

## An Introduction to Bar Modelling A Meeting for Parents

Alderley Edge Community Primary School

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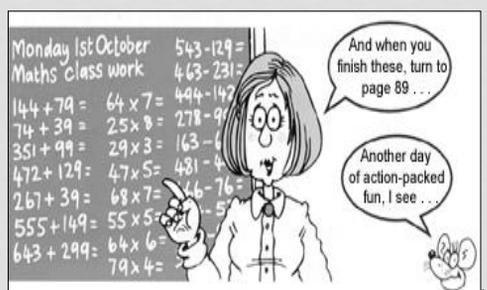
## Aims

- To consider the theory underpinning the National Curriculum
- To understand how Bar Modelling can be integral to the teaching and learning of mathematics



Rebecca Holland  
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## Previous practice



## Current practice



<b>Knowledge</b>	more efficient to be able to recall facts quickly
<b>Skills</b>	includes working mentally
<b>Understanding</b>	how methods work, which approach is the best and whether the answer is reasonable

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## National Curriculum 2014 - 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 develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **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.

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Based on research by psychologist **Jerome Bruner**, suggesting that there are three steps (or representations) necessary for pupils to develop an understanding of a concept. Reinforcement is achieved by going back and forth between these representations.

**Concrete representation** The enactive stage - a student is first introduced to an idea or a skill by acting it out with real objects.

**Pictorial representation** The iconic stage - a student has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem.

**Abstract representation** The symbolic stage - a student is now capable of representing problems by using mathematical notation, for example:  $12 \div 2 = 6$

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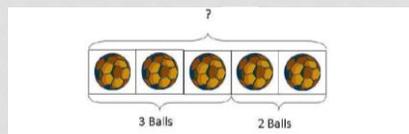
### The four different types of model:

- Discrete model
- Part-whole model
- Comparison model
- Change/transformation or "Before and After" model

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Primary School

### Discrete model

There are three footballs in the red basket. There are two footballs in the blue basket. How many footballs are there altogether?

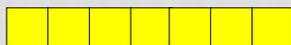


There are \_\_\_\_ footballs altogether.

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### Discrete model

I had seven bananas. I gave three to my mum. How many bananas do I have left over?



I have \_\_\_\_ bananas left over.

$$7 - 3 = \square$$

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### Part-whole model for addition and subtraction

The model represents a quantitative relationship among three variables:

Whole, Part 1 and Part 2.

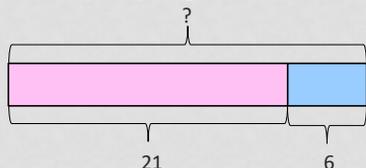


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### Part-whole



Hope bought some balloons for the party. There were 21 pink balloons and 6 blue balloons. How many balloons did Hope buy altogether?



Hope bought \_\_\_\_ balloons.

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Primary School

### Part-whole

The class book has 98 pages. On Monday the teacher read 22 pages. How many more pages has she left to read?



The teacher has \_\_\_\_ pages left to read.

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### Comparison model for addition and subtraction

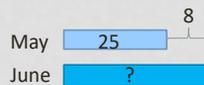
The model represents a quantitative relationship among three variables:  
larger quantity, smaller quantity and difference.



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Mathematics Specialist Consultant

### Comparison model - addition

May has 25 pencils. June has 8 more pencils than May.  
How many pencils does June have?

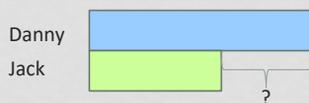


June has \_\_\_\_\_ pencils.

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### Comparison model - difference

Danny has read 42 pages of the class book, Jack has read 23. How many more pages has Danny read than Jack?



Danny has read \_\_\_\_\_ more pages than Jack.

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### Change / transformation model

- This type of model can be used to solve complex problems
- The parts can be transformed into smaller units.
- This type of model is useful for tackling problems which involve before-and-after situations.

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Mathematics Specialist Consultant

### Two step problem

Ella buys a lolly for 26p and some stickers for 45p. She pays with a £1 coin. How much change does she get?

Ella gets \_\_\_\_\_p change.



Rebecca Holland  
Mathematics Specialist Consultant

### Two step problem

A shop keeper sold  $\frac{1}{2}$  of his balloons in the morning. He then sold  $\frac{1}{3}$  of the remainder in the afternoon.

If he had 40 balloons left, find the number of balloons he had at first.

He had \_\_\_\_\_ balloons at first.



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Mathematics Specialist Consultant

KS1 2016

14 Abdul has some toy cars.  
He gives half of them to Ben.  
He has four toy cars left.



How many toy cars did Abdul start with?

Rebecca Holland  
Primary School, Cheshire

KS1 2016

28



There are 40 crayons in a box.  
Sam takes 17 crayons.  
Kemi takes 10 crayons.  
How many crayons are left?

Rebecca Holland  
Primary School, Cheshire

KS2 2016

9

6 pencils cost £1.68



3 pencils and 1 rubber cost £1.09



What is the cost of 1 rubber?

Rebecca Holland  
Primary School, Cheshire

KS2 2016

12  $n = 22$

What is  $2n + 9$ ?

1 mark

$2q + 4 = 100$

Work out the value of  $q$ .

$q =$

1 mark

Rebecca Holland  
Primary School, Cheshire

KS2 2016

6

Jacob cuts 4 metres of ribbon into three pieces.  
The length of the first piece is 1.28 metres.  
The length of the second piece is 1.65 metres.

Work out the length of the third piece.

Rebecca Holland  
Primary School, Cheshire

Modelling fractions

$\frac{1}{2}$  of 16 =

$\frac{1}{4}$  of 12 =

$\frac{1}{3}$  of 30 =

$\frac{3}{4}$  of 20 =

## 2014 SATs Level 6 Paper 2

4 Two numbers are in the ratio 4 : 5

One of the numbers is 60

There are two possible values for the other number.

What are the two possible values?



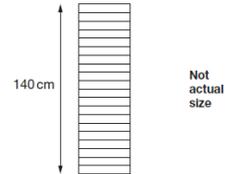


2 marks

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## KS2 - Reasoning

A stack of 20 identical boxes is 140 cm tall.



Stefan takes **three** boxes off the top.

How tall is the stack now?

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## The Way Forward...

- ✓ Be positive about mathematics- it's fun!
- ✓ Ask your child to show you how they calculate and to explain their thinking
- ✓ Support your child by making sure that counting and recall skills are established so that your child can concentrate on written methods within school
- ✓ **Recognise that children tend to forget a standard method if they have no understanding of what they are doing**

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