Moorside Primary School and Nursery

Progression in bar modelling

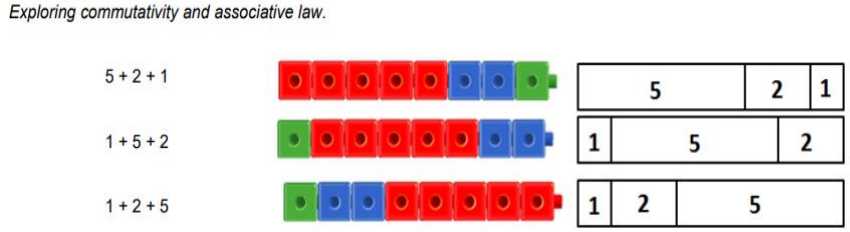
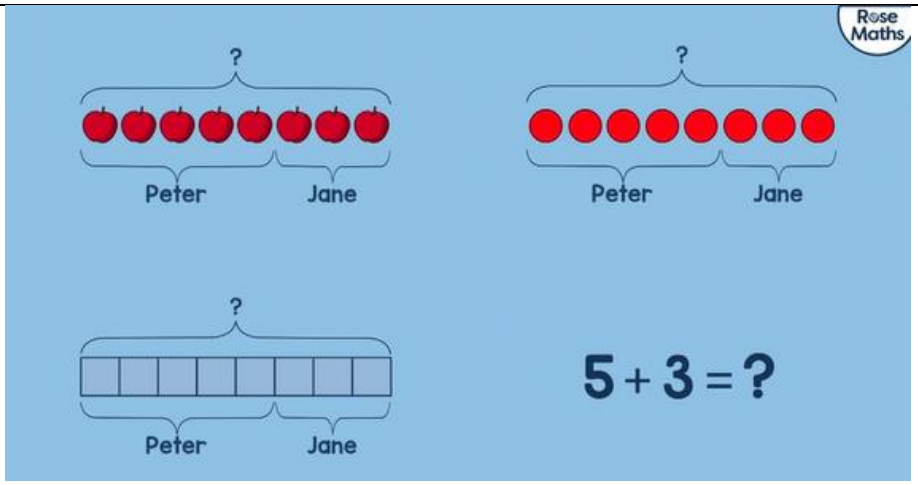
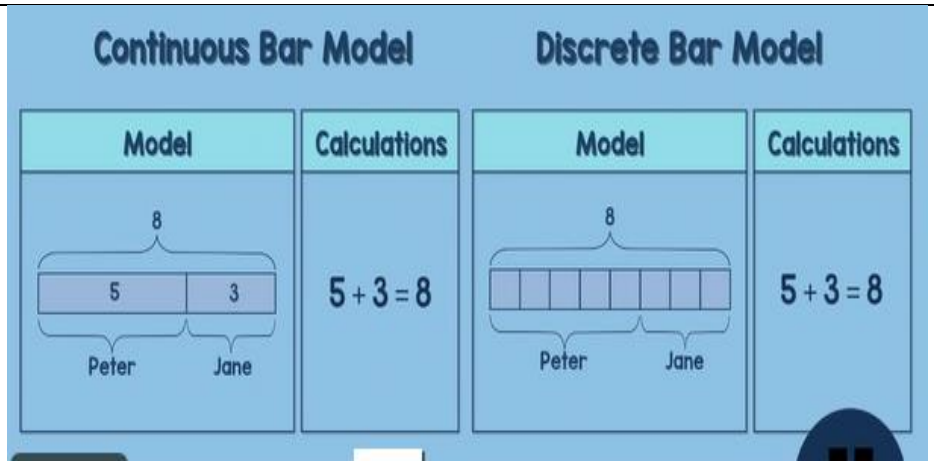
MOORSIDE

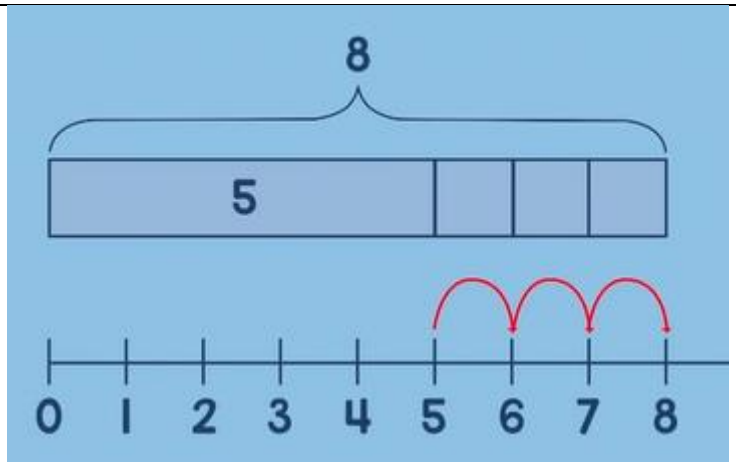
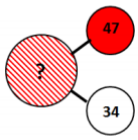
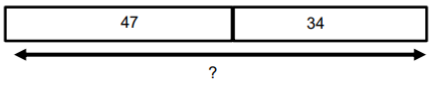
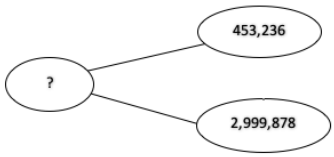
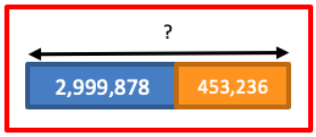
Bar models are pictorial representations of problems or concepts that can be used for any of the 4 main operations. They are also very helpful for fractions, percentages and ratio and proportion. In word problems bar models can help children to decide which operations to use or to visualise problems.

The main aim of a bar model is to give a pictorial representation of the underlying structure of a mathematical problem. As a result, this helps children understand and solve the problem as it exposes the mathematical concept allowing children to easily understand what calculation to perform.

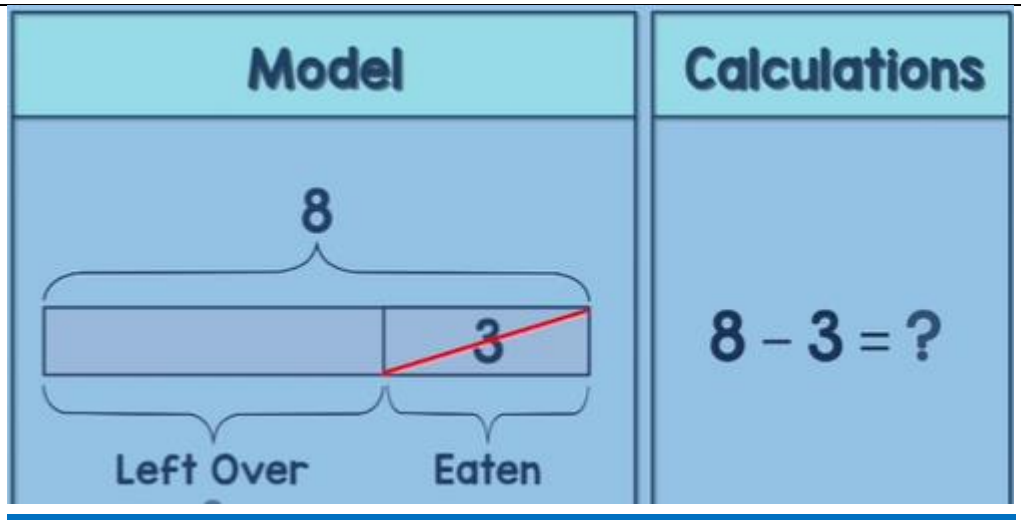
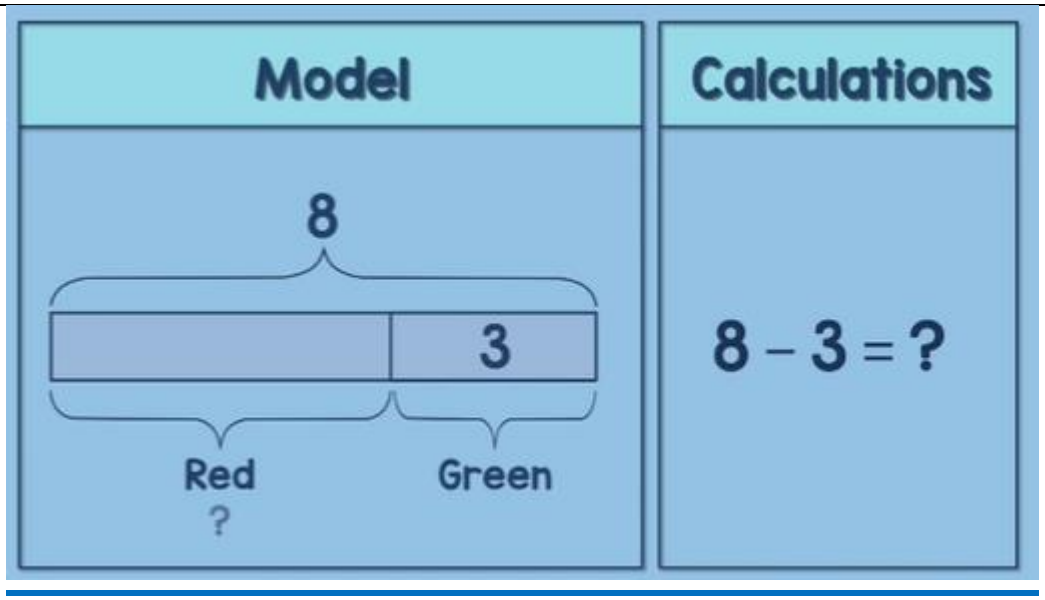
The next pages outline how we progressively teach bar modelling at Moorside Primary School and Nursery.

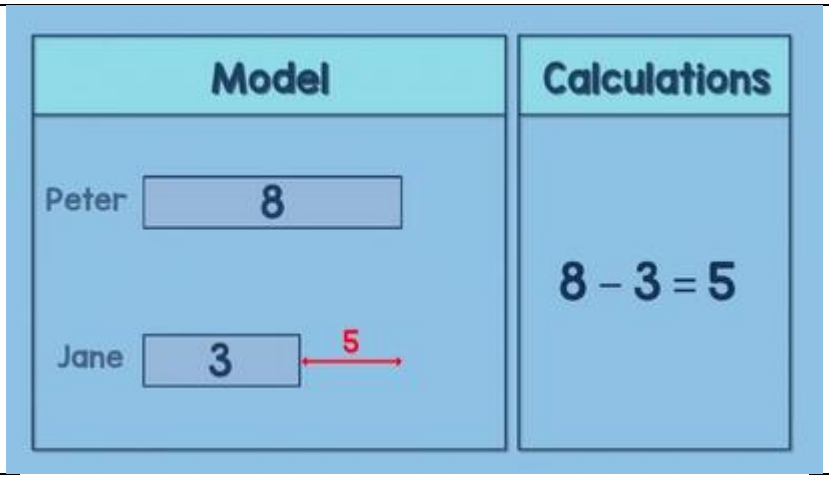
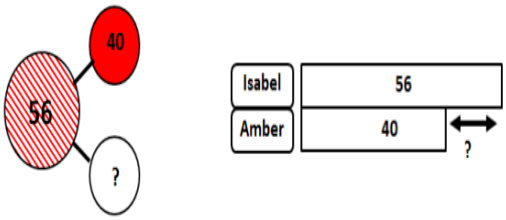
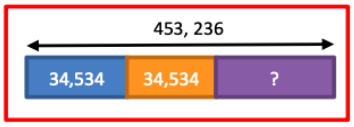
ADDITION

	A bar model begins through a concrete representation , encouraging children to understand commutativity.
	This is a discrete model which encourages children to count out. We can model this with a continuous bar model which is more efficient and encourages children to learn their number bonds.
	This is an example of aggregation, where two parts come together to make a whole. Eg. Peter has 5 apples. Jane has 3 apples. How many apples do they have altogether?

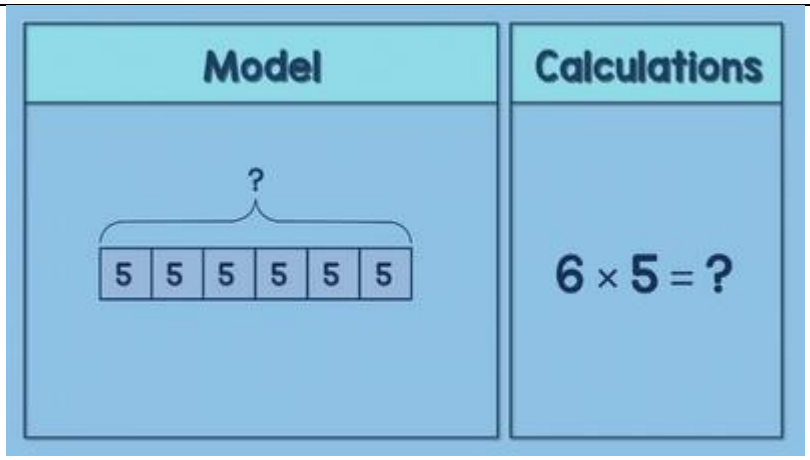
	If children struggle and are wanting to count the individual squares, we can mix the discrete and continuous bar model so they can count on. In the example here, they are counting on from 5. This is an example of augmentation.
Amber has 47 pence and Isabel has 34 pence. How much do they have altogther?   81 = 34 + 47 47 + 34 = 81 81 - 34 = 47 81 - 47 = 34 34 = □ - 47 34 more than 47 is 81. 81 is 47 more than 34. 47 fewer than 81 is 34. 34 is 47 fewer than 81.	As numbers get larger, a continuous bar model supports children's understanding and links with commutativity.
 	

SUBTRACTION

	Bar models are always shown with the calculation alongside. This example is called reduction. Jane has 8 apples, she eats 3. How many does she have left? We strike the 3 out to show what has been taken away.
	This example is called partitioning. Jane has 8 apples. There are 3 green apples and the rest are red. How many apples are red?

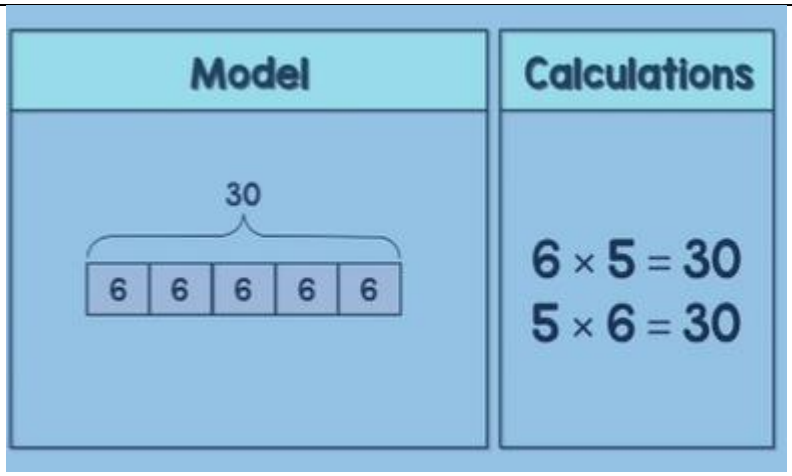
	To model a difference question, we use a comparison bar model. Peter has 8 apples. Jane has 3 apples. How many more apples does Peter have than Jane?
Amber has 40 buttons. Isabel has 56 buttons. How many fewer buttons does Amber have than Isabel? 	
 James needs 34,534 bricks to build a mansion. He buys 7,784 and has 3,698 left over from another job. How many more does he need?	Bar models are used to support the understanding of more complex problems involving subtraction.

MULTIPLICATION



Muffins come in boxes of 5. Peter buys 6 boxes of muffins. How many muffins did Peter buy altogether?

This shows the connection between multiplication and repeated addition.



The bar model shows how multiplication is commutative.

Multiplication and Division

1. Kate bought 4 blouses for £89 each and 2 similar pair of jeans. She paid £574. Find the cost of 1 pair of jeans.

From the bar model above, we know that

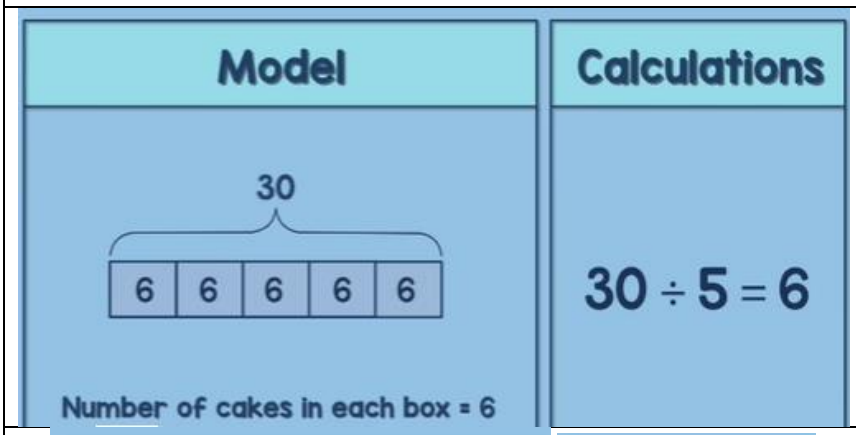
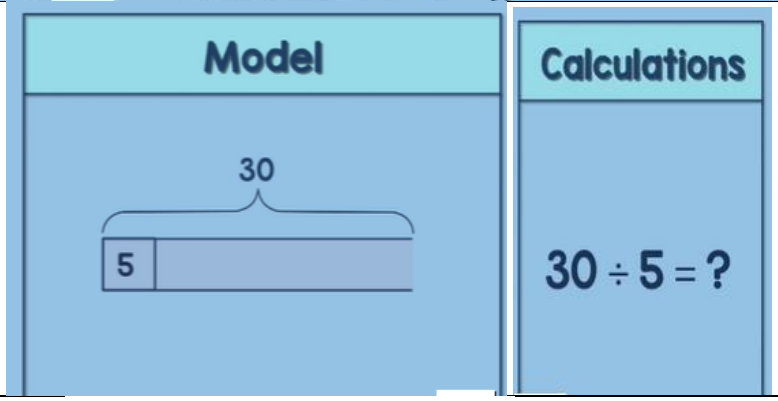
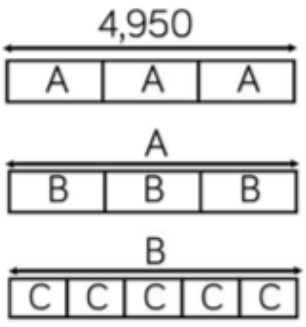
4 blouse cost = £89 x 4 = £356

2 pair of jeans cost = £574 - £356 = £218

1 pair of jeans will cost = £218 ÷ 2 = **£109**

Bar models are used to support the understanding of multi-step problems involving multiplication and division.

DIVISION

	Sharing Jane has 30 cakes. She wants to share them equally between 5 boxes. How many should go in each box?
	Grouping Jane has 30 cakes. She wants to pack them into boxes with 5 cakes in each box. How many boxes will she need?
Work out the value of C. (The bar models are not drawn to scale) 	Bar models are used to demonstrate multi-step problems involving division.