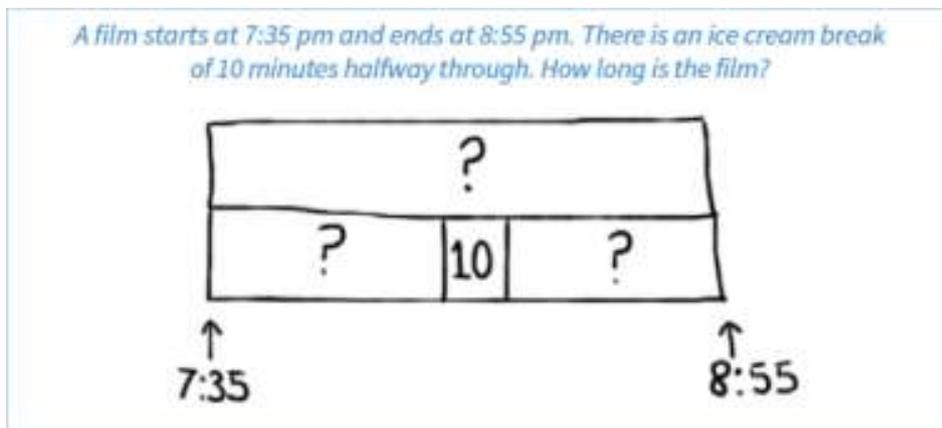# Other Types of Problem

**Lower KS2**

**Time Problems**
Time can be a tricky thing for children to visualise as their go-to pictorial model is a clock which goes round and round. As far as we know time doesn't go round, it moves forward in a line so bar models can represent some time problems quite well. Here's an example:

*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?*

Children can use bar models like this as a working document, changing parts of it as they work out their answers:

? 

? | 10 | ?

↑ 7:35   ↑ 7:45                    ↑ 8:55
                                      8:45

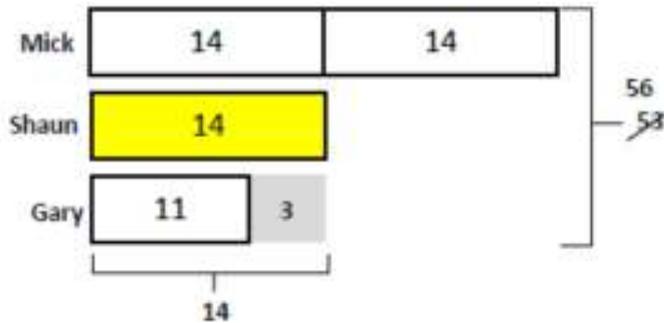10 minutes              1 hour
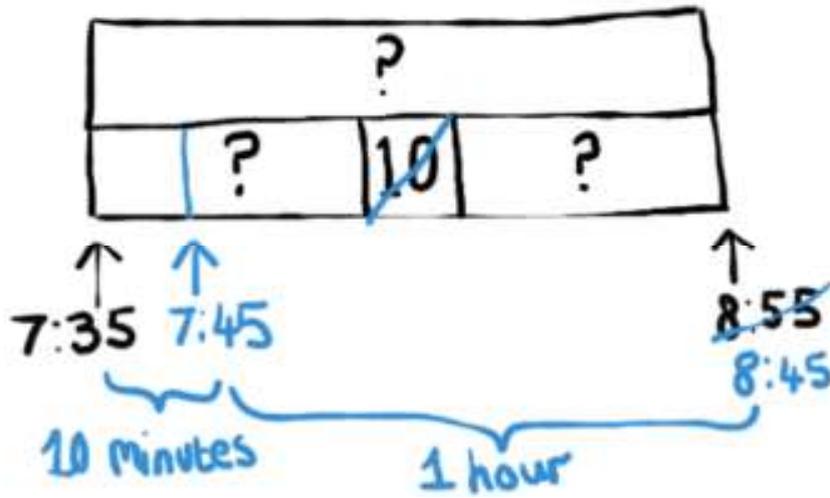
## Multistep Problems

Five friends are having a pizza party. They buy one large pizza and three small pizzas. They share the cost equally. How much does each person pay?
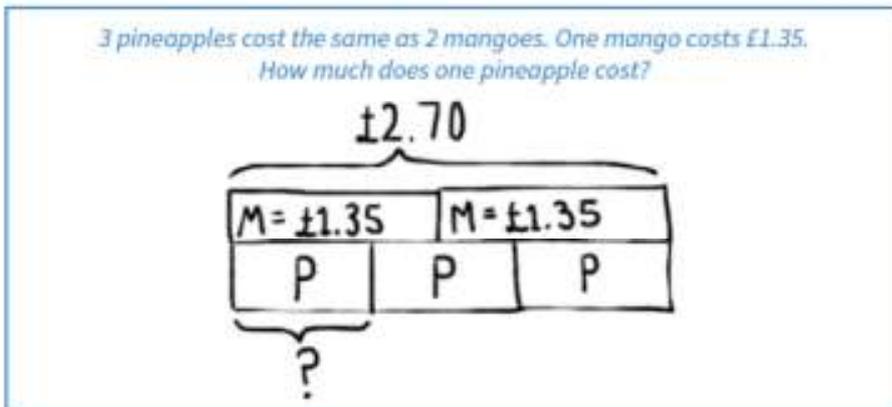
Small pizza  £4

Large pizza  £6

1 large pizza          3 small pizzas

| £6 | £4 | £4 | £4 |

←── Total cost

Individual cost
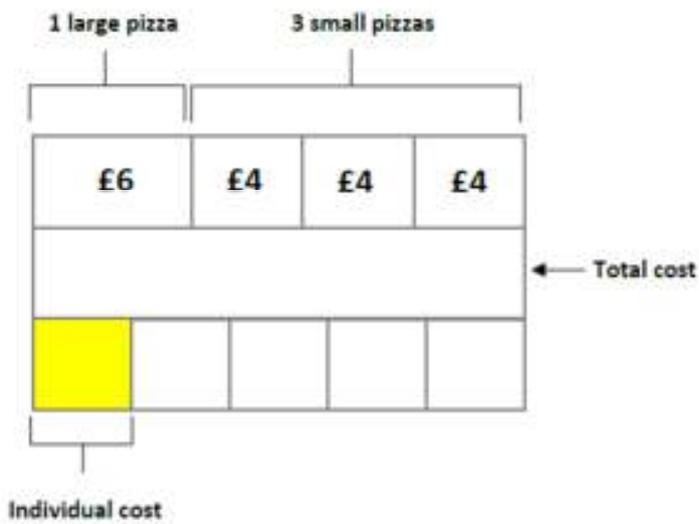
## Upper KS2

Mick, Shaun and Gary are brothers. *Mick is twice as old as Shaun. Gary is 3 years younger than Shaun. The sum of all their ages is 53. How old is Shaun?*

| Mick | 14 | 14 |
|------|----|----|

56
53

| Shaun | 14 |
|-------|----|

| Gary | 11 | 3 |
|------|----|---|

14

Take question 14 from the **2017 SATs Reasoning Paper 3**, for example:

*3 pineapples cost the same as 2 mangoes. One mango costs £1.35. How much does one pineapple cost?*

£2.70

| M = £1.35 | M = £1.35 |
|-----------|-----------|
| P | P | P |

?

Using the part/whole bar model in this way, allows children to see that 3p = 2m. Children now know, and can therefore complete, the calculation (written or mental) alongside their bar model.
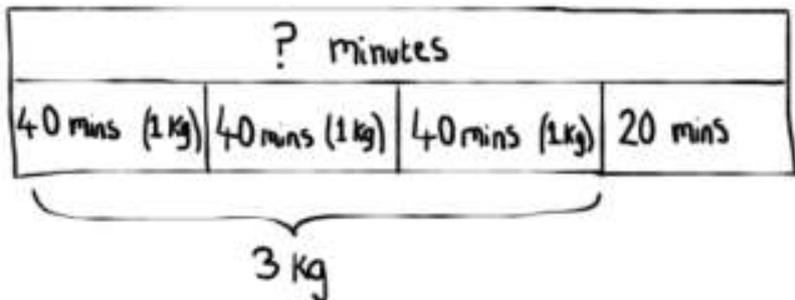
*Question 11 of 2017 SATs Reasoning Paper 2:*

**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

| ? minutes | | | |
|---|---|---|---|
| 40 mins (1 kg) | 40 mins (1 kg) | 40 mins (1 kg) | 20 mins |

3 kg

*Question 20 from the 2017 SATs Reasoning Paper 2:*

**20** Adam says,

0.25 is **smaller** than $\frac{2}{5}$

Explain why he is correct.

| 0.25 | 0.25 | 0.25 | 0.25 |
|:---:|:---:|:---:|:---:|

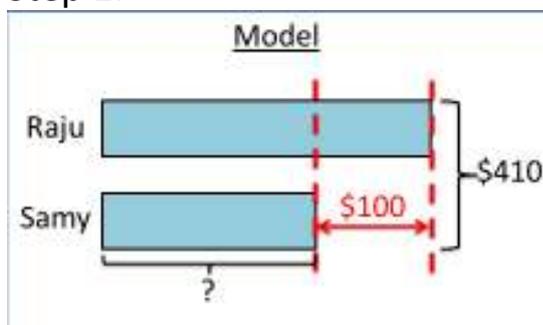$$\frac{1}{5} \quad \frac{1}{5} \quad \frac{1}{5} \quad \frac{1}{5} \quad \frac{1}{5}$$
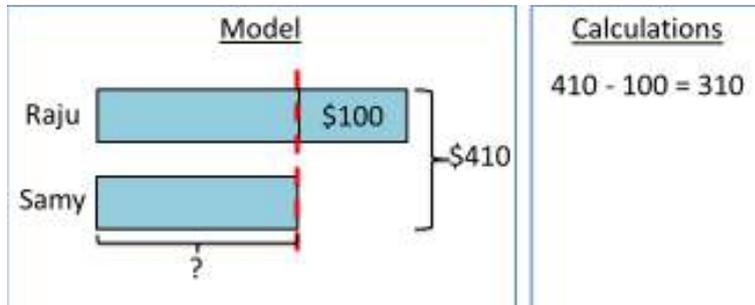
$$\frac{2}{5}$$
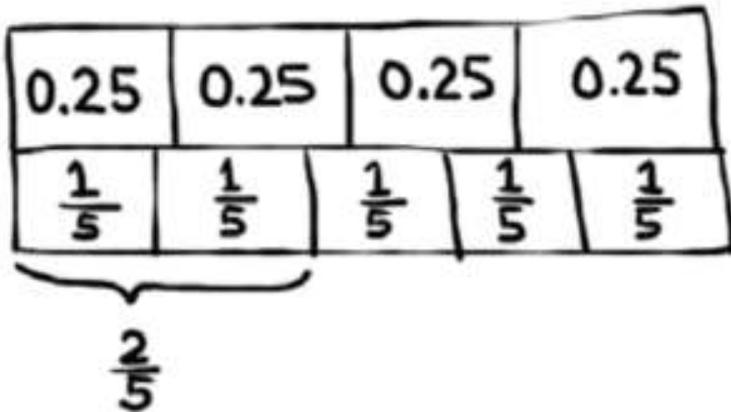
Drawing and describing a bar model can help children to develop the language they need to talk about a problem.

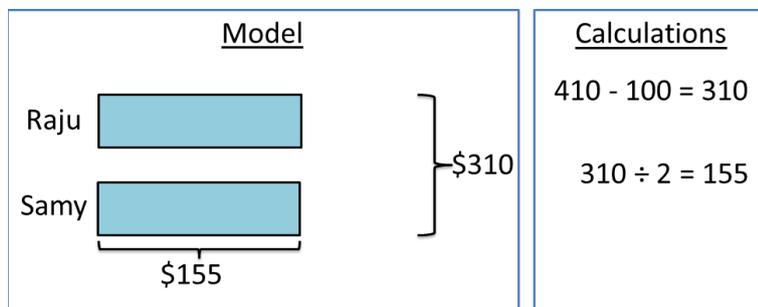*Raju and Samy shared $410 between them. Raju received $100 more than Samy. How much money did Samy receive?*

Step 1:

Model

Raju

Samy

$410

$100

?

Step 2:

| Model | Calculations |
|---|---|
| Raju [========== $100] <br> Samy [========] <br> ? $410 | 410 - 100 = 310 |

## Step 3:

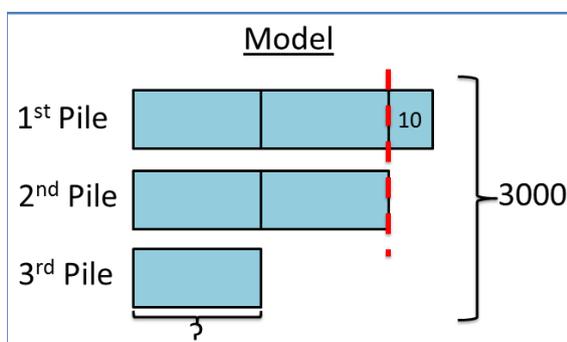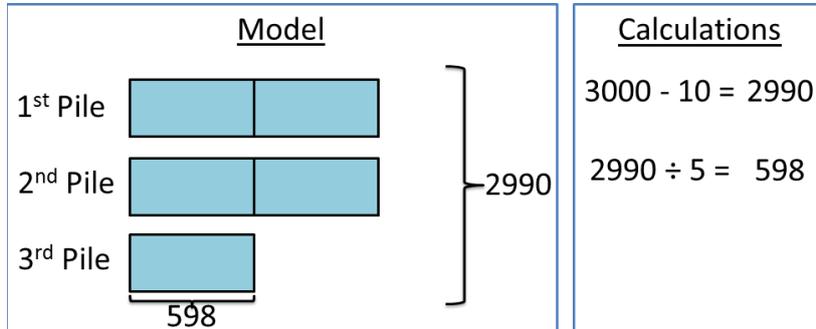| Model | Calculations |
|---|---|
| Raju [==========] <br> Samy [==========] <br> $155 $310 | 410 - 100 = 310 <br><br> 310 ÷ 2 = 155 |

*3000 exercise books are arranged into 3 piles.  The first pile has 10 more books than the second pile.  The number of books in the second pile is twice the number of books in the third pile. How many books are in the third pile?*
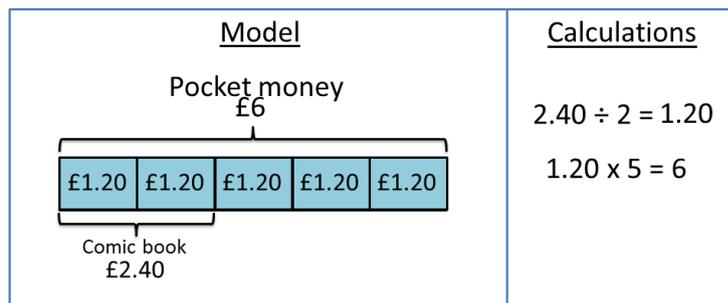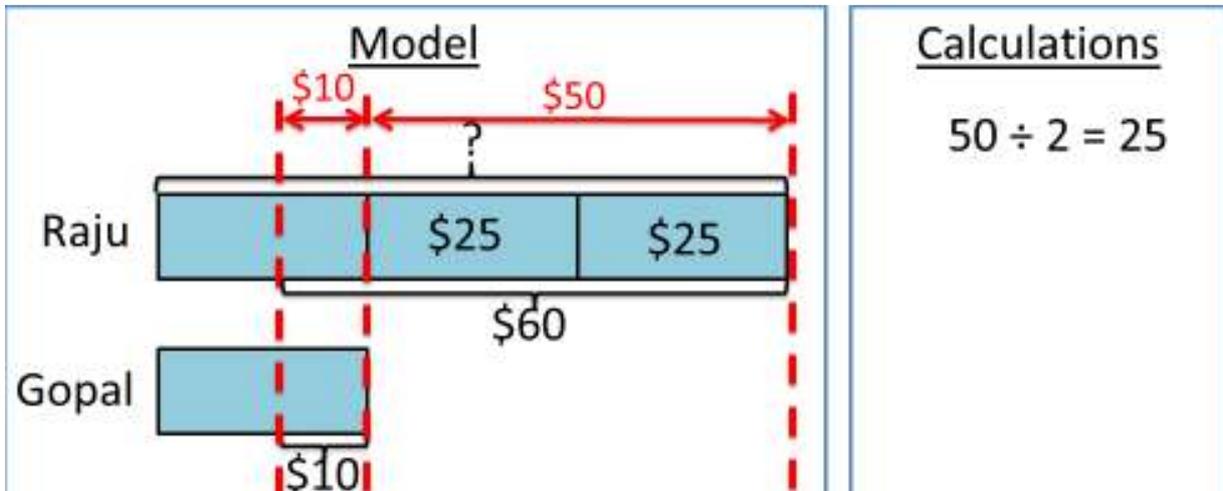
## Step 1:

**Model**

1st Pile [======|====|10] <br>
2nd Pile [======|====] } 3000 <br>
3rd Pile [====] <br>
?

Step 2:

| Model | Calculations |
|---|---|
| 1st Pile ▭▭ <br> 2nd Pile ▭▭ <br> 3rd Pile ▭ <br> 598 | 3000 - 10 = 2990 <br><br> 2990 ÷ 5 = 598 |

2990 (bracket spanning the three piles)

*Jenny spent $^2/_5$ of her pocket money on a comic book. The price of the comic book was £2.40. How much pocket money did Jenny get?*

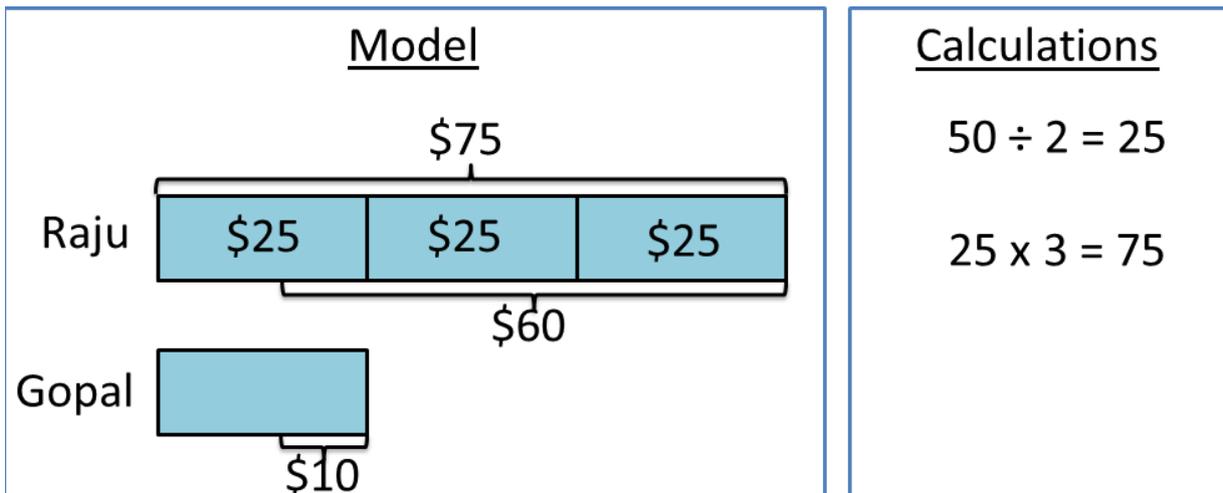| Model | Calculations |
|---|---|
| Pocket money <br> £6 <br> £1.20 \| £1.20 \| £1.20 \| £1.20 \| £1.20 <br> Comic book <br> £2.40 | 2.40 ÷ 2 = 1.20 <br><br> 1.20 x 5 = 6 |

*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?*

Step 1:

| Model | Calculations |
|---|---|
| $10   $50<br>?<br>Raju   $25   $25<br>$60<br>Gopal<br>$10 | 50 ÷ 2 = 25 |

Step:

| Model | Calculations |
|---|---|
| $75<br>Raju   $25   $25   $25<br>$60<br>Gopal<br>$10 | 50 ÷ 2 = 25<br><br>25 x 3 = 75 |

**Key Stage 3 Problems**

1. Ralph posts 40 letters, some of which are first class, and some of which are second class. He posts four times as many second class letters as first.

How many of each class of letter does he post? (This question appeared on a GCSE higher tier paper.)

2. A computer game was reduced in a sale by 20% and it now costs £55. What was the original cost?

3. A computer game was reduced in a sale by 30% and it now costs £77. What was the original cost?

4. Sally had a bag of marbles. She gave one-third of them to Rebecca, and then one quarter of the remaining marbles to John. Sally then had 24 marbles left in the bag. How many marbles were in the bag to start with?

5. Peter is playing Space Explorer on his computer. He finished 13 of the levels last week and 25 of the remaining levels this week. He has 12 more levels to complete. How many levels does Space Explorer have?

6. Sam bakes a variety of biscuits. One third are peanut, half  are raisin, the remaining 12 were oat. How many biscuits are baked?

7. Tom spent 30% of his pocket money and put away 45% into his savings. He was left with £2.50. How much pocket money did he receive?

8. Two numbers are in the ratio 4:5. They both sum to 135. Identify both numbers.

9. Two numbers are in the ratio 6:7. They both sum to 169. Identify both numbers.

10. A herbal skin treatment uses yoghurt and honey in the ratio 5:3. How much yoghurt is needed to mix with 130 g of yoghurt?