

Chad Vale Primary School

Calculation Policy

Multiplication



Children are encouraged to develop their understanding of mathematics using the CPA approach (*Concrete - Pictorial - Abstract*).

At Chad Vale, we feel that it is important that the abstract method is used alongside any *concrete* and *pictorial* representations whenever possible. This is to show children the relationship between both methods. As children progress through the calculation policy, it might be more appropriate for children to start on *pictorial* representations with *concrete* examples used for those who are struggling or need further support.

This document identifies the progression in calculation strategies rather than specifying which method should be taught in a particular year group. Therefore, children should only progress to the next stage when they are ready. The purpose of this policy is to develop understanding. For this reason, in the latter stages where more complex methods are adopted and where children are expected to be competent in certain skills (e.g. numberbonds / times-tables), children are encouraged to move straight onto *abstract* methods as *concrete* and *pictorial* representations (e.g. long division) are not appropriate and likely to lead to confusion.

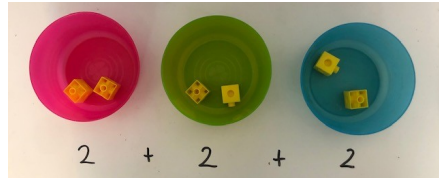
Examples of *varied fluency* are also included in this document which enable children to demonstrate a sound understanding. Teachers should always exercise discretion in their use as adopting new methods, with children who are not secure might again lead to confusion.

Concrete

Pictorial

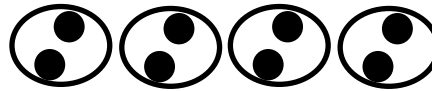
Abstract

Repeated Addition



Children use objects to add equal groups.

$2 \times 4 = 6$



$2 \times 5 = 10$



Children move onto counting pictorially.

Jim has two sweets in each bag. How many are there altogether?

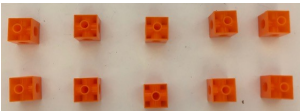


$2 + 2 + 2 = 6$

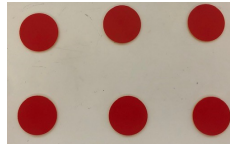
Children solve problems using repeated addition. Initially, these might be dictated by a teacher. Children may use objects / pictures to help them.

Arrays
(commutative multiplication)

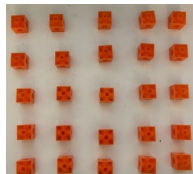
$2 \times 5 = 10$



$2 \times 3 = 6$

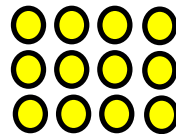


$5 \times 5 = 25$



Children create arrays using objects and counters to represent multiplication sentences.

$3 \times 4 = 12$



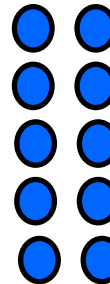
$3 \times 4 = 12$

$3 \times 5 = 15$



$3 \times 5 = 15$

$5 \times 2 = 10$



$2 \times 5 = 10$

Children draw arrays to show **commutative** multiplication.

Use arrays to answer these questions:

$2 \times 7 = \underline{\quad}$

$4 \times 5 = \underline{\quad}$

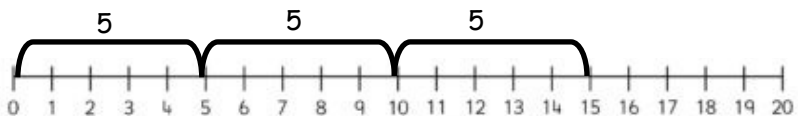
$10 \times 3 = \underline{\quad}$

Children use arrays to answer multiplication questions.

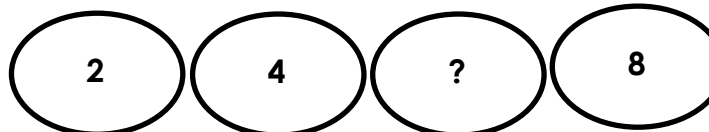
Varied Fluency: Examples to support the understanding of multiplication



$$5 \times 3 = 15$$



What number is missing?



Fill in the missing numbers

$$2 \times ? = 18$$

$$4 \times ? = 8$$

$$7 \times ? = 35$$

Stage 2

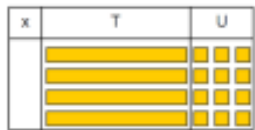
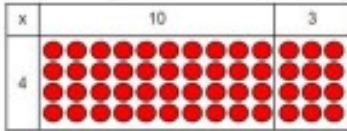
Concrete

Pictorial

Abstract

Grid Method (TO x O / O x TO)

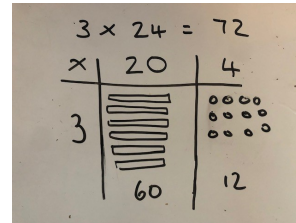
$4 \times 13 = 52$



Children use arrays and move to base 10 when confident.

Concrete and pictorial strategies should be used to support those children with no times table knowledge. Children confident with multiplication may move straight onto the abstract representation and may use concrete or pictorial representations to show their understanding.

$3 \times 24 = 72$



$8 \times 12 = 96$

X	10	2
8	80	16

$80 + 16 = 96$

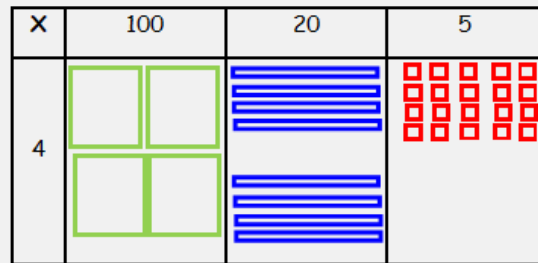
Informal written methods may be used until children are ready to move on.

$$\begin{array}{r} 12 \\ \times 8 \\ \hline 96 \\ \hline 1 \end{array}$$

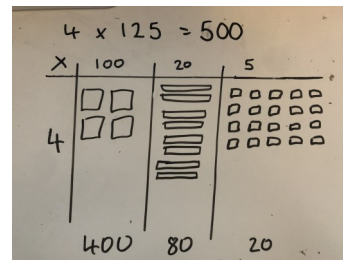
Children move onto formal written methods of short division.

Grid Method (H TO x O / O x HTO)

$4 \times 125 = 500$



$4 \times 125 = 500$



$4 \times 125 = 500$

X	100	20	5
4	400	80	20

$400 + 80 + 20 = 500$

Informal written methods may be used until children are ready to move on.

$$\begin{array}{r} 125 \\ \times 4 \\ \hline 500 \end{array}$$

Children move onto formal written methods of short division.

Stage 3



Concrete

Pictorial

Abstract

Grid Method
(HT x HT)

Once children have a sound understanding of multiplication and the previous stages, they should continue straight onto abstract methods of multiplication. Children who show limited understanding should review the previous examples until they are competent.

Grid Method
(H TO x HT / HT O x HTO)

$$24 \times 16 = 384$$

X	20	4
10	200	40
6	120	24

$$\begin{array}{r} 200 + 20 = 240 \\ 120 + 24 = +146 \\ \hline 386 \end{array}$$

Informal written methods may be used until children are ready to move on.

$$\begin{array}{r} ^2 \\ 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$$

Finally, children move onto formal written methods of long multiplication.

$$124 \times 26 = 3224$$

X	100	20	4
20	2000	400	80
6	600	120	24

$$\begin{array}{r} 2000 + 400 + 80 = 2480 \\ 600 + 120 + 24 = + 744 \\ \hline 3224 \\ 11 \end{array}$$

Informal written methods may be used until children are ready to move on.

$$\begin{array}{r} ^1 ^2 \\ 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ 11 \end{array}$$

Finally, children move onto formal written methods of long multiplication.