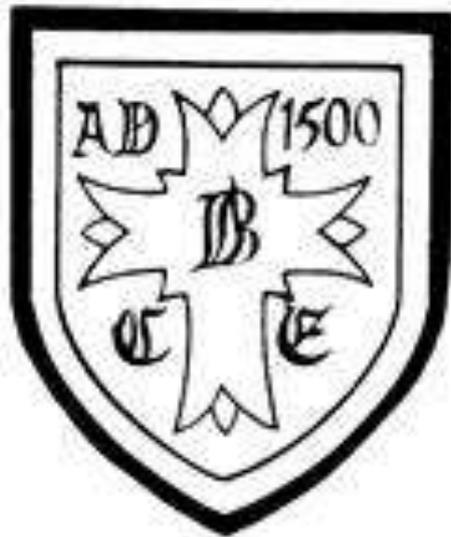


**National Curriculum  
For  
Mathematics  
2014**



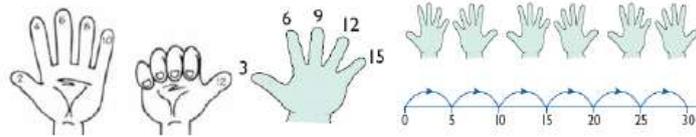
**Calculation Policy**

**Routes through Multiplication**

**Revised and amended September 2013**

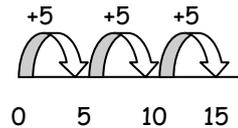
**EARLY SKILLS-** most children from foundation stage.

Multiplication as counting in equal steps - '5, 10, 15, 20', or in twos or tens or other multiples.  
 Include doubling and halving  
 Include practical activities and number rhymes.

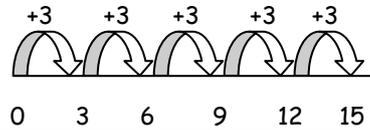


**MULTIPLICATION AS REPEATED ADDITION.** (Suggested Year 1 onwards)

$5 \times 3$  is  $5 + 5 + 5 = 15$

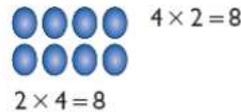


$3 \times 5$  is  $3 + 3 + 3 + 3 + 3 = 15$



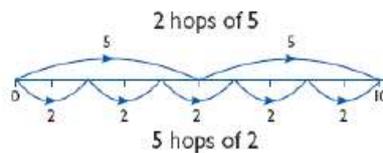
**MULTIPLICATION AS ARRAYS**

Understanding multiplication as describing an **array**.  
 (Begin to understand the relationship with Division)



**COMMUTATIVE LAW/RULE** (Suggested Year 2 onwards)

Recognising that multiplication can be done in any order - e.g. realising that  $5 \times 2$  is the same as  $2 \times 5$ .



**MULTIPLICATION USING PARTITIONING** - most children from year 3 onwards

Mental methods for multiplying  $TU \times U$  can be based on the distributive law of multiplication over addition. This allows the **tens and units to be multiplied separately** to form partial products. These are then added to find the total product. **Either the tens or the units can be multiplied first but it is more common to start with the tens.**

Informal recording in year 3 might be

$$\begin{array}{r} 43 \times 6 \\ 40 \text{ and } 6 \\ \downarrow \quad \downarrow \times 6 \\ 240 \text{ and } 18 = 258 \end{array}$$

To multiply successfully, children need to be able to:

- recall all multiplication facts to  $12 \times 12$ ;
- partition number into multiples of one hundred, ten and one;
- work out products such as  $70 \times 5$ ,  $70 \times 50$ ,  $700 \times 5$  or  $700 \times 50$  using the related fact  $7 \times 5$  and their knowledge of place value;
- add two or more single-digit numbers mentally;
- add multiples of 10 (such as  $60 + 70$ ) or of 100 (such as  $600 + 700$ ) using the related addition fact,  $6 + 7$ , and their

knowledge of place value;  
 • add combinations of whole numbers using the column method.

*Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for multiplication.*

**SIMPLE GRID METHOD - Suggested most children from end of year 3 onwards**

An expanded method that links directly to the mental method. It is an alternative way of recording.

Begin with simple 2 digit multiplied by 1 digit (TU x U), progressing to more complex 2 digit x 1 digit.

Solve using partitioning moving onto addition/column addition.

**TU x U**

**A**  
 $18 \times 5 =$

$$\begin{array}{r|c|c} \times & 10 & 8 \\ \hline 5 & 50 & 40 \end{array}$$

$50 + 40 = 90$

**B**  
 $38 \times 5 =$

$$\begin{array}{r|c|c} \times & 30 & 8 \\ \hline 5 & 150 & 40 \end{array}$$

$150 + 40 = 190$

<https://www.youtube.com/watch?v=7Hj1wAYamfE> **Multiplication A**  
<https://www.youtube.com/watch?v=62Qm4mGK7xI> **Multiplication B**

Now try these:

$16 \times 4$

$17 \times 3$

$47 \times 5$

$53 \times 4$

**COMPLEX GRID METHOD → EXPANDED WRITTEN METHOD → EFFICIENT WRITTEN METHOD**

(Suggested most children from Year 4 onwards)

Extend to HTU x U.

Children should then be able to multiply two and three digits by a single digit, using the efficient written method of short multiplication. To enable them to progress to longer multiplication in Year 5 it is worth extending their knowledge and understanding to TU x TU.

Children to **estimate first**. Start with the **grid method**. The partial products in each row are added, and then the two calculations at the end of each row are added to find the total product.

**HTU x U**

$284 \times 3$

$$\begin{array}{r|c|c|c} \times & 200 & 80 & 4 \\ \hline 3 & 600 & 240 & 12 \end{array} \quad \begin{array}{r} 600 \\ 240 \\ + 12 \end{array}$$

$600 + 210 + 12 =$   
 Solve using partitioning moving onto addition/column addition.

<https://www.youtube.com/watch?v=nGvPVYjgrg8>  
**Multiplication C**

Try this:  $365 \times 4$

**TU x TU/HTU x TU**

$27 \times 56$

$$\begin{array}{r|c|c} \times & 50 & 6 \\ \hline 20 & 1000 & 120 \\ 7 & 350 & 42 \end{array} \quad \begin{array}{r} 1120 \\ + 392 \end{array}$$

Using column addition to solve.

[https://www.youtube.com/watch?v=69vMILj\\_oaw](https://www.youtube.com/watch?v=69vMILj_oaw)  
**Multiplication D**

Try this:  $74 \times 43$

Extend to decimals, as appropriate.

$4.9 \times 3$

$$\begin{array}{r|c|c} \times & 4.0 & 0.9 \\ \hline 3 & 12.0 & 2.7 \end{array} \quad \begin{array}{r} 12.0 \\ + 2.7 \end{array}$$

Using column addition to solve

<https://www.youtube.com/watch?v=jqbc8-wjaTc>  
**Multiplication E**

Try these:  $4.3 \times 5$      $2.5 \times 8$      $8.3 \times 6$

## EXPANDED SHORT MULTIPLICATION

The next step is to represent the method of recording in a **column format, but showing the working**. Draw attention to the links with the grid method above.

Children should describe what they do by referring to the actual values of the digits in the columns. For example, the first step in  $38 \times 7$  is 'eight multiplied by seven'. Next it is 'thirty times seven', not 'three times seven', although the relationship  $3 \times 7$  should be stressed.

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 56 \\ \underline{210} \\ 266 \end{array} \quad \begin{array}{l} 8 \times 7 = 56 \\ 30 \times 7 = 210 \end{array}$$

<https://www.youtube.com/watch?v=vFeXjrn7t1w>  
**Multiplication F**

## SHORT MULTIPLICATION (Most children from the end of Year 4 onwards)

The recording is reduced further, with carry digits recorded below the line.

If, after practice, children cannot use the compact method without making errors, they should return to the expanded format of stage 3.

$$\begin{array}{r} 38 \\ \times 7 \\ \hline \underline{266} \\ 5 \end{array}$$

<https://www.youtube.com/watch?v=eUUrV5onhyo>  
**Multiplication G**

Have a go:  $49 \times 5$

$$\begin{array}{r} 242 \\ \times 5 \\ \hline \underline{1210} \\ 21 \end{array}$$

<https://www.youtube.com/watch?v=ntXkdMO-7aY> **Multiplication H**

Have a go:  $347 \times 4$

The step here involves adding 210 and 50 mentally with only the 5 in the 50 recorded. This highlights the need for children to be able to add a multiple of 10 to a two-digit or three-digit number mentally before they reach this stage.

## TWO-DIGIT BY TWO-DIGIT PRODUCTS (Suggested most children from Year 5 onwards)

Showing the links to the grid method. Estimate first.

$56 \times 27$  is approximately  $60 \times 30 = 1800$ .

$$\begin{array}{r} 56 \\ \times 27 \\ \hline 42 \\ 350 \\ \underline{120} \\ \underline{1000} \\ 1512 \\ 1 \end{array} \quad \begin{array}{l} 6 \times 7 = 42 \\ 50 \times 7 = 350 \\ 6 \times 20 = 120 \\ 50 \times 20 = 1000 \end{array}$$

<https://www.youtube.com/watch?v=pHHcW4JyKbk> **Multiplication I**

Now try these:  $72 \times 43$        $49 \times 34$        $87 \times 26$

Reduce the recording further by carrying the digits to the left.

in the partial products of  $56 \times 20 = 120$  and  $56 \times 7 = 392$  are usually carried mentally.

$56 \times 27$  is approximately  $60 \times 30 = 1800$ .

$$\begin{array}{r} 56 \\ \times 27 \\ \hline 392 \\ \underline{1120} \\ 1512 \\ 1 \end{array} \quad \mathbf{J}$$

<https://www.youtube.com/watch?v=lcRTceIxNQI> **Multiplication J**  
[https://www.youtube.com/watch?v=U\\_KUoI81cLk](https://www.youtube.com/watch?v=U_KUoI81cLk) **Multiplication K**

$286 \times 29$  is approximately  $300 \times 30 = 9000$ .

$$\begin{array}{r} 286 \\ \times 29 \\ \hline 2574 \\ \underline{5720} \\ 8294 \end{array} \quad \mathbf{K}$$

This shows the process of multiplying by the units, then the tens and then the hundreds

Now try:  $325 \times 36$

Children who are already secure with multiplication for  $TU \times U$  and  $TU \times TU$  should have little difficulty in using the same method for  $HTU \times TU$ . Again, the carry digits in the partial products are usually recorded in jottings and/or carried mentally, as appropriate.

Progressing to;

$4392 \times 63$  is approximately  $4400 \times 60 = 264000$ .

$$\begin{array}{r} 4392 \\ \times 63 \\ \hline 13086 \\ \underline{263520} \\ 276.606 \\ \phantom{0}1 \end{array}$$

<https://www.youtube.com/watch?v=NILkVHV041U>

**Multiplication L**

Now try:

$8346 \times 35$

$7529 \times 29$

$8562 \times 47$

Thank you for using Berkswell's Route Through Calculation.

Please be aware that there are many very similar *and* different methods to these. You may have learnt slightly different methods to that which your children are learning within school. There may be differences between layout and presentation in these examples. The most important thing is that we encourage your children to learn a method which they are comfortable with and do not confuse them with too many contradictory strategies. The 'Route Through' is a way of making sure children understand what is happening in their maths. Skipping to the end without having been through the rest of the route may not harm you child in the short term, but could harm their chances of progressing further with maths in secondary school, due to a lack of understanding which is key to many of the more developed areas such as algebra. Thank you again for taking the time to view these examples and read through our route through calculation. It was created by a team of local schools and updated for the National Curriculum 2014.

Mr M. Penn