

Multiplication and Division

A whole school approach.

Fluency - Reasoning - Problem Solving

The new curriculum, as issued by the government, states that children should go through three stages of learning in maths.

Fluency: $6 \times 6 = 36$ (straight forward calculation.)

Reasoning: $20 = \square \times \square$ Find all of the possibilities
(Demonstrating an understanding of the process and numbers.)

Problem Solving: Sally and Katie want to share sweets out between them. They can buy sweets in bags of 17, 18 and 21. Which bag should they buy? What other bags could they buy? (Showing that they can apply the skills that they have learned.)

Concrete - Pictorial - Abstract

There is no emphasis on moving the children through the various and progressive written methods. What we aim to do is develop their understanding and broaden their thinking within the year groups that they are in. We do this in three ways.

Concrete

Repeated grouping/repeated addition
(does not have to be restricted to cubes)
3 x 4 or 3 lots of 4



Use number lines to show repeated groups- 3 x 4



Pictorial

Children to represent the practical resources in a picture e.g.

xx xx xx
xx xx xx

Use of a bar model for a more structured method



Abstract

$$3 \times 4$$

$$4 + 4 + 4$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

Times Tables

Learning times tables is crucial to your child's learning as they are something that is used in many areas of maths

Measurement eg area and perimeter

Fractions eg find $\frac{3}{4}$ of 40

Percentages eg find 15% of 45

Ratio eg If there are 3 girls to every 5 boys in a class and there are 25 boys, how many girls are there?

Times tables are practised in school using times table challenges but home learning can support this aspect of maths and is hugely beneficial.

Expectations on Each Year Group

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Doubling & Halving	2,5 & 10	3,4 & 8	6,7,9, 11 & 12	Consolidation of all tables up to 12 x 12. Manipulation of facts.	
Multiplication facts through number sentences		TO x O	TO x O HTO x O	TO x TO HTO x O HTO x TO ThHTO x O	Up to 4 digits x TO
Division facts through number sentences	Finding fractions of a quantity	TO ÷ O	TO ÷ O HTO ÷ O	HTO ÷ O ThHTO ÷ O	Up to 4 digits ÷ TO Use of decimals.

Use of pictures and number lines (x)

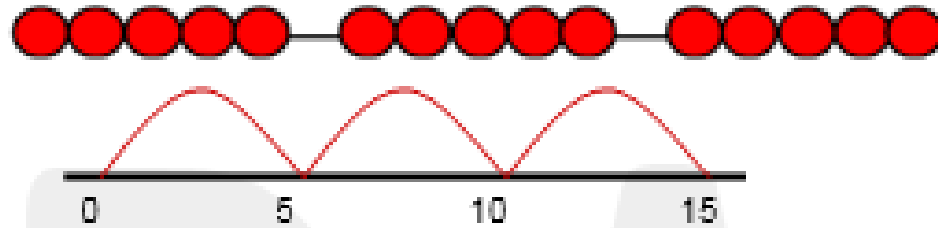
Practical/recorded using ICT
Pictures/Symbolic

There are five cakes in each bag.
How many cakes are there in three bags?



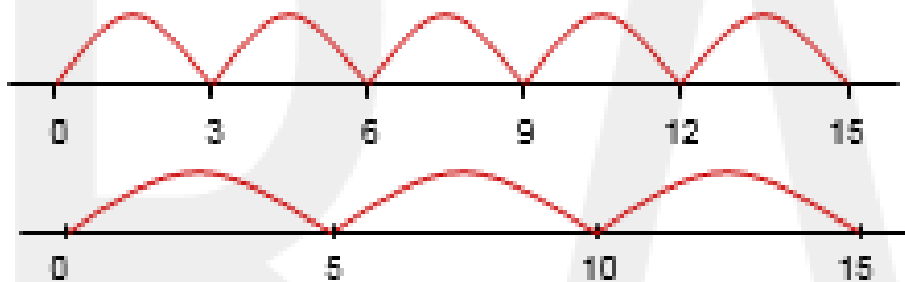
Visual (eg. modelled using bead strings)

5×3 or 3×5 [two, three times] or [three groups of two]



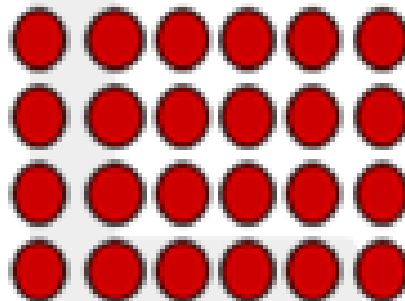
Repeated addition

5×3 or 3×5



Arrays

6×4 or 4×6



Mostly used
in Years 1
and 2.

Grid Method (x)

$$36 \times 4 = 144$$

X	30	6
4	120	24

$$342 \times 7 = 2394$$

x	300	40	2
7	2100	280	14

$$47 \times 36 = 1692$$

(estimate $50 \times 40 = 2000$)

x	40	7	
30	1200	210	1410
6	240	42	282
			1692

$$5.65 \times 9 = 50.85$$

(estimate $6 \times 9 = 54$)

x	5	0.6	0.05	
9	45	5.4	0.45	50.85

[Or compute 565×9 , then divide the solution by 100.]

Mostly used in Years 3 and 4.
Grid method is used in Years 5 and 6 as consolidation of a method.

(Expanded) Formal Method (x)

$$36 \times 4 = 144$$

$$\begin{array}{r} 36 \\ \times 4 \\ \hline (6 \times 4) \quad 24 \\ (30 \times 4) \quad 120 \\ \hline 144 \end{array}$$

$$237 \times 4$$

(estimate: $250 \times 4 = 1000$)

$$\begin{array}{r} 237 \\ \times 4 \\ \hline 28 \\ 120 \\ 900 \\ \hline 948 \end{array}$$

$$27 \times 34 = 918$$

(estimate $30 \times 30 = 900$)

$$\begin{array}{r} 27 \\ \times 34 \\ \hline 28 \quad (7 \times 4) \\ 80 \quad (30 \times 4) \\ 210 \quad (7 \times 30) \\ 600 \quad (30 \times 30) \\ \hline 918 \end{array}$$

Mostly used towards the end of Years 3 and 4. In Years 5 and 6, it may be used to introduce multiplication of bigger numbers before using Formal Method.

Formal Method (x)

$36 \times 4 = 144$

$$\begin{array}{r} 36 \\ \times 4 \\ \hline 144 \end{array}$$

$342 \times 7 = 2394$

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \end{array}$$

$2741 \times 6 = 16446$
(estimate $3000 \times 6 = 18000$)

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \end{array}$$

$124 \times 26 = 3224$ see Y6

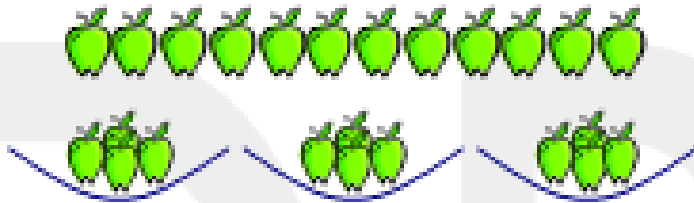
$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$$

Mostly used towards the end of Years 3 and 4. In Years 5 and 6, it may be used to introduce multiplication of bigger numbers before using Formal Method.

Use of pictures and number lines (\div)

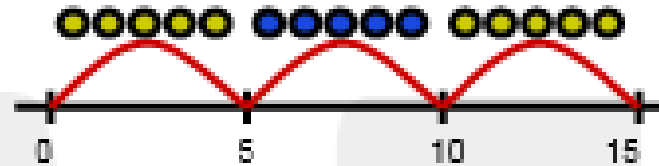
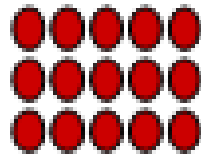
Pictures/Symbolic

How many apples in each bowl if I share 12 apples between 3 bowls?



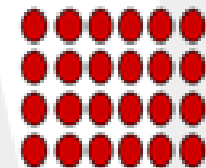
Visual (modelled using bead strings)

$$15 \div 5 = 3$$



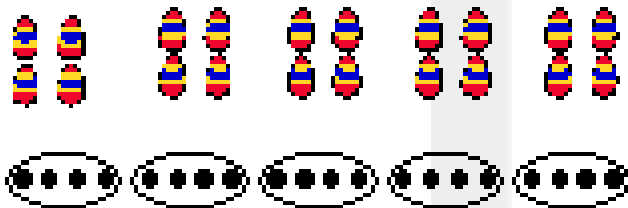
Arrays

Find $\frac{1}{4}$ of 24
 $24 \div 4 = 6$



Pictures/Symbolic

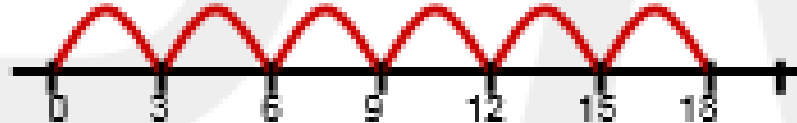
Four eggs fit in a box.
How many boxes would you need to pack 20 eggs?



Visual

(modelled using bead strings)

$$18 \div 3 = 6$$



Partitioning

$$32 \div 2 = 16$$

$$20 \div 2 = 10$$

$$12 \div 2 = 6$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

(Expanded) Formal Method (\div)

$$51 \div 3 = 17$$

$$\begin{array}{r} 51 \\ \underline{30} \quad (3 \times 10) \\ 21 \\ \underline{21} \quad (3 \times 7) \\ 0 \end{array}$$

$$252 \div 7 = 36$$

$$\begin{array}{r} 252 \\ \underline{210} \quad (7 \times 30) \\ 42 \\ \underline{42} \quad (7 \times 6) \\ 0 \end{array}$$

$$346 \div 8 = 43 \text{ r}2 \text{ (estimate } \rightarrow 40, \rightarrow 50)$$

$$\begin{array}{r} 346 \div 8 \\ \text{(estimate: } 400 \div 8 = 50) \end{array}$$

$$\begin{array}{r} 8 \overline{)346} \\ \underline{-320} \quad (8 \times 40) \\ 26 \\ \underline{-24} \quad (8 \times 3) \\ 2 \end{array}$$

$$432 \div 15 = 28.8$$

$$\begin{array}{r} 15 \overline{)432.0} \\ \underline{45} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

These are all methods that will be used throughout Key Stage 2, depending on which children find the most accessible.

Formal Method (\div) or 'Bus Stop' Method

$$\begin{array}{r} 51 \div 3 \\ = 17 \end{array}$$

$$\begin{array}{r} 17 \\ 3 \overline{) 51} \end{array}$$

These are also all methods that will be used throughout Key Stage 2, assuming that there is a secure conceptual understanding of division.

$$\begin{array}{r} 432 \div 5 = 86 \text{ r}2 \\ (\text{estimate: } 400 \div 5 = 80) \end{array}$$

$$\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

$$\begin{array}{r} 43.68 \div 7 = 6.24 \\ (\text{estimate: } 42 \div 7 = 6) \end{array}$$

[Or compute $4368 \div 7$, then divide the solution by 100.]

$$\begin{array}{r} 6.24 \\ 7 \overline{) 43.68} \end{array}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$