The Importance of Bar Models

Session Contents

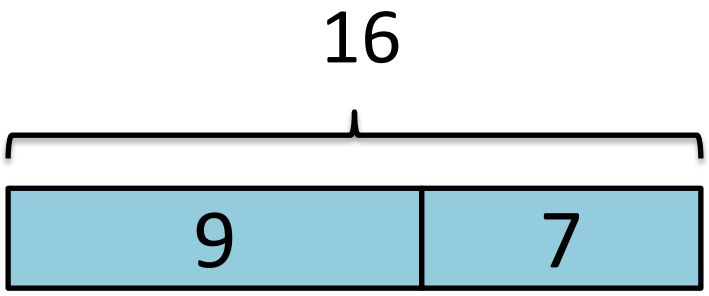
- What are ‘bar models’?
- How can bar models be used?
- How can bar models be introduced?
- What do bar models look like across key stages?

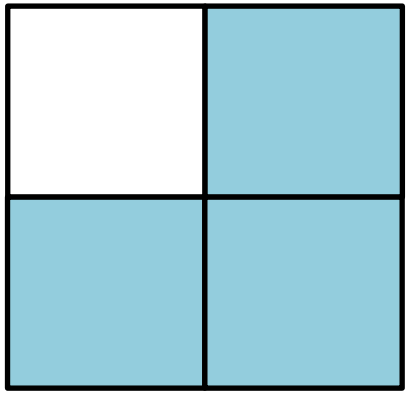
Discussion

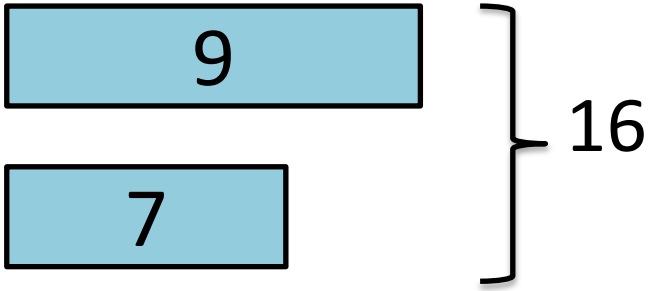
- What do bar models look like?

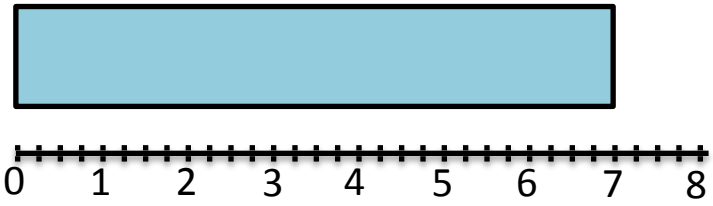
- Why are bar models used?

What Are Bar Models?









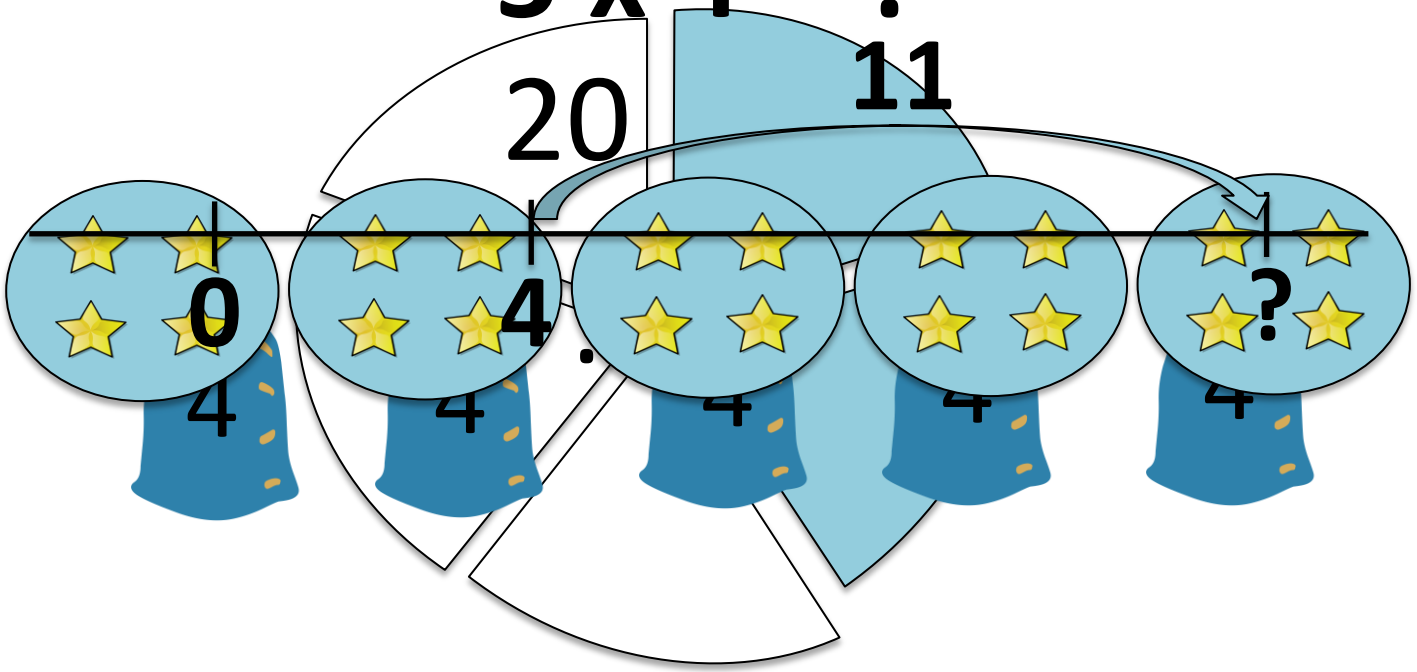
A Consistent Picture

2 of 20 = ?

5 x 4 = ?

Share 20 in the ratio 2:3

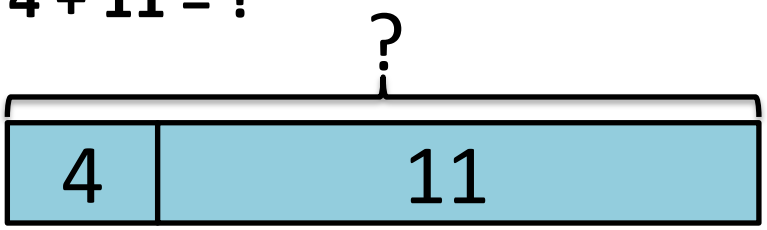
4 + 11 = ?



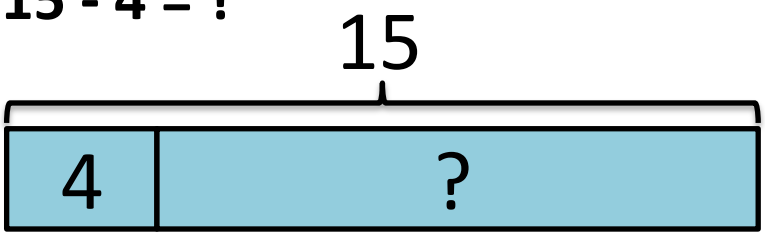
A Consistent Picture

MathsHUBS White Rose

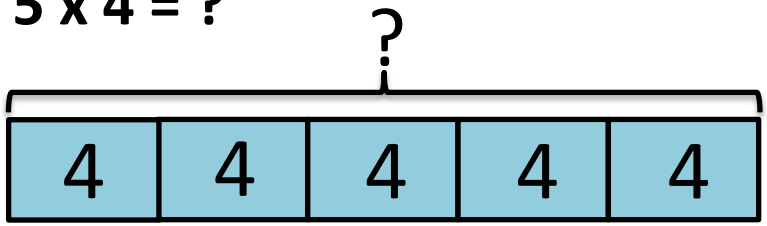
4 + 11 = ?



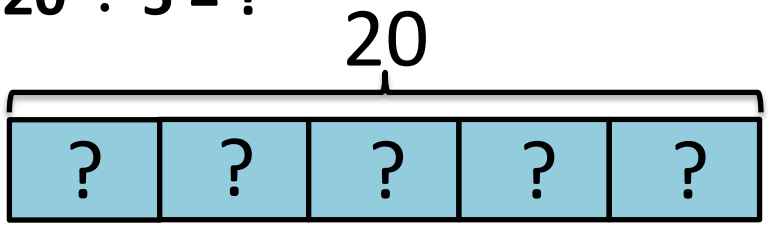
15 - 4 = ?



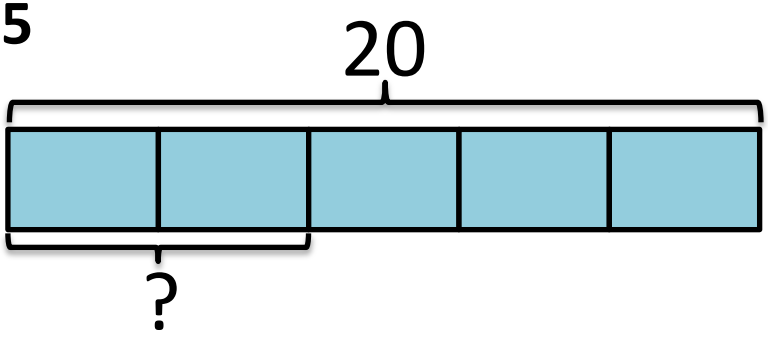
5 x 4 = ?



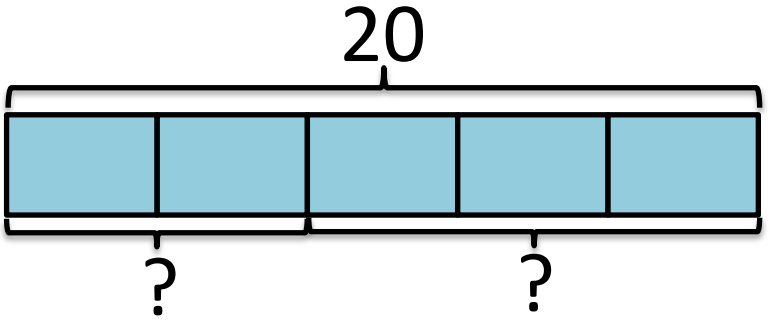
20 ÷ 5 = ?



$\frac{2}{5}$ of 20 = ?



Share 20 in the ratio 2:3



When solving word problems, it is often not the calculation that children can't do – rather they are not sure which calculation they need to do.

(NCETM, 2013)

The importance of bar modelling

"Instead of relying on superficial and unreliable clues like key words, the simple visual diagrams help children understand why the appropriate operations make sense."

"Model drawing trains children to think analytically, providing an important transition between the concrete and the abstract."

"Bar models are a tool to help children visualise stories and help children decide which operations to use."

"Although children have experience and exposure to concrete materials they are clearly designed to … are able to develop the ability to visualise"

Ban Har 2016

Forsten 2014

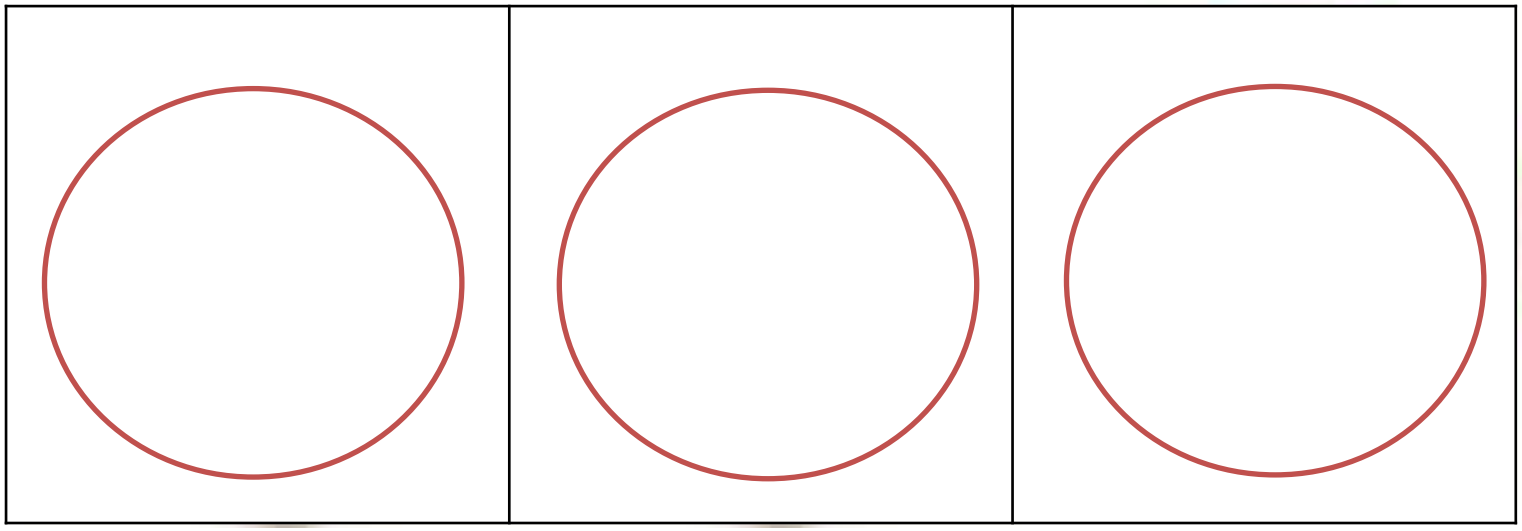
Ban Har 2016

Beckmann 2014

Beckmann 2014

Introducing Bar Models

Introducing Bar Models in EYFS



Show me…

- There are six glasses of apple juice
- Hannah has more than five friends
- Sam has more conkers than Tom

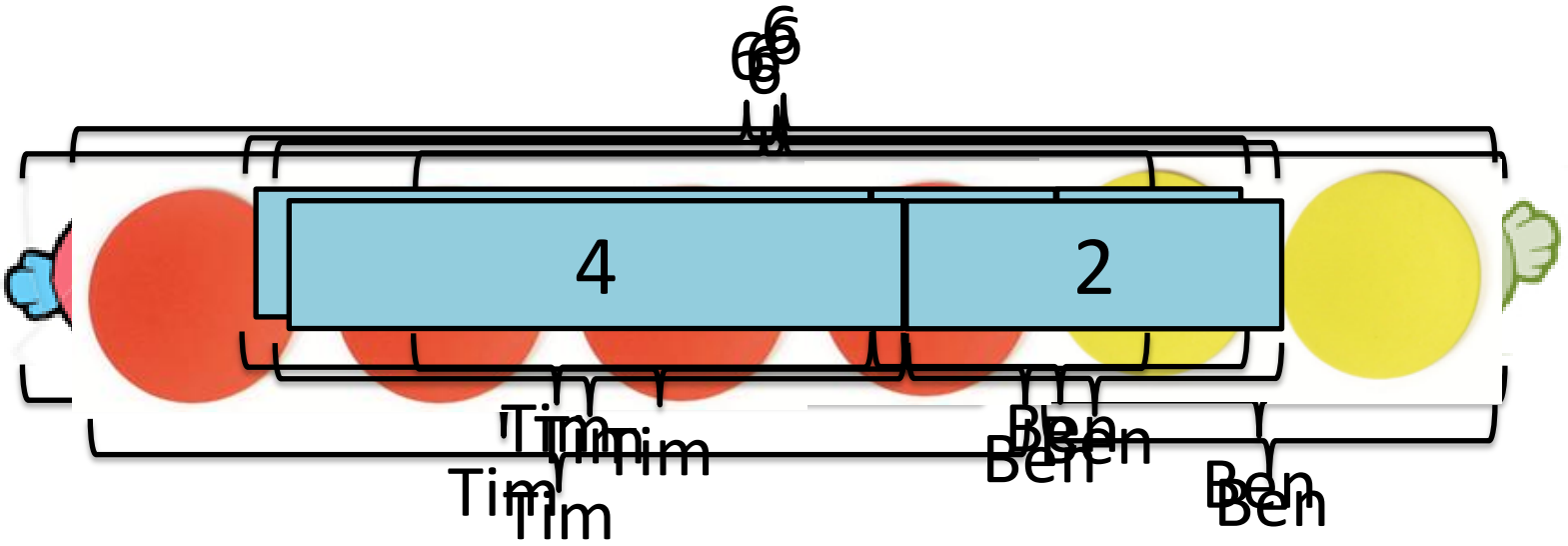
KS1 bar modelling

Peter has 5 toy cars and Jane has 3 toy cars.
How many toy cars do they have altogether?

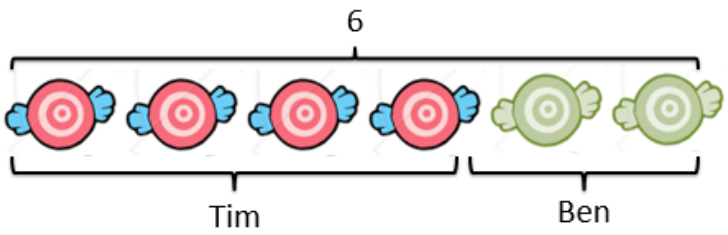
KS1 Bar Modelling

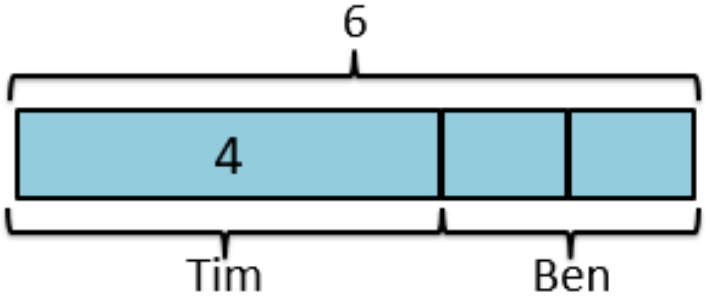
Tim has 4 sweets and Ben has 2 sweets.

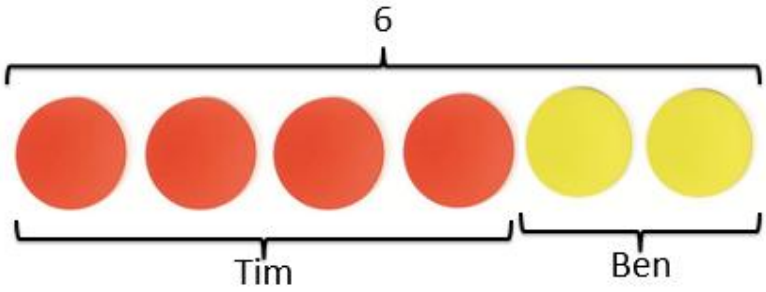
How many sweets do they have altogether?

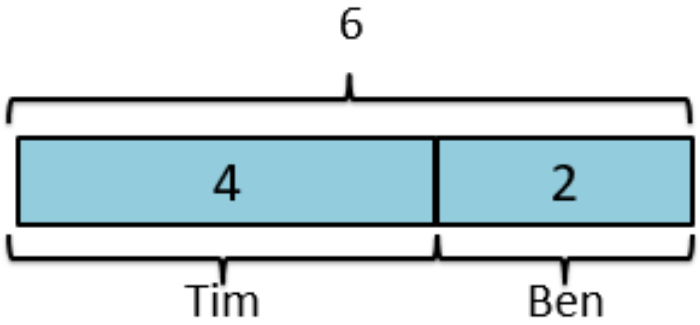


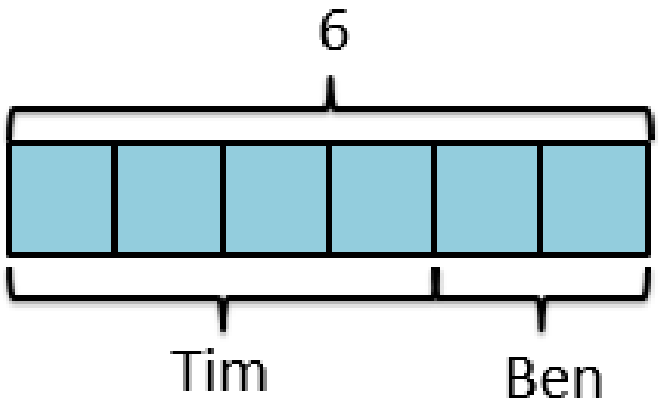
Small steps











$4 + 2 = 6$

KS2 barmodelling

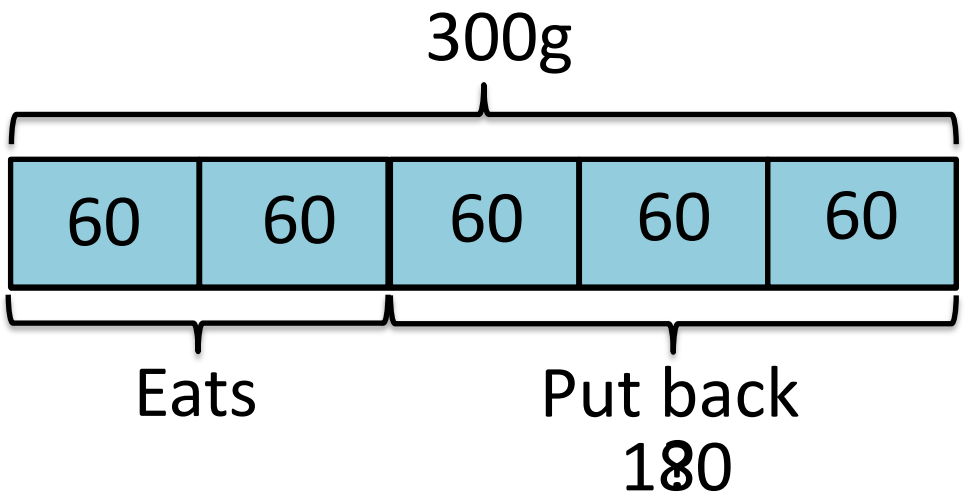
$\frac{3}{5}$ of 20 = ?

KS2 Bar Modelling

Solve… Matthew has a 300g block of cheese. He eats $\frac{2}{5}$ of the cheese and puts the rest back in the fridge.

How much cheese did Matthew put back in the fridge?

Model



Calculations

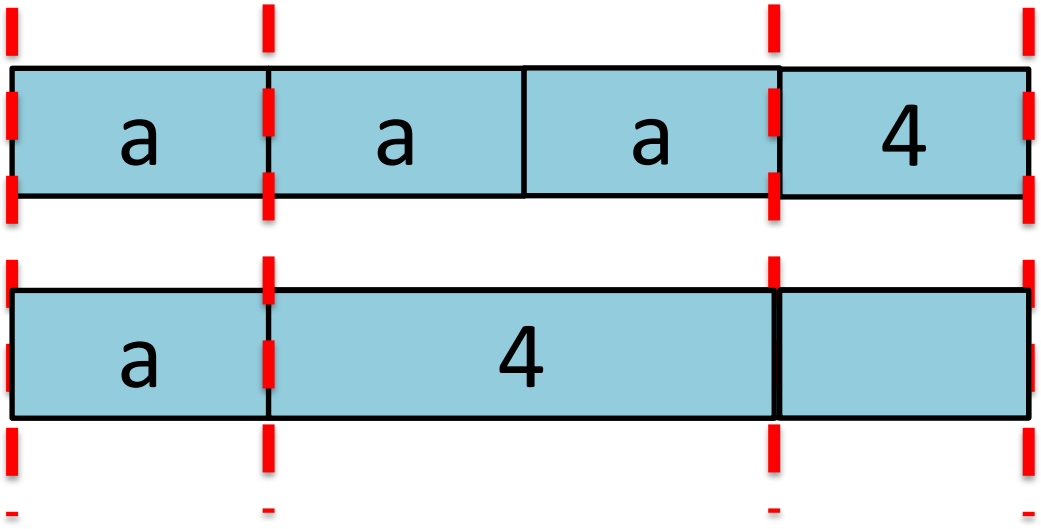
300 ÷ 5 = 60

3 x 60 = 180

KS3 Bar Modelling

$3a + 4 = a + 8$

Model



Calculations

$3a + 4 = a + 8$

$-a \qquad -a$

$2a + 4 = 8$

$-4 \qquad -4$

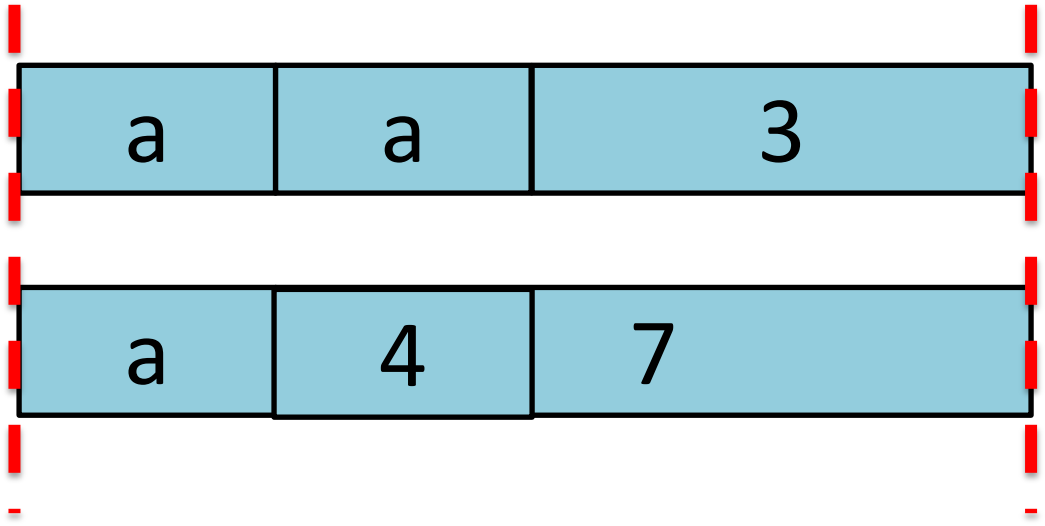
$2a = 4$

$\div 2 \qquad \div 2$

$a = 2$

KS3 Bar Modelling

Solve $2a + 3 = a + 7$



$2a + 3 = a + 7$

$-a \qquad -a$

$a + 3 = 7$

$-3 \qquad -3$

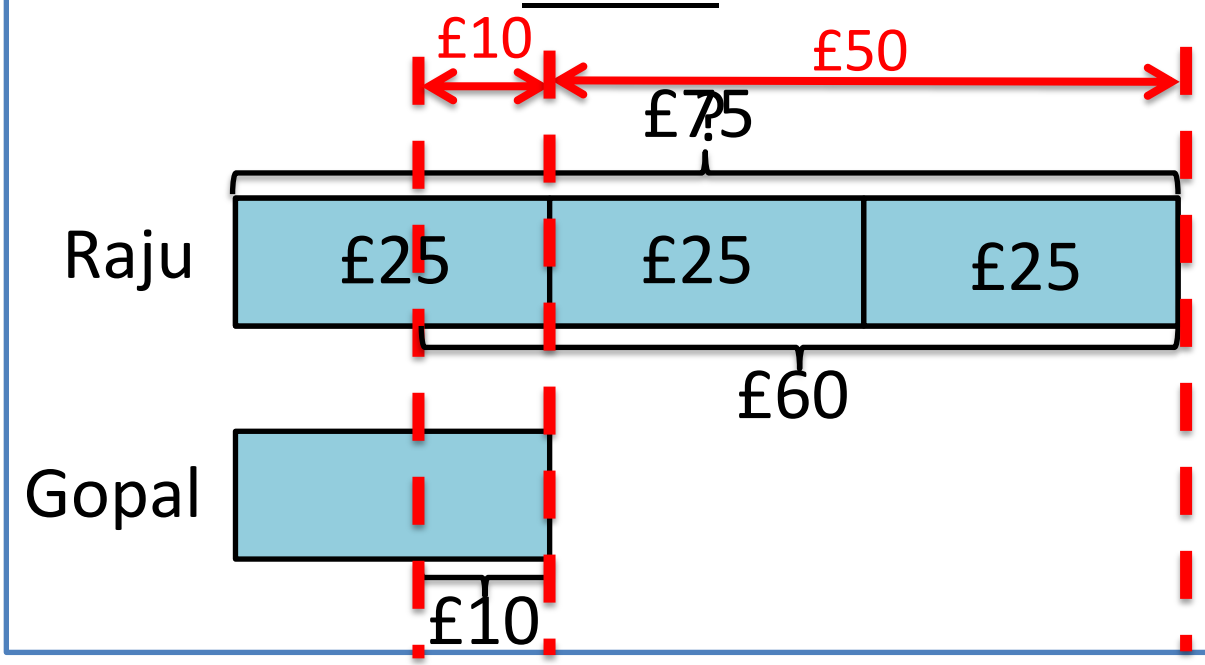
$a = 4$

Word problem

Raju had 3 times as much money as Gopal. After Raju spent £60 and Gopal spent £10, they each had equal amount of money.

How much money did Raju have at first?

Model



Calculations

50 ÷ 2 = 25

3 x 25 = 75

Primary Mathematics volume 6B

Problem Solving

- Tom has a bag of 64 marbles. His friend gives him 28 more. How many does he have now?

- Kelsey was running a 26 mile marathon. After 18 miles she felt very tired. How many more miles did she have to run?

- Carly bought an apple for 17p and a banana for 26p. How much has she spent?

- Ali had £10. He bought a DVD for £6.70 and a CD for £2.90. How much money did he have left?

Multi-Step Problem Solving

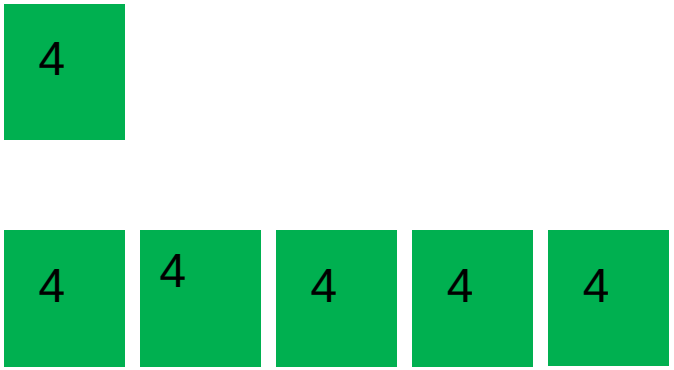
Sam had 5 times as many marbles as Tom.

If Sam gives 26 marbles to Tom, the two friends will have exactly the same amount.

How many marbles do they have altogether?

Multiplicative reasoning

- Peter has 4 books. Harry has five times as many books as Peter. How many books has Harry got?



National Centre for Excellence in the Teaching of Mathematics

Multiplication

- Henry ate 10 meatballs at the Christmas party. Shane ate 3 times as many meatballs as Henry. How many meatballs did they eat altogether?

- Helen has 9 times as many football cards as Sam. Together they have 150 cards. How many more cards does Helen have than Sam?

- The sum of 2 numbers is 60. One number is 9 times as big as the other. What is the bigger number?

- The sum of 2 numbers is 64. One number is 7 times as big as the other. What is the smaller number?

Division

- 108 Year 3 children are going on a field trip to the art museum. Each bus must carry 12 children. How many buses are needed?

- Mr Smith had a piece of wood that measured 36 cm. He cut it into 6 equal pieces. How long was each piece?

Problem Solving

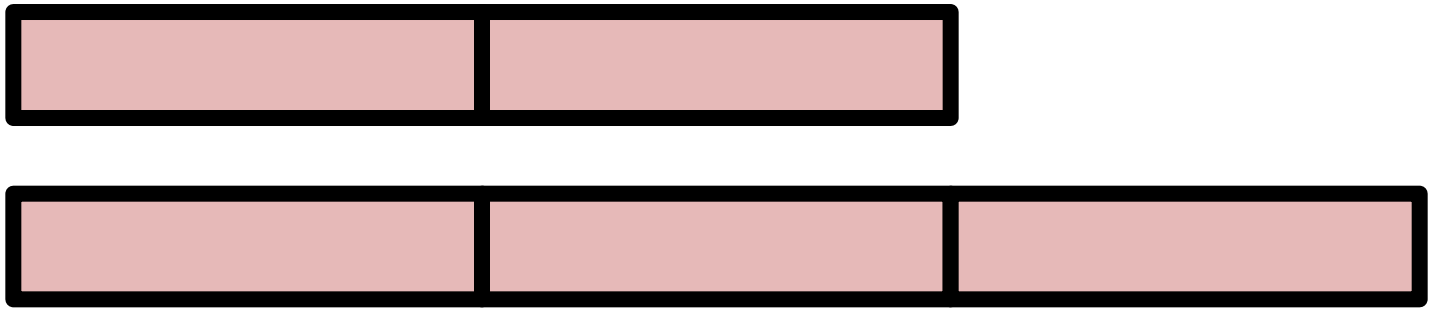
Ralph posts 40 letters, some of which are first class, and some are second.

He posts four times as many second class letters as first.

How many of each class of letter does he post?

GCSE higher paper 2012!

Ratio



Tim and Sally share marbles in the ratio of 2:3
If Sally has 36 marbles, how many are there altogether?

Key Stage 2 SATs – 2012

MathsHUBS White Rose

24 In a class, 18 of the children are girls.

A quarter of the children in the class are boys.

Altogether, how many children are there in the class?

24

A cake costs 15p more than a biscuit.

Megan bought a cake and two biscuits for 90p.

How much do a cake and a biscuit each cost?

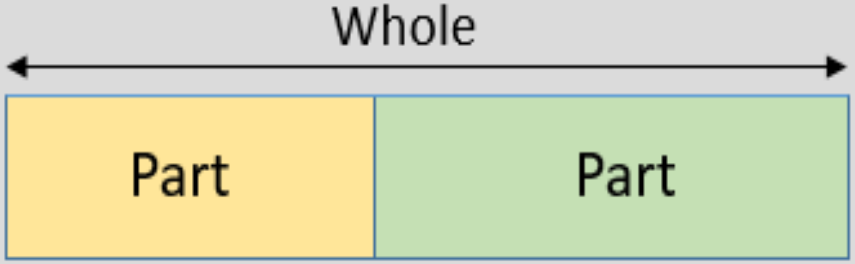
Show your working

Cost of a cake ____ p

Cost of a biscuit ____ p

2 marks

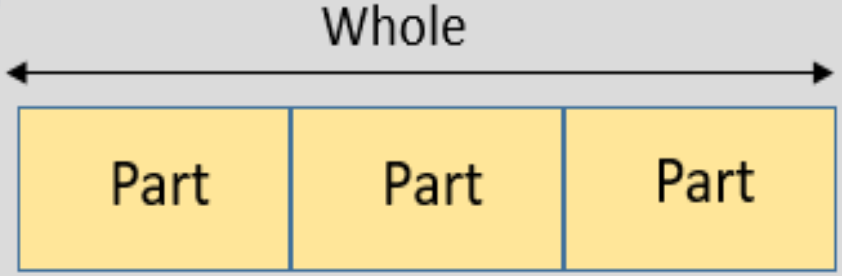
Part-Part-Whole



Whole = Part + Part

Part = Whole – Part

Equal Parts of a Whole

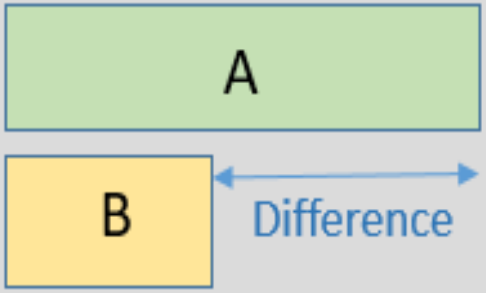


Whole = Part x Number of Parts

Part = Whole ÷ Number of Parts

Number of Parts = Whole ÷ Part

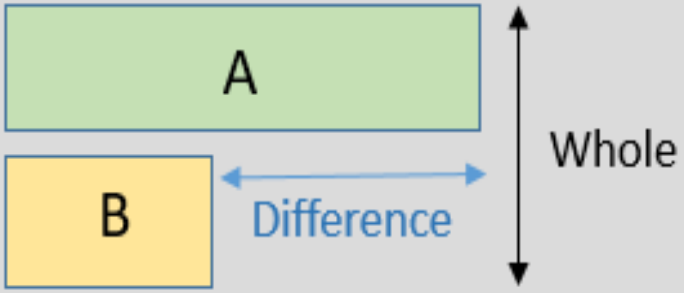
Comparison



Difference = A – B

A = B + Difference

Part-Part-Whole and Comparison

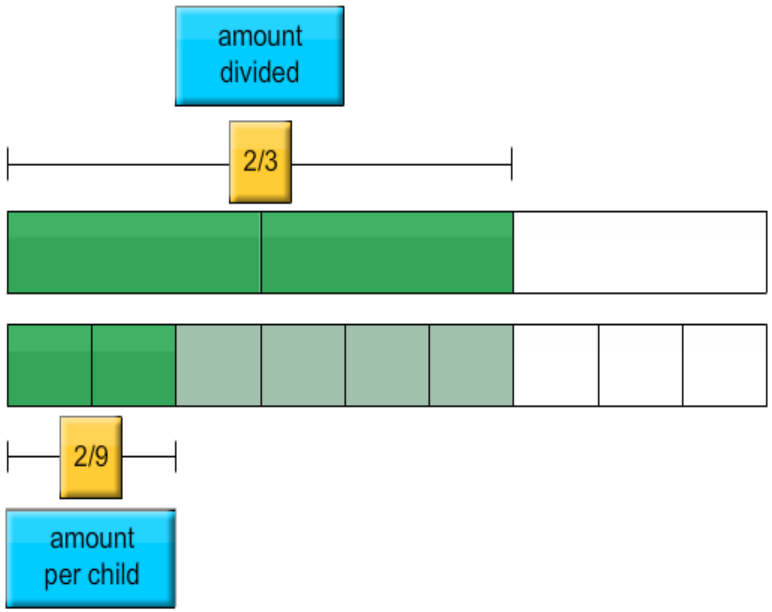


Whole = A + B

Difference = A – B

Word Problem: Mrs. Wilson won a sum of money. She divided 2/3 of the money among her 3 children. What fraction of the money did each child receive?

Thinking Blocks



ANSWER: 2/9 of the money

Fantastic!

Next

Instructions
Tap the **Next** button to continue.

Multiply and Divide

Where to find out more:

More examples of bar models

ttp://www.thedailyriff.com/WordProblems.pdf

Bar model images to be used on interactive whiteboard

http://www.mathplayground.com/thinkingblocks.html

You tube – dividing fractions
http://www.youtube.com/watch?v=_11SEY-P_h0

You tube regarding progression -
https://www.youtube.com/watch?v=Em2yERb3Kfs