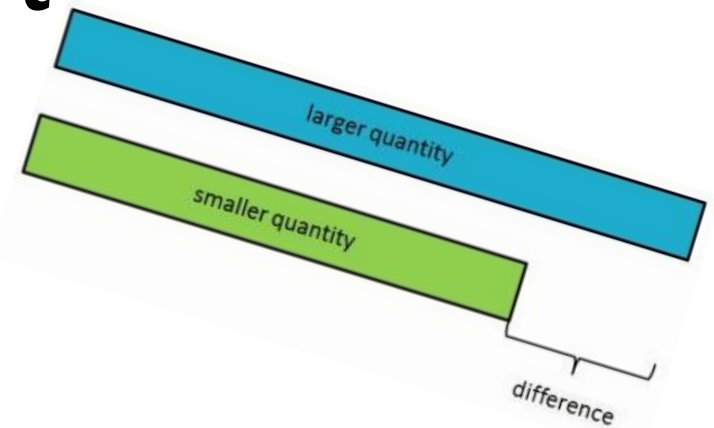
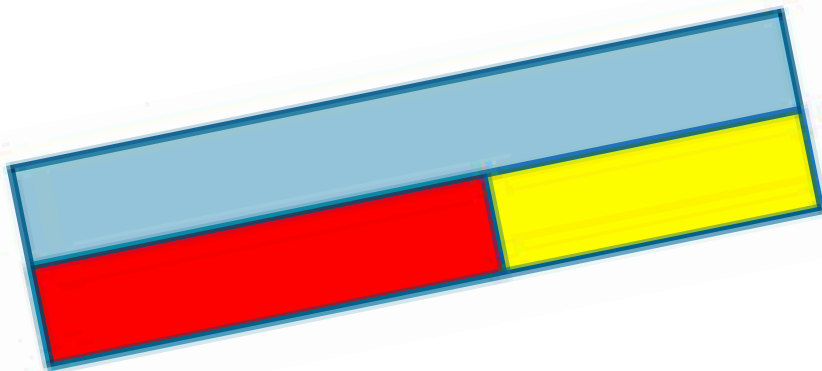
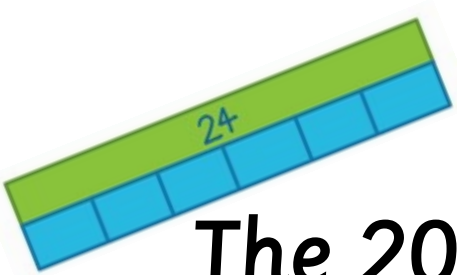


Using Bar Models in Mathematics at Maidwell Primary School



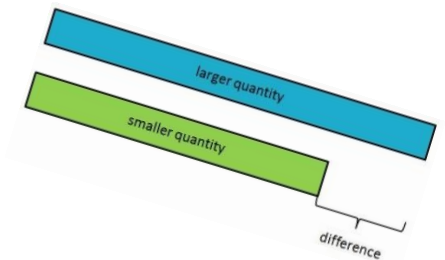


The 2014 Primary National Curriculum saw changes in mathematics with the removal of levels. This meant the focus for higher ability children was to gain a 'mastery' of maths rather than moving on to higher year group concepts.

This means allowing children to gain a deeper understanding of concepts, structures and patterns.

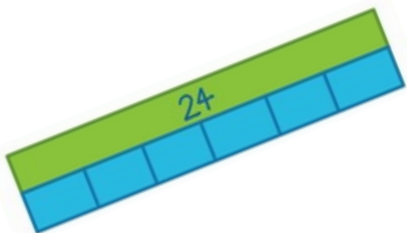
Although there is not one agreed definition of 'mastery', the National Association of Mathematics Advisers (NAMA) highlights a 'focus on using mathematical structures'.

Using images can be a way of overcoming the language barriers associated with learning maths.



The bar model has been used successfully in Singapore maths teaching. Whilst commentators often suggest it is not possible to import methods to different cultures taking some parts can be effective.

At Maidwell, we have taken the model and are using it in different ways to meet the needs of our unique setting and unique children. In much the same way as we adapted the Talk for Writing approach.



The bar model fits into the three stages of mathematics teaching.

It is a visual method to aid understanding before moving onto abstract methods

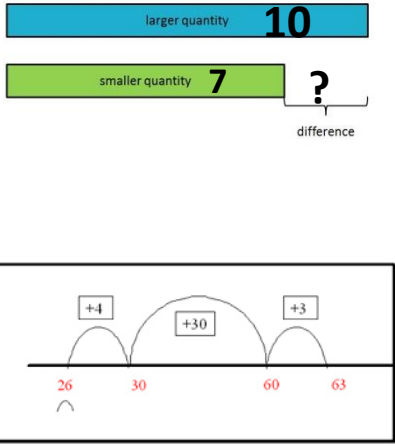
concrete



The concrete stage shows a group of colorful interlocking blocks representing the number 10, and a blue ten-frame with six white circles. Below this is a pile of blue and orange circular objects representing the number 7.

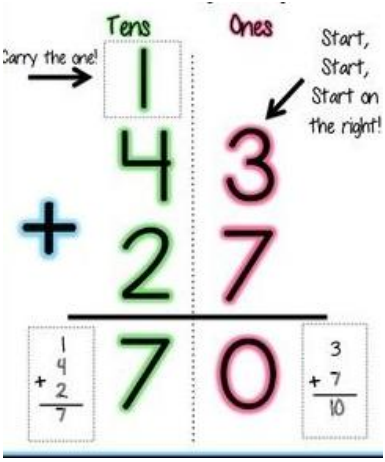
$10 - 7 = ?$

Visual



The visual stage uses bar models and a number line. The top bar model shows a blue bar for 'larger quantity 10' and a green bar for 'smaller quantity 7', with a bracket labeled 'difference' and a question mark. The bottom number line shows jumps from 26 to 30 (+4), 30 to 60 (+30), and 60 to 63 (+3).

Abstract



The abstract stage shows a columnar subtraction method. The tens column has 1, 4, 2, and 7. The ones column has 3, 7, and 0. A '1' is written above the tens column, and a '3' is written above the ones column. A note says 'Start, Start, Start on the right!'. Below the columns are two small boxes: the first shows $\begin{array}{r} 1 \\ 4 \\ + 2 \\ \hline 7 \end{array}$ and the second shows $\begin{array}{r} 3 \\ + 7 \\ \hline 10 \end{array}$.

In Key Stage 1 we are using bar models to visualise the links between addition and subtraction and in solving simple problems alongside concrete apparatus.

Year 1

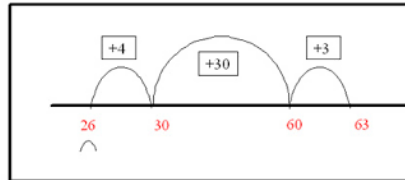
concrete



$10 - 7 = ?$

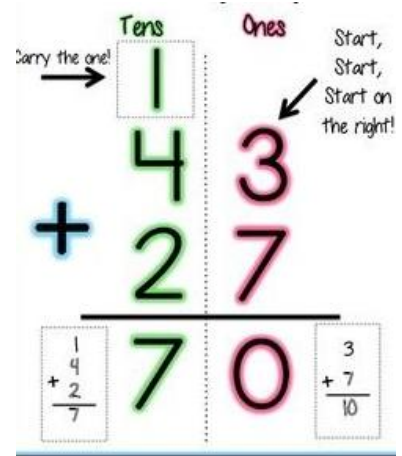
Year 1/2

Visual



Year 2

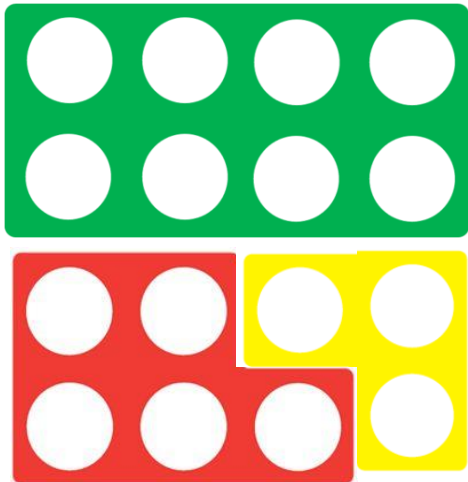
Abstract



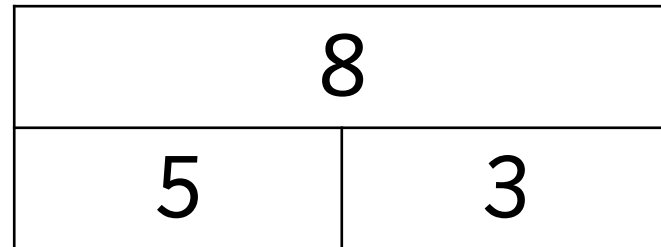
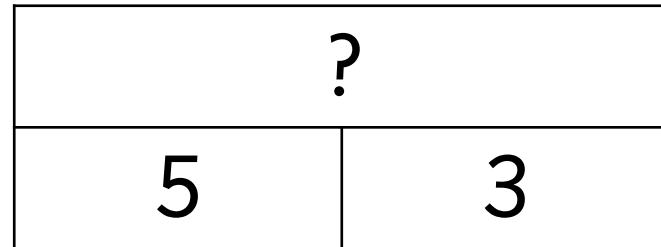
Example of Year 1

Problem solving

Mike has 5 pens and Jack has 3 pens. How many pens do they have altogether?



Concrete Numicon is also used to represent the bar model image



The children work out that they need to add the two smaller numbers to make the bigger number at the top of the bar model and are able to write out the number sentence for the model

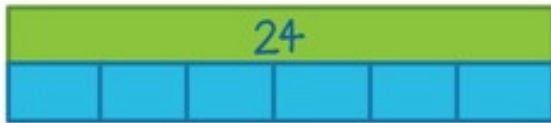
$$5+3=?$$

They calculate the answer using a number line

In Class 2 we are using bar models to help calculate and understand multiplication and division .

Bar model showing $24 \div 6$

Visual



Grid Method of Multiplication

x	30	5
20	600	100
6	180	30

$$600 + 100 = 700$$

$$180 + 30 = 210$$

$$700 + 210 = 910$$



Abstract

$$\begin{array}{r} 237 \\ \times \quad 4 \\ \hline 948 \\ 1 \quad 2 \end{array}$$

Short Multiplication

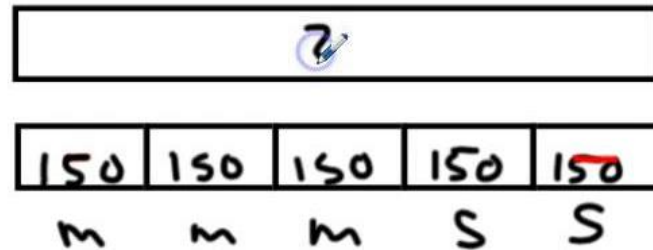
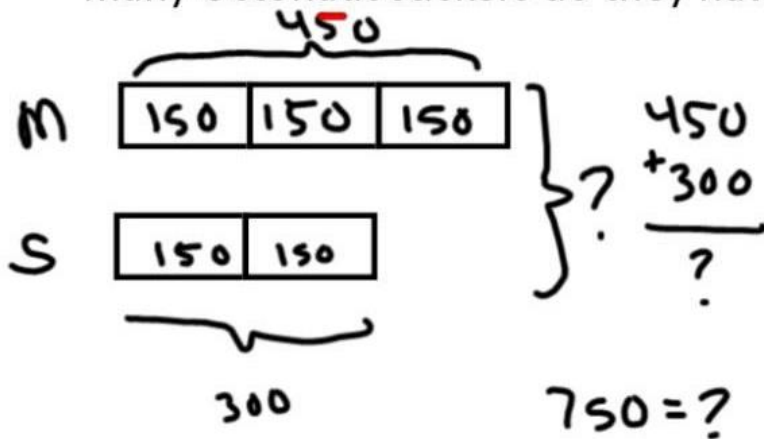
$$\begin{array}{r} 137 \text{ r } 5 \\ 7 \overline{) 964} \\ \underline{7} \quad \quad \\ 26 \quad \quad \\ \underline{21} \quad \quad \\ 54 \quad \quad \\ \underline{56} \quad \quad \\ 4 \end{array}$$

Short Division

In Class 3 we are using bar models to help us to gain an understanding of the underlying procedures in a multi step word problem

Visual

Octonauts stickers have 150 in a pack. Malia has 3 packs. Sam has 2 packs. How many Octonaut stickers do they have altogether?

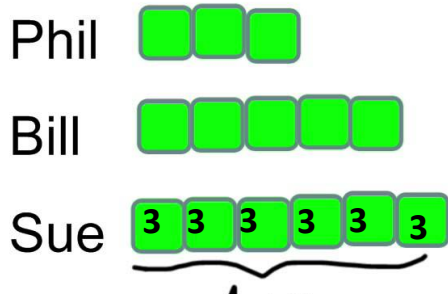


In Class 3 we are also using bar models to help calculate and understand more challenging concepts such as fractions, percentages and ratio.

Ratio

Phil, Bill and Sue share some money out in the ratio 3:5:6.

Sue gets £18, how much does Phil get?



As the model shows Sue has 6 parts we can divide 18 by 6 to find that every section is worth £3.

This helps us calculate how much Phil has

$$3 \times 3 = \text{£}9$$

Whilst some problems can be solved without a bar model all of the most able learners have seen the value in helping them to solve at least one complex problem.

Fractions

Filip and his family were on a day out. He gave his two children $\frac{3}{5}$ of his money. He gave his wife $\frac{1}{2}$ of the remaining money. He had £100 left, so how much did he have to begin with?

