

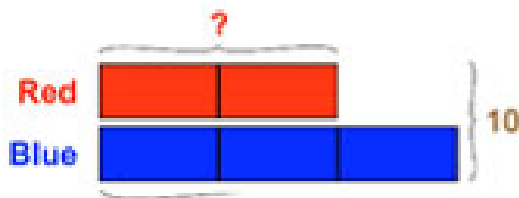
AJS Bar Model Policy

Bar Model Basics:

A bar model is not a calculation method. It is a calculation strategy to help reveal the mechanics within the maths, which in turn helps students to recognise the steps they need to take to reach a solution. A bar model is a pictorial representation of a problem or concept where bars or boxes are used to represent the known and unknown quantities. A Singapore-style of maths model, bar modelling allows pupils to draw and visualize mathematical concepts to solve problems.

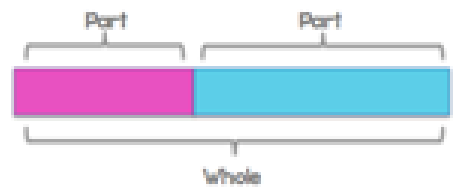
We use two styles of bar model: **the story model** and **the comparison model**.

Comparison Model:



Comparison bar models use the language of comparison, such as 'how many more' or 'how many fewer'. Comparison bar models will be set out as two bars, one on top of the other, starting from the same point. The bars always require a label to denote what they represent. A bracket will be used for the total represented by both bars (if known). Brackets with question marks are used to denote the missing information which we need to calculate. Parts of the bars should be of equal size if the value they represent is equal, e.g. each part in our visual example is worth 2 so each part is of an equal size to show this.

Story Model:



The story model represents the information given using rectangular bars placed in a single row from left to right, as if it is representing the 'story' of the maths. For example, looking at the story model to the left, we could say Jenny had 4 flowers and Ben had 6 flowers - how many flowers did they have altogether? Therefore we look for the language of calculation such as 'total', 'how much' or 'altogether'. We use brackets to represent the value of parts that we know and a bracket with a question mark denotes the missing information which we need to calculate. Parts of the bar should be proportionate in size to their value.

Early Bar Modelling

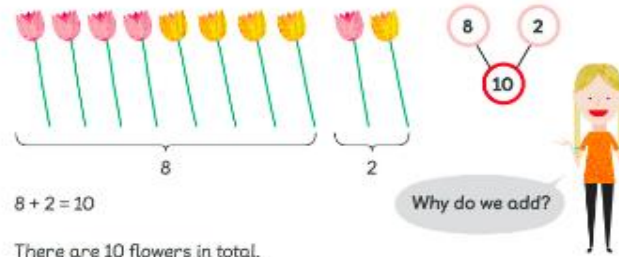
The example below explains how bar modelling moves from concrete maths models to pictorial representations.

Concrete - modelling with real objects

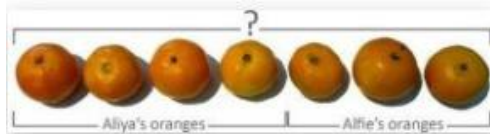


Should we add or subtract to find the total number of flowers?

There are 8 flowers in the vase.
There are 2 flowers in Hannah's hand.
How many flowers are there in total?



Reference: Maths — No Problem! Primary Maths Series Textbook 1B, page 22



Often, calculations will be presented as word problems: Aliya has 4 oranges. Alfie has 3 oranges. How many oranges are there altogether? With addition, subtraction and multiplication, to help children fully understand later stages of bar modelling, it is crucial they begin with concrete representations of the real thing.

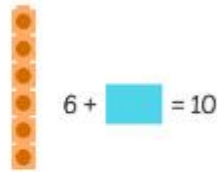
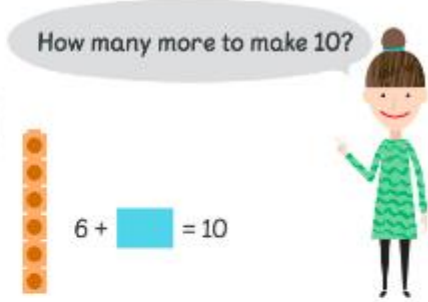


Once they are used to the format and able to represent word problems with models in this way themselves (assigning 'labels' verbally), the next stage is to replace the 'real' objects with objects that represent what is being discussed.

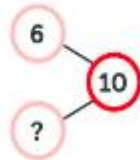
Concrete - handling real objects



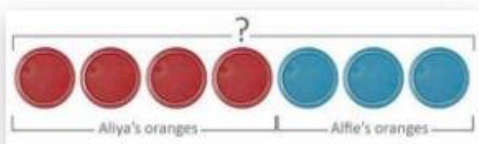
How many more cubes do they need to make a stack of 10 cubes?



- 6 + 1 = []
- 6 + 2 = []
- 6 + 3 = []
- 6 + [] = 10



Reference: Maths — No Problem! Primary Maths Series Textbook 15, page 26



Now you can see we have replaced our previous example of oranges with counters. We have chosen different coloured counters to represent the two different values given to us in the word problem.

Next, we need to prepare to move to a pictorial representation. We can start this process by drawing brackets around our concrete representations.

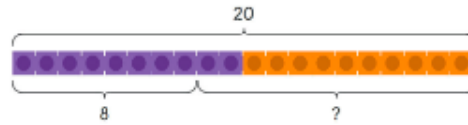
Concrete - modelling with other objects and pictures



Sam bakes 20 cookies.
What if he gives some away?




Let's use   to help us.

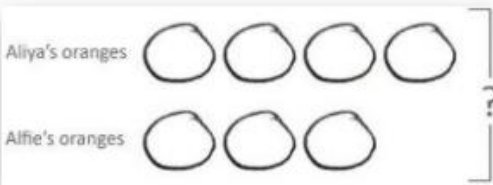
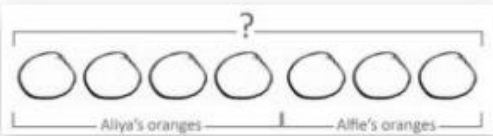


What if Sam gives away 8 cookies?

$$20 - 8 = \square$$

Then, Sam would have  cookies left.

Reference: Maths — No Problem! Primary Maths Series Textbook 1B, page 26

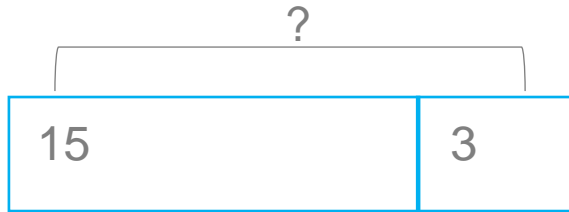


We can then progress into drawing the representation ourselves, as you can see with our 'oranges' example.

The penultimate step is then to represent the values using rectangular bars, with the ultimate step being to add the numeric values to the representation.

Bar Model examples for calculation

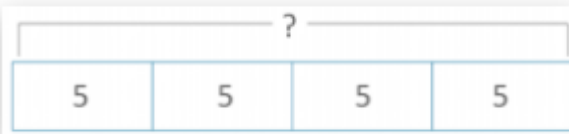
Addition



Calculation: $15 + 3 =$

Find the total

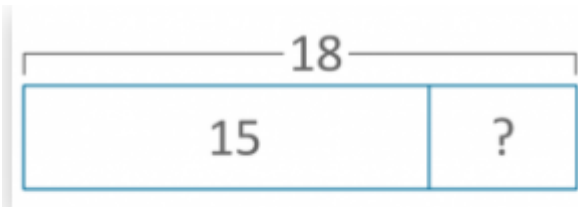
Multiplication



Calculation: $4 \times 5 =$

Or repeated addition

Subtraction



Calculation: $18 - 15 =$

Find the difference

Division



Calculation: $20 \div 4 =$

Sharing problem