



Weetwood Primary School: Progression in Multiplication

These notes show the stages in building up to a compact, efficient method for multiplication. Our aim is that children use mental methods when appropriate but for calculations that they cannot do in their heads they choose an appropriate written method which they can use accurately and with confidence. Time must be taken building up to the formal written method to ensure complete understanding at each stage. Multiplication should be taught alongside its inverse, division.

Stage 1 – Typically, children in Reception, Years 1 and 2 will be at this stage

Repeated Addition: Practical Multiplication

Children need plenty of experience of multiplying using repeated addition with concrete objects and pictorial representations. Give children plenty of opportunities to count in equal groups. Give children plenty of problem solving activities involving counting equal sets or groups.

e.g. How many legs on 5 teddies?



$$2 + 2 + 2 + 2 + 2 = 10$$

There are 3 sweets in a bag. How many sweets in 3 bags?



$$3 + 3 + 3 = 15$$

Children need to be able to:

- Count in 2s, 5s and 10s.
- Recognise equal sets.

Key Vocabulary:

Groups of, lots of, altogether, equals, count, repeated addition.

Stage 2 – Typically children in Years 2 and 3 will be at this stage

Repeated Addition: Arrays

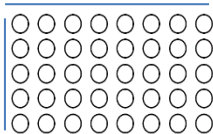
Children will recognise multiplication as repeated addition and picture this as arrays.

e.g. Children can represent 8×5 pictorially as (this can also be done using the 5 and 8 Cuisenaire rods):

8



5



Children can then work this out using repeated addition.

Children need to be able to:

- Count in steps
- Understand multiplication as repeated addition
- Understand that multiplication is commutative (multiplication can be done in any order).
- Solve one step multiplication problems.
- Understand multiplication as the inverse of division.

Key Vocabulary:

Groups of, lots of, altogether, equals, count, repeated addition, sets of, row, column, multiply, times, ___ times as big as, array.

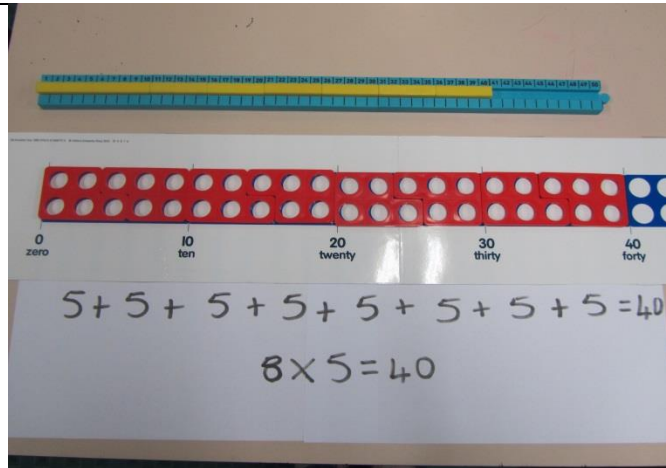
Repeated Addition : Number lines

Children need to be able to:

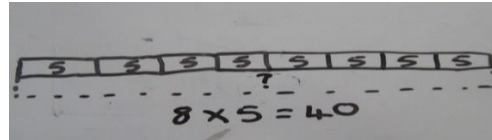


Weetwood Primary School: Progression in Multiplication

To work out 8×5 children can use numicon or Cuisenaire to create a number line :

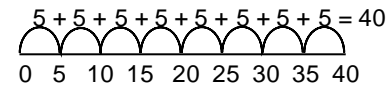


Children can record this as a bar model:



The dotted line shows the unknown quantity. Children could then replace the question mark with the number 40.

Children can then record this onto an empty number line:

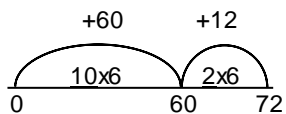


$$8 \times 5 = 40$$

Children will then move on to using a number line to multiply larger numbers by using the distributive law (which allows numbers to be partitioned and each part to be multiplied separately; the parts then added to attain an answer).

e.g.

$$12 \times 6$$



Children should become completely confident with this method before progressing onto the next stage.

- Count in steps accurately.
- Understand multiplication as repeated addition.
- Be familiar with 2, 5, 10, 3, 4 multiplication tables.
- Solve one step problems involving multiplication.
- Understand multiplication to be the inverse of division.

Key Vocabulary:

Groups of, lots of, altogether, equals, count, repeated addition, sets of, row, column, multiply, times, ___ times as big as, array, bar model, number line.



Weetwood Primary School: Progression in Multiplication

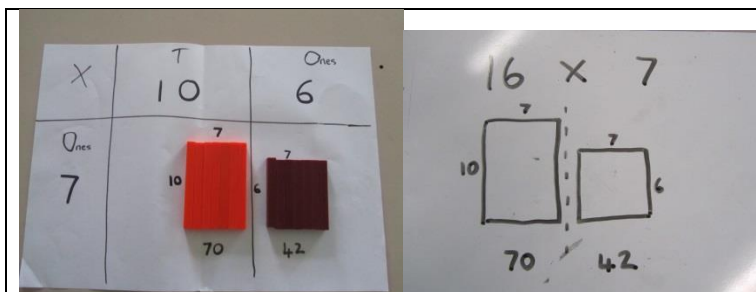
Stage 3 – Typically children in Years 3 and 4 will be at this stage

Grid Method

The grid method should be introduced alongside children physically making an array to represent the calculation.

Two digit teens number multiplied by a single digit:

e.g. 16×7



X	10	6	
7	70	42	112

$$16 \times 7 = 112$$

Two digit numbers by a single digit:

e.g.

$$56 \times 7 = 392$$

x	50	6	
7	350	42	392

Ensure that children understand the relationship between 7×5 and 7×50 and that they are not simply “adding a zero”.

Multiplying a 2 digit by a 2 digit number:

Children should partition both numbers and multiply each part. Children can then add the parts together, using column addition if needed:

e.g. $56 \times 27 = 1512$

X	20	7	
50	1000	350	1350
6	120	42	162
			1512

Children need to be able to:

- Partition numbers
- Recall multiplication facts up to 12×12
- Have a secure understanding of related multiplication facts e.g. from 5×7 and place value knowledge, know 50×7 , 50×70 , 50×700 .
- Have a secure understanding of place value.
- Add combinations of numbers mentally or using column addition.
- Solve two step problems involving multiplication.
- Understand multiplication to be the inverse of division.

Key Vocabulary:

Groups of, lots of, altogether, equals, count, repeated addition, sets of, row, column, multiply, times, ___ times as big as, array, bar model, number line, ten times bigger, 100 times bigger, multiple, product, inverse.



Weetwood Primary School: Progression in Multiplication

Multiplying by a decimal:

Children can also multiply by decimals using grid method.

x	30	6	0.8	
7	210	42	5.6	257.6

e.g. $36.8 \times 7 = 257.6$

Children can then use column addition to add up the numbers.

Children need to be able to:

- Have a secure understanding of decimal place value.
- Understand the relationship between facts such as 7×8 and 0.7×8 .
- Have a secure knowledge of times tables facts up to 12×12 .
- Use column addition to add decimal numbers.
- Solve two step problems involving multiplication.
- Understand multiplication to be the inverse of division.

Key Vocabulary:

Groups of, lots of, altogether, equals, count, repeated addition, sets of, row, column, multiply, times, ___ times as big as, array, bar model, number line, ten times bigger, 100 times bigger, 10 times smaller, 100 times smaller, multiple, product, inverse.



Weetwood Primary School: Progression in Multiplication

Stage 4 – Typically children will have reached this stage by Year 5 and will continue with it in Year 6

Short Multiplication - Typically children should be introduced to this by the end of Year 4

Once children have a *secure* understanding of the grid method, they can move on to short multiplication.

e.g. 56×7			
x	50	6	
7	350	42	392

$$\begin{array}{r}
 56 \\
 \times 7 \\
 \hline
 392 \\
 \hline
 4
 \end{array}$$

Introduce short multiplication alongside the grid method. Ask children to compare similarities and differences between the two methods. Unpick the steps to show how they are reduced from grid method.

Long Multiplication – Typically children should be introduced to this within Year 5

Children can multiply two digit numbers by two or three digit numbers as follows:

e.g. $56 \times 27 = 1512$			
x	50	6	
20	1000	120	
7	350	42	1512

$$\begin{array}{r}
 56 \\
 \times 27 \\
 \hline
 392 \quad (56 \times 7) \\
 1120 \quad (56 \times 20) \\
 \hline
 1512 \\
 \hline
 1
 \end{array}$$

Introduce long multiplication alongside grid method. Unpick the steps to show how they are reduced from grid method.

Eventually children will be able to do this without writing out what they are multiplying at the side.

Multiplying with decimals – Typically children will be introduced to this in Year 6

As children progress, they will be able to use the short multiplication method to multiply decimal numbers.

e.g. $3.19 \times 8 = 12.52$

$$\begin{array}{r}
 3.19 \\
 \times 8 \\
 \hline
 25.52 \\
 \hline
 17
 \end{array}$$

Children need to be able to:

- Have secure knowledge of times tables up to 12×12 .
- Have secure knowledge of place value, including decimal place value.
- Be able to multiply and divide decimals to 2dp by 10, 100 and 1000.
- Have a secure understanding of the grid method.
- Solve complex multistep problems involving multiplication.
- Understand multiplication to be the inverse of division.

Key Vocabulary:

Groups of, lots of, altogether, equals, count, repeated addition, sets of, row, column, multiply, times, ___ times as big as, array, bar model, number line, ten times bigger, 100 times bigger, 10 times smaller, 100 times smaller, multiple, product, inverse.