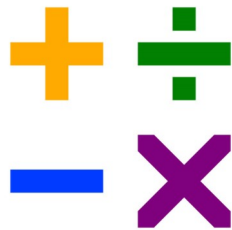


Multiplication

If you have questions about any of the information in this booklet please contact Le Murier on 246660



Over the years, the ways of teaching maths have changed, as has the name. We now call it Numeracy, which is about using our maths skills in everyday situations.

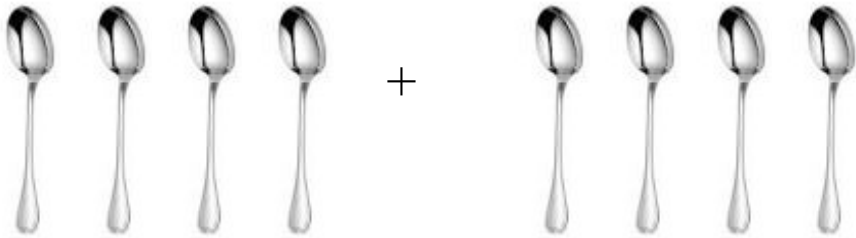
This booklet shows the different methods that are used in the teaching of multiplication — one of the four rules of number within computation.

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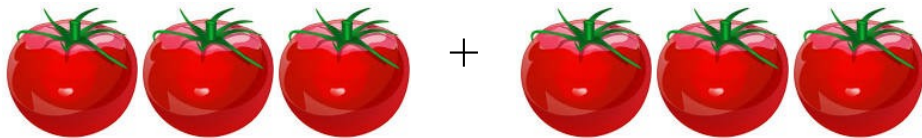


When we start to teach multiplication we use Addition, as this is now a rule of number the students are familiar with.

Doubles (4 + 4 = 8)



We start to use the words "lots of". We have 2 lots of 4 spoons = 8



In this example we have 3 + 3 = 6. We have 2 lots of 3 tomatoes = 6. When this is understood then we go on to

Traditional Method HTU x U (653 x 3)

This method can be used to multiply larger numbers by single digit numbers.

$\begin{array}{r} \text{H T U} \\ 6 \ 5 \ 3 \\ \times \quad 3 \\ \hline 1959 \\ \underline{\quad 1} \end{array}$	First Second Third	$3 \times 3 = 9$ $5 \times 3 = 15$ carry the one to the next column $6 \times 3 = 18 + 1 = 19$
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So
 $653 \times 3 = 1959$

All of these methods can be used with money. The easiest way to do this is to remove the decimal point, complete the sum using the chosen method and then putting the decimal point back into the sum, before the second number from the end on the right hand side.

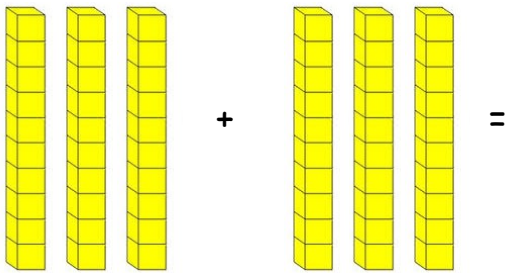
e.g. $\pounds 1.25 \times 4 = 125 \times 4 = 500 = \pounds 5.00$

Next you multiply the tens
 $3 \times 2 = 6$ and you have to add the
 one ten that was carried over from
 the units column.
 $6 \text{ tens} + 1 \text{ ten} = 7 \text{ tens}$

$$\begin{array}{r} \text{T U} \\ 38 \\ \times 2 \\ \hline 6 \\ 1 \end{array}$$

Repeated addition ($2 \times 4 = 8$)

For repeated addition we use equipment and put it into an 'array'. An array is a group of objects put into columns and rows.



$$\begin{array}{r} \text{T U} \\ 38 \\ \times 2 \\ \hline 76 \\ 1 \end{array}$$

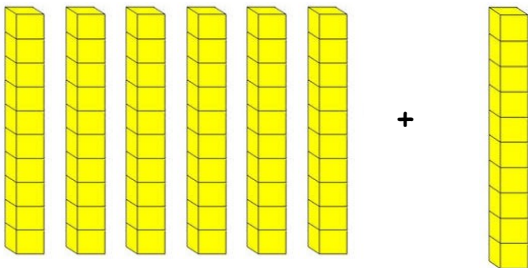
This array shows



The rows show
 $4 + 4 = 8$
 2 lots of 4 = 8
 $2 \times 4 = 8$

The columns show
 $2 + 2 + 2 + 2 = 8$
 4 lots of 2 = 8
 $4 \times 2 = 8$

This shows the students that
 2×4 is the same as 4×2



Carried
 over from
 units

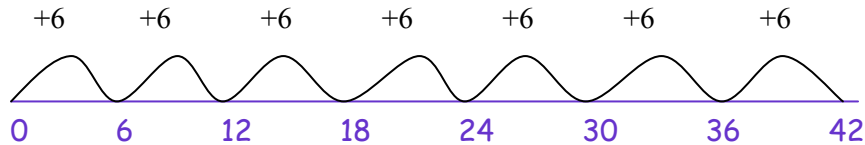
So
 $38 \times 2 = 76$

Repeated addition on a number line ($7 \times 6 = 42$)

When the students have grasped the concept of repeated addition, we can then start to use a number line to work out our answers.

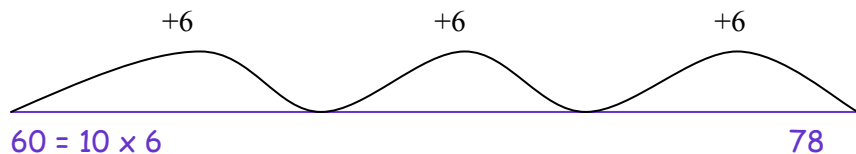
$$6 + 6 + 6 + 6 + 6 + 6 + 6 = 42 \text{ (7 lots of } 6 = 42\text{)}$$

$$7 \times 6 = 42$$



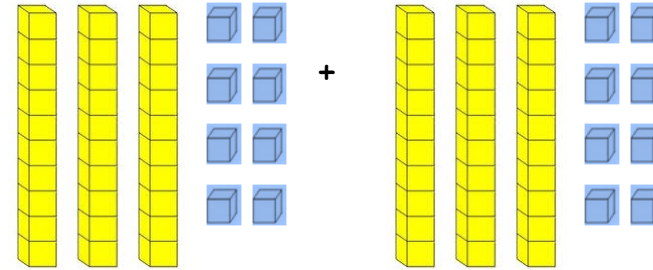
We encourage the students to learn the times Tables, as this will then help to move the repeated addition on and will help when solving multiplication sums using bigger numbers.

Number line using known facts ($13 \times 6 = 78$)



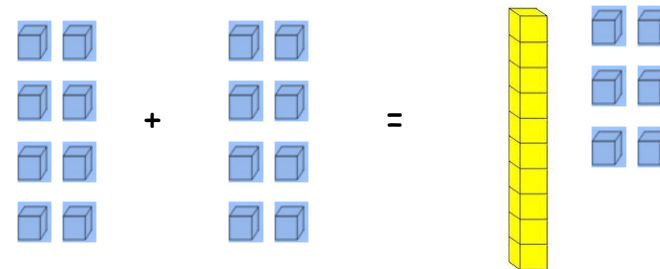
Traditional Method TU x U ($38 \times 2 = 38 + 38$)

This method is introduced using equipment until the students understand how to carry.



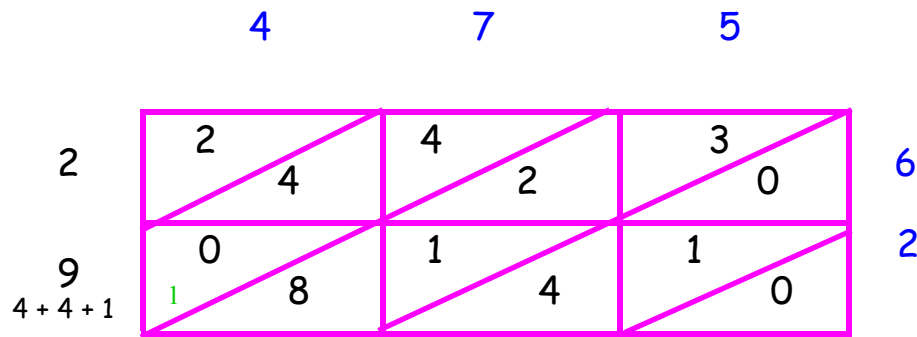
$$\begin{array}{r} \text{TU} \\ 38 \\ \times 2 \\ \hline \end{array}$$

First we add the units together which is the same as multiplying $8 \times 2 = 16$. This is made up of 1 ten and 6 units. When we fill in the sum we put the 6 in the units answer column and carry the ten.



$$\begin{array}{r} \text{TU} \\ 38 \\ \times 2 \\ \hline 6 \\ \hline 1 \end{array}$$

Lattice Method HTU x HTU (475 x 62)



4
5
0

$8 + 1 + 2 + 3 = 14$ $4 + 1 = 5$
 4 is written down and
 the one is carried
 into the next column

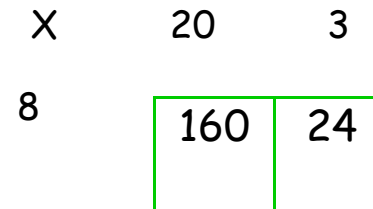
So the answer to $475 \times 62 = 29,450$

We encourage the students to learn the multiplication tables as this makes multiplying so much easier. Multiplication is then taught using three different methods, this enables the student to choose which method they prefer and to get the correct answers consistently. These methods are partitioning, lattice and traditional. These will now be explained one at a time.

Partitioning TU x U using a grid (23 x 8 = 184)

First we need to draw a grid. We need to know how many boxes to draw. We work this out by looking at the numbers in the sum. 23 has two digits and 8 has one digit, so we need to draw a grid that is 2 boxes by 1 box.

We then split the numbers into tens and units
 $23 = 20 + 3$
 $8 = 8$



At the same time, we show partitioning in columns, see example on the next page.

$20 \times 8 = 160$
 $3 \times 8 = 24$
 $160 + 24 = 184$

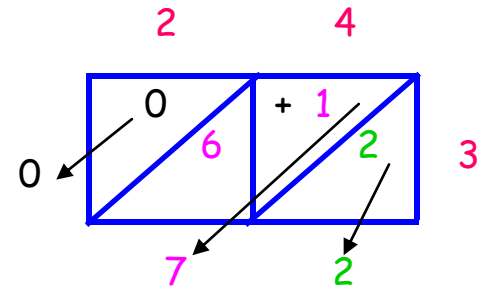
Partitioning in columns ($23 \times 8 = 184$)

$$23 \times 8$$

$$\begin{array}{r} 23 \\ \times 8 \\ \hline 3 \times 8 = 24 \\ 20 \times 8 = 160 \\ \hline 184 \end{array}$$

This is used to show how partitioning using a grid works.

We multiply the unit first $\{3 \times 8\}$ and then the number in the tens column $\{20 \times 8\}$



We then add the amounts diagonally.

$$\begin{array}{r} 0 \quad 6 + 1 = 7 \quad 2 \\ 0 \quad 7 \quad 2 \\ \hline = 72 \end{array}$$

So $24 \times 3 = 72$

Partitioning HTU & TU x TU using a grid ($375 \times 82 = 30750$)

For this sum we need to draw a bigger grid.
 $375 = 3$ digits and $82 = 2$ digits so our box needs to be 3 squares by 2 squares. Then we need to split the number into hundreds tens and units.
 $375 = 300 + 70 + 5$
 $82 = 80 + 2$

X	300	70	5
80	24000	5600	400
2	600	140	10

$300 \times 80 = 24000$ $70 \times 80 = 5600$ $5 \times 80 = 400$
 $300 \times 2 = 600$ $70 \times 2 = 140$ $5 \times 2 = 10$

A quick way to do these difficult multiplications is to ignore the zeros, do the multiplication then add the zeros back on.
 $300 \times 80 =$
 $3 \times 8 = 24$ then add on the three zeros you took off. The answer is 24000

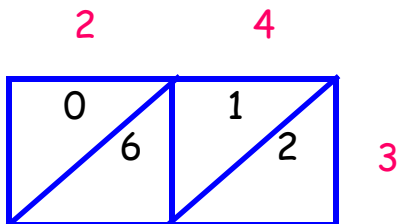
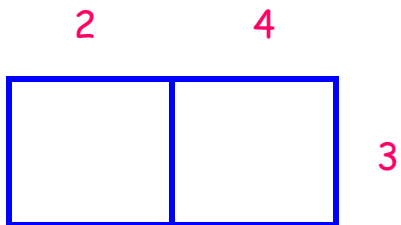
The answers in the boxes need to be added together.

This method can be used with any large numbers and as we are only multiplying single digits it remains an easy method. For each sum you have to remember to count the number of digits and draw the grid with the correct number of boxes. Then draw the diagonal lines from top right to bottom left in each box and put the digits above or beside the boxes. When adding at the end, remember that the columns are added diagonally. See example on the next page.

Lattice Method TU x U ($24 \times 3 = 72$)

First we need to draw a grid. We need to know how many boxes to draw. We work this out by looking at the numbers in the sum. 24 has two digits and 3 has one digit so we need to draw a grid that is 2 boxes by 1 box.

In this method we split the numbers into digits
 $24 = 2 + 4$
 $3 = 3$



First we draw the boxes as shown and then draw diagonal lines in each box going from top right to bottom left. Then we start multiplying. We multiply $4 \times 3 = 12$. The tens (1) go into the top half of the box and the units (2) goes into the bottom half of the box as shown. Then we multiply $2 \times 3 = 6$. There are no tens so we put zero in the top half of the box and the 6 units in the bottom half of the box.

Using the partitioning in columns this sum can be shown as follows.

$$\begin{array}{r} 375 \times 82 \\ \times \quad 82 \\ \hline 2 \times 5 = 10 \\ 2 \times 70 = 140 \\ 2 \times 300 = 600 \\ 80 \times 5 = 400 \\ 80 \times 70 = 5600 \\ 80 \times 300 = 24000 \\ \hline 30750 \end{array}$$

The important thing with the method above is to make sure that the digits are written in the correct column and line up. The units need to be in the unit column, the tens in the tens column etc.

The partitioning methods can be used for even bigger numbers, but there are lots of zeros that have to be remembered and put in the correct column.