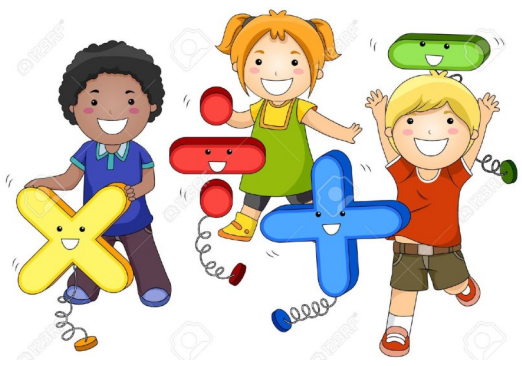
NUMBER AND THE BIG FOUR

+ - x ÷

A Parents' Guide to Number and the Four Operations

+ - x ÷



Introduction

Dear Parents and Carers

Mathematics is an area of learning which some people do not always feel confident about, especially when it comes to helping and supporting others. As a response to this IJS&CE has been looking at ways in which we can offer some support with this - one outcome is the writing of this booklet.

The aim of this booklet is to provide information about the different methods and strategies your children may meet in Maths as they progress through school. It is hoped that it will be useful to you so that you can support your children with their Maths learning at home.

The booklet focuses on the 4 number operations - addition, subtraction, multiplication and division - and is divided into year groups. It shows a range of methods and strategies which teachers may use in their teaching - although not all children will be taught every method.

However, as we all know, children progress at different rates and will be ready to move on to new strategies when they are confident to do so. This may mean that some children will still be learning and using strategies from an earlier year group. By having information about all the different stages in a child's understanding and progress in Maths you will be able to work alongside them as they learn.

We hope that you will find this booklet useful as one way in which to help your children with their learning in Maths. Alongside this, our door is always open, should you require any more advice and support.

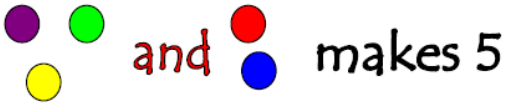
Happy calculating!

The Maths Curriculum Team

Foundation Stage

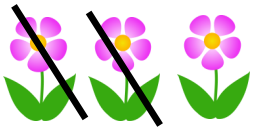
What might your child be learning in ...

Addition

- Combine two sets of objects practically, using cubes/counters etc.
- Draw objects
- Number sentence with objects drawn 

- Simple written addition 3 + 2 = 5
- Pairs to 10: 5 and 5 8 and 2 4 and 6 etc

Subtraction

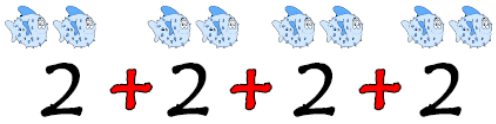
- Begin to count backwards
- Practical taking away from a set of objects
- Draw objects and cross out number taken away
- Number sentence with objects drawn  3 - 2 = 1
- Compare lengths of objects ready to find the difference

Multiplication

- Counting in 2s, 5s and 10s 2, 4, 6 , 8 ,10 10, 20, 30, 40 etc
- Practical grouping of objects

- Recognising X as repeated addition

e.g. 4 lots of 2 make 8

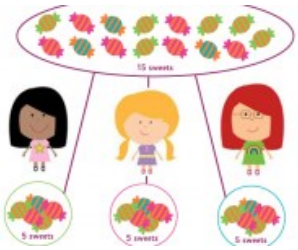


Division

- Practical sharing of objects with vocabulary of sharing not grouping. This may include a 'leftover'

e.g. 'one for you, one for me …'

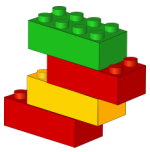
- Recording in pictures



How you can help at home …

- Singing counting songs

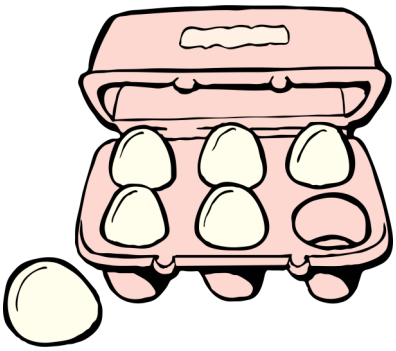
- Writing numbers up to 20: 1, 2, 3, 4 …



- Counting objects: beads, pasta, lego etc
- Looking at numbers in the environment

- Cooking and measuring e.g. 3 teaspoons, 5 oranges etc

- Share things and see how many 'left over'
- Egg boxes are good for counting in 2s



What might your child be learning in ...

Year 1 and Year 2

Addition

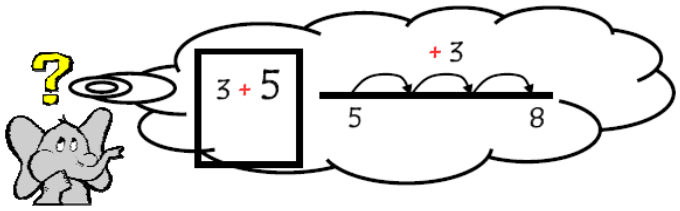
Some children may initially be using some methods from Foundation Stage such as:

- Combining two sets of objects practically, using cubes/counters etc.
- Drawing objects
- Using Number sentences with objects drawn
- Writing simple written addition sums 3 + 2 = 5
- Learning Pairs to 10: 5 and 5 8 and 2 4 and 6 etc

Other methods shown in Year 1 and Year 2 may include:

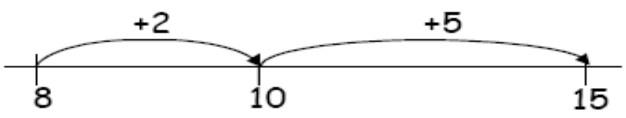
- Using practical apparatus e.g. Numicon

- Knowing that addition can be done in any order e.g. 7 + 3 = 10 3 + 7 = 10
- Putting the biggest number in your head and count on

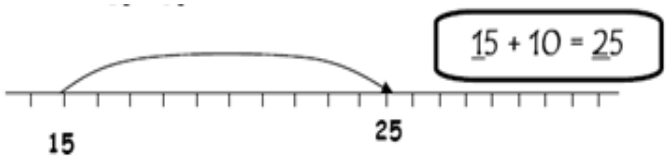


- Adding two single digit numbers that bridge 10

e.g. 8 + 7 = 15



- Adding 3 or more single digit numbers e.g. 8 + 7 + 3 =
- Partitioning two digit numbers using tens and ones 23 + 12 = 35
- Jumping along marked and then empty number lines (start by counting on in 1s then progress to 10s and then progress to multiples of 10)
- Drawing own number lines



48 + 30 = 78

78 + 6 = 84

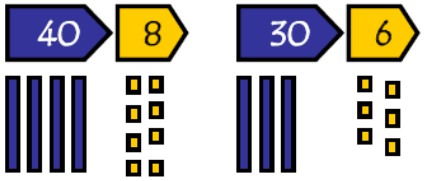
- Expanded method (written)

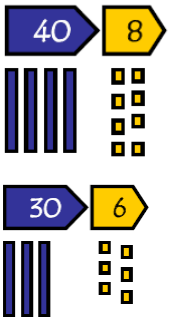
e.g. 40 + 30 + 8 + 6

40 + 30 = 70

8 + 6 = 14

70 + 14 = 84





40+ 8

30+ 6

70+14 = 84

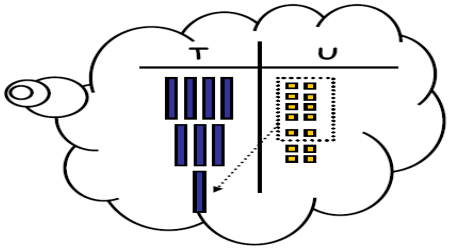
48

+36

70

14

Eventually this will lead to



48
+ 36
84
1

Subtraction

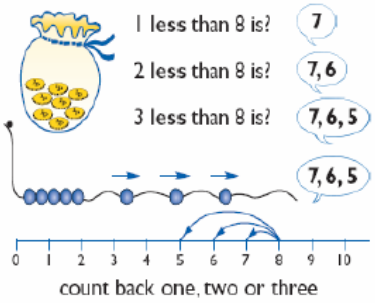
NB: It is important that the children have a good understanding of place value and partitioning using real objects, resources and visual images to support calculation.

Some children may initially be using some methods from Foundation Stage such as:

- Counting backwards
- Practical taking away from a set of objects
- Drawing objects and cross out number taken away
- Using Number sentences with objects drawn
- Comparing lengths of objects ready to find the difference

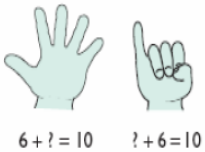
Other methods shown in Year 1 and Year 2 may include:

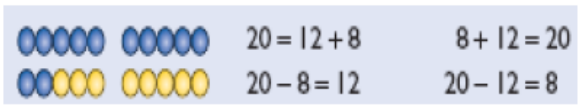
- Using the language 'less than'



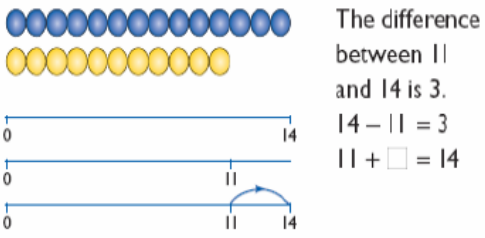
count back one, two or three

- Counting back in ones and then tens
- Knowing by heart subtraction facts for numbers up to ten and 20



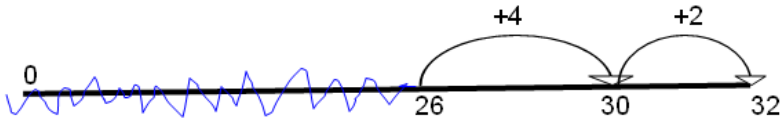


- Subtracting single digit numbers often bridging through 10
- Subtracting multiples of 10 mentally, but also show how to record using a number line.
- Beginning to find the difference by comparing 2 lines

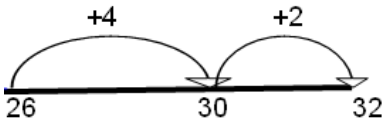


- Finding a small difference by counting up from the smallest number
- Finding the difference by counting on (gradually extending size of numbers)

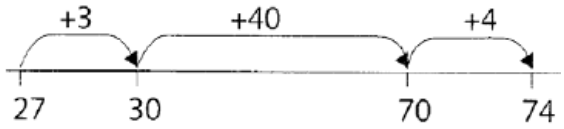
32 – 26 = 6



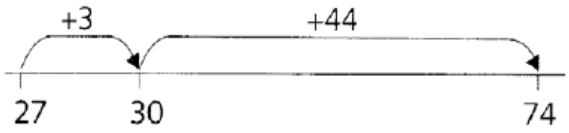
- Jumping along the empty number line using boundary numbers or multiples of 10.



74-27= 47



- Eventual aim is to use fewer jumps



NB: Help children decide whether to count on or back depending on the size of the difference e.g. 156 – 7……. count back. 185 – 162… count on.

Multiplication

NB: learning times tables by heart is the key to efficiently learning written methods of multiplication and division

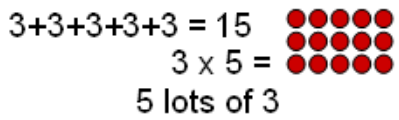
Some children may initially be using some methods from Foundation Stage such as:

- Counting in 2s, 5s and 10s
- Practical grouping of objects
- Recognising X as repeated addition e.g. 4 lots of 2 make 8

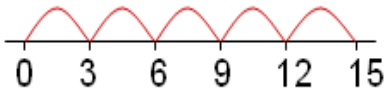
Other methods shown in Year 1 and Year 2 may include:

- Re-calling multiplication and division facts for the 2, 5 and 10 times tables

- Multiplication as an array



- Jumping on a number line



- Using different vocabulary to describe the same calculation

e.g. 4 x 3

4, 3 times 4 + 4 + 4

3 groups of 4

4 multiplied by 3

- Understanding that multiplication of two numbers can be done in any order **(but division cannot)**

e.g. 3 x5 = 15 and 5 x 3 = 15

- Writing own calculations using x and = signs

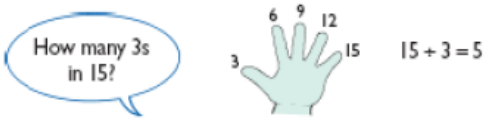
Division

Some children may initially be using some methods from Foundation Stage such as:

- Practical sharing of objects with vocabulary of sharing not grouping. This may include a 'leftover' e.g. 'one for you, one for me …
- Recording in pictures

Other methods shown in Year 1 and Year 2 may include:

- Using fingers to work out calculations e.g. How many 3s in 15?



- Re-calling multiplication and division facts for the 2, 5 and 10 times tables
- Writing own calculations using ÷ and = signs

How you can help at home ...

- Practice counting backwards from different numbers
- Choose easy additions to solve practically

  e.g. dry pasta

3 + 6 = 9

- Practice the number bonds to 10 using fingers
- Use objects to practice subtraction
- Use 'more than'/'less than' vocabulary at home
- Practice 2, 5 and 10 times tables - know off by heart
- Choose easy multiplications to solve practically (initially with repeated addition)

  e.g. 3 x 3 means the same as 3 + 3 + 3

3 + 3 + 3 = 9

- Share groups of items between 2 or 3 or 4 people
- Use the language 'lots of'/'groups of' e.g. How many groups of 3 can I make from these pasta shapes?

What might your child be

Year 3 and Year 4

Addition

Some children may initially be using some methods from Y1 and Y2 such as:

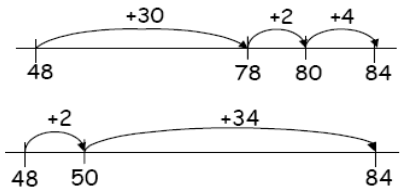
- Using practical apparatus eg. Numicon
- Knowing that addition can be done in any order e.g. 7 + 3 = 10 3 + 7 = 10
- Putting the biggest number in your head and count on
- Adding two single digit numbers that bridge 10 e.g. 8 + 7 = 15
- Adding 3 or more single digit numbers e.g. 8 + 7 + 3 =

Other methods shown in Year 3 and Year 4 may include:

- Mental addition of 2 digit numbers by partitioning

e.g. 48 + 36 =

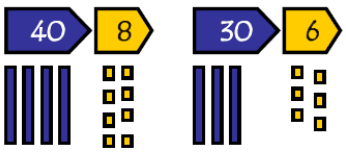
48 + 30 = 78



- Expanded method (written)

e.g. 40 + 30 + 8 +

40 + 30 = 70



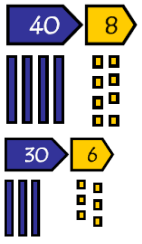
8 + 6 = 14

70 + 14 = 84

40+ 8

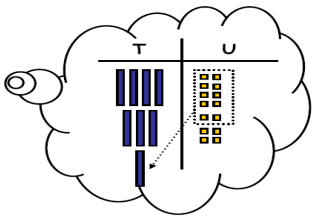
30+ 6

70+14 = 8



48
+36
70
14
84

Eventually this will lead to



48
+ 36
84
1

- Expanded to compact standard (written)

It is far better that children work using the expanded method they understand rather than a more formal standard written method that they cannot explain to you.

762 + 453 =

700 + 60 + 2
400 + 50 + 3
1100 + 110 + 5 = 1215

8462
+753
8000
1100
110
5
9215

leads to

- Written columnar addition

(eventually with carrying- 3-digit numbers in Y3,4-digit numbers in Y4)

e.g. 8462
+ 753
9215
11

Subtraction

Children may initially be using some methods from Y1 and Y2 such as:

- Using the language 'less than'
- Counting back in ones and then tens
- Knowing by heart subtraction facts for numbers up to ten and 20
- Subtracting single digit numbers often bridging through 10
- Subtracting multiples of 10 mentally but also show how to record using a number line.
- Beginning to find the difference by comparing 2 lines
- Finding a small difference by counting up from the smallest number
- Finding the difference by counting on (gradually extending size of numbers)

32 – 26 =

Jumping along the empty number line using boundary numbers or multiples of 10. Eventual aim is to use fewer jumps

NB: Help children decide whether to count on or back depending on the size of the difference e.g. 156 – 7……. count back. 185 – 162… count

Other methods shown in Year 3 and Year 4 may include:

- Expanded method

Modelling how to take the numbers from the number line into vertical recording

```
 74
-27
 + 3   (takes me to 30)
+40    (takes me to 70)
 + 4   (takes me to 74)
 47
```

Extends to

```
 174
-27
 + 3   (takes me to 30)
+70    (takes me to 100)
+74    (takes me to 174)
 147
```

- Expanded to compact standard

NB: It is far better that children work using the expanded method they understand rather than a more formal standard written method that they can not explain to you

- Expanded to compact standard

NB: It is far better that children work using the expanded method they understand rather than a more formal standard written method that they can not explain to you

```
 1274
 -685
   15     (700)
  300     (1000)
  274     (1274)
  589
```

```
 1274
 -685
  315     (1000)
  274     (1274)
  589
```

NB: This is dependent on a secure knowledge of place value and complements to 100 so this must be secure mentally first.

- Written columnar subtraction

(eventually with exchange - 3-digit numbers in Y3, 4-digit numbers in Y4)

e.g.

```
  3  1
  4  3
-   2  7
-------
    1  6
```

Multiplication

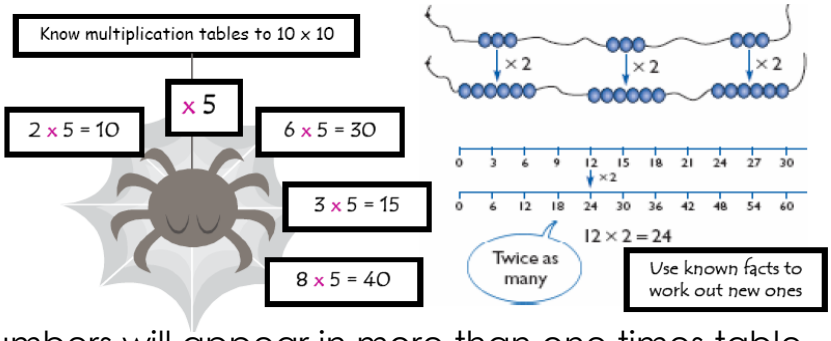
Some children may initially be using some methods from Y1 and Y2 such as:

- Re-calling multiplication and division facts for the 2, 5 and 10 times tables
- Multiplication as an array
- Jumping on a number line
- Using different vocabulary to describe the same calculation
- Understanding that multiplication of two numbers can be done in any order (but division cannot) e.g. 3 x5 = 15 and 5 x 3 = 15
- Writing own calculations using x and = signs

Other methods shown in Year 3 and Year 4 may include:

NB: learning times tables by heart is the key to efficiently learning written methods of multiplication and division

- Using known facts to work out others

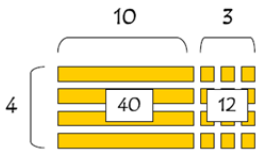


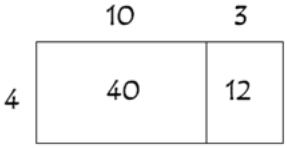
- Understanding that some numbers will appear in more than one times table i.e. 'factors' e.g. 3 is a factor of 6 and 12 because 2 x 3 = 6 and 4 x 3 = 12
- Using written methods to record calculations

Step 1: Multiplying TU x U (one ten only)

NB: this depends on the ability to multiply by 10 mentally

13 x 4



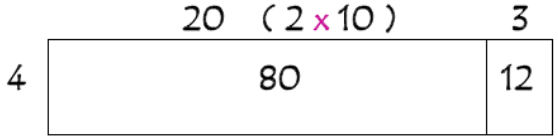


40 + 12 = 52

Step 2: Multiplying TU x U (extending to HTU x U)

NB: this depends on the ability to multiply by 10 mentally

23 x 4



80 + 12 = 92

Step 3: Short Multiplication

NB: this method may be introduced on Y4 and its use extended further in Y5 &Y6

24 × 6 becomes

	2	4
×		6
1	4	4
	2	

Answer: 144

342 × 7 becomes

	3	4	2
×			7
2	3	9	4
	2	1	

Answer: 2394

2741 × 6 becomes

	2	7	4	1
×				6
1	6	4	4	6
	4	2		

Answer: 16 446

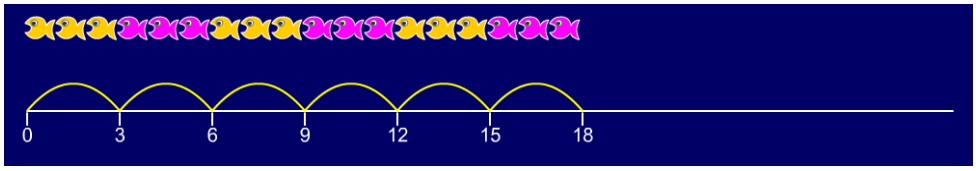
Division

Some children may initially be using some methods from Y1 and Y2 such as:

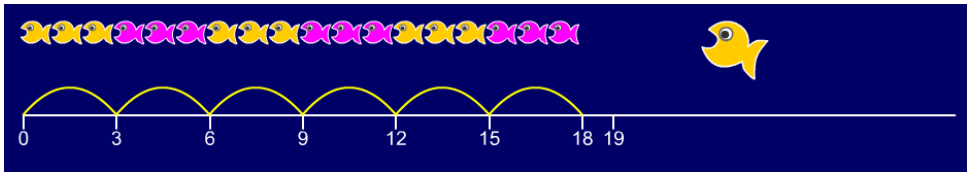
- Using fingers to work out calculations eg. How many 3s in 15?
- Re-calling multiplication and division facts for the 2, 5 and 10 times tables
- Writing own calculations using ÷ and = signs

Other methods shown in Year 3 and Year 4 may include:

- Step 1: Using number lines to show grouping



Including some remainders 19 ÷ 3 = 6 rem 1



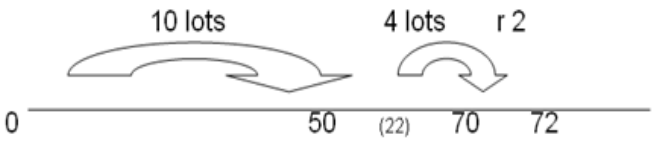
- Step 2: Expanded method (allow time to ensure this stage is secure)

TU ÷ U where the first 'chunk' is 10 lots of the divisor

Use knowledge of multiples to 'chunk'

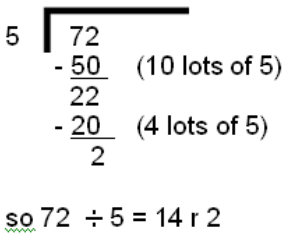
NB: this depends on the ability to multiply by 10 mentally

72 ÷ 5 =



Modelling how the number line relates to the written method of recording

Children need to see these both together for a while

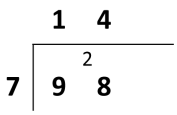


so 72 ÷ 5 = 14 r 2

- Step 3: Short division

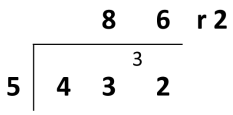
NB: this method may be introduced on Y4 and its use extended further in Y5 &Y6

98 ÷ 7 becomes



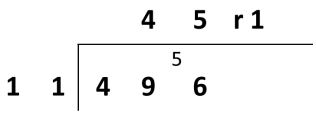
Answer: 14

432 ÷ 5 becomes



Answer: 86 remainder 2

496 ÷ 11 becomes



Answer: $45\frac{1}{11}$

How you can help at home ...

- Start at any tens number and count up in multiples of 10
- Start at 100 and count back in multiples of 10 and write 100 - 40 = 60

- Talk about 'the difference between' as meaning take-away (subtract)
- Use shopping trips to talk about total costs and change

NB: learning times tables by heart is the key to efficiently learning written methods of multiplication and division

- Begin to learn times tables (starting with 2x 5x and 10x if not already known), then progress to rest
- Use known facts to work out new ones e.g. 6 x 2 = 12, so 60 x 2 = 120

(x10)

- Practice division facts relate to times tables facts

  e.g. 4 x 5 = 20 and 5 x 4 = 20, so 20 ÷ 4 = 5 and 20 ÷ 5 = 4

What might your child be

Year 5 and Year 6

Addition

Some children may initially be using some methods from Y3 and Y4 such as:

- Counting on and back
- Mental addition of 2 digit numbers by partitioning
- Expanded method (written)
- Expanded to compact standard (written)
- Written columnar addition (eventually with carrying- 3-digit numbers in Y3, 4-digit numbers in Y4)

Other methods shown in Year 5 and Year 6 may include:

- Being able to do the following mentally:

  adding on multiples of 10

  adding on a single digit

- Asking 'Is my answer sensible?'
- Checking answers using inverse operation
- Written columnar addition with numbers with more than 4 digits

Subtraction

Some children may initially be using some methods from Y3 and Y4 such as:

- <u>Expanded method</u>

```
 174
 -27
_____
 + 3   (takes me to 30)
+70    (takes me to 100)
+74    (takes me to 174)
_____
 147
```

- Expanded to Compact Standard

```
 1274
 -685
   15      (700)
  300      (1000)
  274      (1274)
  589
```

- Written columnar subtraction

(eventually with exchange - 3-digit numbers in Y3, 4-digit numbers in Y4) e.g.

```
  3  1
  4 ¹3
- 2  7
------
  1  6
```

Other methods shown in Year 5 and Year 6 may include:

- Written columnar subtraction with numbers with more than 4 digits

Multiplication

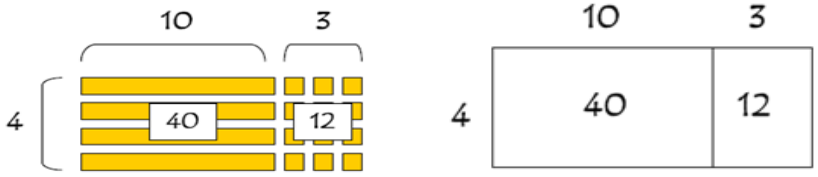
Some children may initially be using some methods from Y3 and Y4 such as:

NB: learning times tables by heart is the key to efficiently learning written methods of multiplication and division

- Using known facts to work out others
- Understanding that some numbers will appear in more than one times table
  i.e. 'factors' e.g. 3 is a factor of 6 and 12 because 2 x 3 = 6 and 4 x 3 = 12
- Using written methods to record calculations

Step 1: Multiplying TU x U (one ten only)

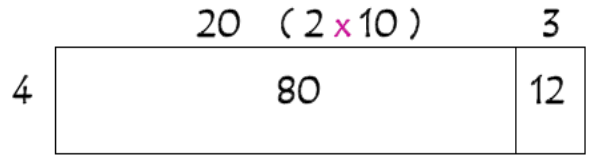
13 x 4



40 + 12 = 52

Step 2: Multiplying TU x U (extending to HTU x U)

23 x 4



80 + 12 = 92

Step 3: Short Multiplication

NB: this method may be introduced in Y4 and its use extended further in Y5 & Y6

24 × 16 becomes

$$\begin{array}{r} {\scriptstyle 2} \\ 2\,4 \\ \times\ 1\,6 \\ \hline 2\,4\,0 \\ 1\,4\,4 \\ \hline 3\,8\,4 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\,2} \\ 1\,2\,4 \\ \times\ \ 2\,6 \\ \hline 2\,4\,8\,0 \\ 7\,4\,4 \\ \hline 3\,2\,2\,4 \\ {\scriptstyle 1\,1} \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\,2} \\ 1\,2\,4 \\ \times\ \ 2\,6 \\ \hline 7\,4\,4 \\ 2\,4\,8\,0 \\ \hline 3\,2\,2\,4 \\ {\scriptstyle 1\,1} \end{array}$$

Answer: 3224

Other methods shown in Year 5 and Year 6 may include:

- Identifying factors and multiples (including common factors and common multiples)
- Multiplying numbers by 10, 100 and 1000 (including decimals)
- Recognising and using square and cube numbers
- Long multiplication

24 × 16 becomes

$$\begin{array}{r} {\scriptstyle 2} \\ 2\,4 \\ \times\ 1\,6 \\ \hline 2\,4\,0 \\ 1\,4\,4 \\ \hline 3\,8\,4 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\,2} \\ 1\,2\,4 \\ \times\ \ 2\,6 \\ \hline 2\,4\,8\,0 \\ 7\,4\,4 \\ \hline 3\,2\,2\,4 \\ {\scriptstyle 1\,1} \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\,2} \\ 1\,2\,4 \\ \times\ \ 2\,6 \\ \hline 7\,4\,4 \\ 2\,4\,8\,0 \\ \hline 3\,2\,2\,4 \\ {\scriptstyle 1\,1} \end{array}$$

Answer: 3224

Division

Some children may initially be using some methods from Y3 and Y4 such as:

- Using number lines to show grouping, including some
- Expanded method
- Short division (up to 3-digit numbers)

NB: this method may be introduced on Y4 and its use extended further in Y5 & Y6

98 ÷ 7 becomes

$$7\overline{)\,9\,{\scriptstyle 2}\,8}\ =\ 1\,4$$

Answer: 14

432 ÷ 5 becomes

$$5\overline{)\,4\,3\,{\scriptstyle 3}\,2}\ =\ 8\,6\ \text{r}\,2$$

Answer: 86 remainder 2

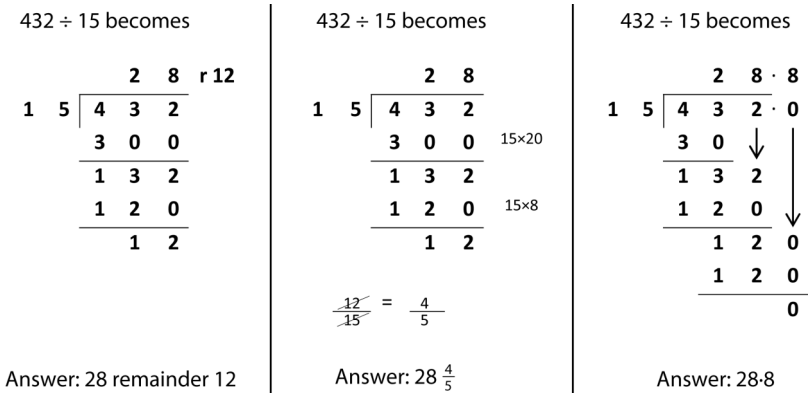
496 ÷ 11 becomes

$$1\,1\overline{)\,4\,9\,{\scriptstyle 5}\,6}\ =\ 4\,5\ \text{r}\,1$$

Answer: $45\frac{1}{11}$

Other methods shown in Year 5 and Year 6 may include:

- Dividing numbers by 10, 100 and 1000 (including decimals)
- Short division up to 4-digit numbers (Y5)
- Long division



How you can help at home ...

NB: learning times tables by heart is the key to efficiently learning written methods of multiplication and division

- Practicing times tables to 12 x 12 and knowing them by heart
- Practicing related division facts up to 12 x 12
- Setting 'real life' problems (e.g. carpeting a floor - I need 12 sq metres of carpet and it costs £25 a metre - what is the total amount to pay?)

12 X 12 Multiplication Table

X	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

We are always here to help so if you have any questions for us, please contact your child's class teacher who will forward them on to the Maths Curriculum Team

Thanks

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