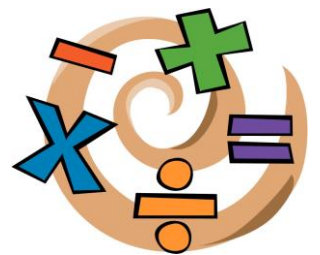
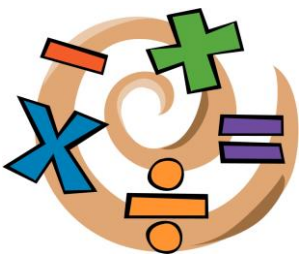


Maths in Edwin Jones Trust Schools



Edwin Jones
TRUST

Methods for the 4 operations



January 2015

At Edwin Jones Trust Schools we really value the support you offer your children with their learning. We know that strategies for teaching maths may have changed. A regular comment from parents at parents' evening is "We never learnt it that way!"

To help parents, the Trust have put together this booklet to help you support your child with their maths learning. It shows the strategies we use across the Key Stages (EYE, KS1 and KS2) and in the different schools.

We have included the age related expectations for each year group, so you can see the sorts of skills your child will be learning. It is however important to note that these are end of year expectations, so do not panic if your child is finding a few of the targets tricky in September!

By the end of Reception your child should:

- ✓ Count reliably with numbers from 1-20.
- ✓ Place numbers from 1-20 in order.
- ✓ Say which number is 1 more or 1 less than a given number.
- ✓ Use materials to add and subtract 2 single digit numbers.
- ✓ Solve problems involving doubling, halving and sharing using materials.

By the end of Year 1 your child should:

- ✓ Count to and across 100 forwards and backwards, from any given number.
- ✓ Count in multiples of 2, 5 and 10 from any given number.
- ✓ Read and write numbers from 1-100 in digits and 1-20 in words.
- ✓ Order numbers to 100.
- ✓ Identify 1 more or 1 less from any number up to 100.
- ✓ Recall and use addition and subtraction facts up to 20.
- ✓ Solve addition, subtraction, multiplication and division problems using materials.
- ✓ Use the inverse in addition sums with the answer up to 20.
- ✓ Recall and use the multiplication and division facts for the 10 times table.
- ✓ Double and half numbers to 10.
- ✓ Recognise odd and even numbers to 20.

By the end of Year 2 your child should:

- ✓ Read and write numbers to at least 100 in digits and words.
- ✓ Count in steps of 2, 5 and 10 up to 100 from any given number.
- ✓ Count in multiples of 3 to 30.
- ✓ Compare and order numbers to 100.
- ✓ Recall addition and subtraction facts to at least 20.
- ✓ Add and subtract 2 digit numbers.
- ✓ Check answers using the inverse of addition and subtraction.
- ✓ Recall multiplication facts for the 10, 2 and 5 times tables.
- ✓ Solve simple problems involving multiplication and division.
- ✓ Make the connection between doubling and halving.
- ✓ Recognise odd and even numbers to at least 100.
- ✓ Show that multiplication is repeated addition.

By the end of year 3 your child should:

- ✓ Read and write numbers up to 1000.
- ✓ Count in multiples of 4, 8, 50 and 100 from a given number.
- ✓ Order numbers up to 1000, using place value.
- ✓ Round 2 or 3 digit numbers to the nearest 10 or 100 and use this to estimate answers.
- ✓ Use the inverse to check answers.
- ✓ Add and subtract 2 and 3 digit numbers.
- ✓ Multiply and divide 2 digit numbers by 1 digit.
- ✓ Show division is the inverse of multiplication.
- ✓ Recall and use the multiplication and division facts for the 2, 3, 4, 5, 6, 8 and 10 times tables.
- ✓ Mentally add and subtract from a 3 digit number.

By the end of year 4 your child should:

- ✓ Read and write numbers up to 10, 000.
- ✓ Count in multiples of 6, 7, 9, 25 and 1,000.
- ✓ Find 1,000 more or less than a given number.
- ✓ Count backwards through 0 to include negative numbers.
- ✓ Recognise the place value of each digit in a four-digit number (1,000s, 100s, 10s and 1s).
- ✓ Order and compare numbers beyond 1,000.
- ✓ Round any number to the nearest 10, 100 or 1,000.
- ✓ Read Roman numerals to 100 (I to C).
- ✓ Recall and use multiplication and division facts up to 12×12 .
- ✓ Multiply and divide 2 and 3 digit numbers by a 1 digit number.
- ✓ Add and subtract numbers with up to 4 digits.
- ✓ Use the inverse to check answers.
- ✓ Solve addition and subtraction 2 step problems.
- ✓ Use +, -, \times , \div to solve problems and decide whether it is best to calculate in their head or on paper.

By the end of year 5 your child should:

- ✓ Read, write, order and compare numbers to at least 1,000,000.
- ✓ Count forwards or backwards in steps of 10 from any given number up to 1,000,000.
- ✓ Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through 0.
- ✓ Round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000 and use this to estimate answers.
- ✓ Read Roman numerals to 1,000 (M).
- ✓ Add and subtract whole numbers with more than 4 digits.
- ✓ Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use.
- ✓ Identify multiples and factors.
- ✓ Multiply and divide numbers up to 4 digits by a one- or two-digit number.
- ✓ Multiply and divide numbers mentally drawing upon known facts.
- ✓ Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes

By the end of year 6 your child should:

- ✓ Read, write, order and compare numbers up to 10 000 000.
- ✓ Round any whole number to a required degree of accuracy.
- ✓ Use negative numbers in context.
- ✓ Multiply numbers up to 4 digits by a two-digit whole number.
- ✓ Divide numbers up to 4 digits by a two-digit whole number.
- ✓ Mentally calculate sums, including with mixed operations and large numbers.
- ✓ Identify common factors, common multiples and prime numbers.
- ✓ Solve addition and subtraction multi-step problem, deciding which operations and methods to use.

How do your children learn to add at Edwin Jones Trust Schools?

Practical Counting:

Children use the materials available to add together and count to find the answer. This could be shown through jottings and drawings.

Number line:

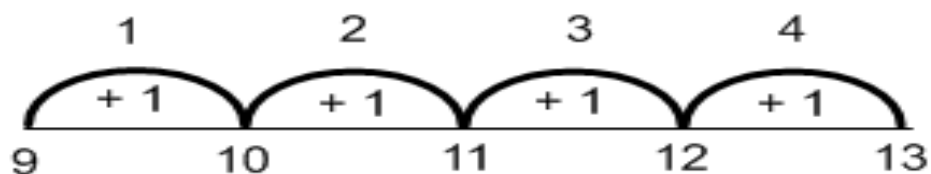
Children will begin with a numbered number line and then move on to an empty number line when confident. The steps are the same.

$$9 + 4 =$$

On a numbered number line, find the largest number. On an empty number line, write the largest number at the start of the number line.

9 _____

The number we are adding is the number of jumps on the number line.



The answer is the last number we land on.

Partitioning:

Before column method is introduced, children need to be secure with place value and partitioning. Depending on the year group and ability, this will either be taught as a mental strategy or a written method.

$$\begin{array}{r} \text{T U} \\ 12 \end{array} + \begin{array}{r} \text{T U} \\ 15 \end{array} =$$

First add the Tens together

$$10 + 10 = 20$$

Then add the Units together

$$2 + 5 = 7$$

Finally add the totals together

$$20 + 7 = 27$$

$$12 + 15 = 27$$

Sometimes the Tens boundary will need to be crossed.

$$\begin{array}{r} \text{T U} \\ 32 \end{array} + \begin{array}{r} \text{T U} \\ 19 \end{array} =$$

First add the Tens together

$$30 + 10 = 40$$

Then add the Units together

$$2 + 9 = 11$$

Next add the Tens together

$$40 + 10 = 50$$

Then add the remaining Units

$$50 + 1 = 51$$

Column method:

The large majority of children will use this method.

$$56 + 33 =$$

Begin by identifying the value of each digit in the number (56 is made up of 5 tens and 6 units and 33 is made up of 3 tens and 3 units). Line up the units under each other and line up the tens under each other.

$$\begin{array}{r} \text{T U} \\ 56 \\ 33 \\ \hline \end{array}$$

Always begin by adding the units together first. Write the answer underneath.

$$\begin{array}{r} \text{T U} \\ 56 \\ 33 \\ \hline 9 \end{array}$$

Next, add the tens together and write the answer underneath.

$$\begin{array}{r} \text{T U} \\ 56 \\ 33 \\ \hline 89 \end{array}$$

The answer is the number underneath the calculation. $56 + 33 = 89$ (8 tens and 9 units).

Sometimes we may need to cross boundaries when using column. This is called carrying.

In this method, carry digits are recorded below the line, using the words 'carry ten' or 'carry one hundred', not 'carry one'.

$$\begin{array}{r} 47 \\ + 76 \\ \hline 123 \\ \text{11} \end{array} \quad \begin{array}{r} 258 \\ + 87 \\ \hline 345 \\ \text{11} \end{array} \quad \begin{array}{r} 366 \\ + 458 \\ \hline 824 \\ \text{11} \end{array}$$

How do your children learn to subtract at Edwin Jones Trust Schools?

Practical Counting:

Children use the materials available to subtract and count to find the answer. This could be shown through jottings and drawings.

Number line:

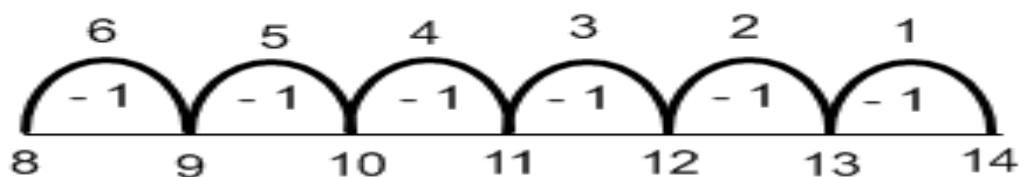
Children will begin with a numbered number line and then move on to an empty number line when confident. The steps are the same.

$$14 - 6 =$$

On a numbered number line, find the largest number. On an empty number line, write the largest number at the end of the number line.

14

The number we are subtracting is the number of jumps on the number line, jumping backwards.



The answer is the last number we land on.

Column method:

$$59 - 46 =$$

Begin by identifying the value of each digit in the number (59 is made up of 5 tens and 9 units and 46 is made up of 4 tens and 6 units). Line the units up under each other and do the same for the tens. The largest number should always be first.

$$\begin{array}{r} \text{T U} \\ 59 \\ \underline{46} \end{array}$$

First, subtract the units of the smaller number from the units of the larger number. In the example, that would be $9-6=3$. The answer is written underneath the sum.

$$\begin{array}{r} \text{T U} \\ 59 \\ \underline{46} \\ 3 \end{array}$$

Next, subtract the tens of the smaller number from the tens of the larger number. In the example, that would be $50-40=10$ (5 tens - 4 tens = 1 ten). The answer is written underneath.

$$\begin{array}{r} \text{T U} \\ 59 \\ \underline{46} \\ 13 \end{array}$$

Sometimes we need to borrow in order to subtract.

$$\begin{array}{r} 425 \\ - 143 \\ \hline 2 \end{array} \quad \begin{array}{r} 3\cancel{4}25 \\ - 143 \\ \hline 82 \end{array} \quad \begin{array}{r} 3\cancel{4}25 \\ - 143 \\ \hline 282 \end{array}$$

How do your children learn to multiply at Edwin Jones Trust Schools?

Practical Grouping:

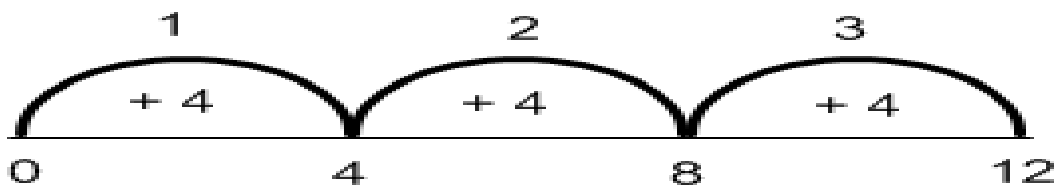
Children will use materials, such as multilink, to arrange groups of the same number and then count them all to get the answer. This can be shown through jottings.

Numbered Number line (repeated addition):

Multiplication is repeated addition and this can be clearly seen on a number line, through the number of jumps completed.

$$4 \times 3 = (3 \text{ groups of } 4).$$

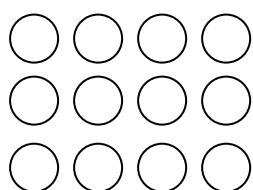
On a numbered number line, the multiples are already identified. Using this method, add 3 lots of 4, starting at the beginning of the number line with 0.



The answer is the last number we land on.

Arrays:

Children look at the number of objects as a group in a square or rectangle. This is called an array. They then count the number on each side and write the multiplication sum.


$$= 4 \times 3 \text{ (there are 4 in each group and there are 3 groups).}$$

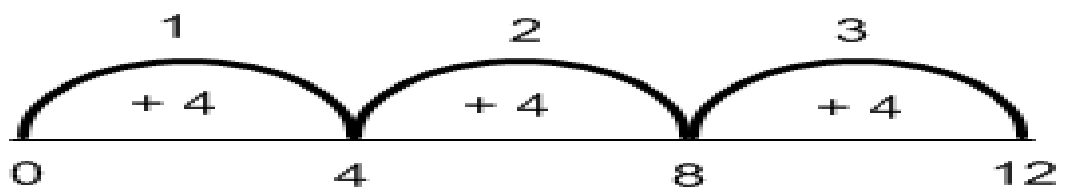
Empty Number Line:

$$4 \times 3 = (3 \text{ groups of } 4).$$

As with addition and subtraction on a number line, begin with an empty number line.



On an empty number line, you must start at 0. You will complete 3 jumps of 4 on the number line, writing in the number you land on after each jump.



The answer is the last number we land on.

Grid method:

Children using this method will be secure with the value of the digits in numbers.

$$27 \times 14 =$$

Begin by partitioning the numbers into tens and units and placing them in a grid. 27 is made up of 2 tens (20) and 7 units (7) and 14 is made up of 1 ten (10) and 4 units (4).

X	20	7
10		
4		

The numbers are then multiplied by each other in turn. 10×20 , 10×7 , 4×20 , 4×7 .

X	20	7
10	200	70
4	80	28

The answers from each of the multiplication steps are then added together to get the final, complete answer.

H	T	U	
2	0	0	$27 \times 14 = 378$
	7	0	
	8	0	
	2	8	
<hr/>			
3	7	8	

Formal column:

$$45 \times 27 =$$

Begin by laying out the calculation as you would for either column addition or subtraction.

$$\begin{array}{r} \text{T} \quad \text{U} \\ 4 \quad 5 \\ \times \quad 2 \quad 7 \\ \hline \end{array}$$

The units of the smaller number begins the multiplication. In the example, you would multiply 7 and 5 (the units) together first ($7 \times 5 = 35$). This answer would be written below the unit column (carrying if necessary).

$$\begin{array}{r} \text{T} \quad \text{U} \\ 4 \quad 5 \\ \times \quad 2 \quad 7 \\ \hline \quad \quad 5 \\ \quad 3 \end{array}$$

5 under the units column, carry the 3 tens to under the tens column to be added in the next step.

Next, multiply 7 and 4 tens ($7 \times 40 = 280$). This is written under the ten column, remembering to add the 3 tens from the previous answer.

$$\begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ \quad \quad 4 \quad 5 \\ \times \quad \quad 2 \quad 7 \\ \hline 3 \quad 1 \quad 5 \\ 1 \quad 3 \end{array} \quad 7 \times 45 = 315$$

Next, we must multiply the ten of the smaller number by the larger number. As above, this is done in stages.

As we are now multiplying a ten number, a place holder 0 must be used in the unit columns answer.

$$\begin{array}{r}
 \text{H} \quad \text{T} \quad \text{U} \\
 \quad \quad 4 \quad 5 \\
 \quad \quad 2 \quad 7 \\
 \hline
 3 \quad 1 \quad 5 \\
 \quad \quad \quad 0
 \end{array}$$

In the example, we will multiply 20 and 5 first.

$$\begin{array}{r}
 \text{H} \quad \text{T} \quad \text{U} \\
 \quad \quad 4 \quad 5 \\
 \quad \quad 2 \quad 7 \\
 \hline
 3 \quad 1 \quad 5 \\
 \quad \quad 0 \quad 0 \\
 1
 \end{array}
 \qquad 20 \times 5 = 100$$

The 1 hundred is carried to the hundred column.

Now we must multiply 20 and 40.

$$\begin{array}{r}
 \text{H} \quad \text{T} \quad \text{U} \\
 \quad \quad 4 \quad 5 \\
 \quad \quad 2 \quad 7 \\
 \hline
 3 \quad 1 \quad 5 \\
 9 \quad 0 \quad 0 \\
 1
 \end{array}
 \qquad 20 \times 40 = 800$$

The answer is written in, remembering to add the carried 1 hundred. Using column addition, the two answers are added together to find the answer to the complete sum.

$$\begin{array}{r}
 \text{H T U} \\
 3 \quad 1 \quad 5 \\
 + 9 \quad 0 \quad 0 \\
 \hline
 1 \quad 2 \quad 1 \quad 5
 \end{array}
 \qquad 45 \times 27 = 1,215$$

How do your children learn to divide at Edwin Jones Trust Schools?

Practical Sharing:

Children will use materials, such as multilink, to share into groups. Children would then count the number in the groups to find the answer. For example, 10 stickers are shared between 2 children, how many stickers would they receive each? This can be shown through jottings.

Practical Grouping:

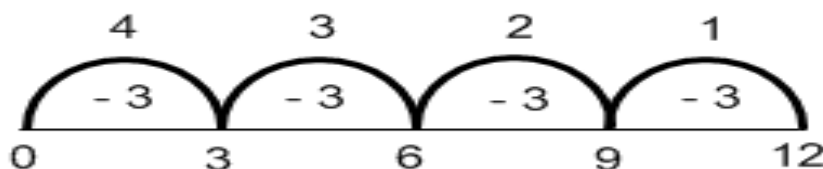
Children will use materials, such as multilink, to group items. For example, if we had 10 children, how many pairs would we make? (How many 2's are in 10?) This can be shown through jottings.

Numbered Number line (repeated subtraction):

Division is repeated subtraction and this can be clearly seen on a number line.

$$12 \div 3 =$$

On a numbered number line, the multiples will already be written. You will start at the largest number and repeatedly subtract in jumps of 3 until you get to 0.



The answer is the number of jumps completed to get to 0.

Empty Number line:

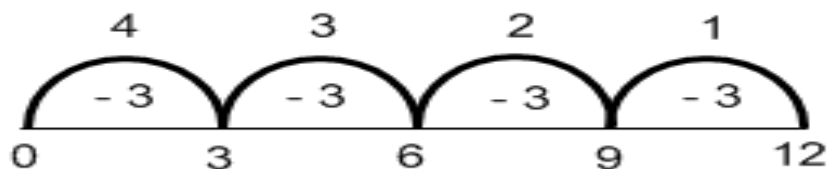
$$12 \div 3 =$$

Begin with an empty number line.

Write the number being divided (the largest number) at the end of the number line.

12

Then you will need to repeatedly jump back in 3's. Make sure you write the number landed on underneath each time and count the jumps completed.



The number of jumps done when you get to 0 is the answer.

Sometimes when dividing, it is not always possible to end on 0. If this happens, the number you are left with is called the remainder.

Long division:

This method makes the link between multiplication and division, as we use our multiplication tables to help answer the division calculation.

$$324 \div 12 =$$

Begin by laying out your division calculation.

$$12 \overline{) 324}$$

Think about the divisor times table (in this case 12 times table). What chunk can you subtract?

$$12 \times 1 = 12$$

$$12 \times 2 = 24$$

$$12 \times 5 = 60$$

$$12 \times 10 = 120$$

$$\begin{array}{r} 12 \overline{) 324} \\ -120 \text{ (10} \times 12) \\ \hline 204 \end{array}$$

At each stage a subtraction is made and the new dividend is written. The subtracting continues until we get to 0 and can't subtract anymore, or until we get to a number that is smaller than the divisor (in the example, that would be any number less than 12), this number is known as a remainder.

$$\begin{array}{r} 12 \overline{) 324} \\ -120 \text{ (10} \times 12) \\ \hline 204 \\ -120 \text{ (10} \times 12) \\ \hline 84 \\ -24 \text{ (2} \times 12) \\ \hline 60 \\ -60 \text{ (5} \times 12) \\ \hline 0 \end{array}$$

The amounts subtracted are added together to get the final answer to the original division calculation.

$$(10 + 10 + 2 + 5 = 27)$$

$$324 \div 12 = 27$$

