

Sacred Heart R.C. Primary School Hindsford

Visual Mathematics Policy Multiplication and Division



Policy written by L. Delargy

Science Leader

September 2019

Accepted by Governors:

J. Carter

signed (chair)

J. M. Dermott

signed (Head)

Shared with staff: date: October 2019

Mission Statement:

By living out our Catholic faith

TOGETHER

we ENCOURAGE

and ACHIEVE.

I have called you by name.

Introduction:

This policy outlines the teaching, organisation and management of mathematics taught and learnt at Sacred Heart. The policy is based on the 2014 expectations and aims of the 'New Curriculum' for mathematics and the Early Years 'Development Matters' EYFS document. This ensures continuity and progression in the learning and teaching of mathematics. The policy has been drawn up by the mathematics leader, shared and discussed with all staff and has the full agreement of the Governing Body.

Aims:

The National Curriculum for mathematics aims to ensure that all pupils:

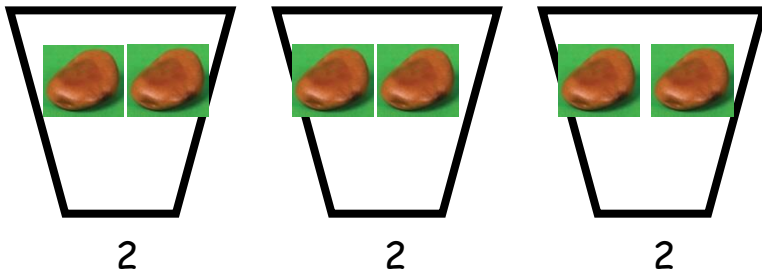
- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Mathematics is a subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are organised in a distinct sequence and structured into separate domains. Pupils should make connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

Multiplication and Division

Multiplication in practical contexts. (CONCRETE)

A gardener sows some bean seeds



There are three pots with two seeds in each pot.

three groups of 2

three lots of 2

$$2 + 2 + 2 = 6$$

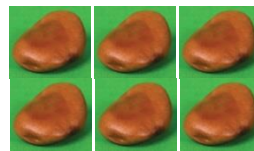
OR

$$3 \times 2 = 6$$

Multiplication using an array $2 + 2 + 2$



$$3 \times 2 = 6$$



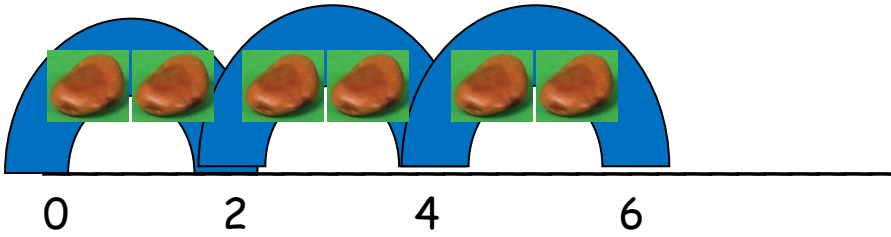
$$2 \times 3 = 6$$

Multiplication using a visual number line (PICTORIAL)

+2

+2

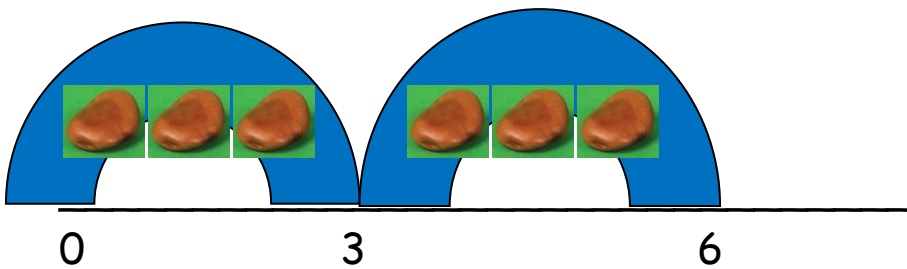
+2



$$3 \times 2 = 6$$

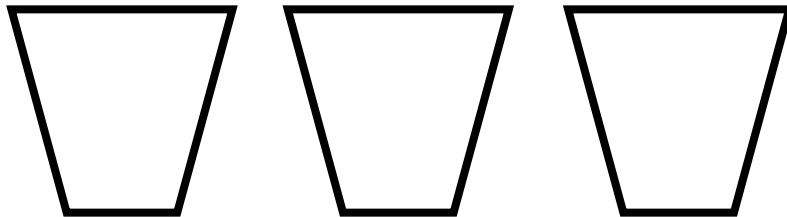
+3

+3



$$2 \times 3 = 6$$

Division in practical contexts. (CONCRETE)



There are six seeds which need to be put into pots in **groups of 2**.

$$6 \div 2 = 3$$

There are six seeds **shared** equally between 3 pots.

$$6 \div 3 = 2$$

Division using an array.



$$6 \div 3 = 2$$

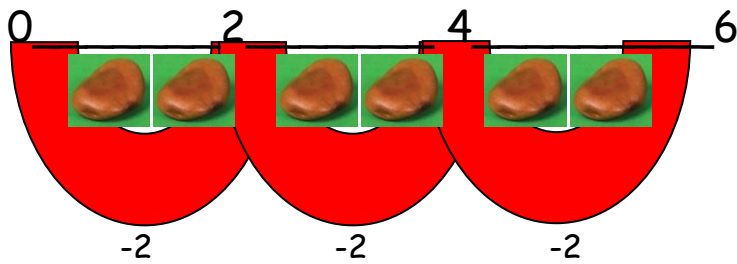


$$6 \div 2 = 3$$

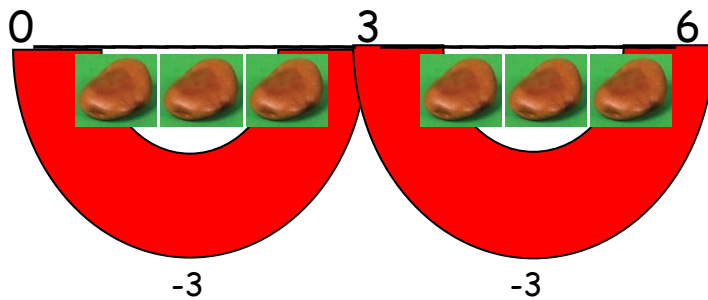
The gardener planted 6 seeds in 3 rows.

The gardener planted 6 seeds in 2 rows.

Division using a visual number line or repeated subtraction (PICTORIAL)



$$6 \div 2 = 3$$

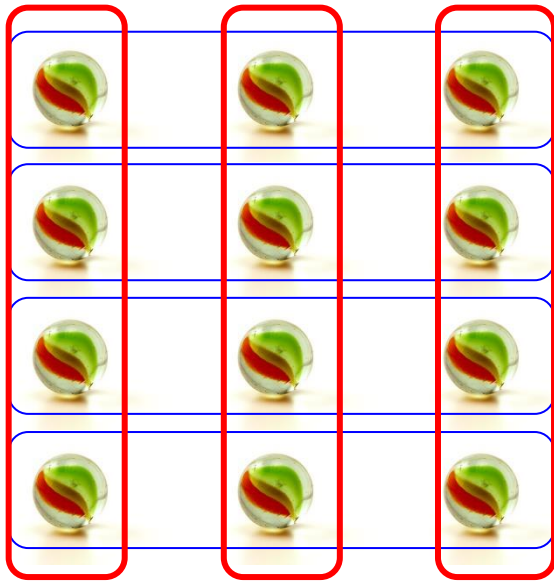


$$6 \div 3 = 2$$

It is essential children understand repeated subtraction in preparation for chunking.

Understanding the link between multiplication and division.

Using arrays



This allows the children to see how it can be thought of as:-

$$3 \times 4 = 12 \quad (3 \text{ groups of } 4 \text{ makes } 12)$$

$$4 \times 3 = 12 \quad (4 \text{ groups of } 3 \text{ makes } 12)$$

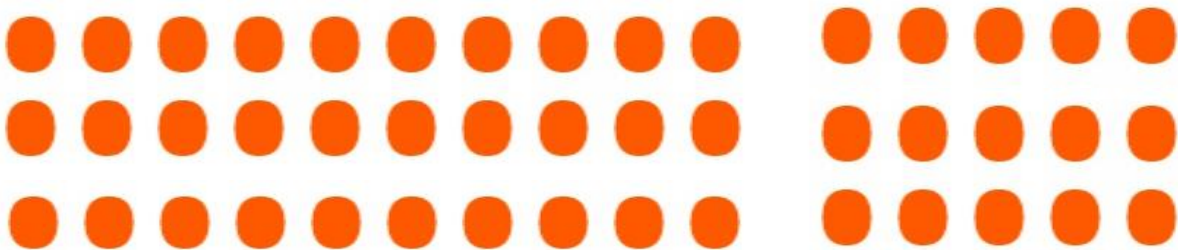
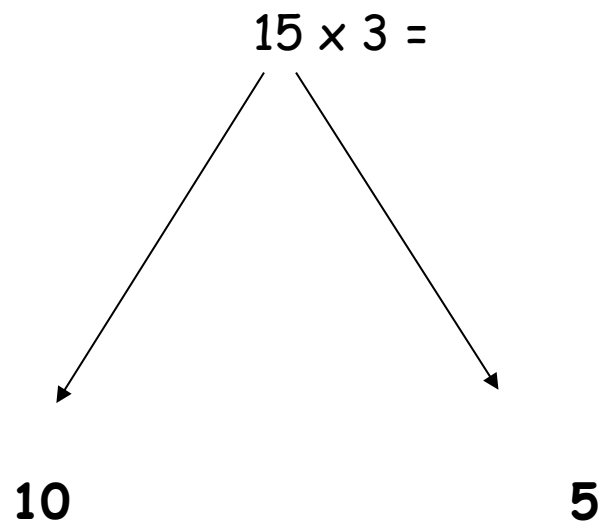
$$12 \div 3 = 4 \quad (12 \text{ into groups of } 4 \text{ is } 3)$$

$$12 \div 4 = 3 \quad (12 \text{ into groups of } 3 \text{ is } 4)$$

Multiplication of teens numbers by single digit numbers

Using an array (CONCRETE OR PICTORIAL)

Partition



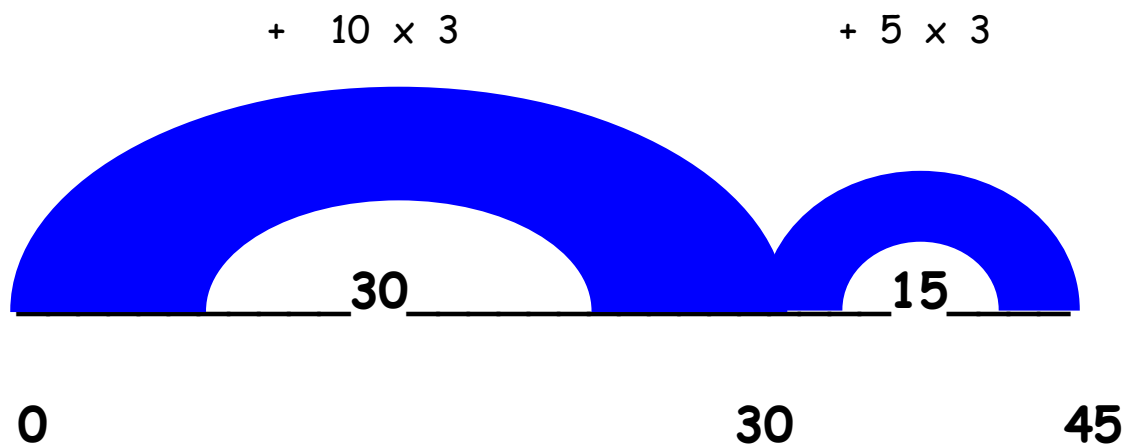
$$10 \times 3 = 30$$

$$5 \times 3 = 15$$

Recombine

$$30 + 15 = 45$$

Visual number line.



Multiplication using the grid method

$$3 \times 15 =$$

Children need to have **secure understanding** of place value, partitioning and recall of multiplication facts for this method. Begin by multiplying teens by ones before moving on to TO by O.

X	10	5
3	30	15

$$30 + 15 = 45$$

For larger numbers children need to be able to multiply multiples of 10 using place value knowledge.

e.g. $3 \times 5 = 15$ SO $3 \times 50 = 150$

$3 \times 55 =$

X	50	5
3	150	15

$150 + 15 = 165$

Multiplying HTO by O

$$3 \times 255$$

X	200	50	5
3	600	150	15

$$600 + 150 + 15 = 765$$

$$6 \times 255 =$$

Children now need to be able to multiply multiples of 100 using place value knowledge.

$$6 \times 2 = 12 \quad \text{SO} \quad 6 \times 200 = 1200$$

X	200	50	5
6	1200	300	30

$$1200 + 300 + 30 = 1530$$

At this stage, children can be shown an expanded written method alongside the grid method.

$$\begin{array}{r}
 255 \\
 \times 6 \\
 \hline
 30 = (5 \times 6) \\
 300 = (50 \times 6) \\
 \underline{1200} = (200 \times 6) \\
 1530
 \end{array}$$

Multiplying 2 digits by 2 digits

Children need to multiply multiples of 10 using place value knowledge.

$$3 \times 4 = 12 \quad \text{SO} \quad 30 \times 40 = 1200$$

$$47 \times 36$$

X	40	3
30	1200	90
6	240	18

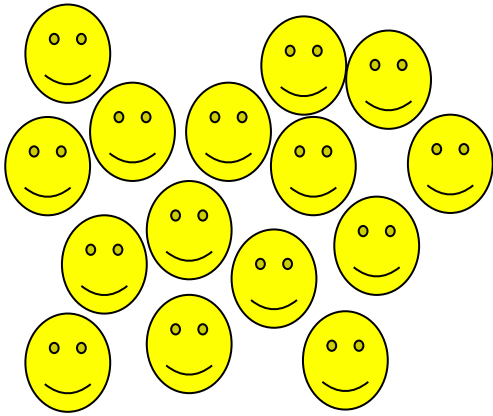
$$1200 + 90 = 1290$$

$$240 + 18 = \underline{258}$$

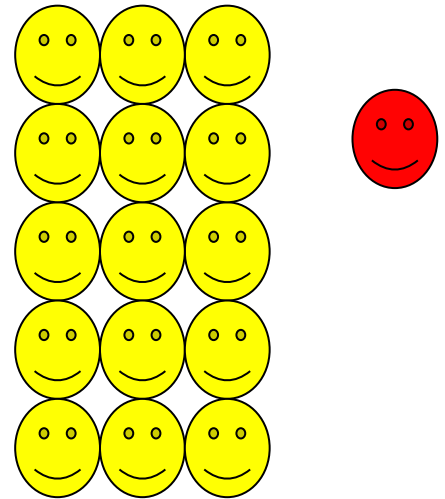
$$\underline{1548}$$

Division with remainders.

Grouping and Sharing (CONCRETE)



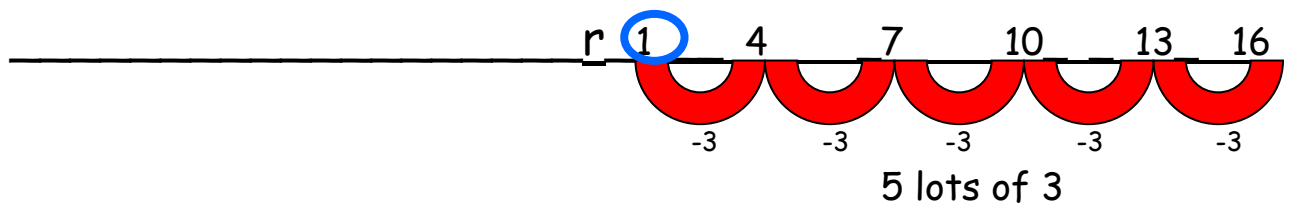
16 faces



How many groups of 3?

$$16 \div 3 = 5 \text{ remainder } 1$$

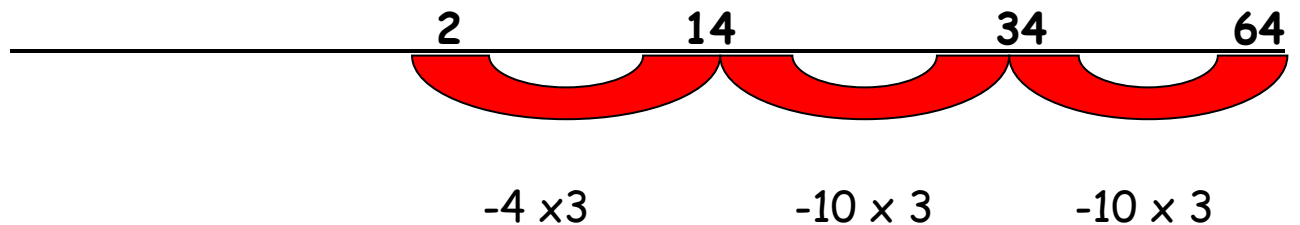
Visual number line (PICTORIAL)



$$16 \div 3 = 5 \text{ remainder } 1$$

Chunking (PICTORIAL)

$$74 \div 3 = 24 \text{ r } 2$$



Using a vertical method alongside a number line (SYMBOLIC)

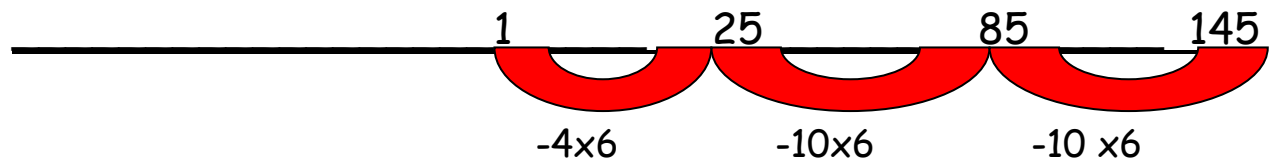
$$\begin{array}{r} 74 \\ \underline{-30} \quad (10 \times 3) \\ 44 \\ \underline{-30} \quad (10 \times 3) \\ 14 \\ \underline{-12} \quad (4 \times 3) \\ 2 \end{array}$$

Add up all the chunks $10 + 10 + 4 = 24 \text{ r } 2$

Dividing HTO by 0

Children start by subtracting groups of 10.

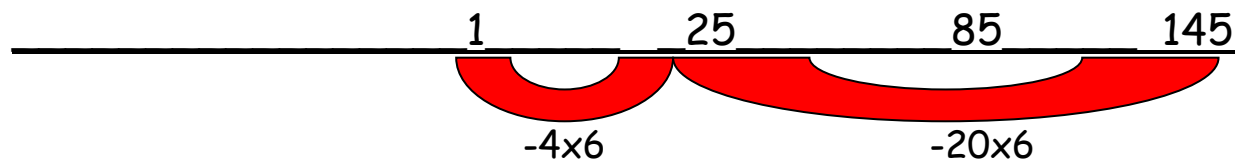
$$145 \div 6 = 24 \text{ r } 1$$



$$\begin{array}{r} 145 \\ - 60 \text{ (} 10 \times 6 \text{)} \\ \hline 85 \\ - 60 \text{ (} 10 \times 6 \text{)} \\ \hline 25 \\ - 24 \text{ (} 4 \times 6 \text{)} \\ \hline 1 \end{array}$$

Add up all the chunks $10 + 10 + 4 = 24 \text{ r } 1$

Using efficient chunking



$$\begin{array}{r} 145 \\ - 120 \quad (20 \times 6) \\ \hline 25 \\ - 24 \quad (4 \times 6) \\ \hline 1 \end{array}$$

Add up all the chunks $20 + 4 = 24$ r 1

ONLY WHEN CHILDREN SECURE

Division using compact method *Guzinter / bus stop.*

$$\begin{array}{r} 10 + 3 \\ 3 \overline{) 39} \\ \underline{30} \quad (10 \times 3) \\ 9 \end{array}$$

$$\begin{array}{r} 13 \\ 3 \overline{) 39} \end{array}$$

$$\begin{array}{r} 90 + 7 \\ 6 \overline{) 582} \\ \underline{540} \quad (90 \times 6) \\ 42 \end{array}$$

$$\begin{array}{r} 97 \\ 6 \overline{) 582} \end{array}$$