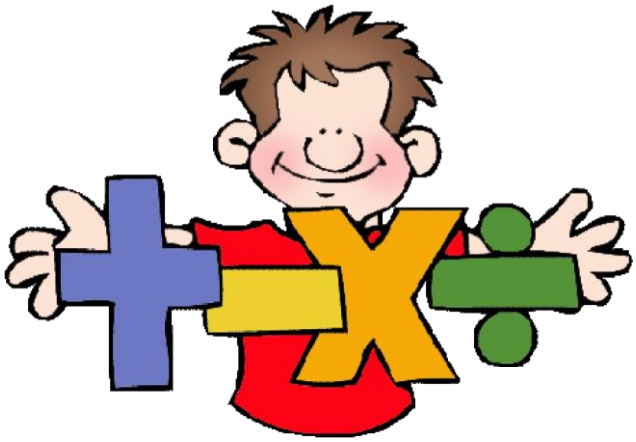
A guide to supporting Maths at home.



Focusing specifically on the four calculation operations:

- Addition
- Subtraction
- Multiplication
- Division

This booklet has been compiled to help parents in supporting their child at home with any maths homework or curriculum practise.

As the maths curriculum and teaching is constantly evolving, we hope that this booklet will be helpful and provide parents with support in helping your child at home with maths.

The aim of this booklet is to offer guidance and explanations of the methods currently used in our school within the daily Numeracy lessons. It focuses specifically on calculation methods as these, of all the mathematical strands, are the most likely to differ from the way in which you were taught.

Each calculation method will be considered and explained from Foundation Stage to Year 6 level. Essentially what this booklet provides is the 'story of addition/subtraction/ multiplication/division' throughout our school.

At Beacon Academy we understand that parental support is crucial to developing a child's confidence, understanding and enjoyment of Maths. We therefore thank you for taking the time to read this booklet and hope it provides you with support and guidance. If you do have any further questions regarding the maths curriculum or teaching of maths then please do not hesitate to contact me for more information.

Miss Nicholls
Maths Lead, Beacon Academy

Mental Strategies for Addition

Can I do this in my head?'

Number

Bonds:

Always encourage your child to think 'Can I

These are absolutely vital to your child's Numeracy understanding. They should learn number bonds to 10

e.g. 7+3 = 10, 5+5 = 10, 2+8 = 10, 10+0 =10

Also number bonds to 20

E.g. 17+3 = 20, 15+5 = 20, 12+8 = 20, 10+10 = 20

Many of the strategies for teaching mental addition are supported by visual images such as number lines and number squares.

Putting the largest number first:

5 + 34 is the same as 34 + 5, so start at 34 and count on 5 more.

40+ 50 is the same as 50 + 40, so start at 50 and count on 4 more tens.

Partitioning numbers:

This involves good place value knowledge as the numbers are broken down into their hundreds, tens and ones values.

E.g. 24 + 45

Tens first = 40 + 20 = 60

(Largest number first and

Ones next = 5 + 4 = 9 count on from there)

Total = 69

Compensation:

This involves rounding numbers to the nearest ten to make the calculation easier to solve mentally. E.g 16 + 9 is the same as 16 + 10 - 1

34 + 11 is the same as 34 + 10 + 1

Doubles and near doubles:

Your child should learn their doubles by heart as they are just as useful as number bonds. E.g. Double 8 = 16

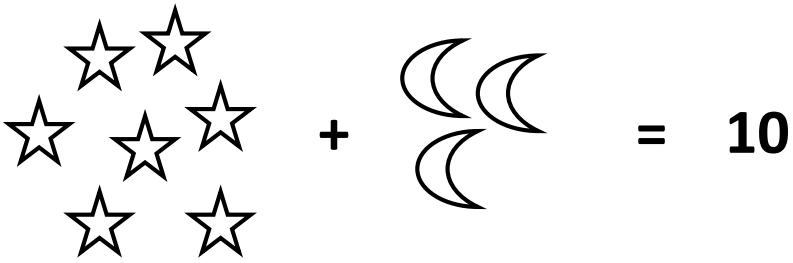
So 8 + 9 = 16 +1

Remember it is a good idea to put the largest number first!

Practical strategies for Addition

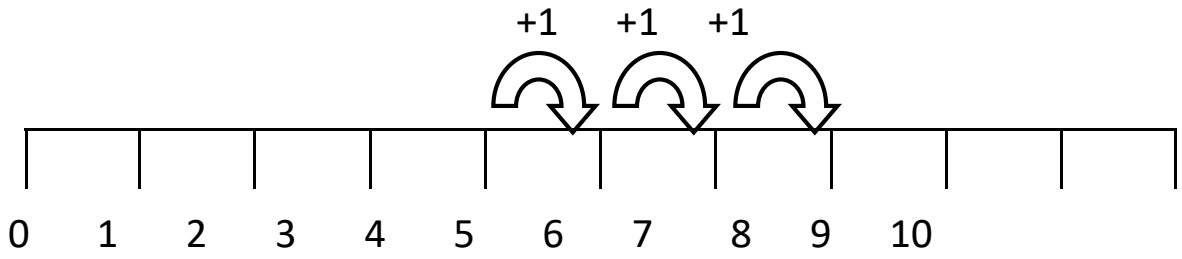
Addition begins in the Foundation Stage with lots of counting activi ties, singing of number rhymes and the introduction of number bonds.

The children complete many practical activities such as adding to gether two groups of practical objects:



"7 add 3 more equals 10"

They also use number lines to count on from the largest number:



E.g. 4 + 3 = ?

Start at 4, jump on in 'ones' three times, so the answer is 7.

The children also use a number square to find one more, one less, ten more or ten less.

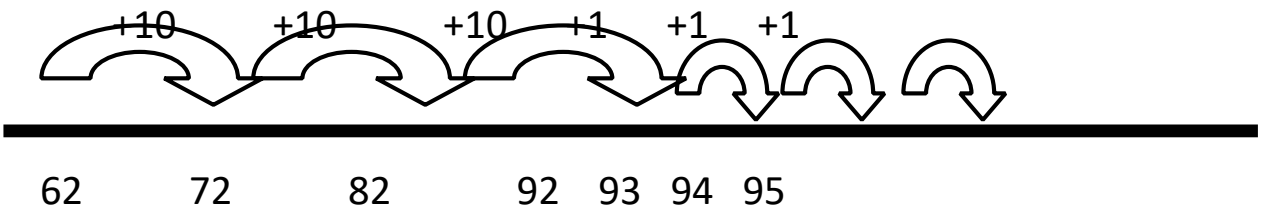
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Addition strategies:

Number lines continue to be used before the introduction of written strategies. They are used in a different way though to support partitioning of numbers.

Partitioning using an empty number line:

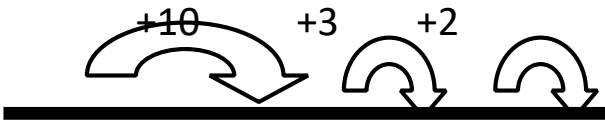
62 + 33 = ? 33 is the same as 10 + 10 + 10 + 1 + 1 + 1



Bridging through ten:

37 + 15 = 52

- Add the tens
- Count on to the nearest tens number.
- Then add the remaining units.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The hundred square continues to be a fantastic resource for adding by counting on.

To add a ten - jump down a row.

E.g. 44 + 24
Jump down two rows for the 2 tens, then jump along four more units.

Formal Written Strategies for Addition:

This method is often referred to as 'column addition' and again re lies on a firm knowledge and understanding of place value.

e.g. 542 + 323

	H	T	U
	5	4	2
+	3	2	3
	8	6	5

Step one – the smallest number goes underneath the biggest number.

Step two – work from right to left, starting with the units first.

It is important that you emphasise the value of each digit.

E.g. 4 tens + 2 tens = 6 tens

NOT: 4 + 2 = 6

Column addition (carrying a ten)

e.g. 645 + 328

	H	T	U
	6	4	5
+	3	2	8
	9	7	3
	1		

Same as before.
However, we need to carry a ten this time.

e.g. 5 units + 8 units = 13

One ten and three units.

Put the 3 in the units column and carry the one ten across underneath the tens column.

Formal Written Strategies for Addition:

Column addition (carrying a ten, hundred and thousand)

e.g. 3769 + 2487

Th	H	T	U
3	7	6	9
+ 2	4	8	7
6	2	5	6
1	1	1	

The carrying method can be extended into hundreds and thousands columns too.

The principal is exactly the same.

Subtraction Strategies

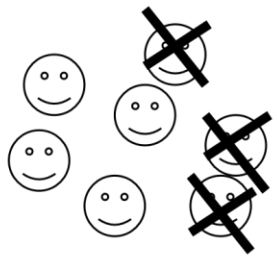
Always encourage your child to think 'Can I do this in my head?'

Lots of these strategies are similar to the addition ones previously shown.

Practical activities:

Subtraction as 'taking away'

7 — 3 = 4



Using counting objects and taking some away or drawing a set number of objects and crossing some out.

Compensation:

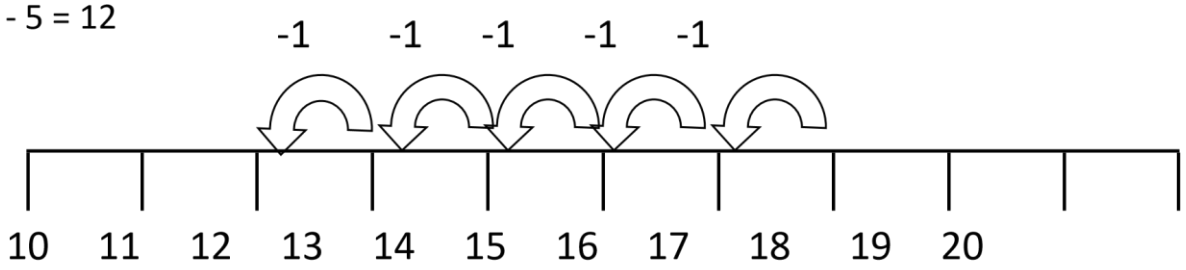
This involves rounding numbers to the nearest ten to make the calculation easier to solve mentally.

E.g 34 - 9 is the same as 34 - 10 + 1

Number lines:

They also use number lines to count back:

17 - 5 = 12



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Using a hundred square:

This time to take away a ten you jump up one row of the hundred square.

E.g. 57 - 23

Jump up two rows (two tens)

Jump back 3 units.

Partitioning for subtraction:

This method is used before the introduction of the formal written method (column subtraction). It requires the children to separate each number into it's hundreds, tens and ones values.

E.g. 92 - 31 = ?

92 → 90 and 2

31 → 30 and 1

Subtract the tens 90 - 30 = 60

Subtract the ones 2 - 1 = 1

Total difference between 92 and 31 is 61.

Formal Written Strategies for Subtraction

This method is often referred to as 'column subtraction' and again relies on a firm knowledge and understanding of place value.

e.g. 547 - 323

	H	T	U
	5	4	7
-	3	2	3
	2	2	4

Step one - the smallest number goes underneath the biggest number.

Step two - work from right to left, starting with the units first.

Again it is important that you emphasise the value of each digit.
E.g. 4 tens - 2 tens = 2 tens
NOT: 4 - 2 = 2

Formal Written Strategies for Subtraction:

Column subtraction (exchanging a ten)

e.g. 665 - 328

	H	T	U
	6	$^{5}\cancel{6}$	$^{1}5$
-	3	2	8
	3	3	7

Same as before. However, we need to exchange a ten for units this time!

e.g. 5 - 8 = ?

One ten = 10 units.

Put a cross through the 6 tens and write a 5, then change the 5 units to 15 units.

Column subtraction (exchanging a ten, and hundred)

e.g. 753 - 264

	H	T	U
	$^{6}\cancel{7}$	$^{14}\cancel{5}$	$^{1}3$
-	2	6	4
	4	8	9

Same as before. However, we need to exchange a ten for units and a hundred for tens this time!

e.g. 3 - 4 = ?
40 - 60 = ?
One ten = 10 units.
One hundred = 10 tens

Exchange 3 units for 13 and 4 tens for 140

Strategies for Multiplication

Multiplication begins with knowledge of number sequences and counting activities. The children may count aloud in groups of 2, 5 and 10 to begin with:
2, 4, 6, 8, 10, 12, 14....
5, 10, 15, 20, 25, 30...
10, 20, 30, 40, 50.....

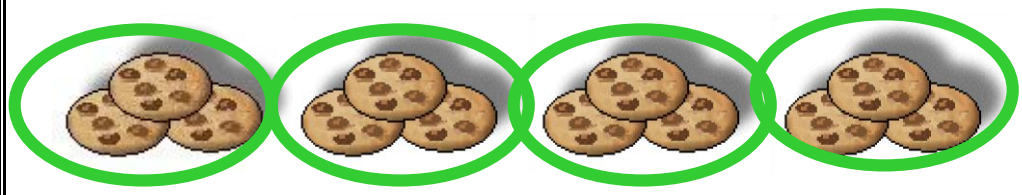
Repeated Addition:

Multiplication is all about repeated addition: adding several sets of the same size. This again begins in a practical context: by using hands, apparatus or diagrams:

3 x 5

5 + 5 + 5 = 15

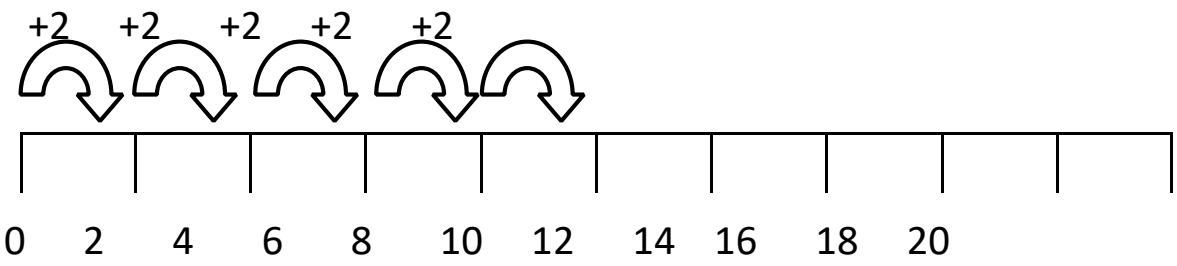
4 x 3 4 groups of 3:



3 + 3 + 3 + 3 = 12

At the appropriate time your child will be introduced to jumping along a number line in equal jumps.

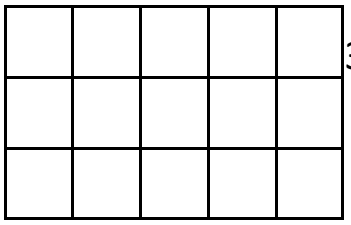
5 x 2 = 10



Strategies for Multiplication

Arrays:

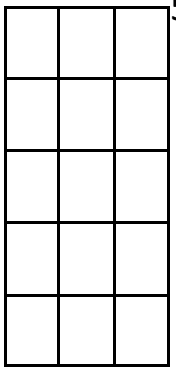
The next step for children in multiplication is to model a multiplication calculation using an array. An 'array' is a visual representation of the calculation:



3 x 5

3 rows of 5 or

5 rows of 3



5 x 3

Commutativity:

Understanding that multiplications can be reversed. E.g.

4 x 5 will have the same answer as 5 x 4

6 x 3 will have the same answer as 3 x 6

Arrays are really useful in introducing this concept to the children.

Times Tables:

We cannot stress enough how useful rapid recall of the times tables facts are for your child.

- By the end of Year 4 every child should know all of their times tables up to and including the 12's.
- Times tables are practised regularly in maths lessons in school, but practise must continue at home for your child's confidence to develop even further.

Children cannot move onto the written methods for multiplication or division without a secure knowledge of their times tables facts.

Written Strategies for Multiplication:

The 'short method' is often introduced as a faster way of solving x1 digit calculations.

e.g. 36 x 4

	T	U
	3	6
x		4
1	4	4
	2	

Step one – the smallest number goes underneath the biggest number.

Step two – work from right to left, starting with the units first.
6 x 4 = 24 (4 in units column, carry 2 tens into tens column)

3 tens x 4 = 12 tens
12 tens + 2 carried tens = 14 tens

Long multiplication may come much later on in Key stage 2, when the children are confident with their tables and all previous methods.

- This method is useful when you are multiplying by a number bigger than 0-9
- It is an alternative to the 'grid method' and can be quicker as it requires less working out.

						4	6	
					X	3	5	
	40	x	35	1	4	0	0	
	6	x	35		2	1	0	
				1	6	1	0	

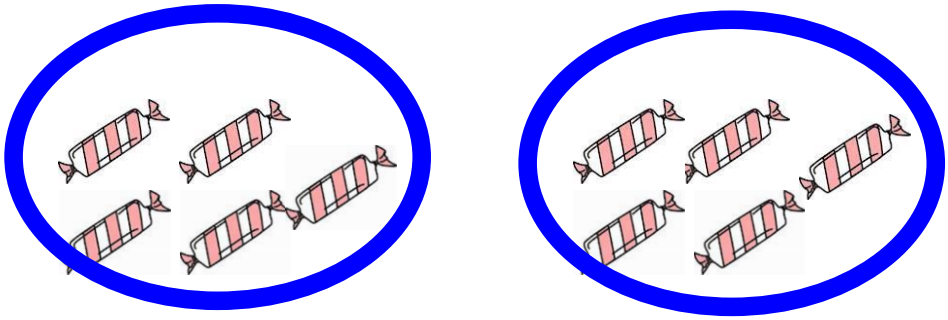
NB: the most important thing is that your child has a reliable method that they are confident with for solving multiplications.

Strategies for Division

Division is perhaps the most difficult of the four operations for children to understand, particularly when it comes to the formal written methods.

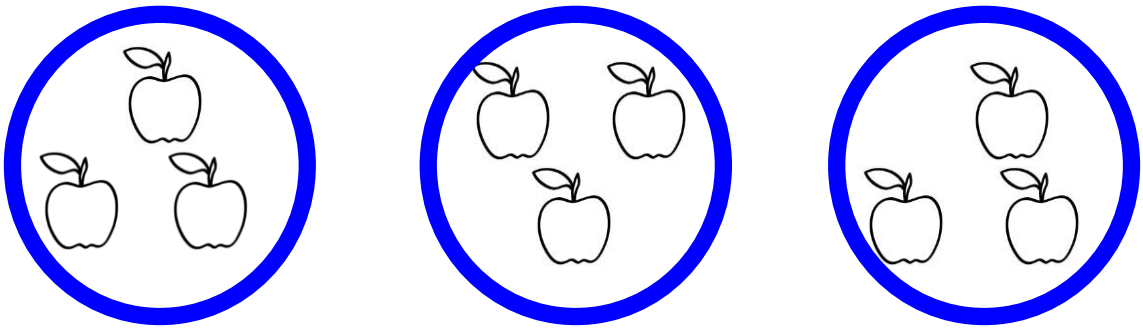
In Foundations Stage and Key Stage One division is largely practical in nature and involves the children thinking about 'sharing' a number of items out between a given number of people.

E.g. Share 10 sweets between 2 children



Each child has 5 sweets

E.g. How many groups of 3 apples could you make with 9 apples?



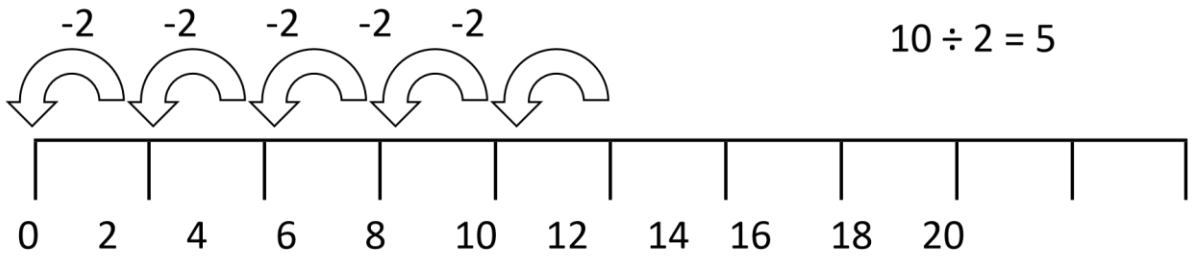
You can make 3 groups of 3 apples.

Repeated Subtraction:

In a similar way to multiplication being taught as repeated addition, division can be taught as repeated subtraction: taking away several sets of the same size. This is shown on the next page on a numberline.

Strategies for Division

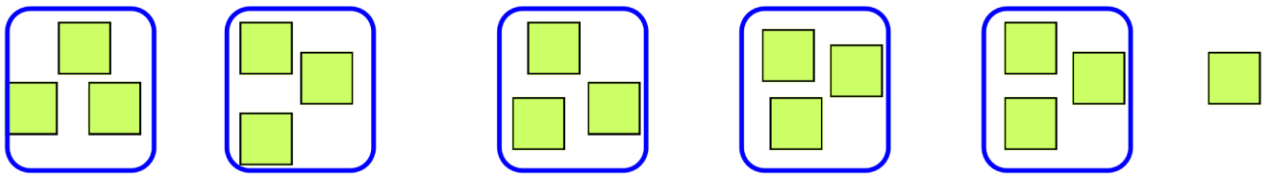
Repeated Subtraction:



Division by grouping, with remainders:

A division sum can not always be equally grouped with none left over. The 'left over' part is called the **remainder**.

E.g. Share 16 cubes between 5 children



Each child would have 3 cubes and there is one cube leftover
16 ÷ 5 = 3 r. 1

Inverse operations:

Inverse means opposite and the opposite of division is multiplication.
In key stage two the children are encouraged to check their answers for division questions by doing a multiplication and vice versa.
(Another reason why times table knowledge is so vital!)

E.g. 25 ÷ 5 = 5 I can check my answer by doing 5 x 5 = 25
72 ÷ 9 = 8 I can check my answer by doing 9 x 8 = 72
49 ÷ 7 = 7 I can check my answer by doing 7 x 7 = 49

Written Method for Division

The formal written method of division iis sometimes referred to as the 'bus-stop' method.

e.g. 66 ÷ 3

$$3\overline{)66} = 22$$

How many times does 3 group into 6?

Answer = 2 (so write 2 above tens column)

How many times does 3 group into 6?

Answer = 2 (so write 2 above units column)

e.g. 92 ÷ 4

$$4\overline{)9^{1}2} = 23$$

How many times does 4 group into 9?

Answer = 2 (so write 2 above tens column and carry one ten into units)

How many times does 4 group into 12?

Answer = 3 (so write 2 above units column)

Some further examples are also shown below for dividing 3 digit numbers. The process of solving remains the same, work from left to right. The example on the right demonstrates how to carry when the division isn't so straightforward.

e.g. 669 ÷ 3

$$3\overline{)669} = 223$$

How many times does 3 divide into 6? Answer = 2 write it above hundreds column

How many times does 3 divide into 6? Answer = 2 write it above tens column.

How many times does 3 divide into 9? Answer = 3 write it above units column.

e.g. 156 ÷ 4

$$4\overline{)1^{1}5^{3}6} = 039$$

How many times does 4 divide into 1? Answer = it doesn't so carry it to the tens column.

How many times does 4 divide into 15? Answer = 3 write it above tens column and carry the remaining 3 into units column.

How many times does 4 divide into 36? Answer = 9 write it above units column.

Written Method for Division

Later in KS2 and in preparation for SAT's the children may come across questions asking them to divide a number by a two digit number. The easiest way to solve these problems is through the 'long method' for division. This is demonstrated below:

Long division:

This method can be used in upper KS2 and is for dividing by a two digit number.

E.g. 964 ÷ 38

Approximate first:
1000 ÷ 40 = 25

Then use 'chunking' method to solve.

```
      25 r 14
38 | 964
    -760 (20 x38)
     204
    -190 ( 5 x 38)
      14
```