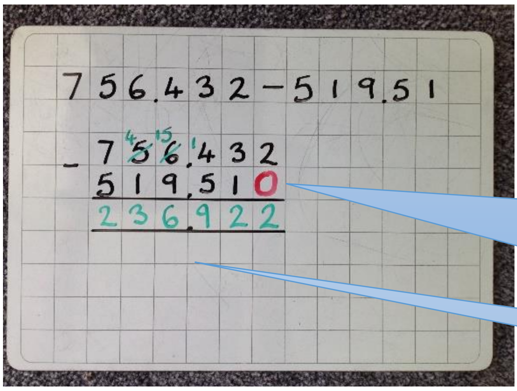
Sometimes it will be necessary to exchange across a number of columns. Here, digits have to be exchanged from the thousands column, across the hundreds and tens, to make the ones column a large enough number from which to subtract.



A zero can be added as a placeholder when subtracting numbers of different sizes.

Column Subtraction with Decimal Numbers

In Year 5, problems can involve decimal numbers with up to 3 decimal places. To solve these problems, the children will use the column subtraction method, taking care to set out the calculation correctly in columns.



Write the largest number at the top of the calculation, with the smaller number underneath. Use a zero as a placeholder with numbers of unequal digits.

Decimal points must be lined up, including a decimal point in the answer box.

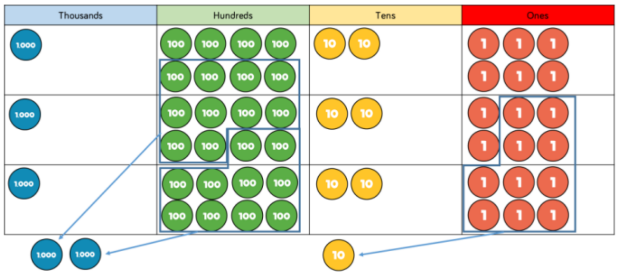
Multiplication

Quick and accurate recall of times tables facts up to 12 x 12 becomes increasingly important in Year 5, in order for the children to tackle multiplication, division and fractions problems with confidence.

In Year 5, children continue to use the formal written method of short multiplication, learned in Lower KS2, to multiply numbers of four digits and more by 1 digit numbers (e.g. 42,113 x 4). As they move into Year 5, they will be introduced to the method of long multiplication, allowing them to multiply numbers of four digits or more by 2 digit numbers (e.g. 42,113 x 24).

Representations

Pictorial methods such as the bar model can be used to aid understanding and express reasoning. Place value counters can also be used to support understanding, if necessary, but children are encouraged to use the abstract written methods of short and long multiplication as the most efficient mathematical methods.

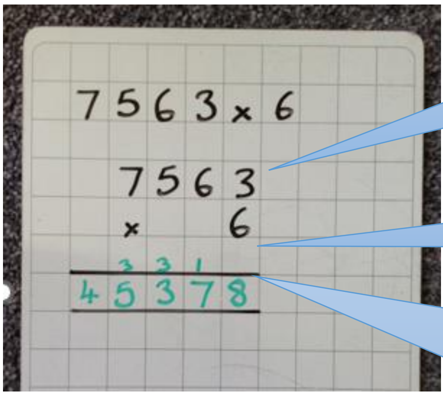


$1,826 \times 3 = 5,478$

5,478		
1,826	1,826	1,826

Short Multiplication

Short multiplication is the most efficient method of multiplying larger numbers by a one-digit number. Set out the calculation in columns and follow the steps outlined below.



Write the largest number at the top of the calculation, with the 1-digit number (the multiplier) below.

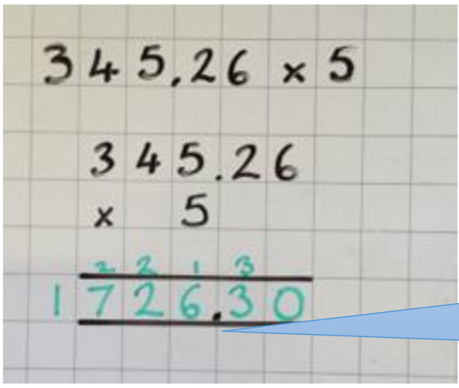
'Mind the Gap!' Leave a row above the answer box to use for exchanging digits.

Start by multiplying the ones digit of the top number by the multiplier. When the total is larger than 9, exchange the 'tens' digit into the next column: 6 x 3 = 18, so the 8 is recorded and the digit 1 is exchanged. Then multiply the digit in the next column, working right to left: 6 x 6.

When multiplying subsequent digits, remember to add any exchanged digits to your total before recording the answer. 6 x 6 = 36. Add the exchanged digit: 36 + 1 = 37. Record the ones digit (7) and exchange the tens digit (3) into the next column.

Using Short Multiplication with Decimal Numbers

The same method of short multiplication is used to multiply decimal numbers by 1 digit numbers.

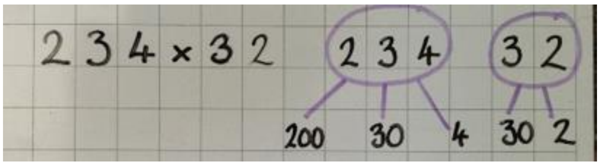


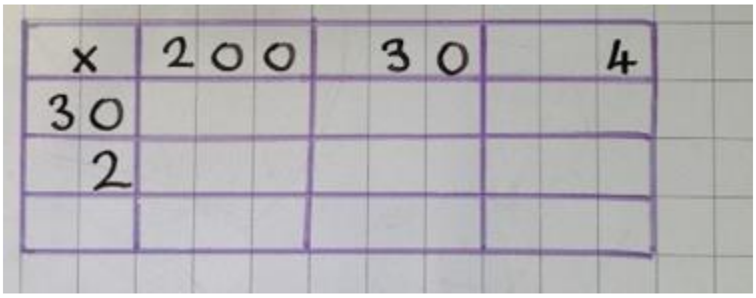
Add the decimal point into the answer box before starting the calculation and take care to keep the digits in the correct column.

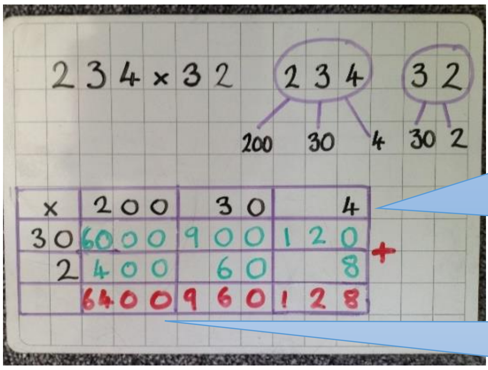
The Grid Method

The Grid Method can be used to multiply numbers with two or more digits by another two-digit number. This is used to help the children begin to use long multiplication and is taught to give the children another strategy for their calculation 'toolbox'.

The first step in the grid method is to partition the numbers into thousands, hundreds, tens and ones. In the example below, 234 x 32, the number 234 can be partitioned into 200 + 30 + 4 and 32 partitions into 30 + 2. These numbers are then laid out in a grid:







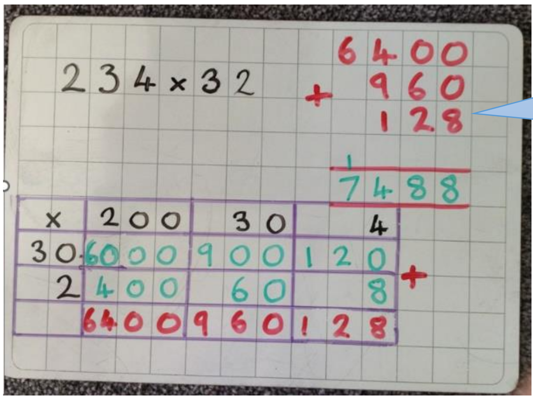
Start by multiplying 30 x 200 and record the answer (60,000) in the correct box.

Then multiply 30 x 30 (900) and record.

Finally, multiply 30 x 4 (120) and record.

Repeat, using the ones digit: 2 x 200, 2 x 30, 2 x 4.

Next, add up the columns: 6,000 + 400 = 6,400 and record the total in the grid box beneath your calculation. Repeat with the other columns.



Finally, take your totals from the last step and add them together using column addition. This gives the answer: 234 x 32 = 7,488.

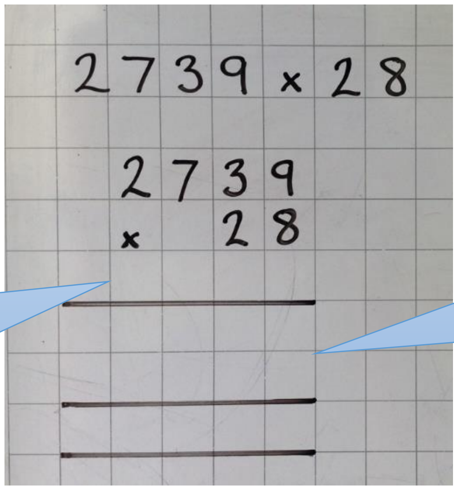
Long Multiplication Method

Although the grid method can be used to multiply large numbers by 2 digit numbers, the most efficient way of doing this is to use the long multiplication method, which is introduced to the children for the first time in Year 5.

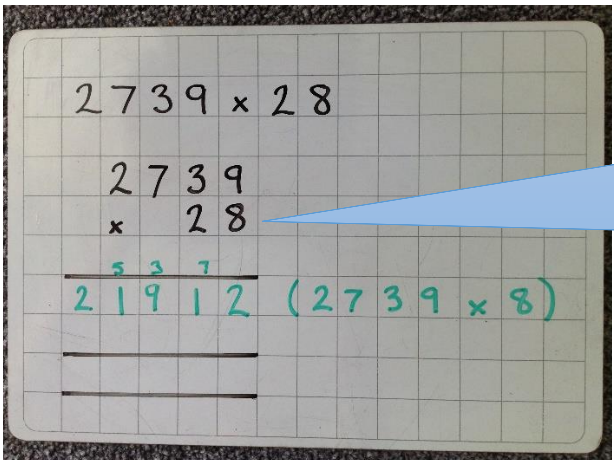
This method takes practise, as it has several steps, each of which require exchanging digits and recording them in a particular place in the calculation. For a long multiplication calculation, the layout is like this:

Set the calculation out carefully in columns, with the multiplier below the number to be multiplied.

'Mind the Gap!' – leave an empty row beneath the numbers, to record any exchanged digits.



Leave two further rows empty, before drawing 2 more lines to create the answer box.

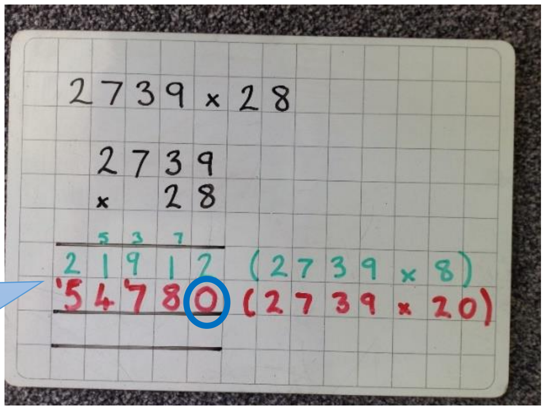


Start by multiplying the top number by the ones digit of the multiplier (8).

As in short multiplication, first multiply the ones digit of the top number, then the tens digit, working right to left through the columns.

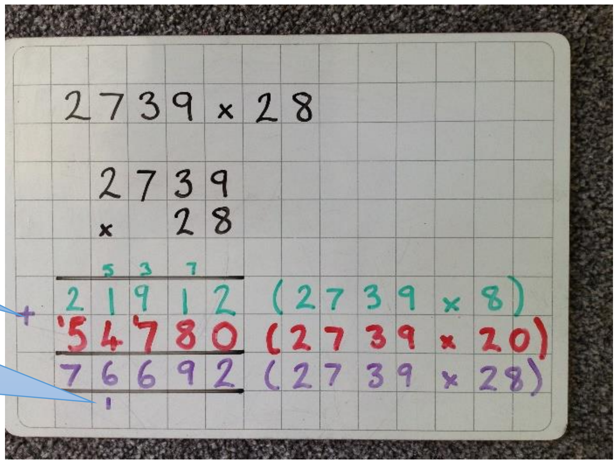
Record exchanged digits in the 'gap', as in the short multiplication method.

Record exchanged digits at the top of the next column to the left, in the same row of digits.



Now multiply the top number by the tens digit of the multiplier (2). However, as we are actually multiplying by 20 instead of 2, our answer will be ten times bigger, so put a placeholder zero O into the ones column before starting to multiply.

Finally, add up the two columns using column addition, to find the total: (2,739 x 8) + (2,739 x 20) = 2,739 x 28.

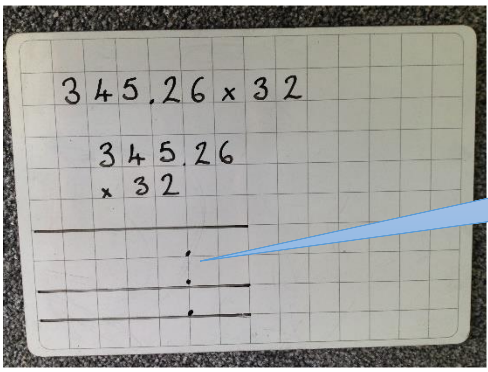


Whilst adding, record any exchanged digits below the answer box, so that they do not become confused with digits from the earlier parts of the calculation.

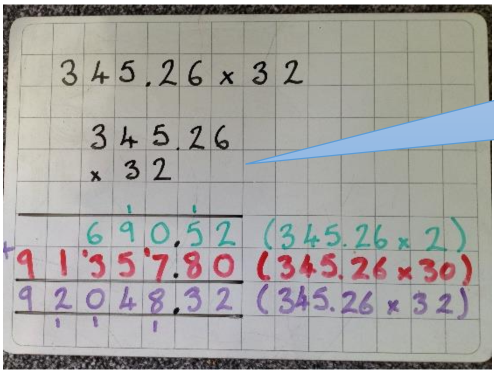
Children are encouraged to check each step of their calculation before moving on to another question, as it is very easy for mistakes to creep in, for instance, forgetting to write the zero when multiplying by the tens digit, or adding exchanged digits from previous steps into the final total.

<u>Using Long Multiplication with Decimal Numbers</u>

Decimal numbers can also be multiplied using long multiplication, and the method is just the same. Getting the initial layout correct is vital.



Add the decimal point into each row before starting the calculation.



Working right to left, multiply the first decimal digit by the ones digit of the multiplier and record in the correct column: e.g. 2 x 0.03 would be recorded in the hundreds column: 0.06.

Add the zero placeholder O before multiplying by the tens digit of the multiplier.

Division

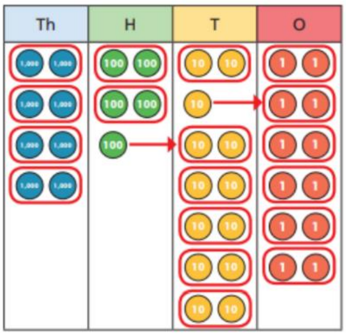
In Year 5, children will continue to use the short division method learned in Lower KS2 to divide numbers greater than 4 digits by 1 digit numbers. They will also be introduced to dividing by 2 digit numbers using this method, as the next step towards using long division in Year 6. They will record remainders as whole numbers, fractions and decimals.

Representations

Children can use bar models to represent a problem and place value counters could be used as a support, but with larger numbers, short division is the most efficient method to use.

When dividing by 2 digit numbers, it can help to write out multiples first, to support calculations with larger remainders:

8,532



	4	2	6	6
2	8	5	$^{1}3$	$^{1}2$

$7{,}335 \div 15 = 489$

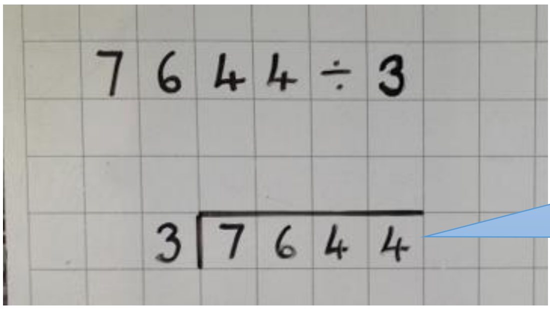
	0	4	8	9
15	7	$^{7}3$	$^{13}3$	$^{13}5$

15	30	45	60	75	90	105	120	135	150

$8{,}532 \div 2 = 4{,}266$

Short Division

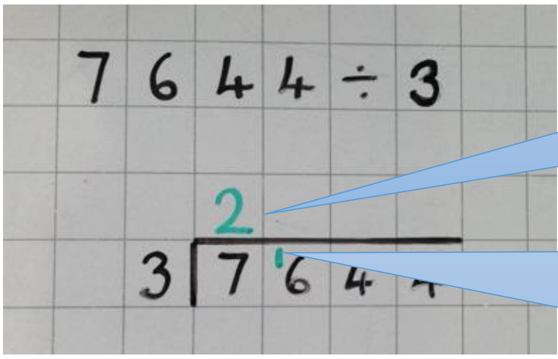
This method is sometimes called the 'bus stop' method. The calculation is set out as below:



The number to be divided (the dividend) is placed inside the division symbol (the 'bus stop'), with the number dividing it (the divisor) written outside.

Divisor Dividend

Divide each digit in turn by the divisor, starting with the largest digit, working left to right. Record a remainder by writing it next to the digit in the column to the right. Write the total on top of the 'bus stop'.

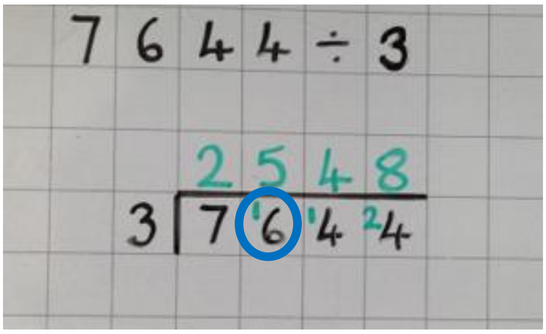


Divide the thousands digit by 3 ('How many 3s go into 7?'). 7 ÷ 3 = 2. Write the answer on the top of the 'bus stop'.

Multiply this number (2) by the divisor (3) and subtract your answer from the thousands digit to find the remainder: 2 x 3 = 6; 7 – 6 = 1. Record this remainder by exchanging into the hundreds column, writing it next to the hundreds digit.

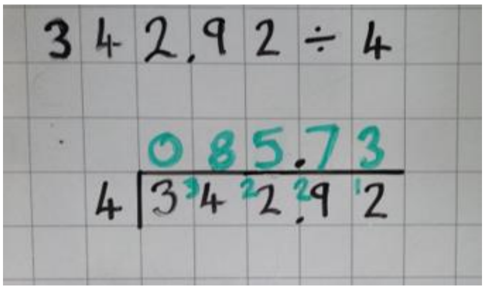
This remainder makes the next number to be divided 16 instead of 6. Divide this new target number by the divisor: 16 ÷ 3 = 5. Record the answer and find any remainder, writing it next to the tens digit.

Repeat the process for all remaining digits.



Dividing Decimal Numbers

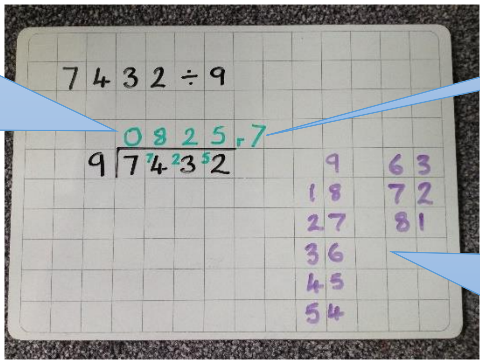
Use the short division method with decimal numbers in exactly the same way as with whole numbers. Write the decimal point in the correct place in the answer space before starting the calculation, and keep digits in the correct column.



Dividing with Remainders

If there are still digits to exchange at the end of the calculation, these are recorded as a remainder (r) at the end of the answer: 825 **r7**.

A zero can be added as a place holder if the first digit is smaller than the divisor. This digit is then exchanged into the column to the right.

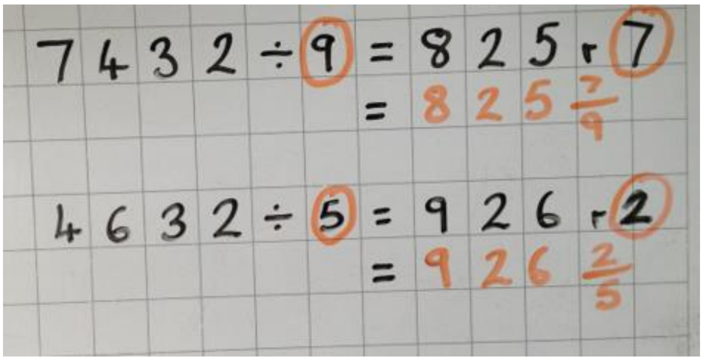


Remainder

If children are unsure of a times table, it can help to write out the multiples of the divisor before starting.

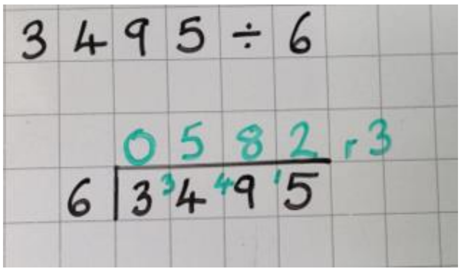
Recording Remainders as Fractions

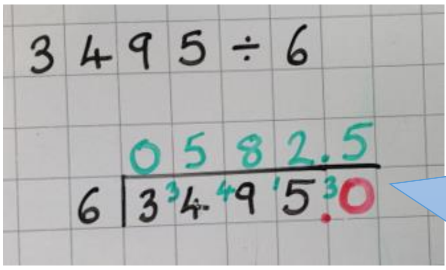
Remainders can also be recorded as fractions. To do this, the remainder is used as the numerator (top number) of the fraction and the divisor becomes the denominator (bottom number).



Recording Remainders as Decimals

Remainders can also be written as decimal numbers. Zeros are used as placeholders.

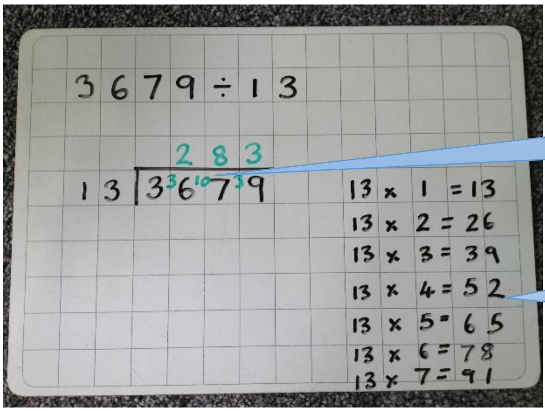




Instead of recording the final remainder (r3), a zero is added as a placeholder, the remainder is exchanged, and the calculation continues, producing a decimal answer.

Using Short Division with 2 Digit Divisors

Year 5s will be introduced to using short division with small 2 digit numbers, as a step towards using long division in Year 6. Since these calculations will go beyond most children's times tables knowledge, it is helpful to work out and record the multiples of the divisor before starting the calculation.



Remainders exchanged may be 2 digit numbers.

Write out the multiples of the divisor before starting the calculation.