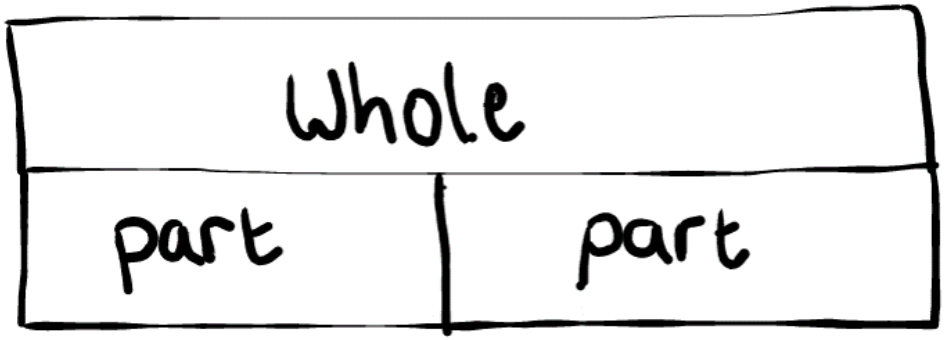
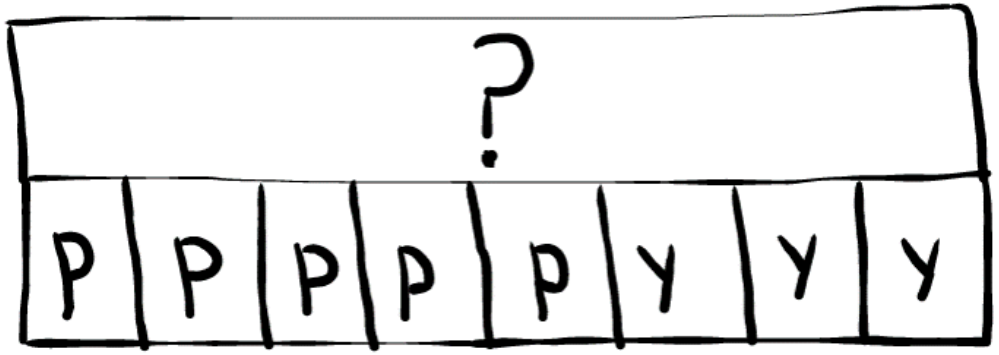
Representing Problems: Bar Modelling

Part/whole Bar Models

Part/whole Bar Models Terminology



Part/whole Bar Models in KS1



This is known as a ‘discrete bar model’, where each box represents one whole.

This will be used more often in KS1.

Part/whole Bar Models in KS1

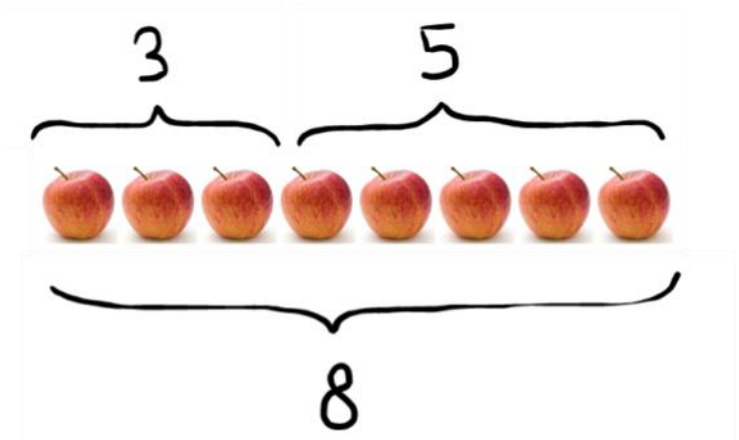
5 + 3 = ?

Bar models can be created using cubes.

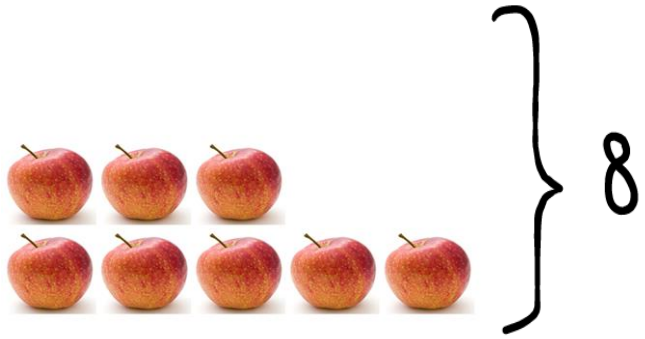
Here the bar model is not pictorial - but concrete.

Early Year Bar Modelling

5 + 3 = ?

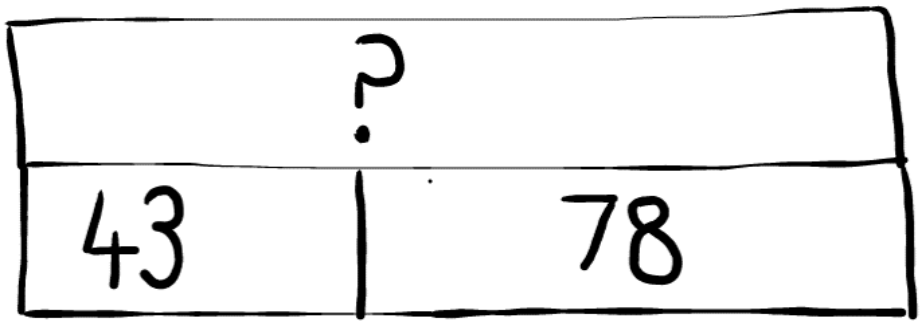


This is known as a ‘discrete bar model’ where each box or object represents one whole. This will be used more often in KS1.



An early version of a comparison bar model.

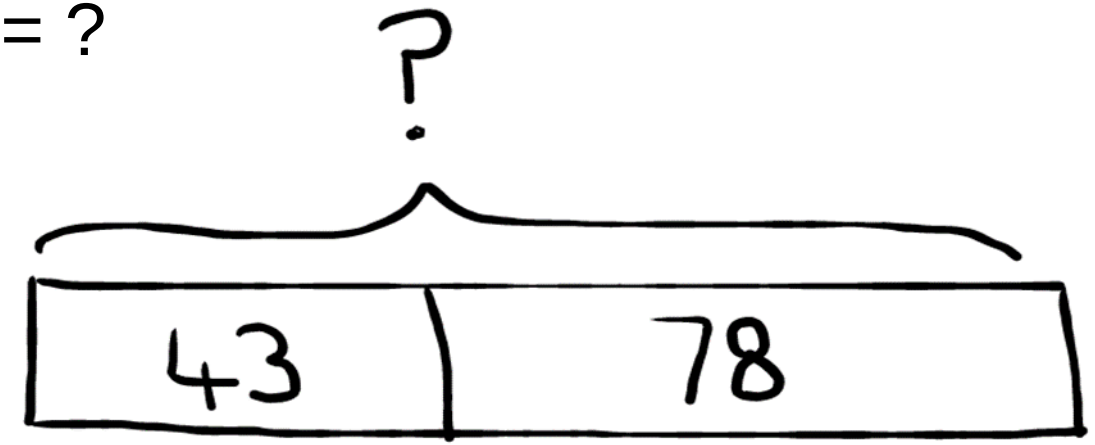
Part/whole Bar Models: Addition



Encourage children to draw bars which represent the size of the numbers. In straightforward addition problems we know the size of the parts but not the size of the whole.

Part/whole Bar Models: Addition

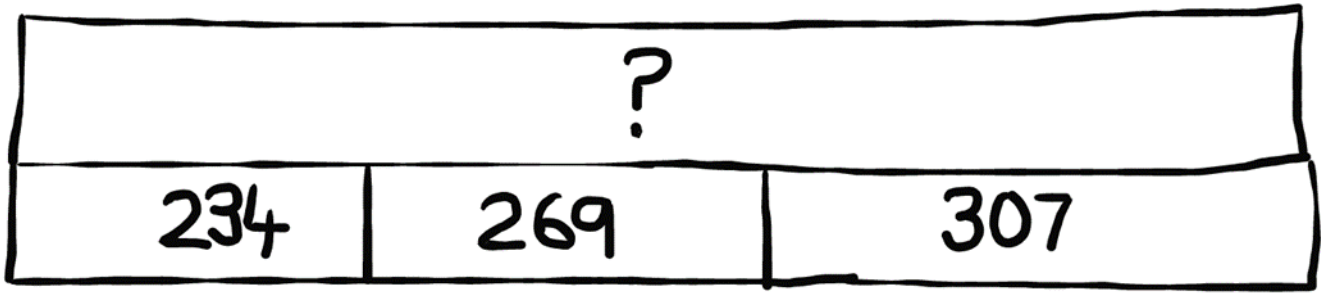
43 + 78 = ?



In part/whole bar models, sometimes the ‘whole’ bar can be replaced with a bracket.

Part/whole Bar Models: Addition

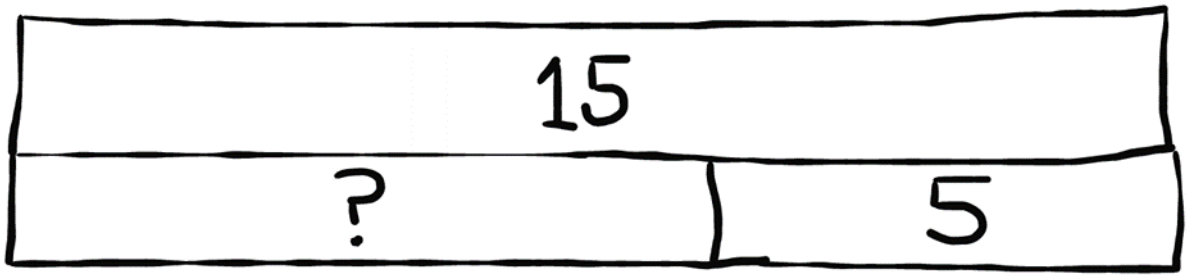
234 + 269 + 307 = ?



You can split the bar models into as many parts as needed.

Part/whole Bar Models: Subtraction

15 − 5 = ?

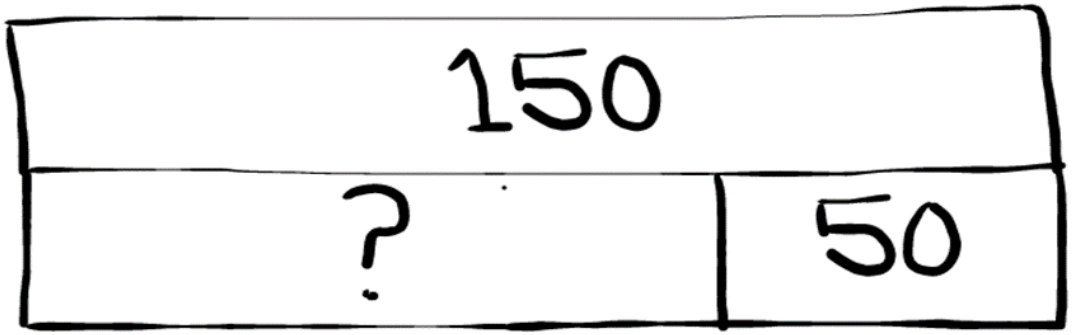


Always ask the question:

“Where does the question mark go?”

Part/whole Bar Models: Subtraction

150 − 50 = ?

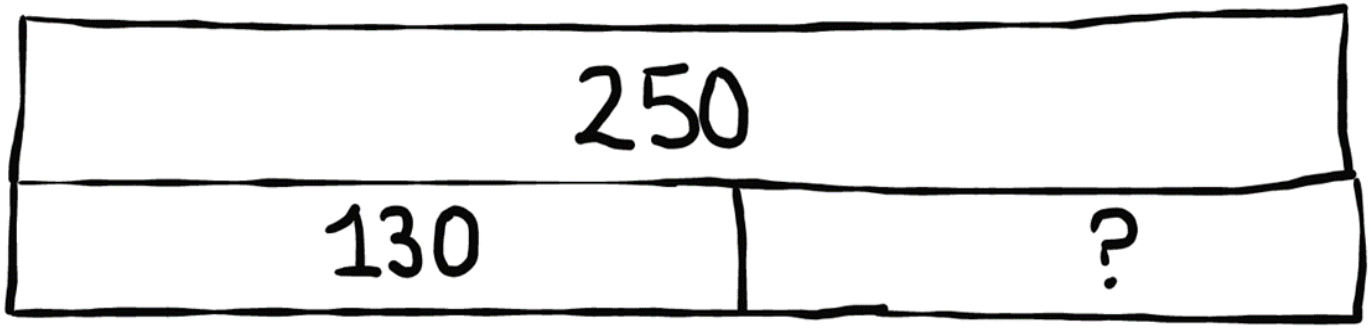


In subtraction problems like this we know the size of the whole and the size of one of the parts.

We also know there is only one other part but we don’t know its size.

Bar Models: Missing Number problems

250 − ? = 30

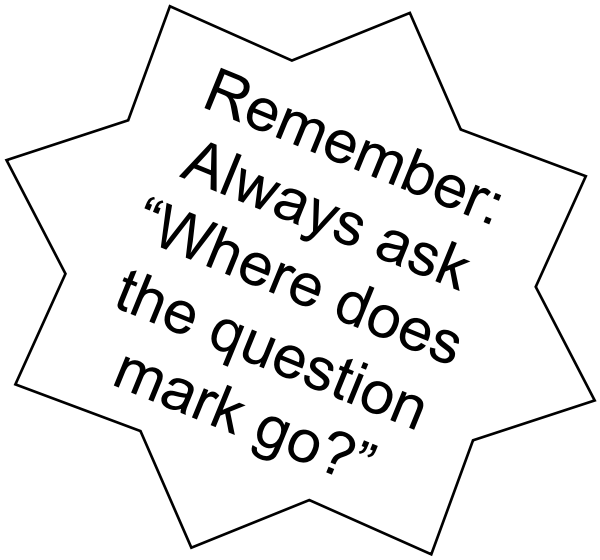


A subtraction missing number problem represented as a bar model looks just the same as a normal subtraction problem because in both problems we begin with knowing the whole.

Your Turn:

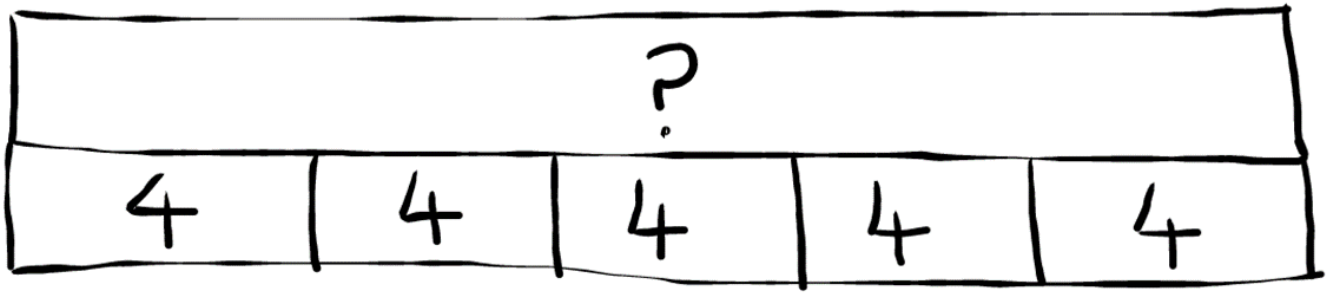
Using squared paper represent these problems as bar models:

- 450 + 350 = ?
- 965 – 345 = ?
- ? + 45 = 100
- 75 – ? = 25



Bar Models: Multiplication & Division

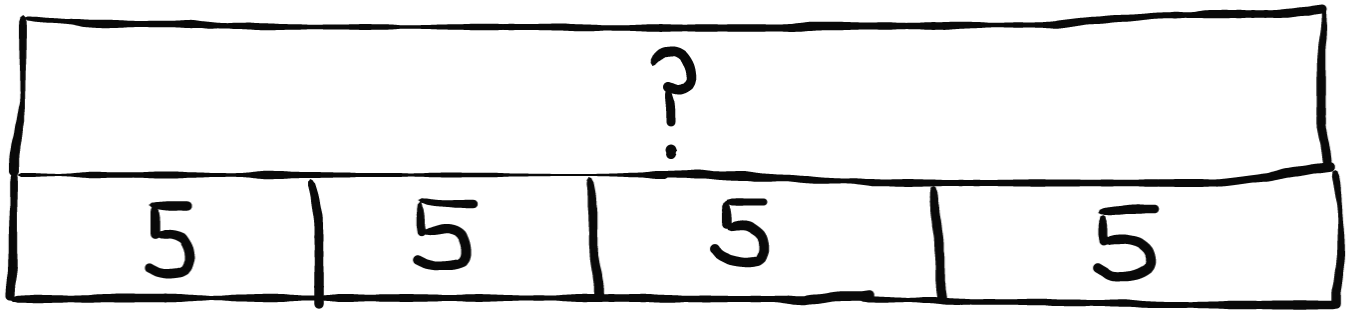
What problem does this bar model represent?



In multiplication problems we do not know the whole but we do know the number of parts and what each part is worth.

Bar Models: Multiplication & Division

4 x 5 = ?

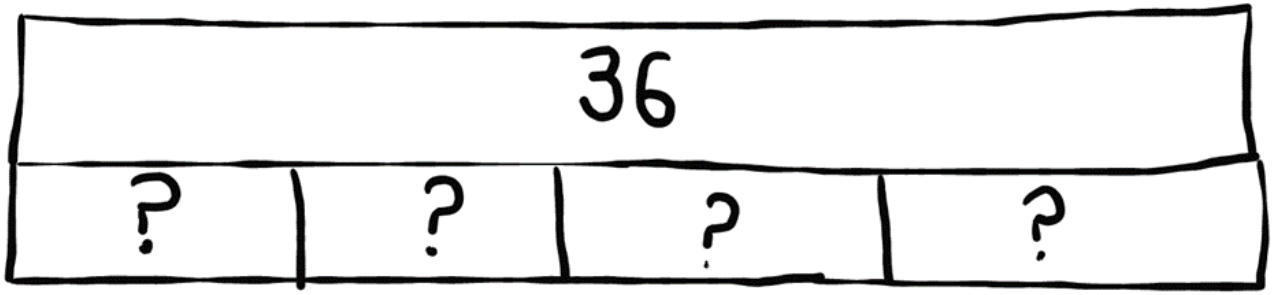


In multiplication problems we do not know the whole but we do know the number of parts and what each part is worth.

Bar Models: Multiplication & Division

36 ÷ 4= ?

4 x ? = 36



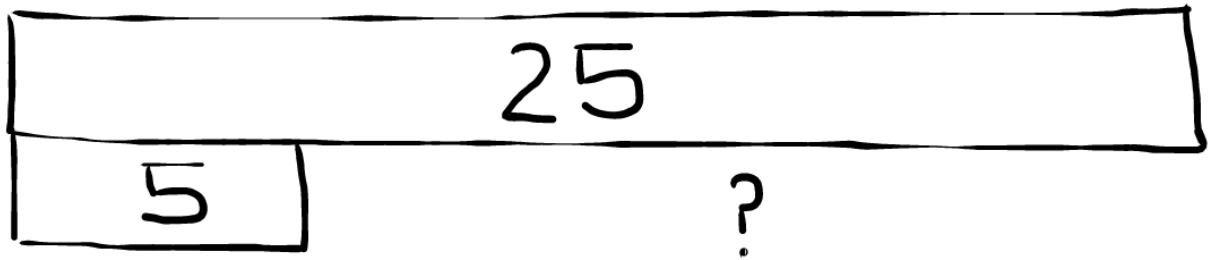
In division problems we know the whole but we don't know either the number of parts or what each part is worth.

In this example we know the number of parts but not the size of each part.

Bar Models: Multiplication & Division

? x 5 = 25

25 ÷ 5 = ?

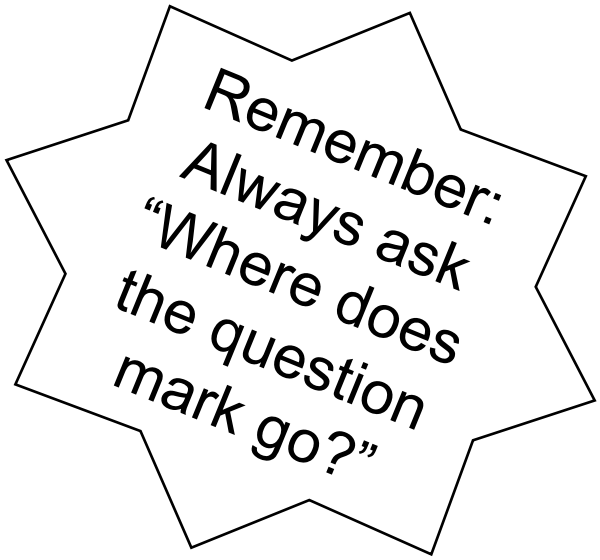


In this example we know the size of each part but not the number of parts. This model is useful when we start applying bar modelling to word problems and when doing missing number problems.

Your Turn:

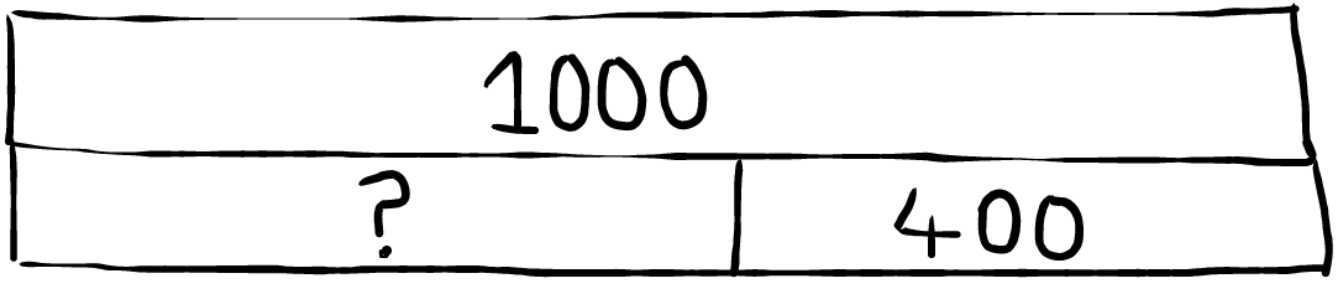
Using squared paper represent these problems as bar models:

- 6 x 7 = ?
- 54 ÷ 9 = ?
- 5 x ? = 35
- ? X 2 = 10



Bar Models: Missing Number Problems

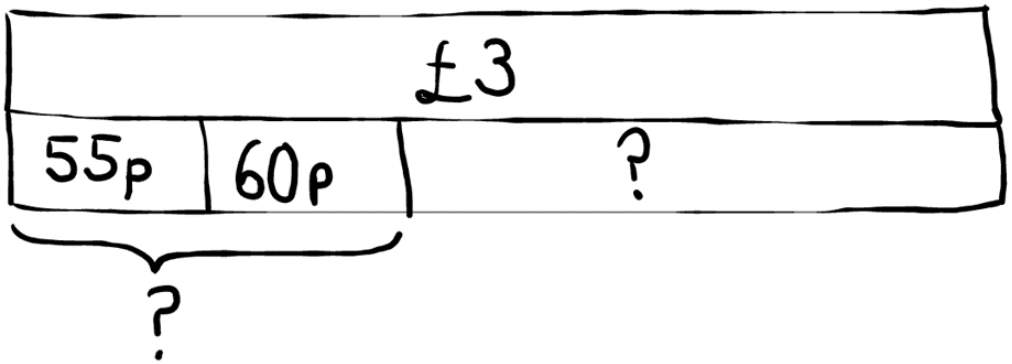
400 + ? = 1000



An addition missing number problem represented as a bar model **also** looks like a subtraction problem because we already know the whole but are looking for the value of one of the parts.

Bar Models: Money

A boy has £3. He buys some crisps for 55p and a chocolate bar for 60p. How much change does he get?



This is known as a ‘continuous model’, where each rectangle represents a number. This will be used more often in KS2.

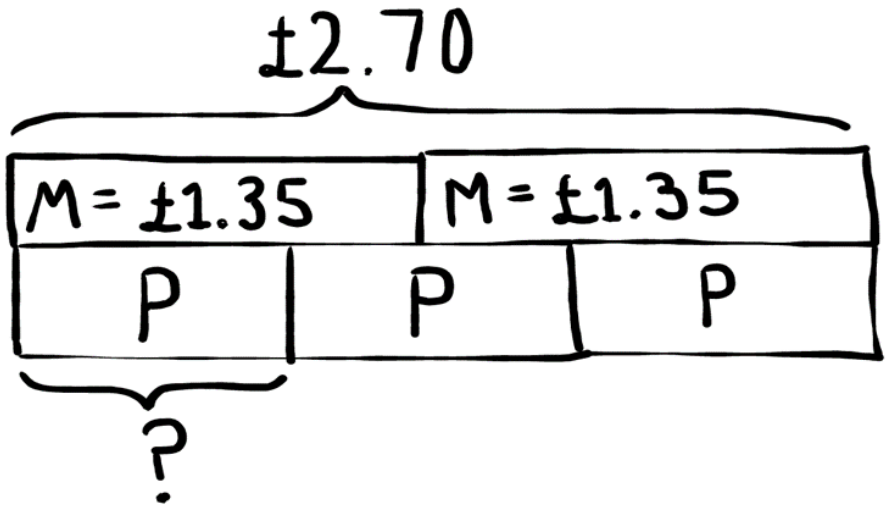
Bar Models: Word Problems and Money

3 pineapples cost the same as 2 mangoes.

1 mango costs £1.35.

How much does one pineapple cost?

(from **2017 KS2 Reasoning Paper 3**)



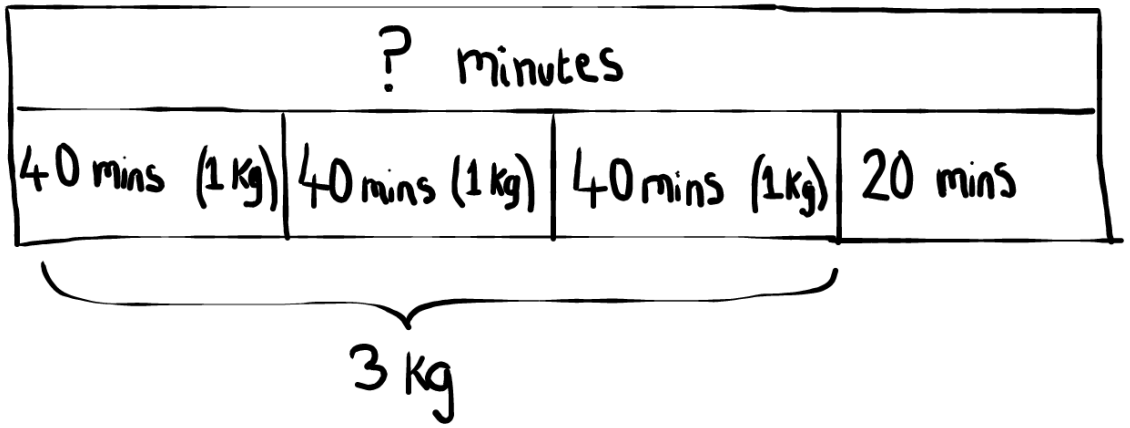
Modelling Tricky Problems

11 Here is a rule for the time it takes to cook a chicken.

Cooking time = 20 minutes plus an extra 40 minutes for each kilogram

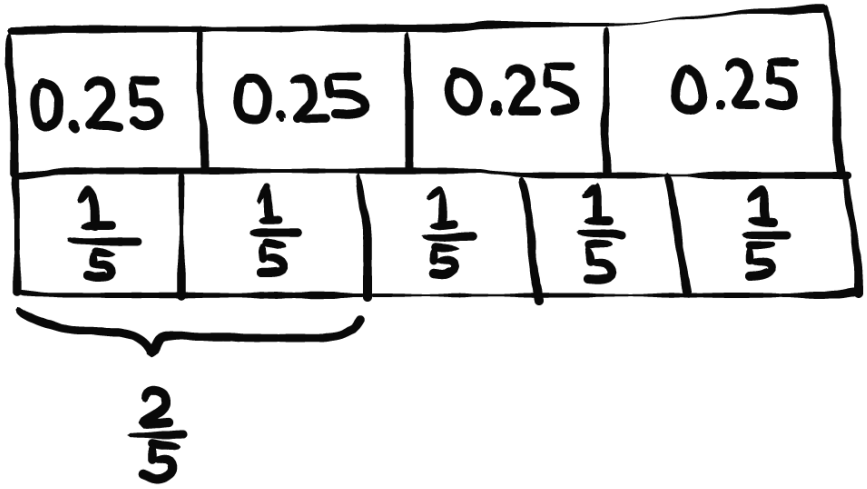
How many minutes will it take to cook a 3 kg chicken?

minutes

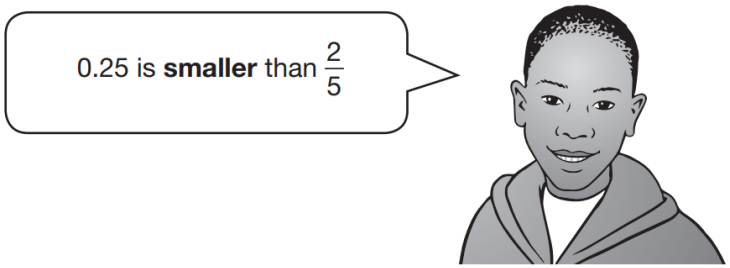


A bar model is used here to solve more complex problems involving duration of time.

Explanations

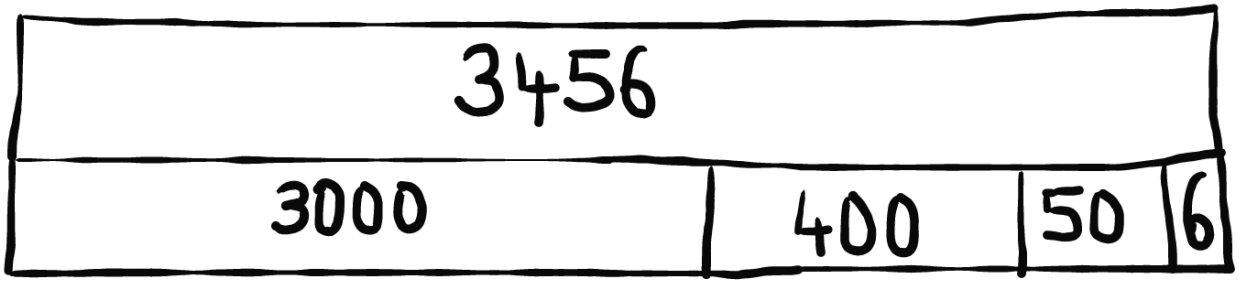


20 Adam says,



Explain why he is correct.

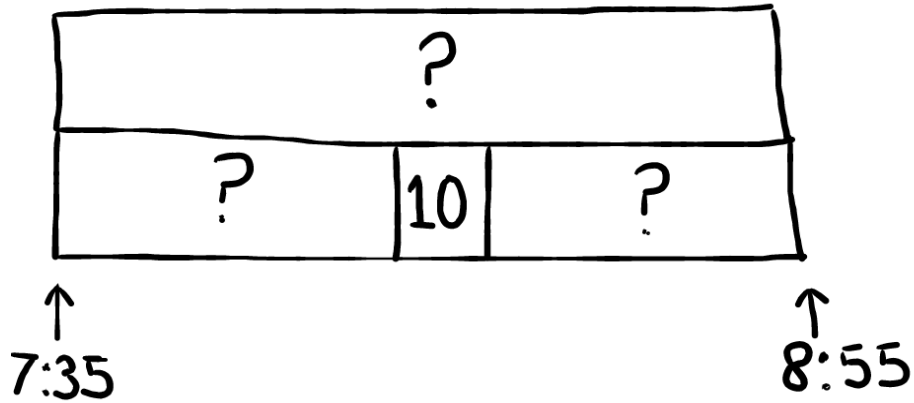
Bar Models: Place Value



When partitioning numbers to understand place value a bar model can be used to show the different parts.

Bar Models: Time

A film starts at 7:35 pm and ends at 8:55 pm.
There is an ice cream break of 10 minutes halfway through.
How long is the film?



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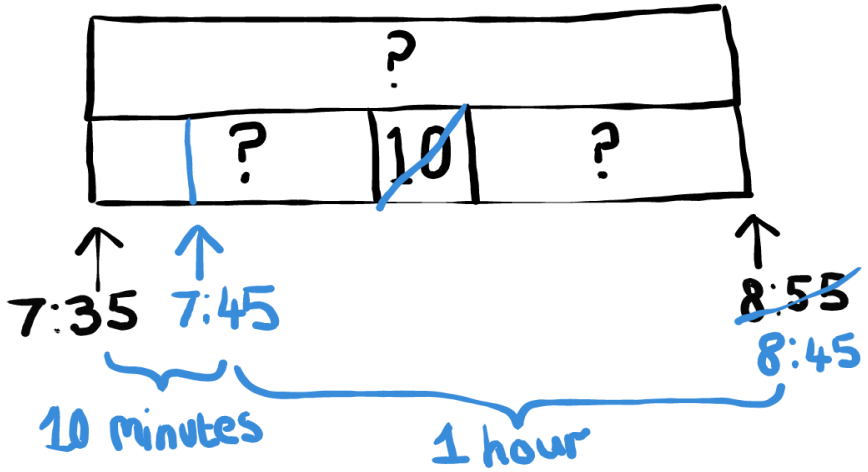
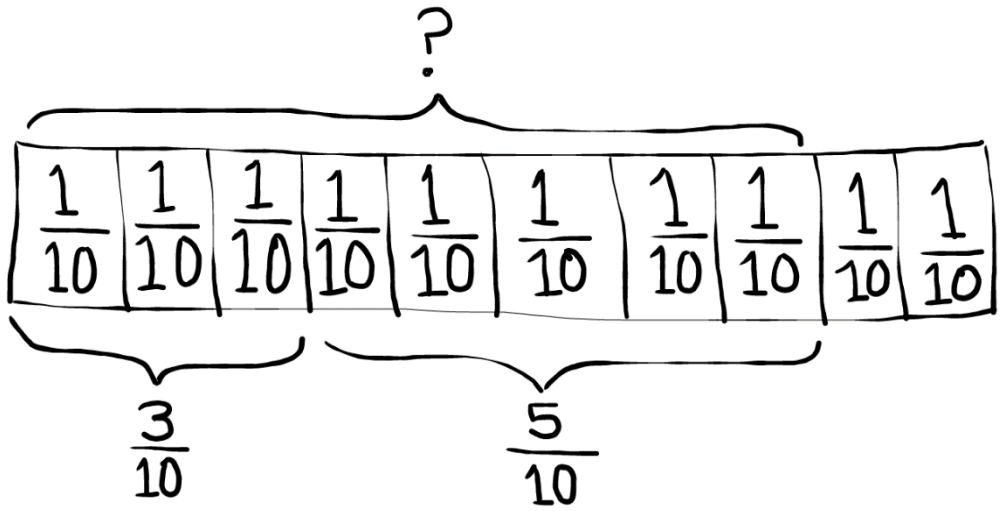


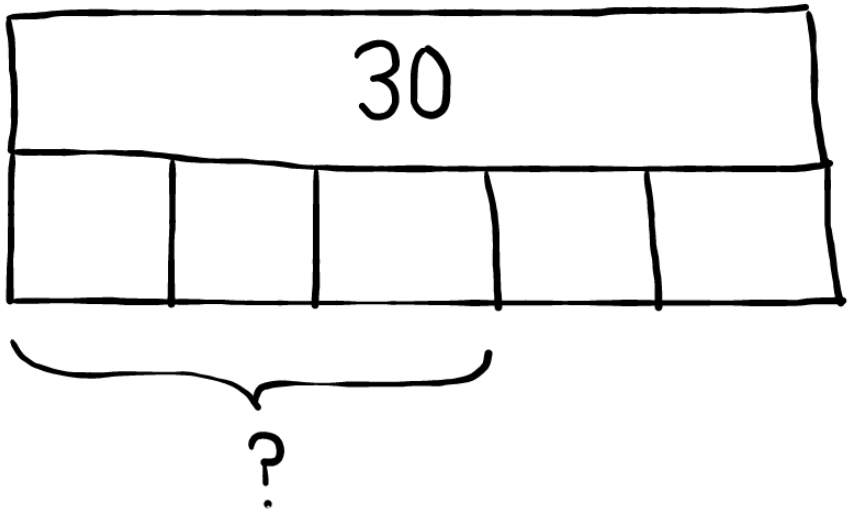
Bar Modelling: Adding Fractions

In Year 3, children start adding fractions with the same denominator such as $\frac{3}{10} + \frac{5}{10} = ?$



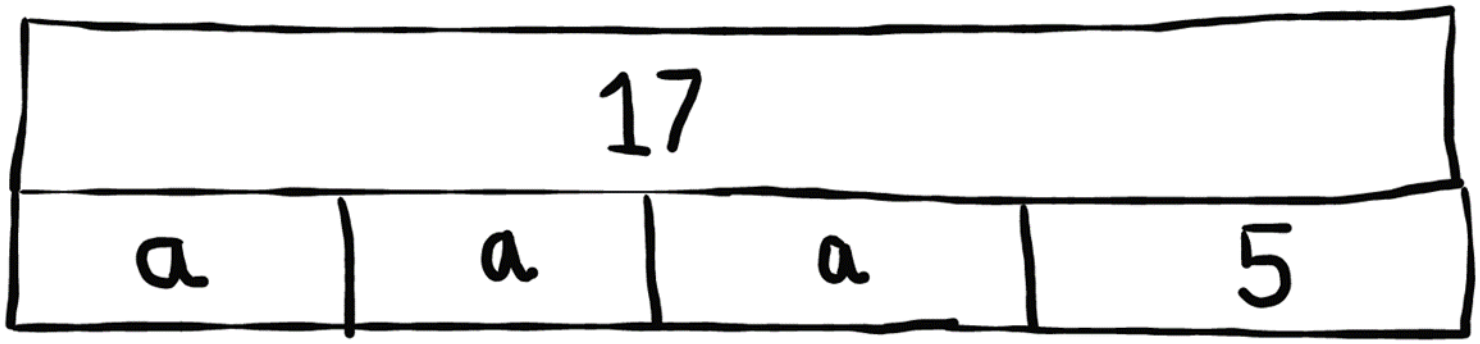
Bar Models: Fractions of Amounts

$\frac{3}{5}$ of 30 = ?



Bar Models: Solving Equations

Solve… $3a + 5 = 17$

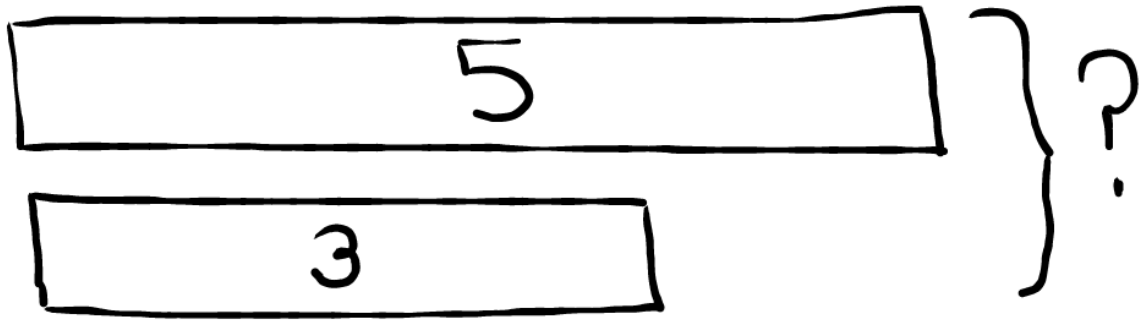


Comparison Models

Models With More Than One Bar

Comparison Models: Addition

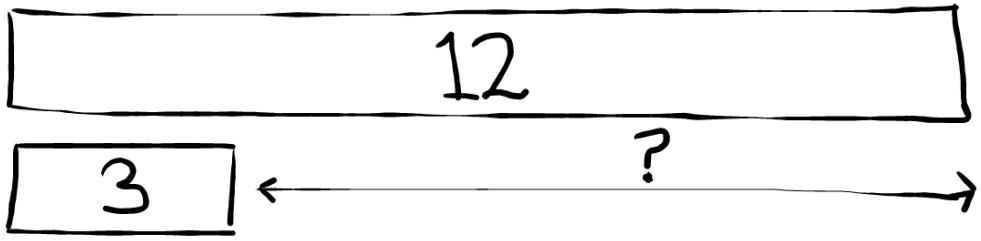
5 + 3 = ?



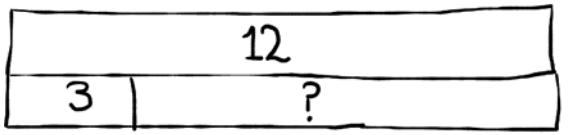
Comparison Models: Subtraction

Sandi has 12 football cards and Umar has 3.

How many more cards does Sandi have than Umar?

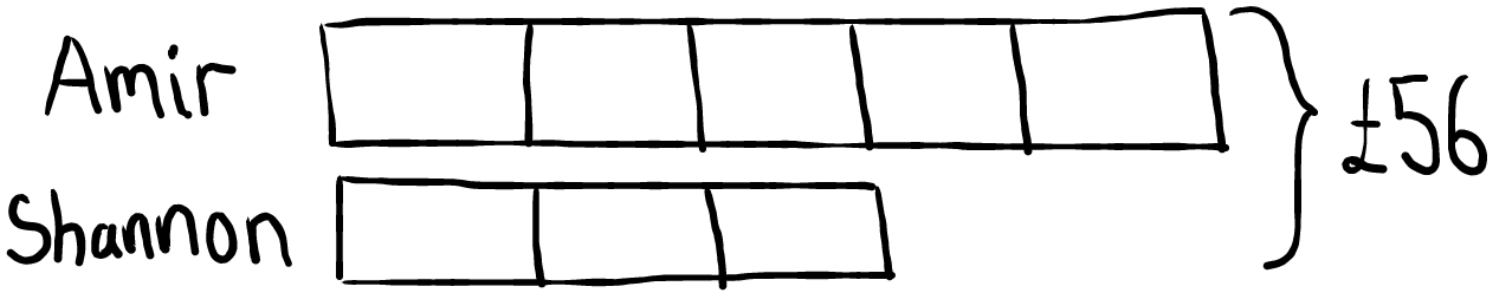


This kind of bar model makes much more sense for this kind of problem as we are finding the difference between two amounts. However it is only subtly different to the part/whole model.



Comparison Models: Ratio

Shannon and Amir share £56 in the ratio of 3:5.
How much money does each person get?



Comparison Models: Ratio

90 sweets are shared between three bowls (a, b and c) in the ratio of 1:2:3.

How many more sweets does bowl b have than bowl a?