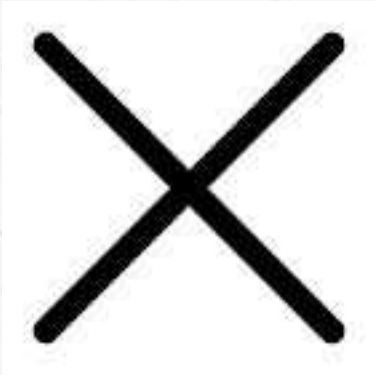
Calculation Policy – Years 5 and 6

Tuesday 6th November 2018

Multiplication

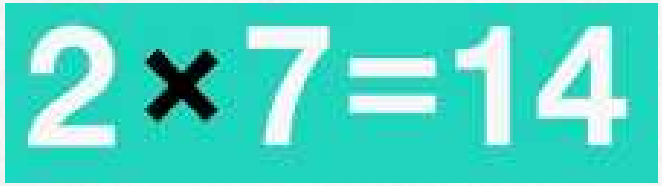


Times Tables

By the end of Year 4, all children should be confident with all times tables up to 12 x 12, and the corresponding division facts.

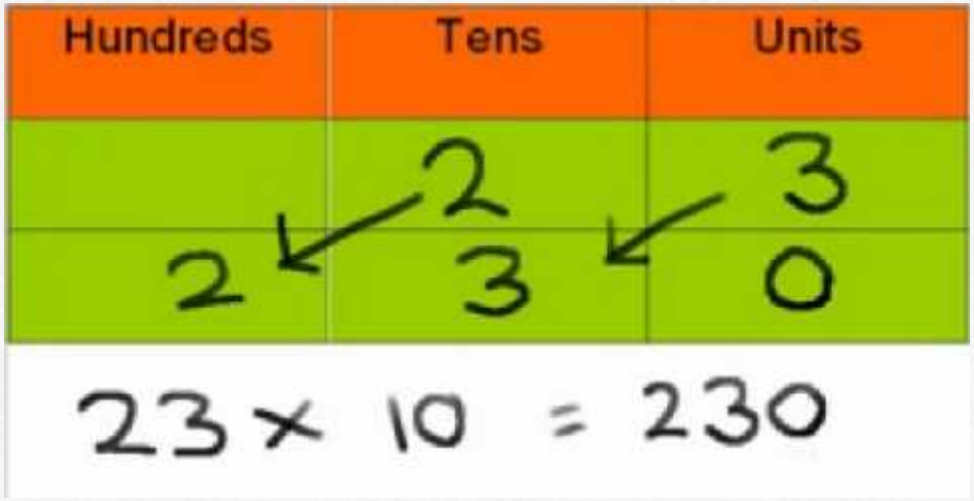
Order for learning tables:

10x, 5x, 2x, 4x, 8x, 3x, 6x, 9x, 7x, 11x, 12x



Multiplying by ten

When multiplying by ten, it is vitally important that children are not told to just ‘add on a zero.’



Multiplying by ten

When multiplying by ten, it is vitally important that children are not told to just ‘add on a zero.’

3 x 10 = 30

BUT WE DID NOT JUST ADD A 0!

If you add a 0, that means

3 + 0 = 3

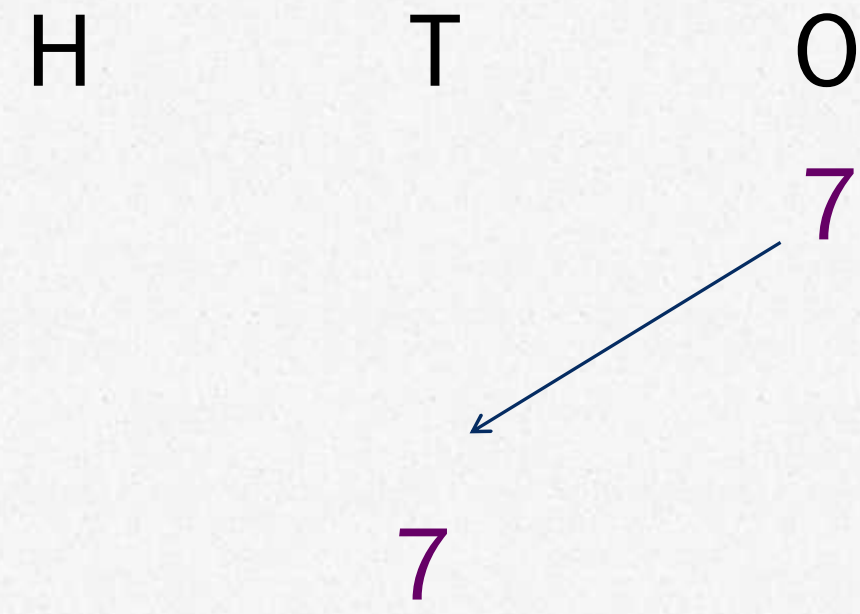
Multiplying by ten

H T O

Multiplying by ten

H	T	O
		7

Multiplying by ten



Multiplying by ten

H	T	O
		7
	7	0

seven tens = 70

Stage 3

The Grid Method

The Grid Method is reliant on a solid knowledge of times tables.

13 x 8 = 104

X	10	3	
8	80	24	= 104

- Draw a grid as shown on the left. Partition the 'thirteen' into one 'ten' and '3' ones.
- Place the '8' at the side and a multiplication symbol (x) in the top left hand corner.
- Work out 10 x 8 (80)
- Work out 3 x 8 (24).
- 80 + 24 = 104

Stage 3

<u>Continuation of the grid method</u>

23 x 8

X	20	3	
8	160	24	= 184

Some children will prefer to break the '20' down into two tens, therefore working out:
(10 x 8)
(10 x 8)
(3 x 8)

Stage 3

Further use of the grid method, for TO x TO

23 x 28

X	20	3	
20	400	60	
8	160	24	= 644

400 + 60 = 460

160 + 24 = 184

460 + 184 = 644

Over to you:

Try using the grid method to find the answer to one of these multiplications:

36 x 3

54 x 6

37 x 24

X	20	3	
20	400	60	
8	160	24	= 644

Stage 3 into Stage 4

The grid method is a popular and effective way of multiplying. It plays on knowledge of partitioning, draws on known facts and demonstrates what happens when you multiply by 10 or by 100.

It also highlights how many multiplication actions need to take place when working with long multiplication. For 23 x 28, four multiplications need to be undertaken, shown clearly in each cell in the grid.

All of the elements of this approach are the same as those needed in the standard method, but in the grid method they can be seen and you can easily tell if one of the multiplications has not taken place.

Stage 4

Partitioned Vertical Multiplication

47
x 8

Step 1 – set the calculation out as you would for using the traditional vertical method.

Stage 4

Partitioned Vertical Multiplication

47
x 8
56 (7 x 8)

Step 2 – multiply the one on the top line by the one on the bottom line.

Stage 4

Partitioned Vertical Multiplication

47
x 8
56 (7 x 8)
320 (40 x 8)

Step 3 – multiply the 'ten' on the top line by the one on the bottom line.

Stage 4

Partitioned Vertical Multiplication

47
x 8
56 (7 x 8)
320 (40 x 8)
376

Step 4 – add each column together
Ones (6 + 0)
Tens (50 + 20)
Hundreds (0 + 300)

Stage 4

52
x 17
14 (2 x 7)
20 (2 x 10)
350 (50 x 7)
500 (50 x 10)
884

The previous method can be extended for TO x TO

Over to you:

Try using partitioned vertical multiplication
to find the answer to one of these multiplications:

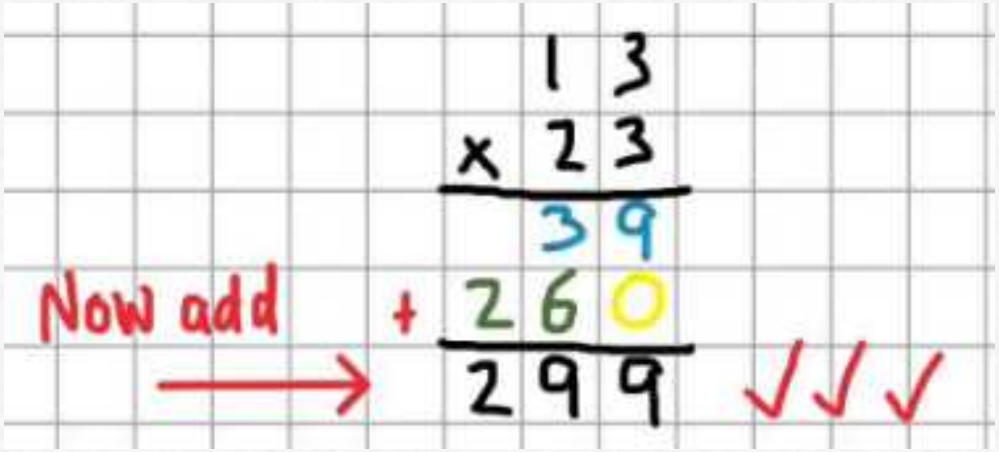
63 x 8

36 x 23

52
x 17
14 (2 x 7)
20 (2 x 10)
350 (50 x 7)
500 (50 x 10)
884

Stage 4 into Stage 5

Applying concepts taught through the grid method to a vertical layout prepares children for using the formal vertical method for multiplication.



Stage 5

$$\begin{array}{r} 47 \\ \times\ 8 \\ \hline 6 \\ \hline 5 \end{array}$$

Step 1 – multiply 7 by 8. This gives 56. Place the ‘one’ (6) in the ones column, and the ‘ten’ (5) under the tens column.

Stage 5

$$\begin{array}{r} 47 \\ \times \quad 8 \\ \hline 376 \\ \hline 5 \end{array}$$

Step 2 – multiply the 8 by the 4 tens. This gives ’32’. Add the carried ‘5’ onto the 32 (37) and place in front of the 6 ones.

This gives an answer of 376.

Stage 5

Going further … 256 x 18

$$\begin{array}{r} 256 \\ \times \quad 18 \\ \hline 2048 \\ 4\ 4 \end{array}$$

Follow the same method shown previously, to multiply the ‘8’ ones on the bottom line by the top number. Ensure that carried digits are added onto the total.

Stage 5

Going further … 256 x 18

256
x 18
2048
4 4
2560

Then, multiply the ‘ten’ on the bottom line by the digits on the top line. As you are multiplying by a ‘ten’, ensure that a ‘zero’ is placed in the ‘ones’ column before starting the calculations.

Stage 5

Going further … 256 x 18

$$
\begin{array}{r}
256 \\
\times\ 18 \\
\hline
2048 \\
2560 \\
\hline
4608 \\
1
\end{array}
$$

Add the columns in each row together. Again, ensure that the carried digits are added to the total as you make your way across.

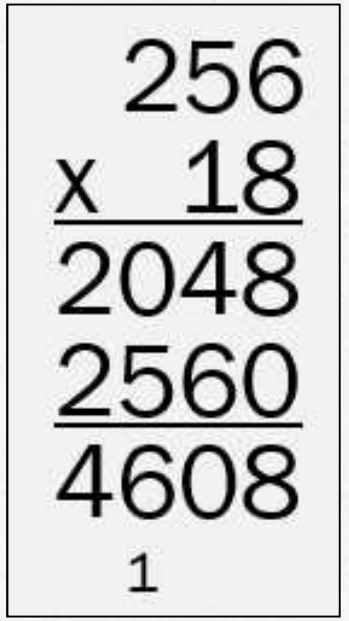
Over to you:

Try using the formal method of multiplication to find the answer to one of these calculations:

142 x 7

342 x 16

435 x 28



Why not go straight into vertical methods?

- The formal method holds many opportunities for errors (incorrect lining up of columns, forgetting about carried tens/hundreds etc).
- Lack of understanding of size of numbers, therefore reasonableness of answers (using a number line earlier on helps to grasp a secure understanding of the number system).
- Recognising when calculations are better carried out mentally, as opposed to a single reliance upon one method.
- Understanding more than one method means that a calculation can be checked without the same error being included.