

Overview of Multiplication at Hanley St Luke's

- Children at Hanley St Luke's are immersed in a number of different multiplication calculation strategies according to their needs and abilities. The overall aim is to ensure that children will use both written and mental methods to solve problems, choosing their own 'best fit' method. The journey is towards column multiplication through partitioning and recombining and confidence/ accuracy when mentally multiplying; including the rapid recall of multiplication tables.
- Children working at P levels will mainly use addition to build up towards repeated addition and the idea of multiplication.
- The mental methods that lead to grid and column multiplication generally involve partitioning numbers into units, tens, hundreds etc to multiply more easily and then recombine. Learning by heart of the multiplication tables is of paramount importance, they provide a solid foundation for multiplication methods and other areas of mathematics.

Addition

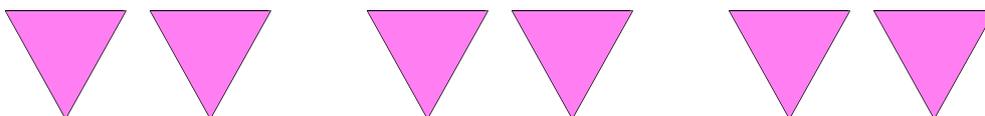
Children at the beginning stages of understanding multiplication tend to focus on addition and addition strategies so the links to multiplication are structured over time. Much of it comes in the form of repeated addition of small groups of physical objects e.g. toys, cubes, counters etc. They will use visual aids such as unifix cubes and numicon. They will then move on to grouping of items once confident.



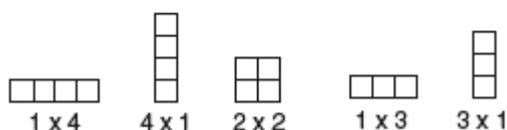
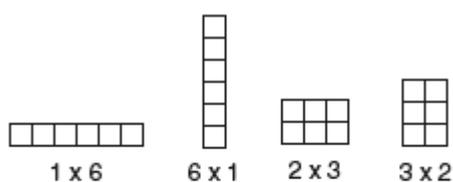
Grouping

Children are introduced to the notion of multiplication as repeated addition. They are immersed in a number of visual, kinaesthetic and auditory methods to learn the associated vocabulary and concepts. Children should experience seeing and handling equal groups of objects to emphasise the visual aspect. They will begin by counting in twos and tens, moving on to groups of five.

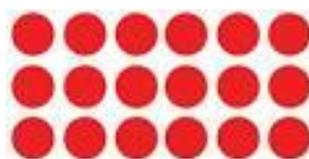
$$3 \times 2 = 6$$



Arrays



$$3 \times 4 = 12$$



$$3 \times 6 = 18$$

Children should be able to write/ draw and create a number sentence using an array. They can be any shape, size or picture; they can be 3 dimensional, 2 dimensional, or displayed through ICT. Children will use different objects to represent a given multiplication as well as looking at arrays and deriving the corresponding multiplication facts. This reinforces that multiplication can be carried out in any order, achieving the same answer.

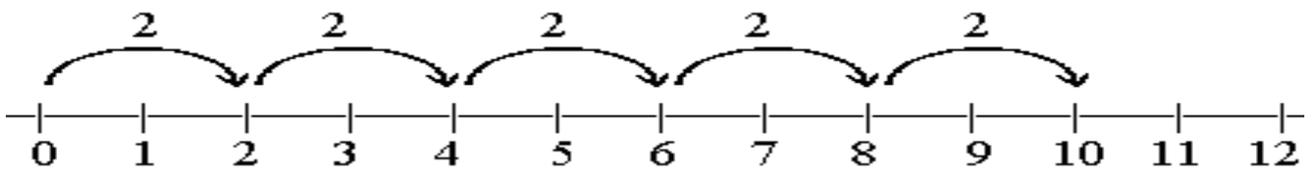
Repeated Addition

Children will develop their understanding of multiplication and use jottings to support calculations for repeated addition.

For example: 3 times 5 is $5 + 5 + 5 = 15$ or 3 lots of 5 or 5×3

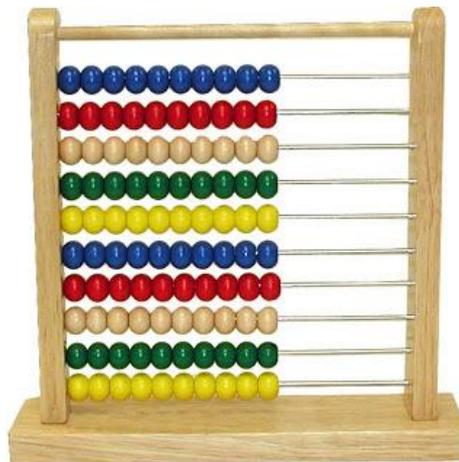
Repeated addition can be shown easily on a number line:

$5 \times 2 = 5 + 5$ $2 + 2 + 2 + 2 + 2 = 5$ jumps of 2



and on a bead bar or Abacus:

$5 \times 3 = 5 + 5 + 5$ etc.



Hundred Squares

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Hundred squares can be used to reinforce repeated addition and later in the child's understanding for more challenging multiplication work such as square numbers, and the observation of further patterns of multiples.

Inverse

Children to then begin to use and apply known methods to find symbols that stand for unknown numbers to complete equations. They are taught to use division as the inverse or opposite of multiplication as a strategy to complete missing number sentences.

$$\heartsuit \times 5 = 15$$

$$3 \times \square = 18$$

$$\square \times \square = 32$$

Partitioning

Mentally and on paper as informal jottings, breaking down the calculation into smaller steps i.e. tens and units, then moving on to hundreds, thousands etc. This strategy is the precursor to the grid and column methods used later in the child's mathematical development.

For example: $13 \times 5 =$

$$10 \times 5 = 50 \quad 3 \times 5 = 15$$

$$50 + 15 = 65$$

.

$135 \times 5 =$

$$100 \times 5 = 500 \quad 30 \times 5 = 150 \quad 5 \times 5 = 25$$

$$500 + 150 + 25 = 675$$

The Grid Method

Grid method is used as a visual tool bringing concepts from partitioning into a more formal written method, and so providing a solid foundation before moving on to column methods, and bringing knowledge of partitioning into a row and column algorithm.

It is better to place the number with the most digits in the left-hand column of the grid so that it is easier to add the answers of each part of the multiplication together.

$7 \times 38 =$

×	7
30	210
8	56
	266

$35 \times 26 =$

×	30	5
20	600	100
6	180	30

$600 + 100 = 700$

$180 + 30 = 210$

$700 + 210 = 910$

Expanded Column Method (Long multiplication)

The next step is to show the method of recording in a column format, but showing the working. This links to the grid method above.

Children should describe what they do by saying the actual values of the digits in the columns. For example, the second step in 223×6 is 'twenty multiplied by six', not 'two times six'.

Children to begin with TU \times U (multiplication by a single digit) then HTU \times U (multiplication by a single digit) later moving on to TU \times TU = (multiplying two digit numbers) and further onto calculations with more digits where appropriate.

$$\begin{array}{r}
 32 \\
 \times 24 \\
 \hline
 8 \quad (4 \times 2) \\
 120 \quad (4 \times 30) \\
 40 \quad (20 \times 2) \\
 600 \quad (20 \times 30) \\
 \hline
 768
 \end{array}$$

The calculation should begin on the bottom right, and be written in brackets on the right hand side of the answer i.e. 8 (4x2). The calculation should be performed systematically to ensure all calculations are included. (Dickie bow).

Short Multiplication

If appropriate or preferred by children working at level 4 and above, they may use the shortened method when confident with the processes involved with the other methods.

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

5

$$7 \times 8 = 56$$

$$7 \times 3 = 21 + 5 = 26$$

We always put the carrying at the bottom of the calculation as in the addition column method.

Multiplying Decimals

N.B: The grid method should be used later to multiply decimal numbers e.g. $4.92 \times 3 =$

\times	4	0.9	0.02
3	12	2.7	0.06

Missing Number/ Equal sign as a Balance

Children should always be used to seeing multiplication calculations in a variety of different ways, including the understanding of the role of the equals sign as a balance. E.g.

Missing numbers need to be placed in all possible places.

$$9 \times 4 = \square$$

$$\square = 13 \times 4$$

$$3 \times \square = 6$$

$$8 = \square \times 4$$

$$\square \times 4 = 16$$

$$21 = 3 \times \square$$

$$\square \times \nabla = 70$$

$$15 = \square \times \nabla$$

Worded Problems

Children should be used to using and applying multiplication skills in word problems by looking for key vocabulary associated with multiplication such as product, multiple, groups of, altogether, times by etc.

E.g. If there are 38 children in a class and they each have 3 sweets, how many sweets altogether?

