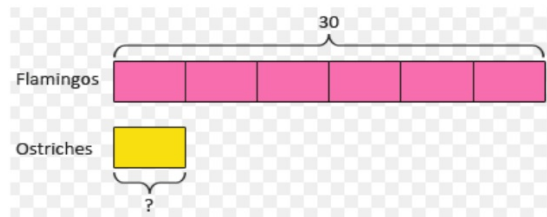
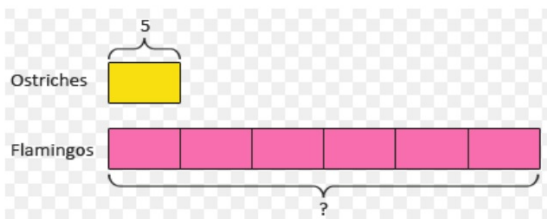




The Singapore Bar Model

May 1st, 2018



Useful across year groups

<https://www.youtube.com/watch?v=iczqtnWnBI0>
<https://www.youtube.com/watch?v=7ozUR6Rf10U>

SET 2

ACTIVITY 13 - PENGUINS



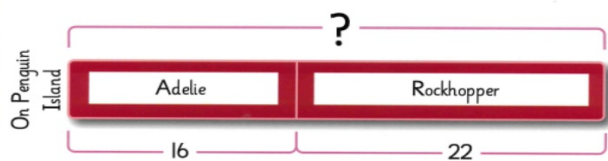
Danielle's class visited the Safari Park and enjoyed 'Penguin Island' where there were two different types of penguins. Danielle counted 16 Adelie penguins and her friend Basheera counted 22 Rockhopper penguins.

How many penguins were on 'Penguin Island'?

HINT

Draw a bar model to represent the numbers of penguins – the different types and the total number.

ACTIVITY 13 - BAR MODEL



SET 6

ACTIVITY 14 - MARY'S FAMILY HAVE COOKIES

Mary enjoyed baking for all the family. One weekend she spent all of Saturday baking cookies. She gave her brother Mark one eighth of the cookies and her brother Paul an eighth. Then she gave her sister Vera a sixth of what was left. Next, her neighbour called round and Mary gave her two fifths of the remainder. Mary had 27 cookies left for herself.



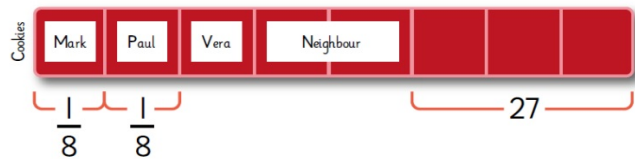
How many has she baked altogether?




The fractions involved might sound complicated but when you draw the bar and show eighths so that you can represent one eighth for Mark, you should see what will happen next.

SET 6

ACTIVITY 14 - BAR MODEL





What is it?

Bar modelling, for the uninitiated, is not a method of calculation. Instead, it is a way of representing problems pictorially: from simple addition, through to finding percentages of amounts, all the way to complex multi-step problems involving ratio and proportion. Bar models can be used to pictorially represent arithmetic problems, as well as reasoning problems written with a context.

The reading comprehension involved in problem-solving hampers our children, and while bar modelling doesn't remove the necessity to read and comprehend maths problems, it certainly provides a structured way of working through a written problem.

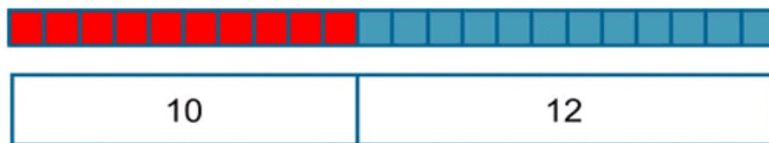
Simply put, it is a powerful tool to unlock problems and provides children with concrete or pictorial strategies to answer a wide range of problems.

<https://thisismyclassroom.wordpress.com/2014/03/31/throwing-out-that-old-rucsac/>

The diagrams don't replace the eventual algorithmic methods, but they provide an entry point where students seem to understand what it is they are trying to solve; something that often gets clouded when algorithms are presented to early on.

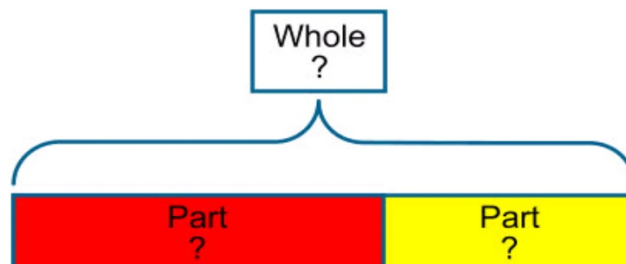
What does the bar model look like?

Sam had 10 red marbles and 12 blue marbles. How many marbles did he have altogether?



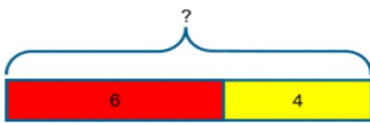
$$10 + 12 = 22$$

In problems involving addition and subtraction there are three possible unknowns as illustrated below and given the value of two of them the third can be found.



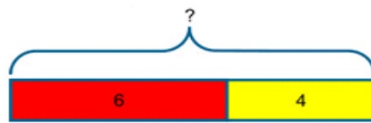
Relationship between addition and subtraction and the laws of commutativity and the associate law

**Addition
Aggregation**
- two quantities combined



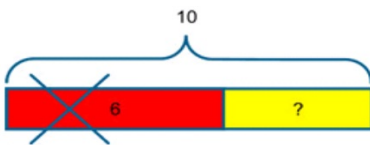
I have 6 red pencils and 4 yellow pencils. How many pencils do I have?
(I combine two quantities to form the whole)

**Addition
Augmentation**
- a quantity is increased



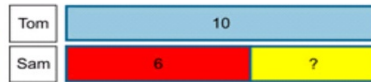
I have 6 red pencils and I buy 4 yellow pencils. How many pencils do I have?
(The bar I started with increases in length)

**Subtraction
- Take Away**



I had 10 pencils and I gave 6 away, how many do I have now?

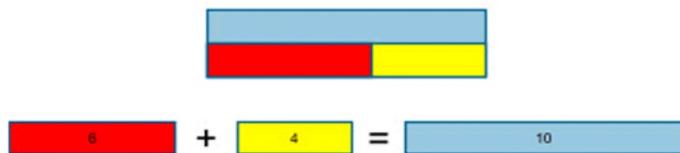
**Subtraction
- Comparison or Difference**



Tom has 10 pencils and Sam has 6 pencils. How many more does Tom have?

Equivalence

The model can be rearranged to demonstrate equivalence in a traditional layout

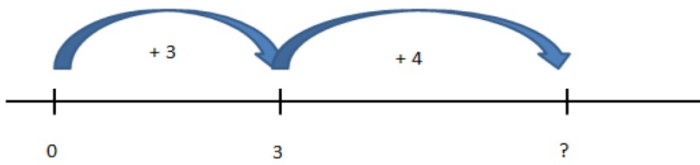


Addition

Joe buys 3 apples and 4 bananas. How much fruit does he buy in total?



$$\begin{aligned} 3 + 4 &= ? \\ 4 + 3 &= ? \\ ? - 4 &= 3 \\ ? - 3 &= 4 \end{aligned}$$

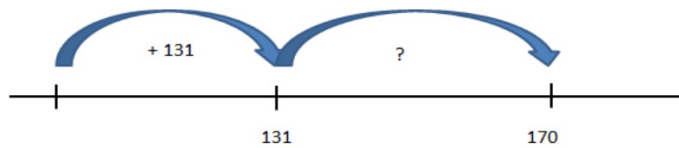


Find the Difference and Subtraction

Joe has £131 and a new pair of trainers costs £170. How much more does he need?

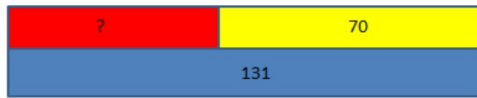


$$\begin{aligned} 131 + ? &= 170 \\ ? + 131 &= 170 \\ 170 - 131 &= ? \\ 170 - ? &= 131 \end{aligned}$$



Find the Difference and Subtraction

Joe has £131 and spends £70 on a new pair of trainers. How much does he have left?

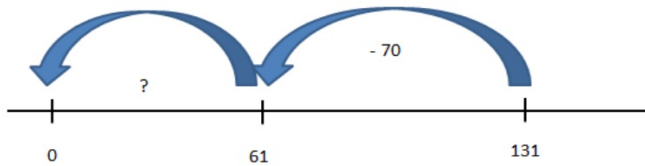


$$131 + ? = 170$$

$$? + 131 = 170$$

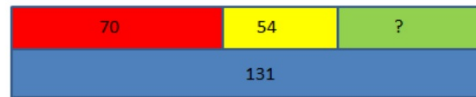
$$170 - 131 = ?$$

$$170 - ? = 131$$



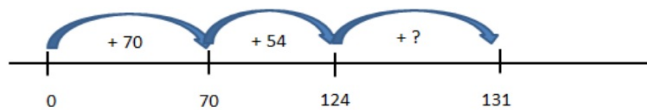
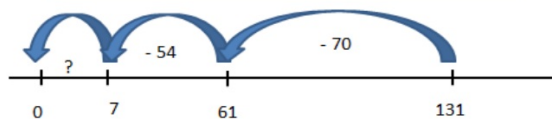
Multi-Step

Joe has £131 and spends £70 on a new pair of trainers and £54 of a pair of jeans. How much does he have left?



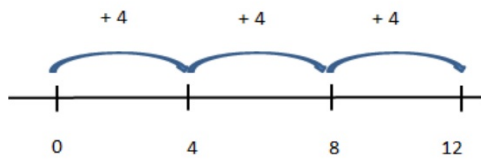
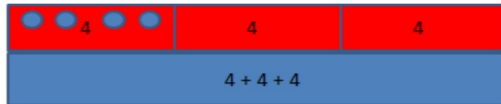
$$70 + 54 + ? = 131$$

$$131 - (70 + 54) = ?$$



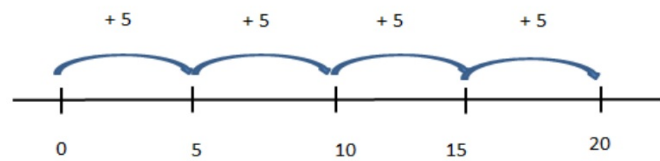
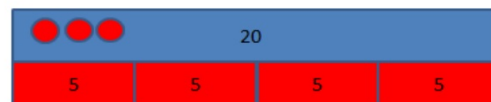
Multiplication

A bucket holds 4 flowers. How many do 3 buckets hold?



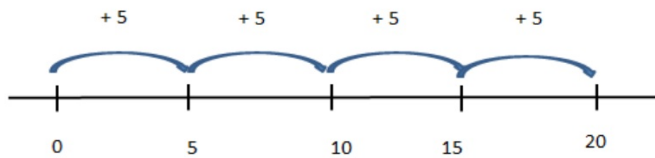
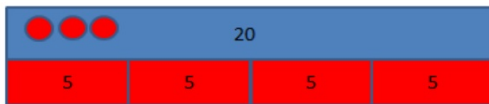
Division

I have 20 cakes to share between myself and 3 friends. How many do we each get?

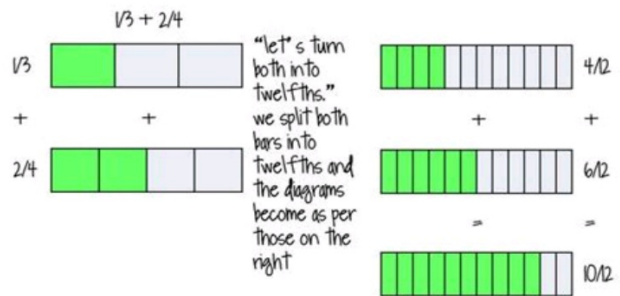


Fractions

I have 20 cakes and eat $\frac{1}{4}$ of them. How many do I eat?

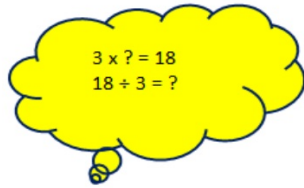
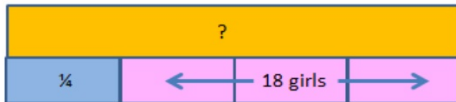


adding fractions different denominators



Fractions

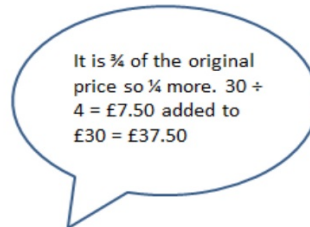
$\frac{1}{4}$ of the class are boys. 18 children in the class are girls. How many children are in the class?



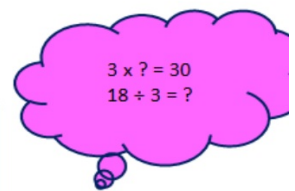
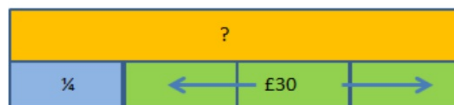
2 historic sats questions that very few children were able to answer correctly.

Fractions

A coat is 25% off. It is now £30. How much was it originally?



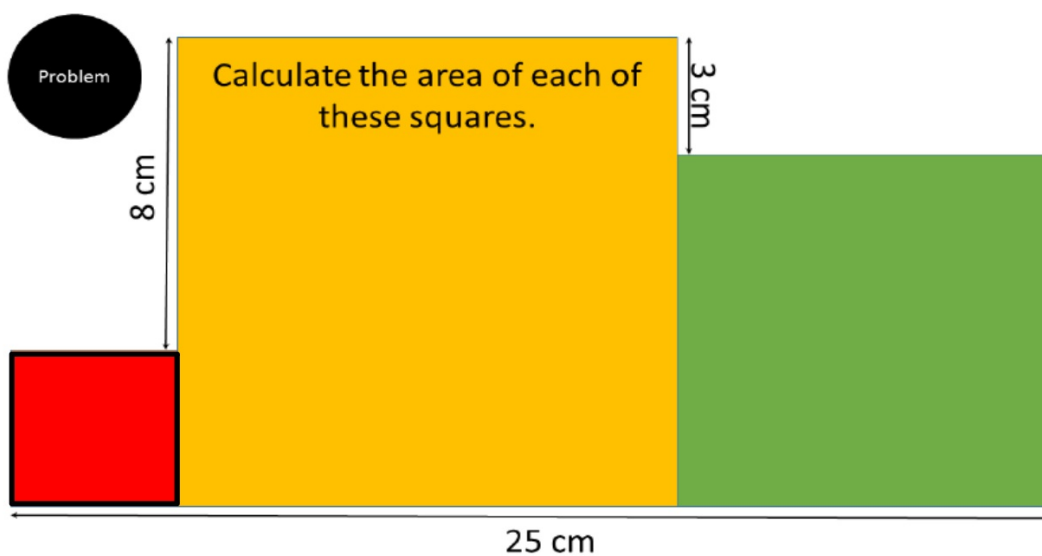
BUT:



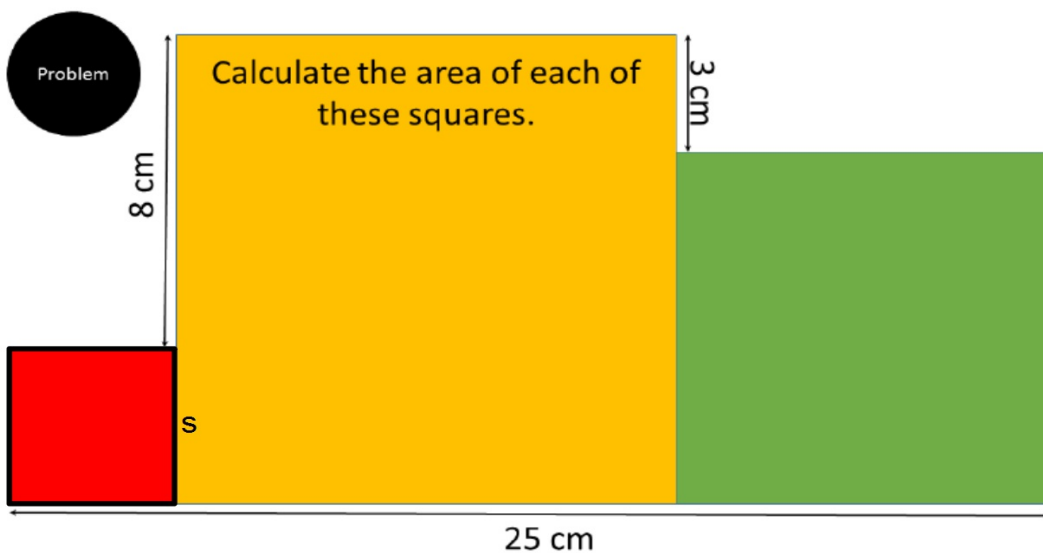
A lot of children would use trial and improvement for this...

Adam and Mary have £100 altogether. Adam has £34 more than Mary. How much money does Adam have?

but it can be done much more efficiently with a bar...



How could you use a bar model to solve this problem?



How could you use a bar model to solve this problem?

s be the short side



so the long square side is



the medium square is



$$3s + 13 = 25 \rightarrow 3s = 12 \rightarrow s = 4$$

“The essence of mathematics is not to make
simple things complicated, but to make
complicated things simple.”
- Prof. Stan Gudder

<https://www.barmodel.co.uk/>

<http://www.bbc.co.uk/skillswise/0/24925787>
