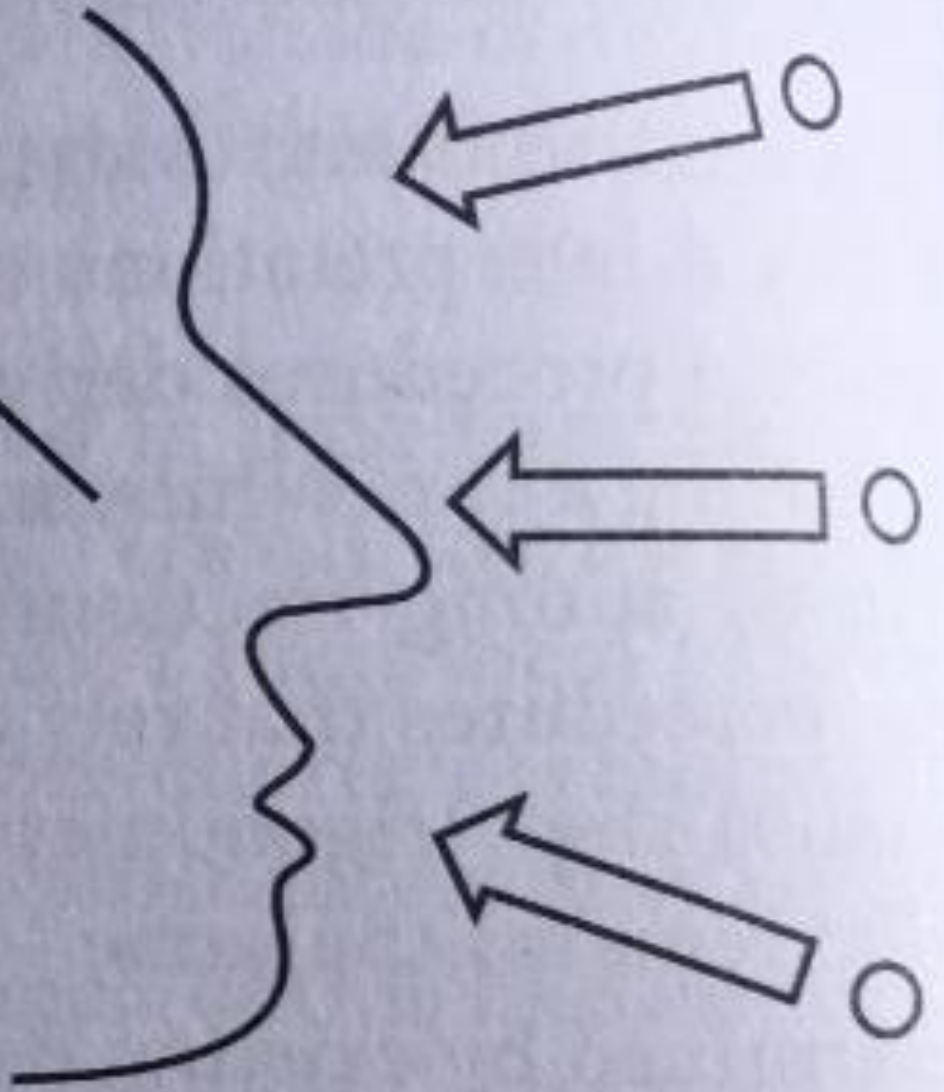
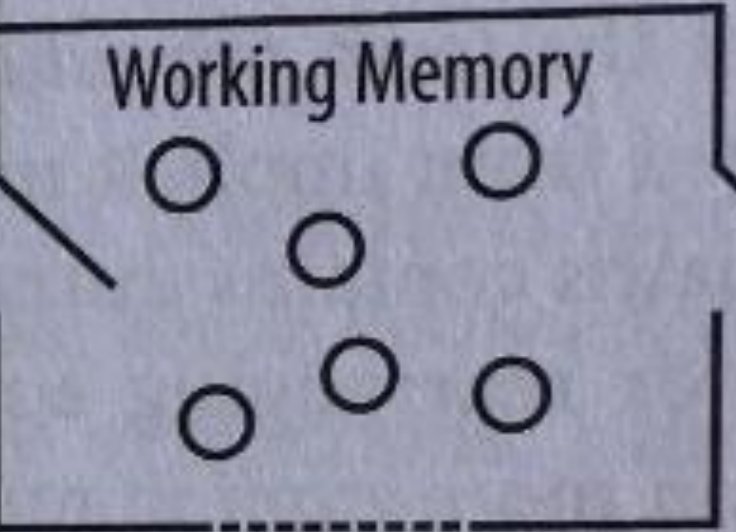
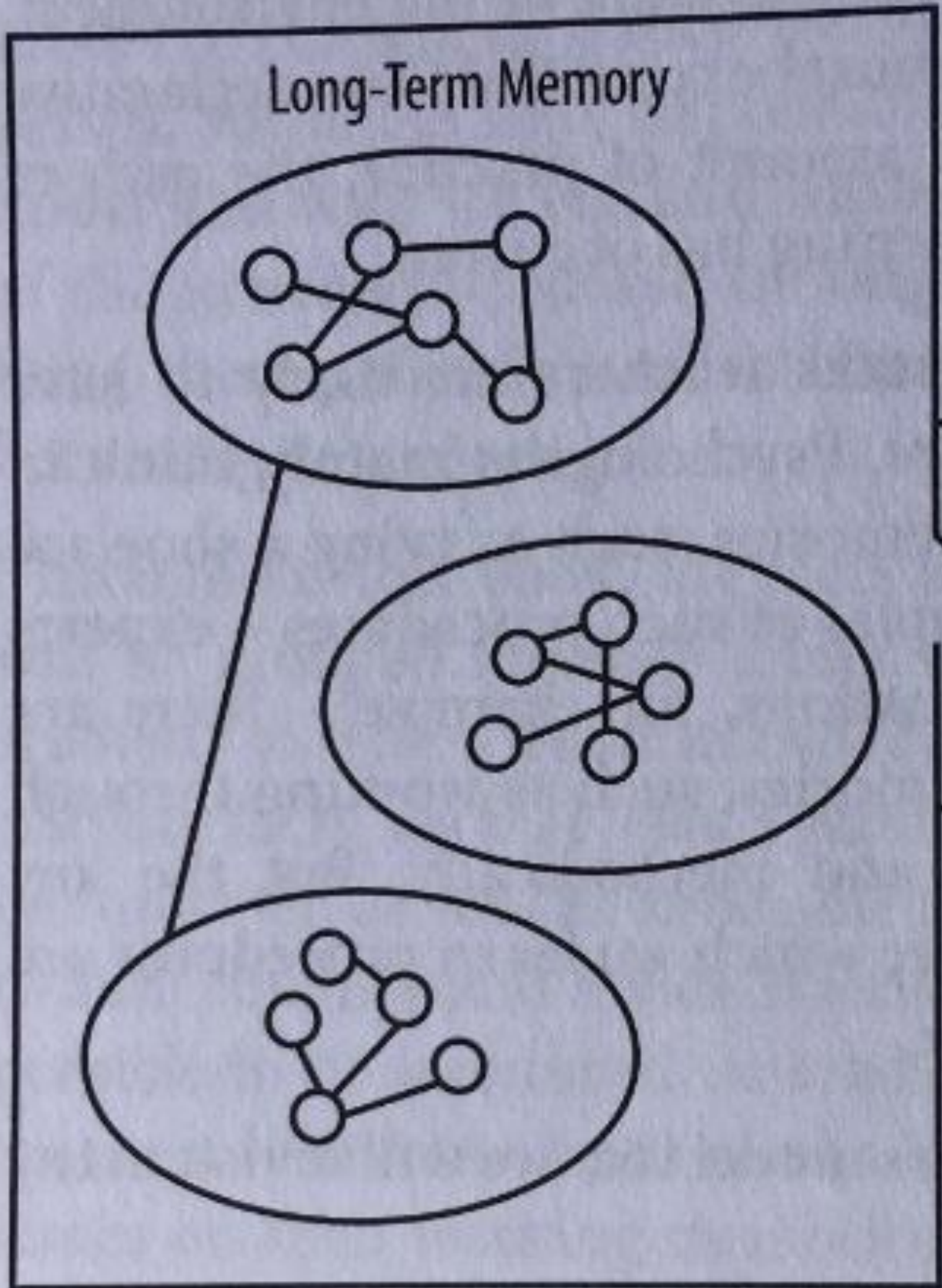


# Using Numberless Prompts to Deconstruct Word Questions, Y2 & Y3

***Build understanding of the deep structure of word questions. Focus thinking on structures, give all children success, break questions into small steps, add challenge.***



The toy costs

I pay

I get

20p

change

Zara



Sandwich: £1.80

Drink: 30p



Ollie spends  on a teddy.

He pays with  coins.

Tick the coins Ollie pays with.



Ollie spends 30 pence on a teddy.

He pays with  coins.

Tick the coins Ollie pays with.



Ollie spends 30 pence on a teddy.

He pays with two coins.

Tick the coins Ollie pays with.



When students are presented with a mathematics word problem, their first response often is to try to compute an answer, even before they have tried to understand the problem.

Studies of expertise have shown that experts attend more to the underlying structure of a problem, whereas novices rely more on surface features.

Expert problem solvers typically spend more time thinking about problems and trying to understand them than do novices, who tend to immediately execute a solution.

**Removing Opportunities to Calculate Improves Students' Performance on Subsequent Word Problems.**      *Givvin and Stigler (2019)*



A group of tourists planned a 3-day walking trip from Big Rock to Eagles Landing, a total of 66 km. On the first day they walked 22 km. On the second day they walked 20 km.

**How far would they have to walk on the third day of their trip?**

A group of tourists planned a 3-day walking trip from Big Rock to Eagles Landing. On the first day they walked one third of the total distance. On the second day they walked a little less.

**How far would they have to walk on the third day of their trip?**

**Removing Opportunities to Calculate Improves Students' Performance on Subsequent Word Problems.** *Givvin and Stigler (2019)*



Participants who explained the non-calculable problems performed significantly better on the transfer test than participants who explained the calculable problems.

We hypothesized that the mechanism at play was a reduction in instrumental thinking and an increase in relational thinking.

**Removing Opportunities to Calculate Improves Students' Performance on Subsequent Word Problems.** *Givvin and Stigler (2019)*

Jen had 16 sweets. Zara had 7 sweets.

Jen gave Zara 5 sweets.

**Who has the most sweets now?**

Jen had  sweets.

Zara had  sweets.

Jen gave Zara  sweets.

**Who has the most sweets now?**



Jen had more sweets than Zara.

Jen gave Zara some of her sweets.

**Now Zara has more sweets.**

Jen had more sweets than Zara.

Jen gave Zara some of her sweets.

**Jen still has more sweets.**

1. Jen had 20 sweets. Zara had 8 sweets.  
Jen gave Zara 3 sweets.

**Who has the most sweets now?**

2. Raj had 20 sweets. Tim had 12 sweets.  
Raj gave Tim 3 sweets.

**Who has the most sweets now?**

3. Kam had 20 sweets. Jack had 12 sweets.  
Kam gave Jack 5 sweets.

**Who has the most sweets now?**

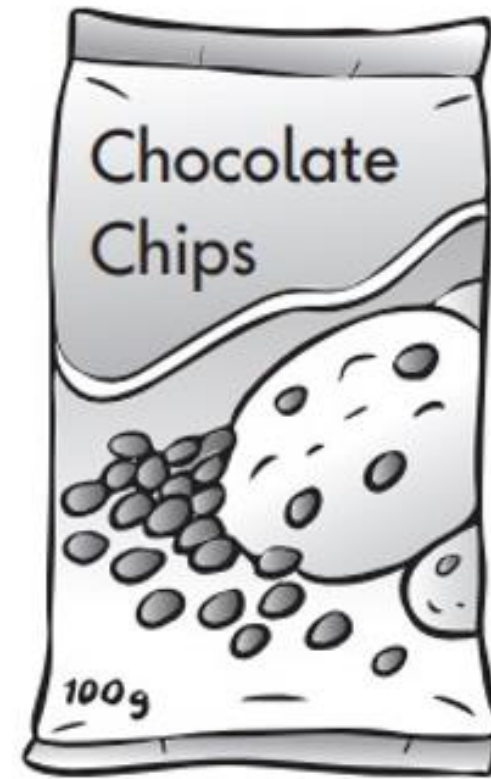
**Extend:** write a question where Jack ends up with 5 more sweets than Kam.

There are **100g** of chocolate chips in the bag.

Sita uses **25g**.

Ben uses **35g**.

How many grams of chocolate chips are **left** in the bag?



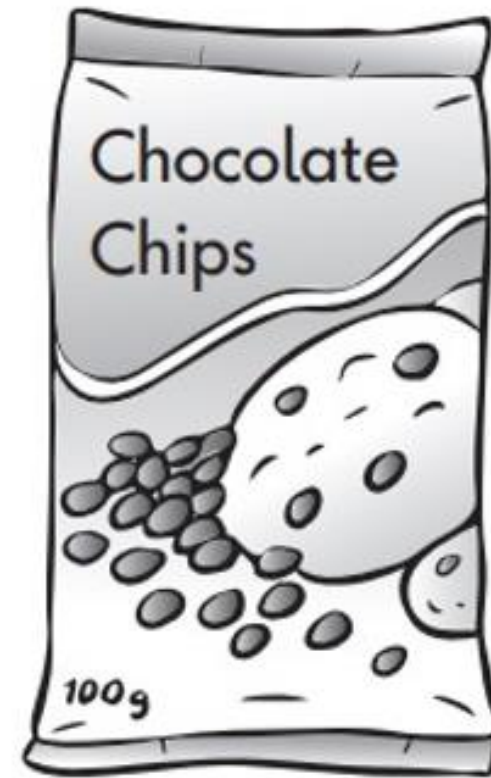


There are **100g** of chocolate chips in the bag.

Sita uses **25g**.

Ben uses **35g**.

How many grams of chocolate chips are **left** in the bag?

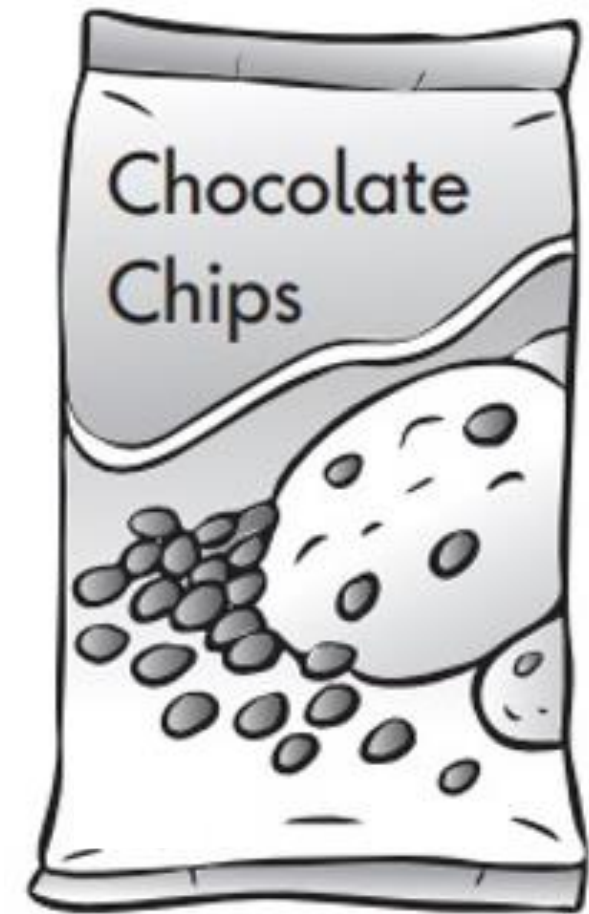


There are  chocolate chips in the bag.

Sita has

Ben has

There are  left in the bag.

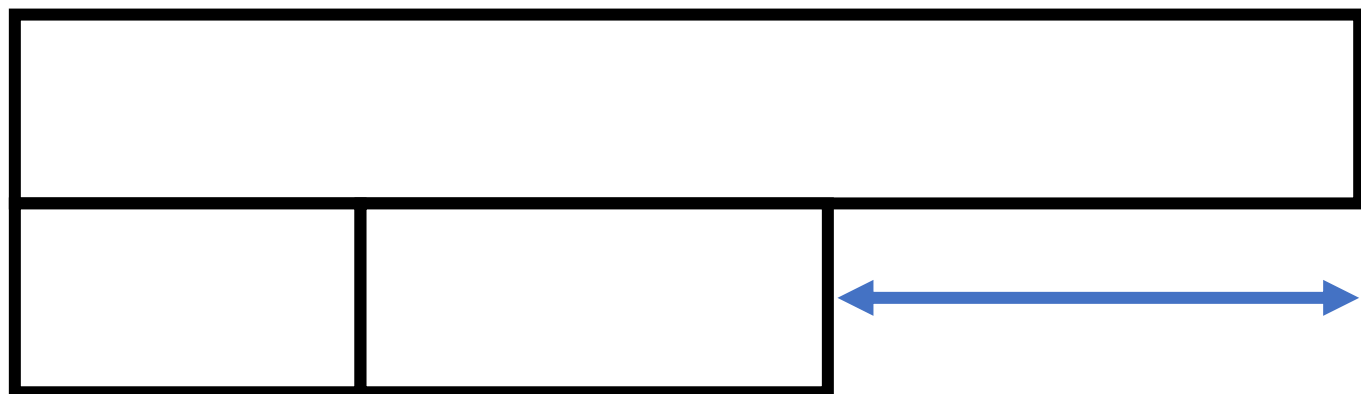
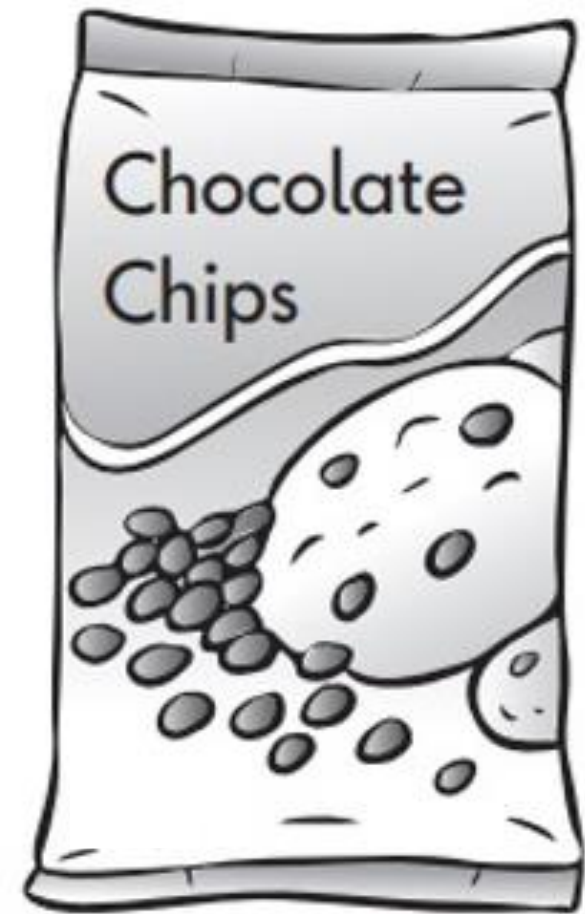


There are  chocolate chips in the bag.

Sita has

Ben has

There are  left in the bag.



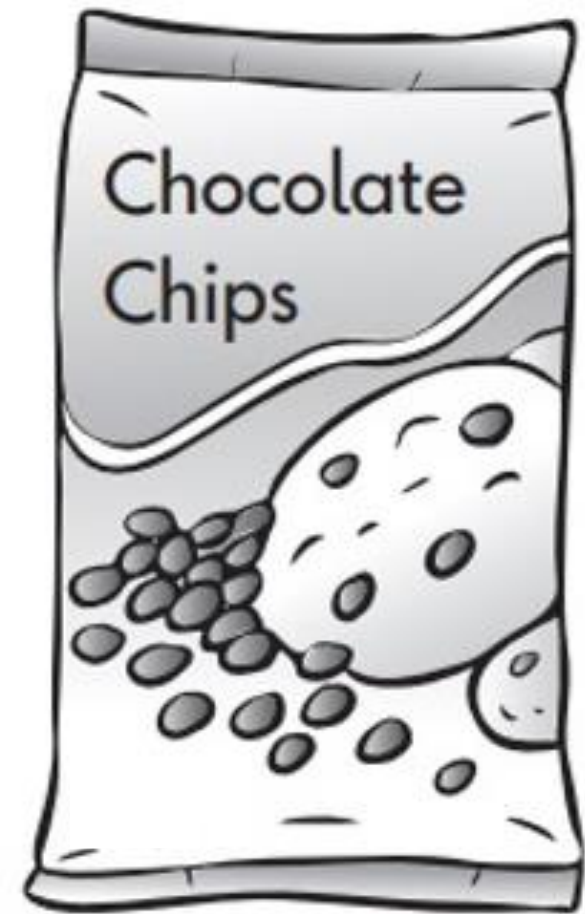


There are  chocolate chips in the bag.

Sita has

Ben has

There are  left in the bag.

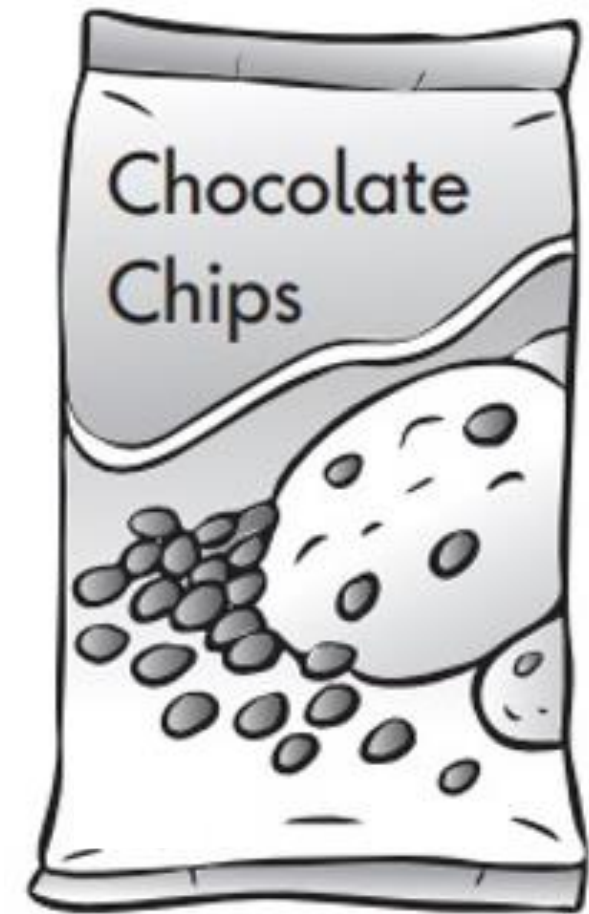


There are  chocolate chips in the bag.

Sita has

Ben has

There are  left in the bag.



1. There are 10 chocolate chips in the bag. Then, Sam eats 4.  
**How many are left in the bag?**
2. There are 20 chocolate chips in the bag. Then, Holly eats 4.  
**How many are left in the bag?**
3. There are 20 chocolate chips in the bag. Then, Hassan eats 4 and Max eats 9.  
**How many are left in the bag?**
4. There are 20 chocolate chips in the bag. Then, Jim eats  $\frac{1}{4}$  and David eats 9.  
**How many are left in the bag?**

**Extend:** Write two more questions in the sequence.



Nima has £100

She buys a t-shirt for £18 and a bag for £27

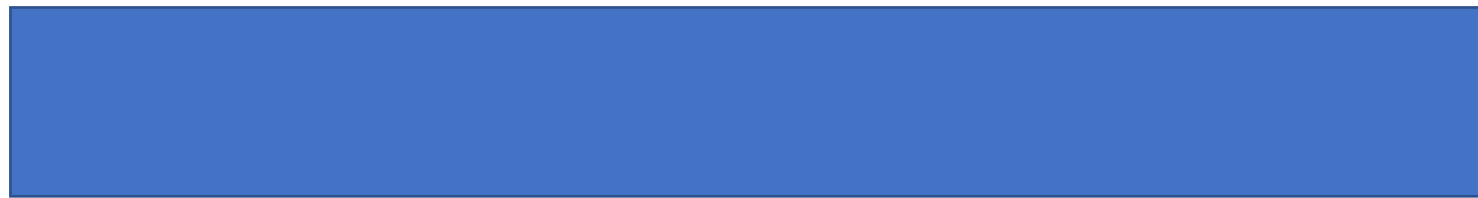


How much money does she have left?

Nima has £100



Nima has £100



**How much does Nima spend?**

**How much money does Nima have left?**

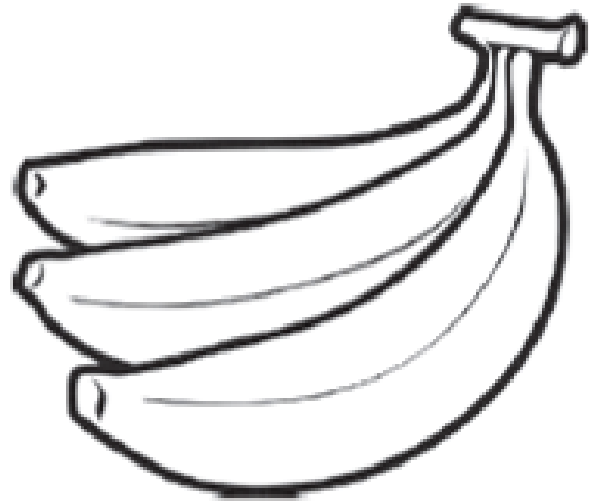
**How much change does Nima get?**

**How much more money does Nima need?**

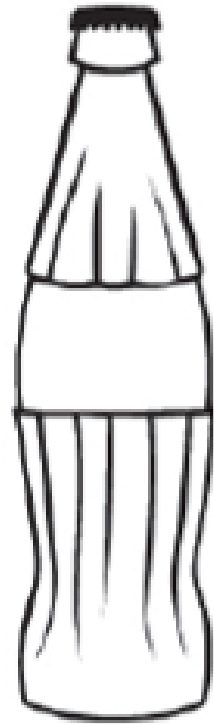
**How many bags can Nima afford?**

**Nima gets £10 change. What did she buy?**

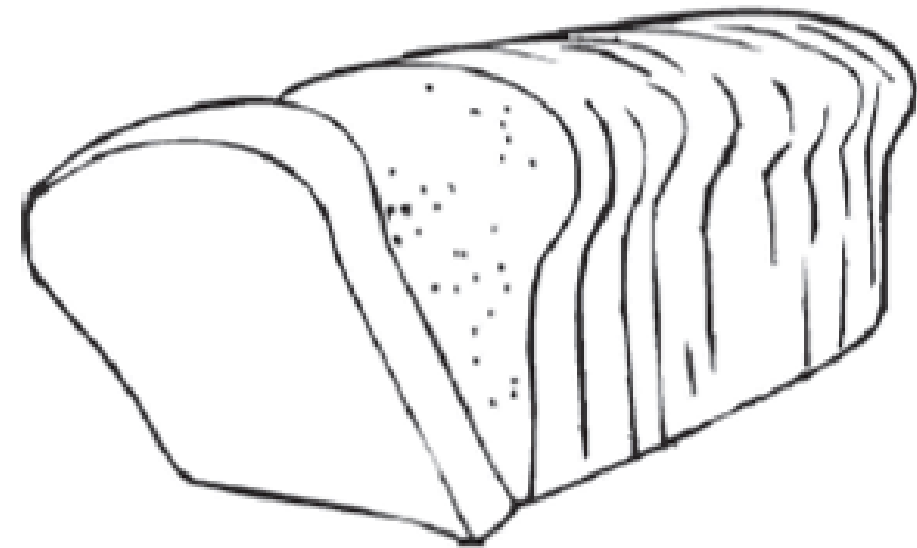
Here is the cost of some items in a shop.



Banana 20p



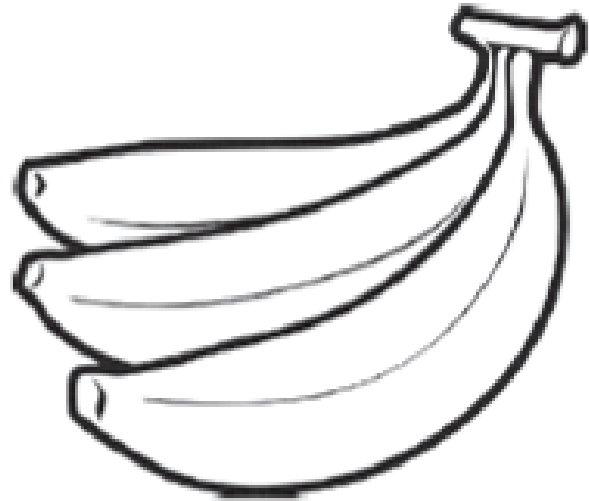
Drink 50p



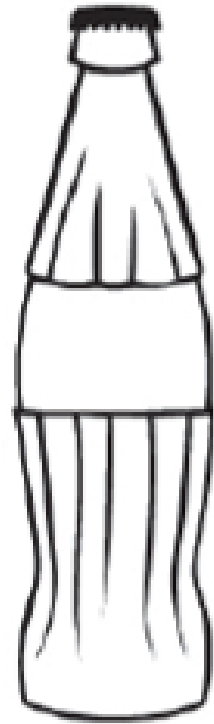
Bread 40p



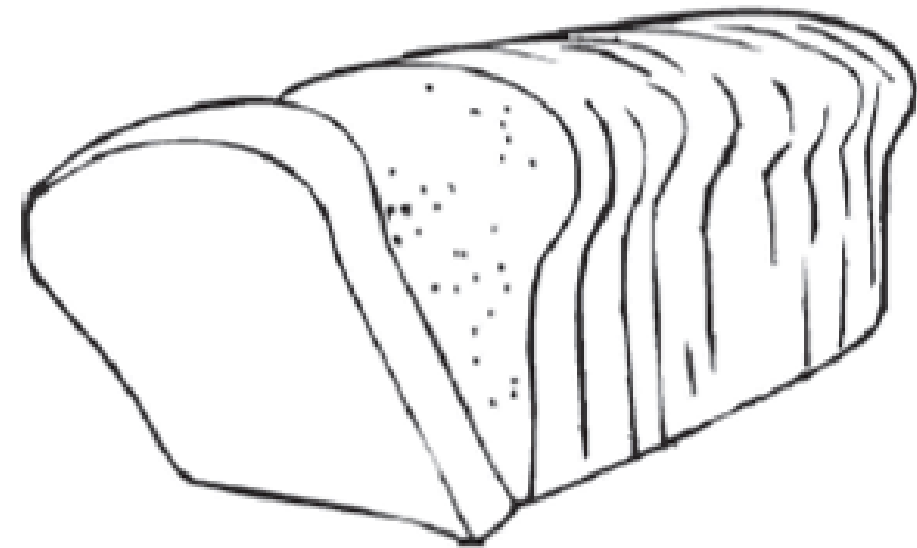
Here is the cost of some items in a shop.



Banana 20p



Drink 50p



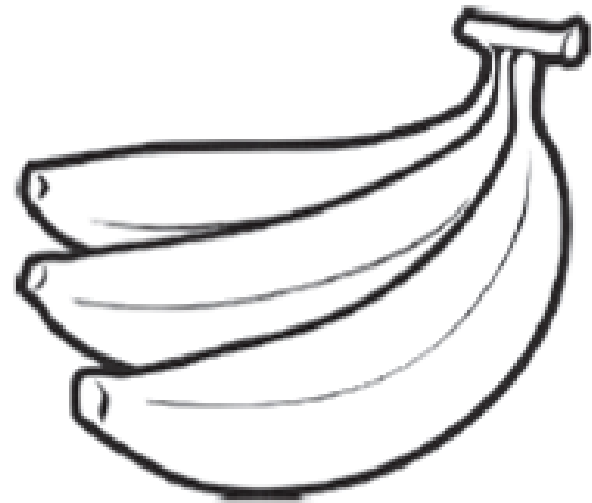
Bread 40p



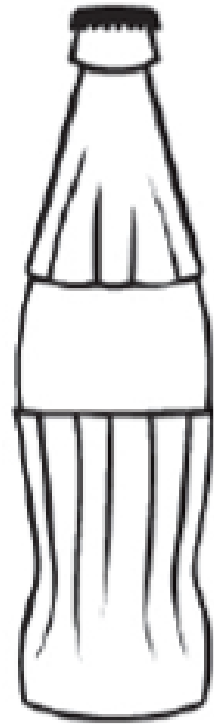
**How much does it cost?**



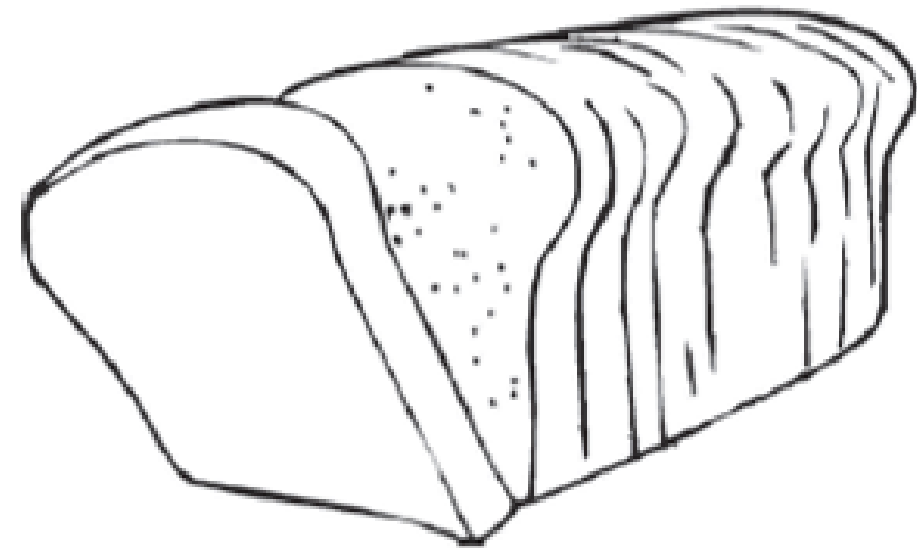
Here is the cost of some items in a shop.



Banana 20p



Drink 50p

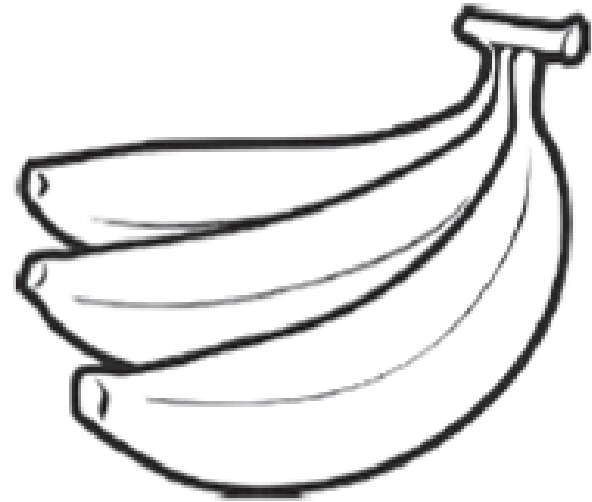


Bread 40p

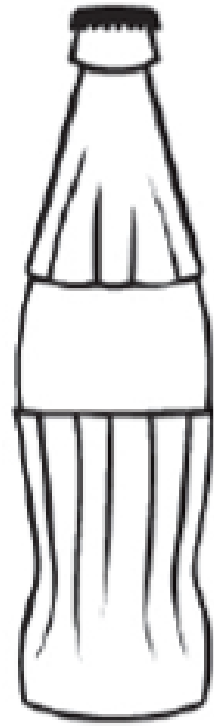
Sam buys two bananas and a drink.

**How much does it cost?**

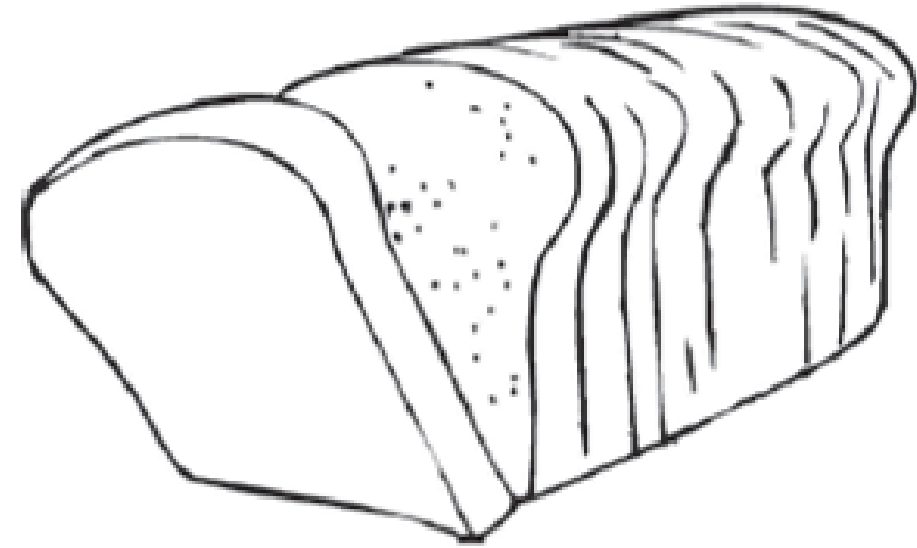
Here is the cost of some items in a shop.



Banana 20p



Drink 50p

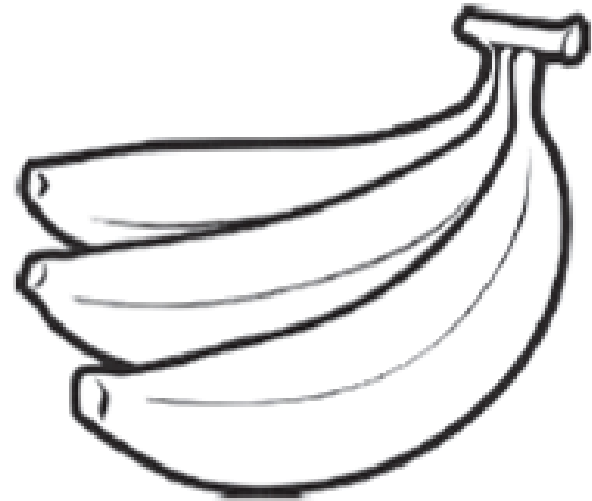


Bread 40p

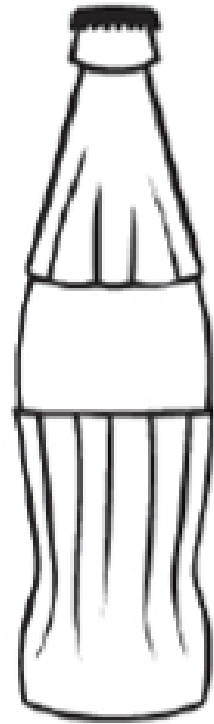


**How much change does he get?**

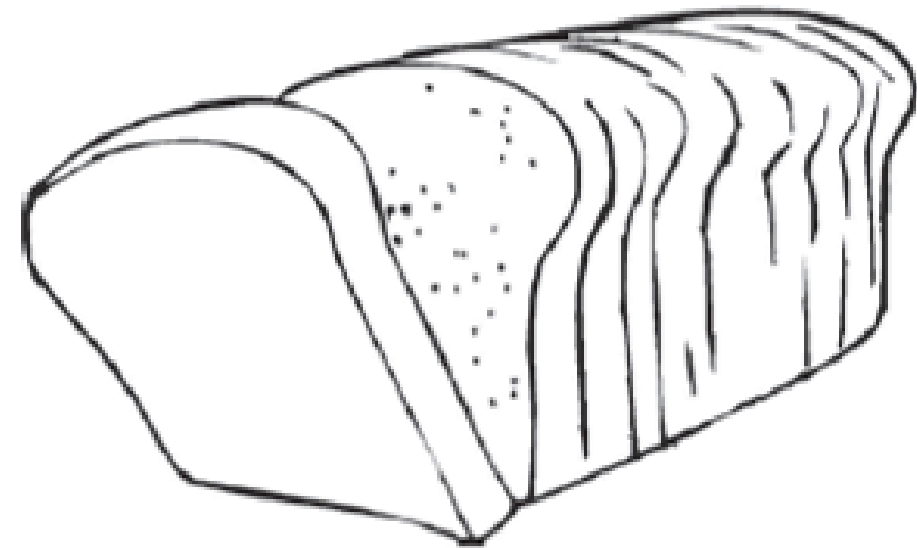
Here is the cost of some items in a shop.



Banana 20p



Drink 50p

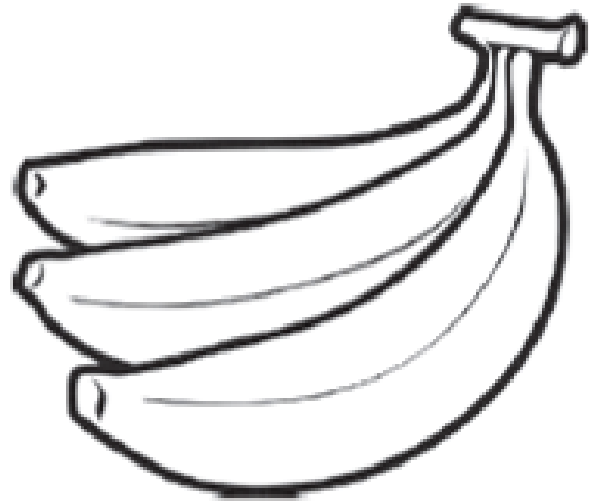


Bread 40p

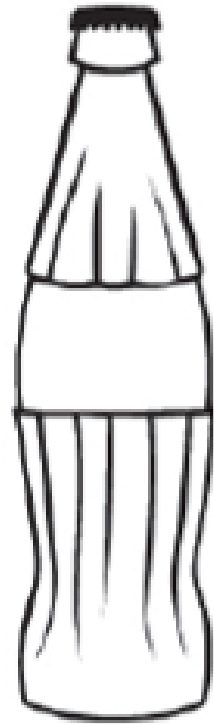
Sam buys two bananas and a drink.  
He pays with a £1 coin.

**How much change does he get?**

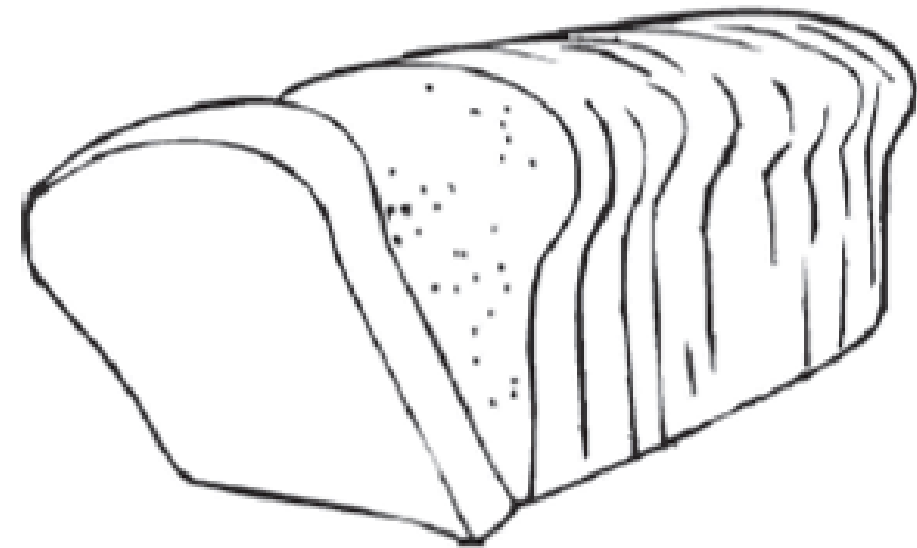
Here is the cost of some items in a shop.



Banana 20p



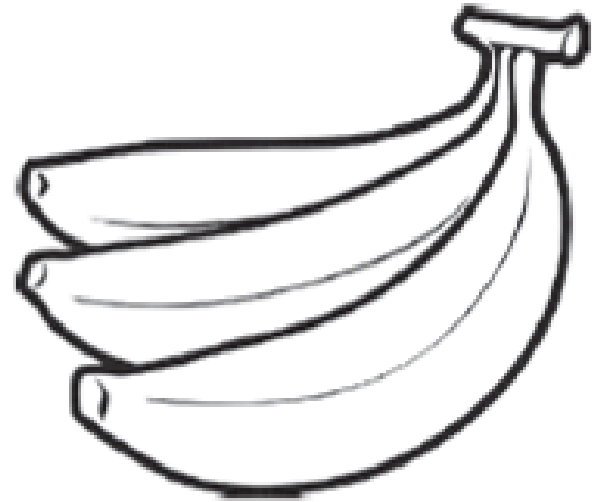
Drink 50p



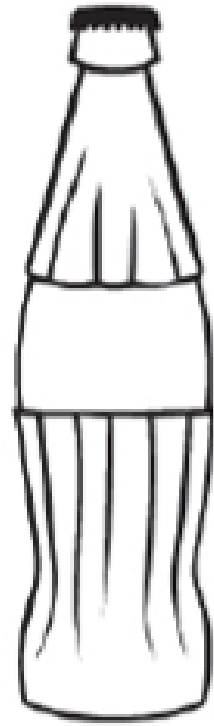
Bread 40p

**How many bananas can he buy?**

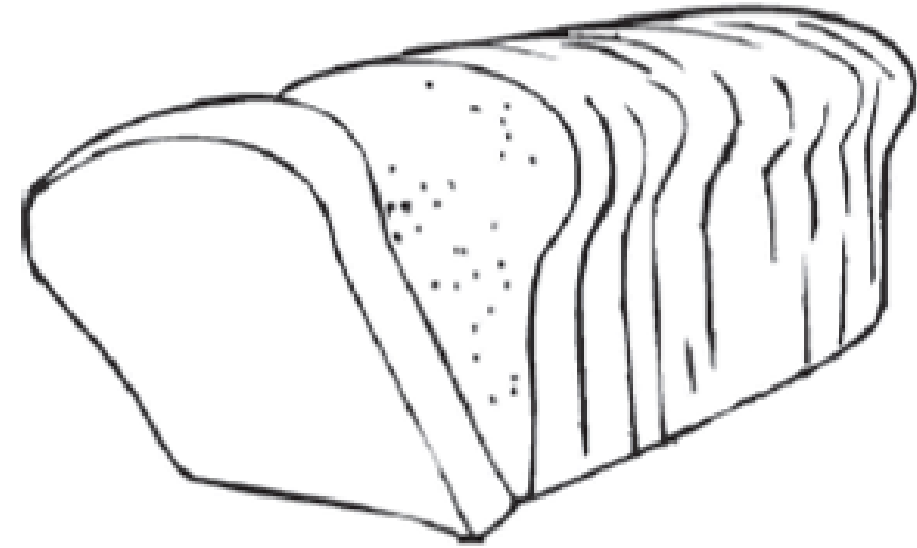
Here is the cost of some items in a shop.



Banana 20p



Drink 50p



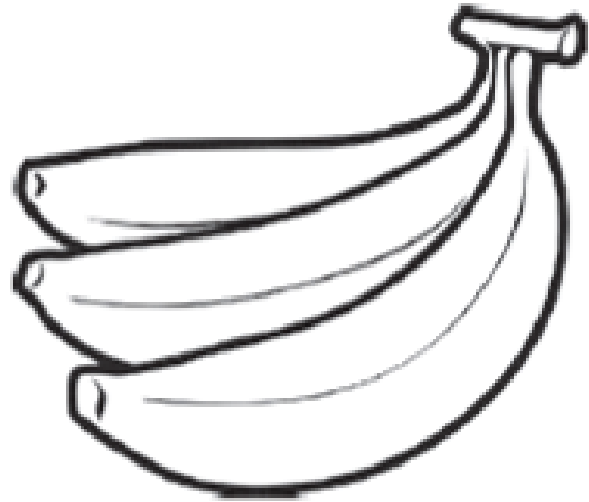
Bread 40p

Sam has £1.

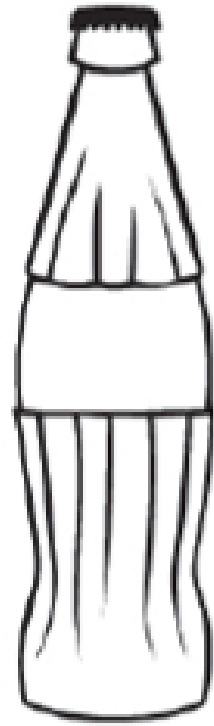
**How many bananas can he buy?**



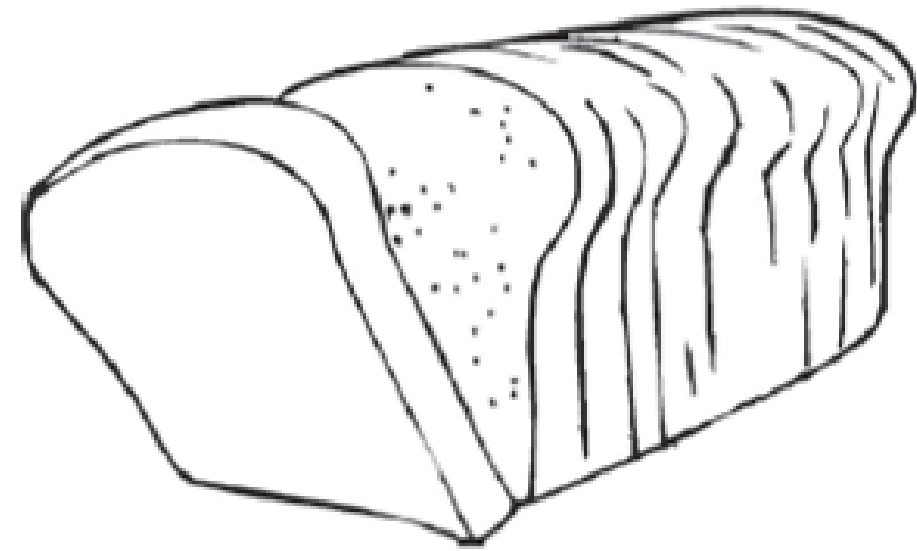
Here is the cost of some items in a shop.



Banana 20p



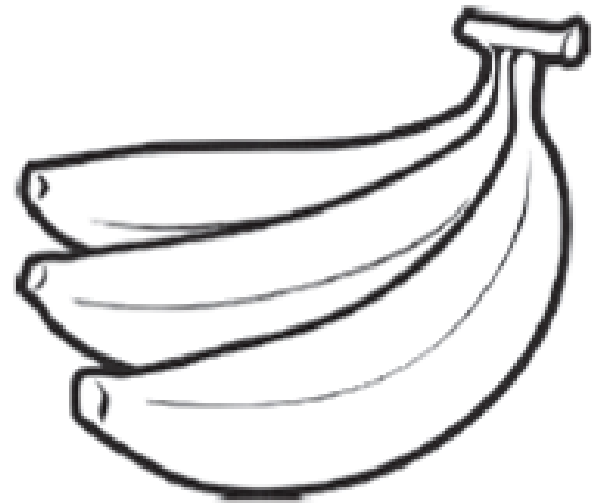
Drink 50p



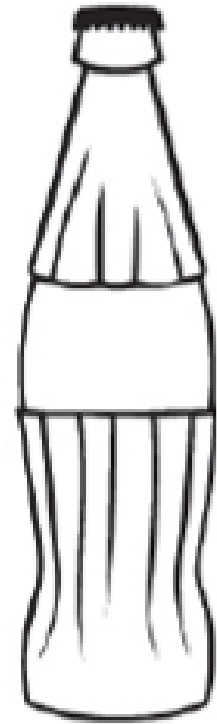
Bread 40p

**3 loaves  
of bread.**

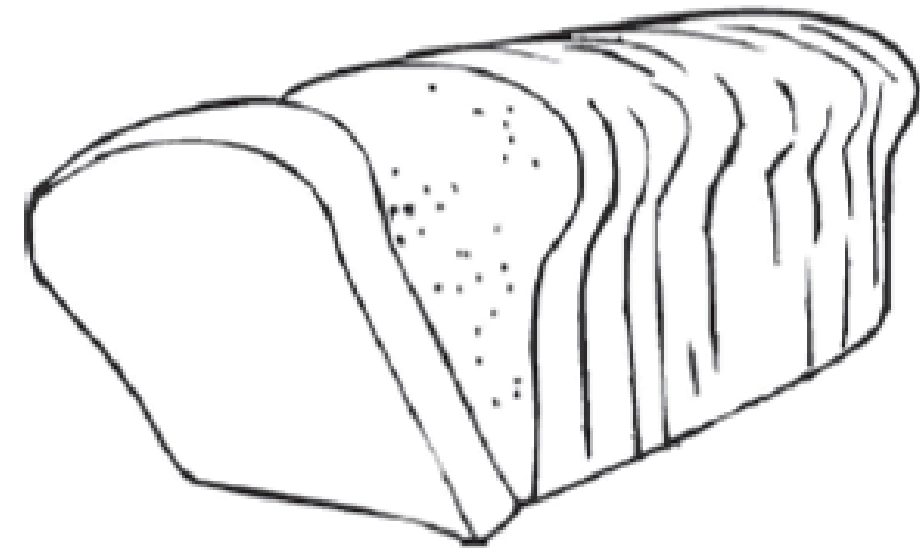
Here is the cost of some items in a shop.



Banana 20p



Drink 50p

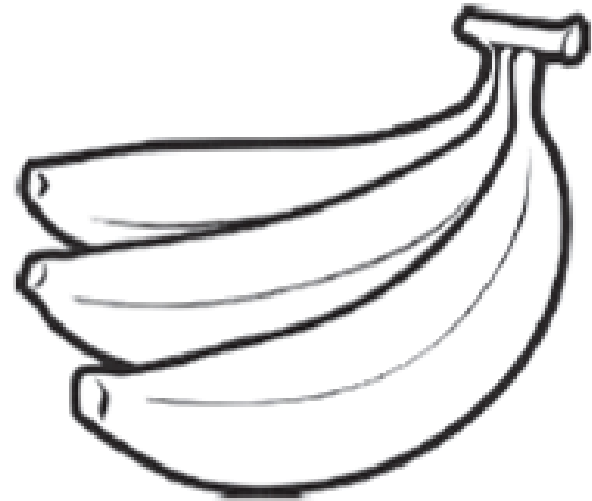


Bread 40p

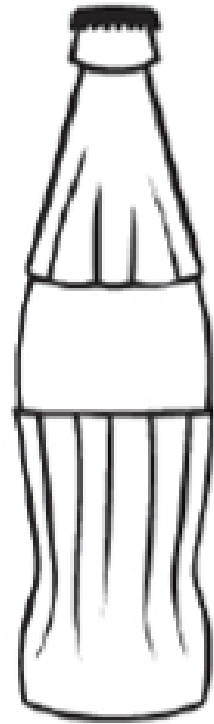
**3 loaves  
of bread.**

**How many loaves of bread can he buy?**

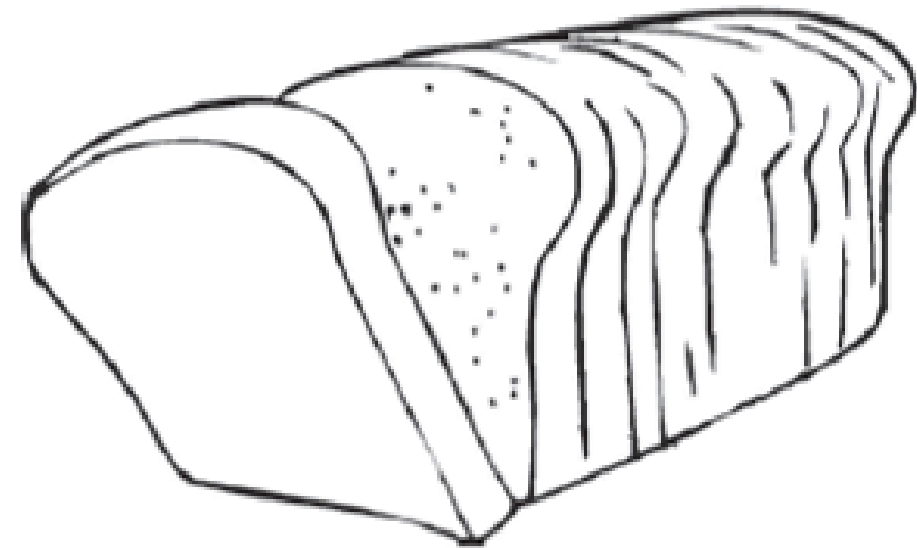
Here is the cost of some items in a shop.



Banana 20p



Drink 50p



Bread 40p

Sam has £1.50

**How many loaves of bread can he buy?**

**3 loaves  
of bread.**

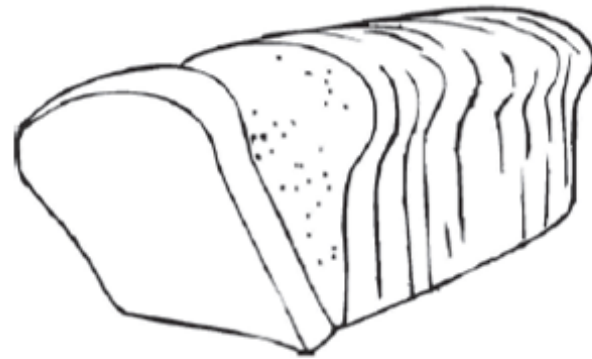
Here is the cost of some items in a shop.



Banana 20p



Drink 50p



Bread 40p

1. Tom buys 3 drinks and a banana. **How much does it cost?**
2. Amy buys 3 drinks and a loaf of bread. **How much does it cost?**
3. Zara buys 3 drinks and a loaf of bread. She pays with a £2 coin. **How much change does she get?**

**Extend:** Harry gets 30p change at the shop.  
What did he buy? What did he pay with?

# Implementing Numberless Questions

**Exploring one question structure in depth.**

**Creating sequences of questions using small variation.**

***Impact on children:*** experiencing more success, focusing on question structures, allowing scope for creativity.

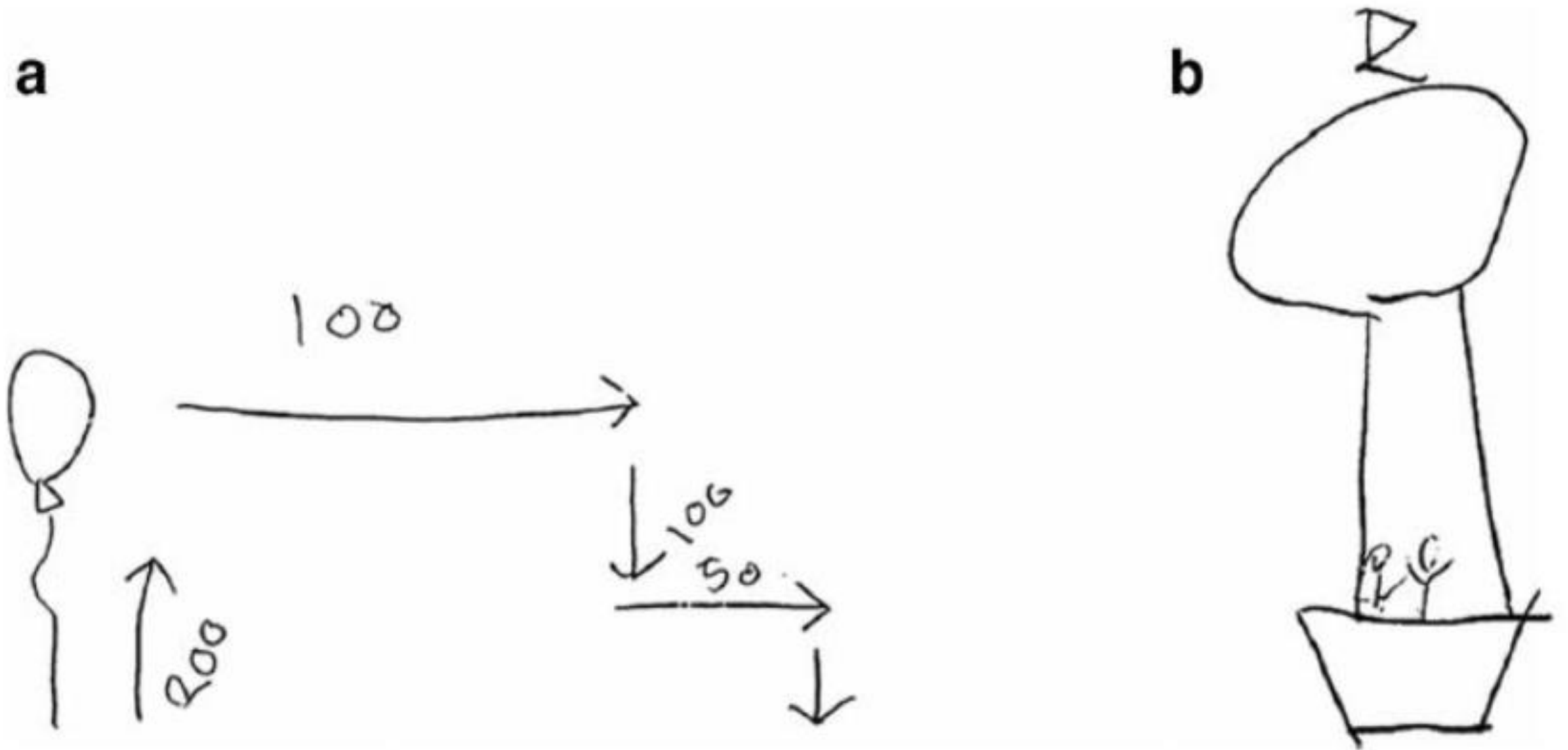
***Logistics:*** When/how often within a sequence of lessons?

*The balance of whole class/independent time?*

*Differentiation?*

*Consistency between classes?*

*A balloon first rose 200 meters from the ground, then moved 100 meters to the east, then dropped 100 meters. It then travelled 50 meters to the east, and finally dropped straight to the ground. How far was the balloon from its original starting place?"*

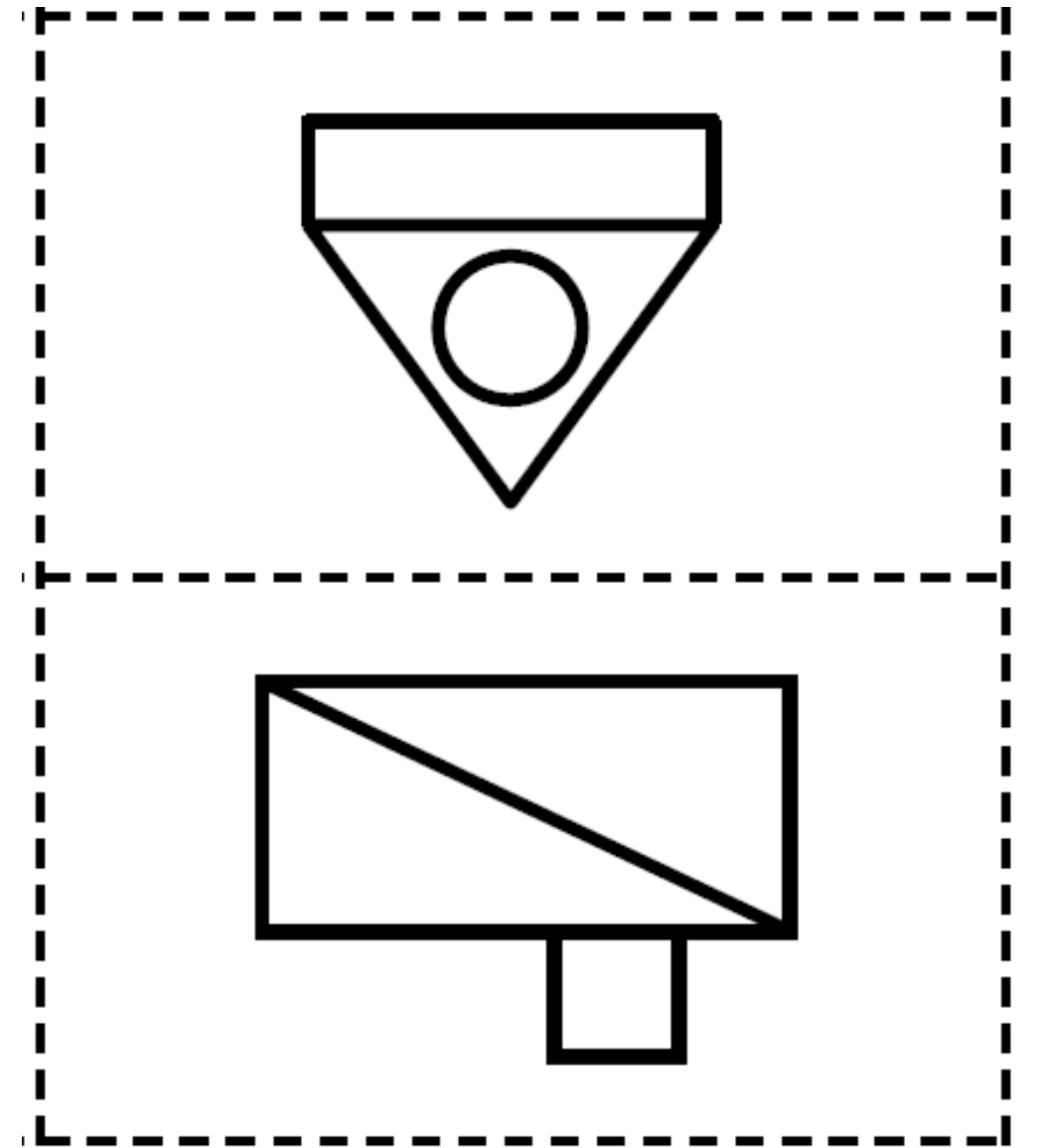


**Fig. 5** An example of a visual-schematic representation (A) vs. a pictorial representation (B)



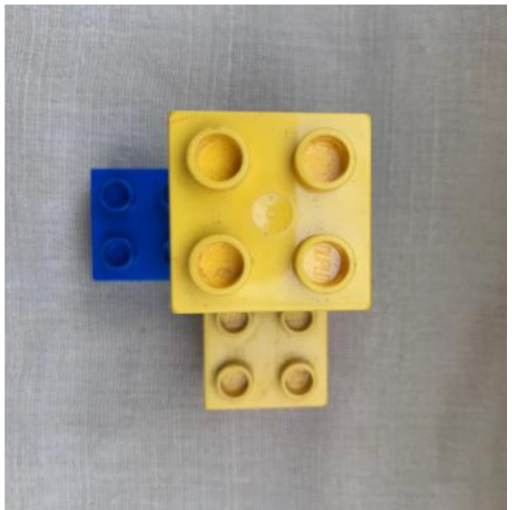
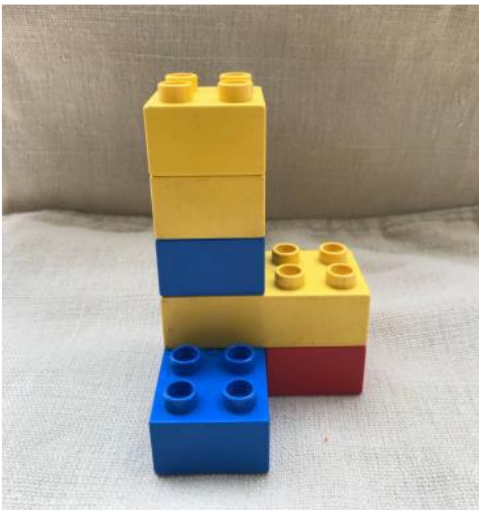
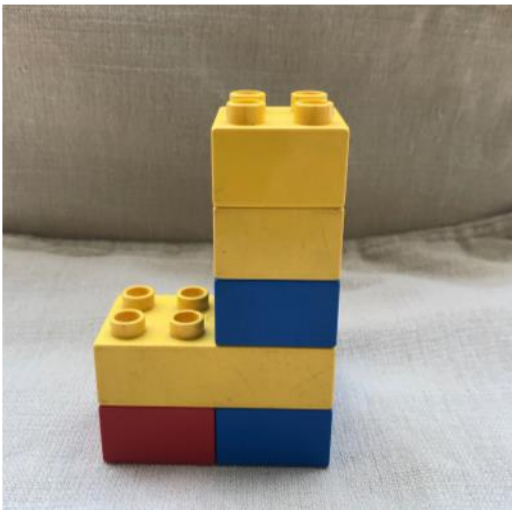
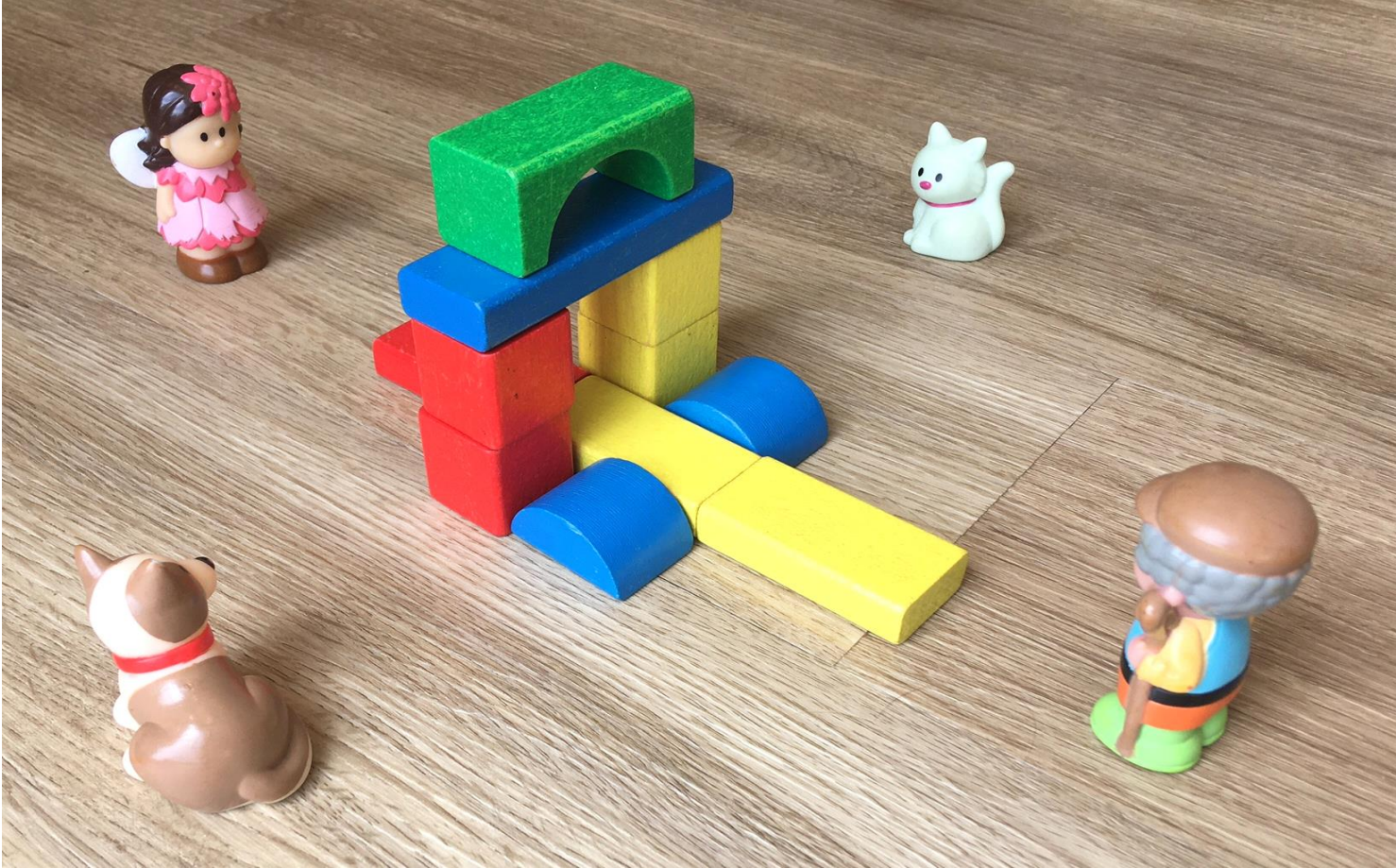












There are 9 girls at the park and 5 boys.

**How many children at the park?**

There are 9 children at the party. 5 are boys.

**How many girls at the party?**

There are 9 children in the pool. 5 are girls.

**How many more girls than boys in the pool?**

There are 9 children in the shop.

There are 5 more girls than boys at the shop.

**How many girls are at the shop?**



There are 9 girls at the park and 5 boys.

**How many children at the park?**

There are 9 children at the party. 5 are boys.

**How many girls at the party?**

There are 9 children in the pool. 5 are girls.

**How many more girls than boys in the pool?**

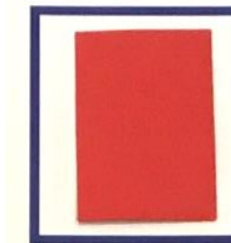
There are 9 children in the shop.

There are 5 more girls than boys at the shop.

**How many girls are at the shop?**



boys



girls

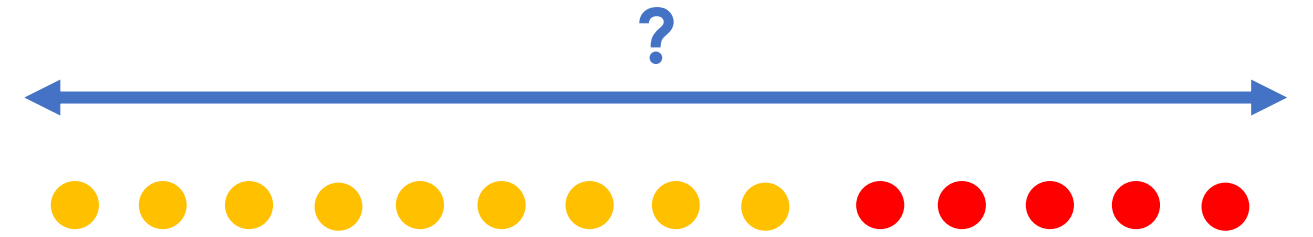


children



There are 9 girls at the park and 5 boys.

**How many children at the park?**



There are 9 children at the party. 5 are boys.

**How many girls at the party?**

There are 9 children in the pool. 5 are girls.

**How many more girls than boys in the pool?**

There are 9 children in the shop.

There are 5 more girls than boys at the shop.

**How many girls are at the shop?**

There are 9 girls at the park and 5 boys.

**How many children at the park?**



There are 9 children at the party. 5 are boys.

**How many girls at the party?**

There are 9 children in the pool. 5 are girls.

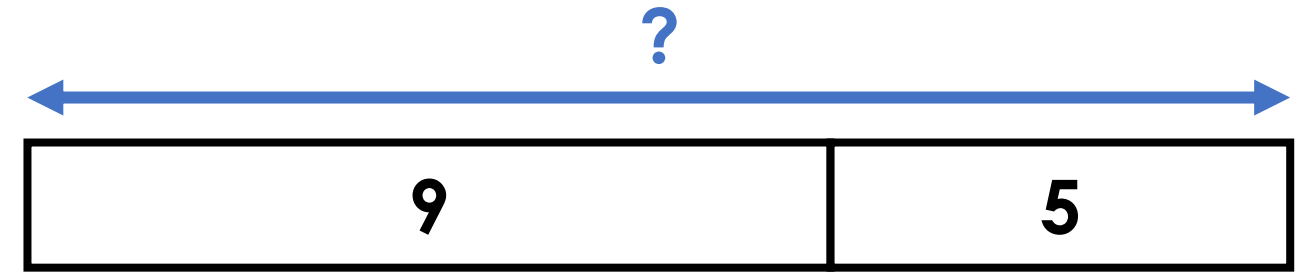
**How many more girls than boys in the pool?**

There are 9 children in the shop.

There are 5 more girls than boys at the shop.

**How many girls are at the shop?**

There are 9 girls at the park and 5 boys.  
**How many children at the park?**



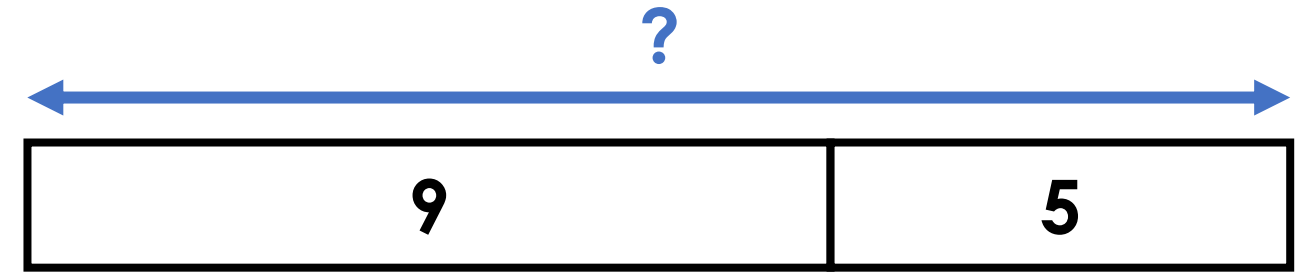
There are 9 children at the party. 5 are boys.  
**How many girls at the party?**



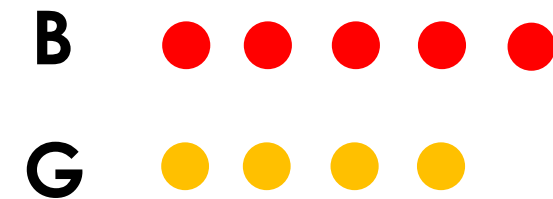
There are 9 children in the pool. 5 are girls.  
**How many more girls than boys in the pool?**

There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**

There are 9 girls at the park and 5 boys.  
**How many children at the park?**



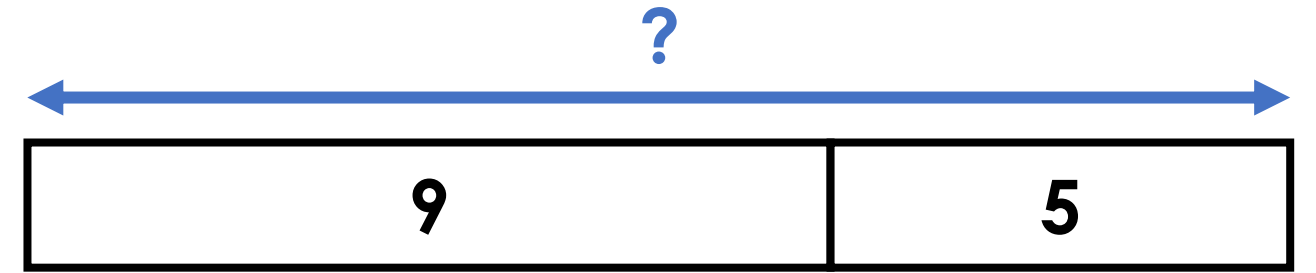
There are 9 children at the party. 5 are boys.  
**How many girls at the party?**



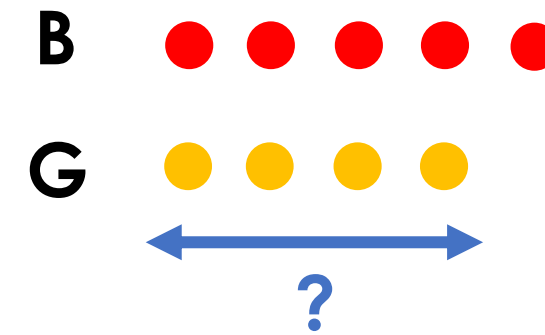
There are 9 children in the pool. 5 are girls.  
**How many more girls than boys in the pool?**

There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**

There are 9 girls at the park and 5 boys.  
**How many children at the park?**



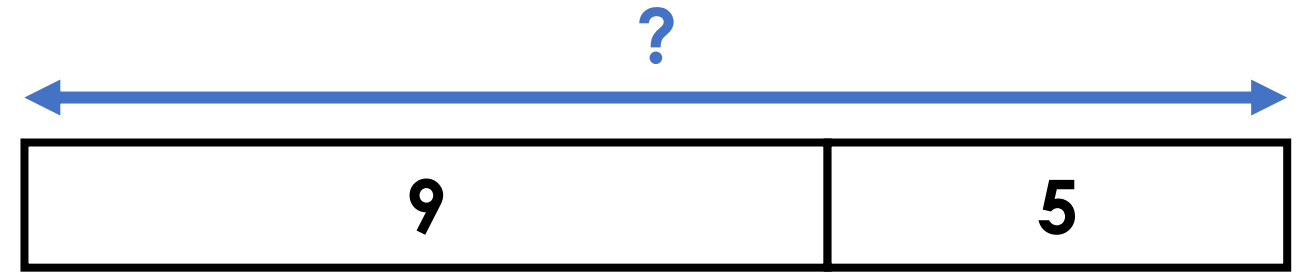
There are 9 children at the party. 5 are boys.  
**How many girls at the party?**



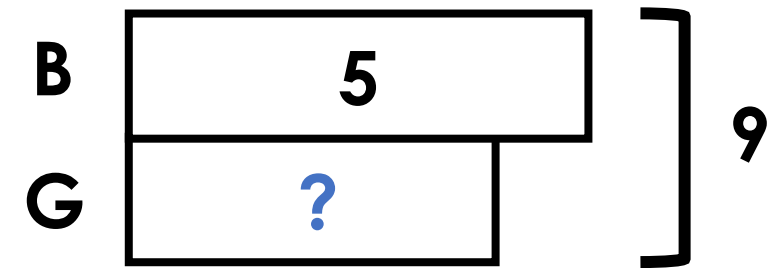
There are 9 children in the pool. 5 are girls.  
**How many more girls than boys in the pool?**

There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**

There are 9 girls at the park and 5 boys.  
**How many children at the park?**



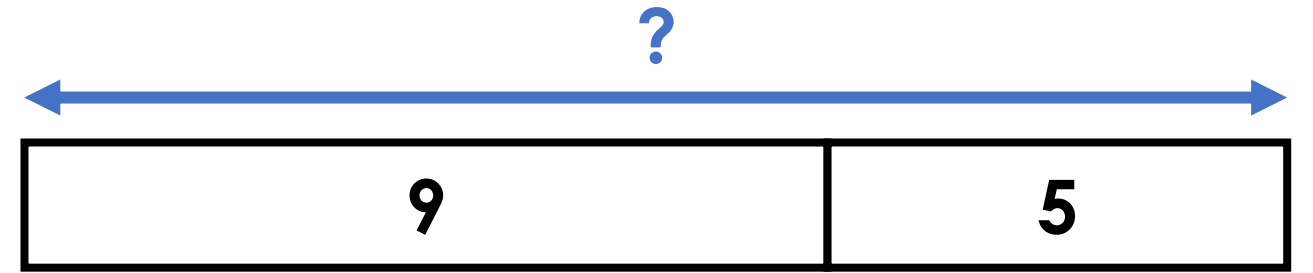
There are 9 children at the party. 5 are boys.  
**How many girls at the party?**



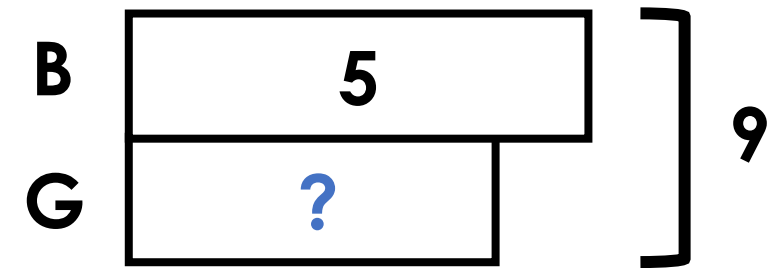
There are 9 children in the pool. 5 are girls.  
**How many more girls than boys in the pool?**

There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**

There are 9 girls at the park and 5 boys.  
**How many children at the park?**



There are 9 children at the party. 5 are boys.  
**How many girls at the party?**



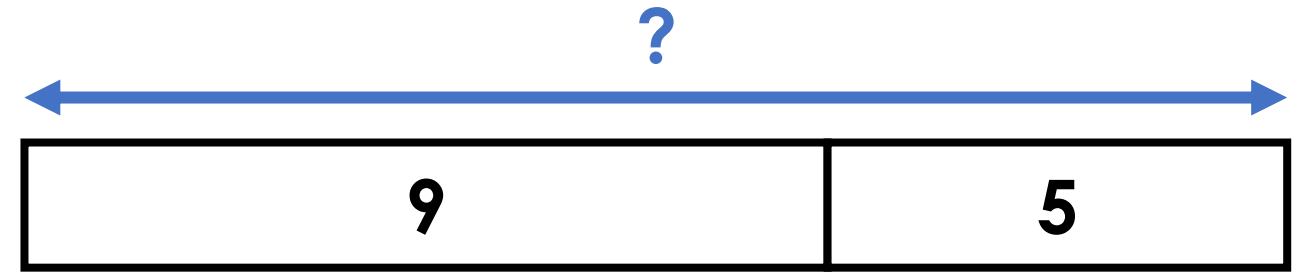
There are 9 children in the pool. 5 are girls.  
**How many more girls than boys in the pool?**



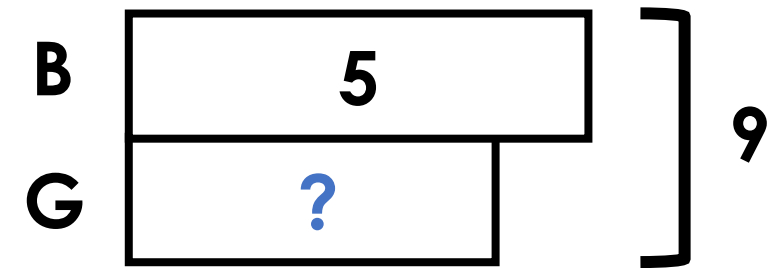
There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**



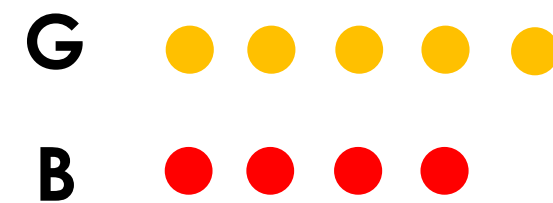
There are 9 girls at the park and 5 boys.  
**How many children at the park?**



There are 9 children at the party. 5 are boys.  
**How many girls at the party?**

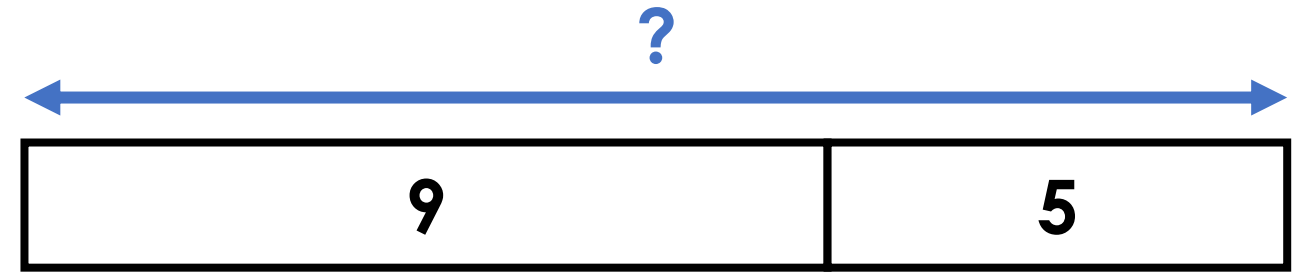


There are 9 children in the pool. 5 are girls.  
**How many more girls than boys in the pool?**

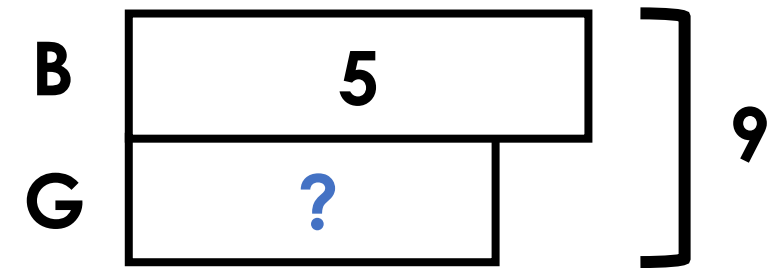


There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**

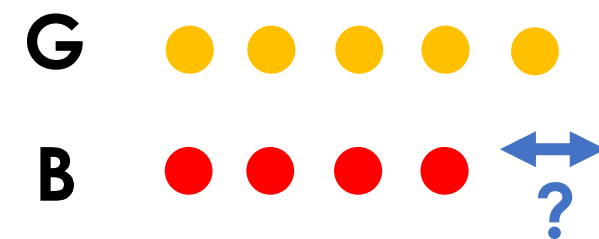
There are 9 girls at the park and 5 boys.  
**How many children at the park?**



There are 9 children at the party. 5 are boys.  
**How many girls at the party?**

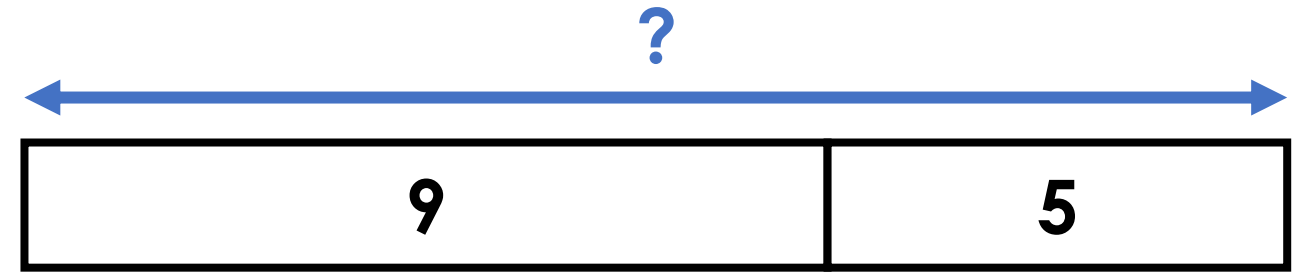


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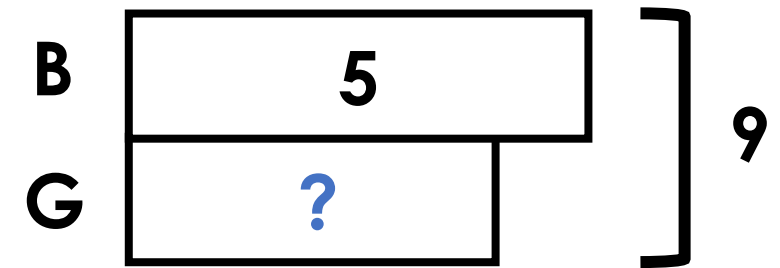


There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**

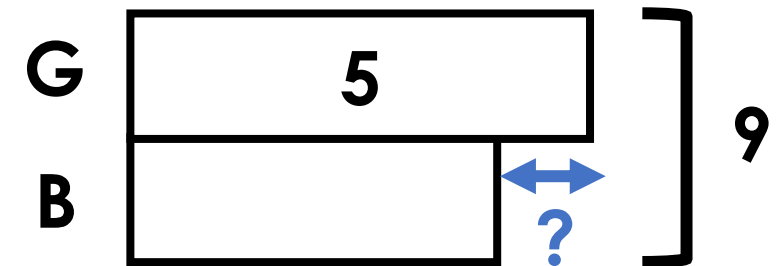
There are 9 girls at the park and 5 boys.  
**How many children at the park?**



There are 9 children at the party. 5 are boys.  
**How many girls at the party?**

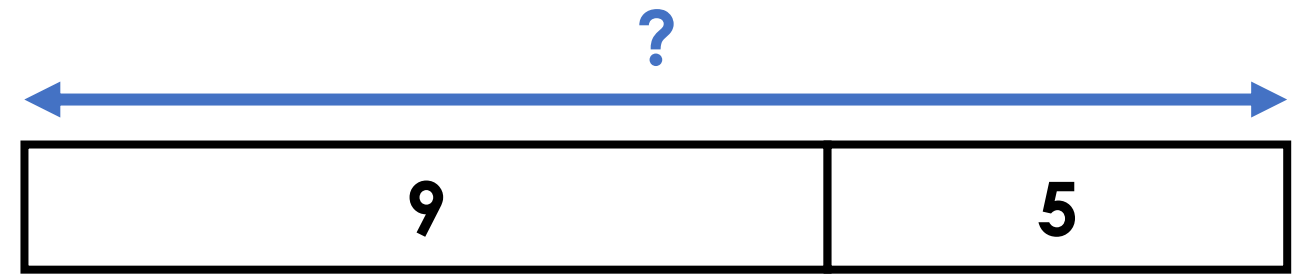


There are 9 children in the pool. 5 are girls.  
**How many more girls than boys in the pool?**

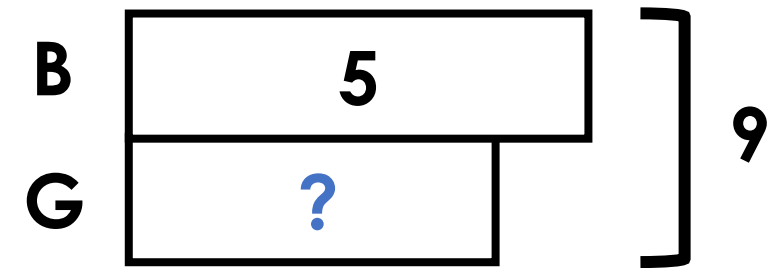


There are 9 children in the shop.  
There are 5 more girls than boys at the shop.  
**How many girls are at the shop?**

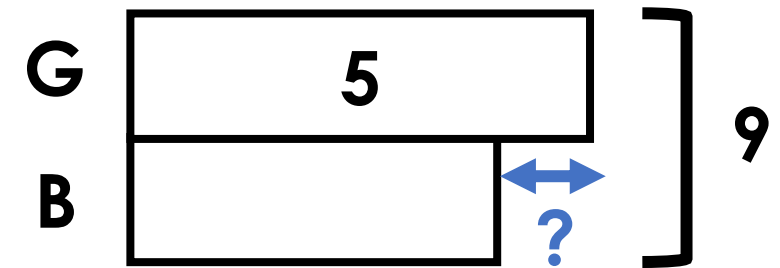
There are 9 girls at the park and 5 boys.  
**How many children at the park?**



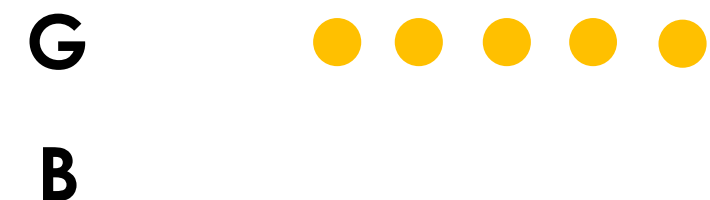
There are 9 children at the party. 5 are boys.  
**How many girls at the party?**



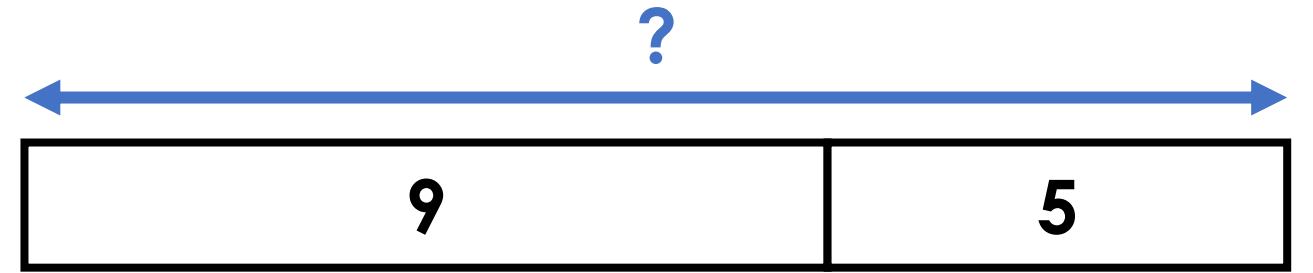
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**How many more girls than boys in the pool?**



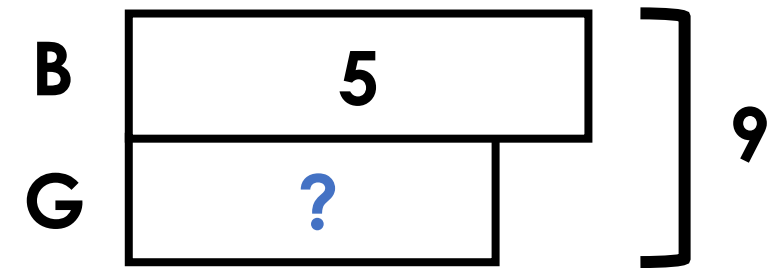
There are 9 children in the shop.  
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**How many girls are at the shop?**



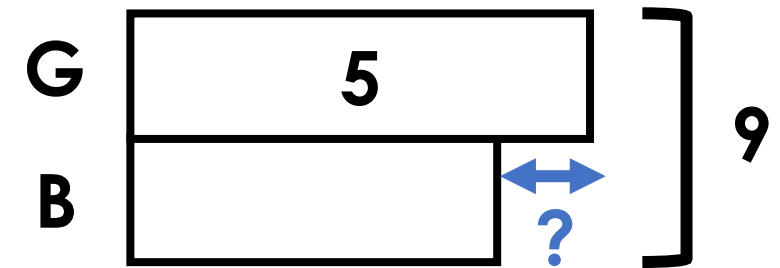
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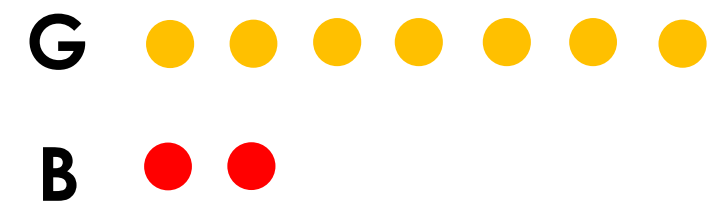
There are 9 children at the party. 5 are boys.  
**How many girls at the party?**



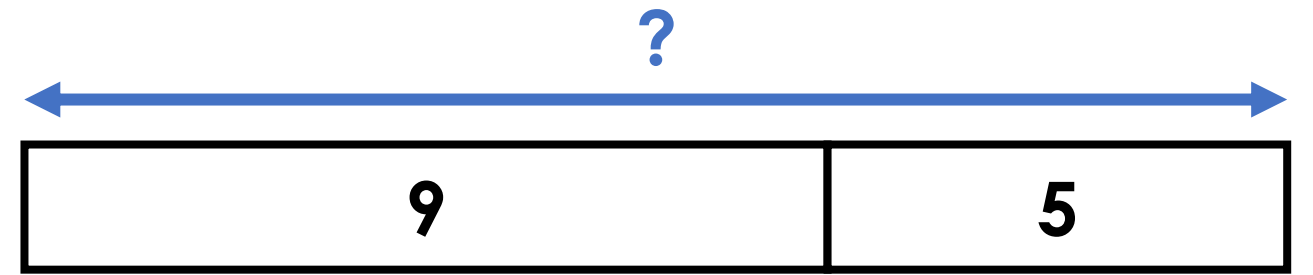
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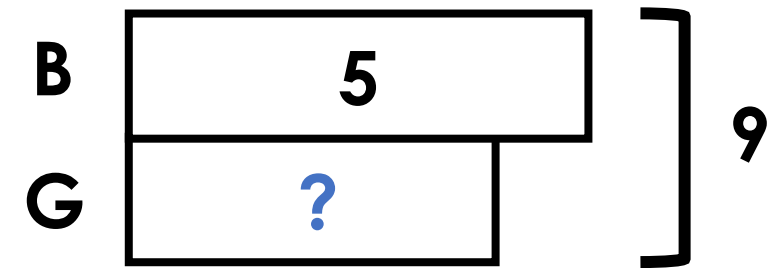
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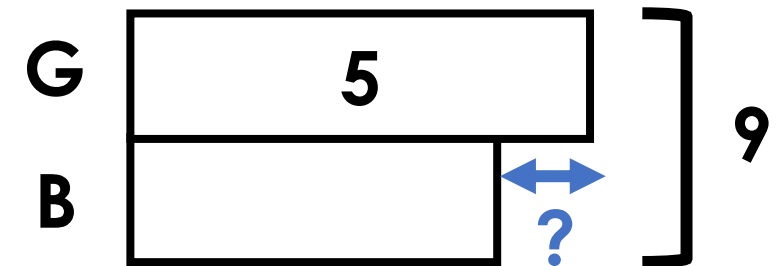
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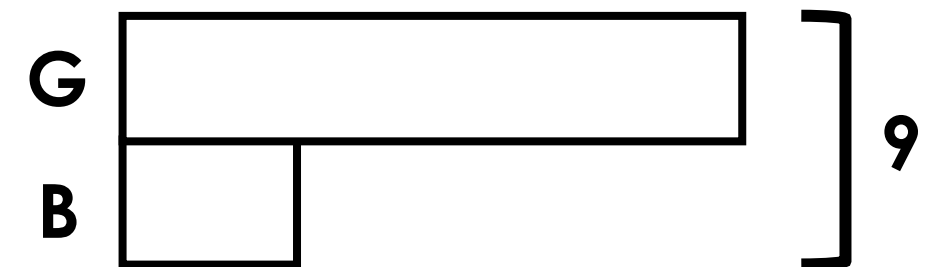
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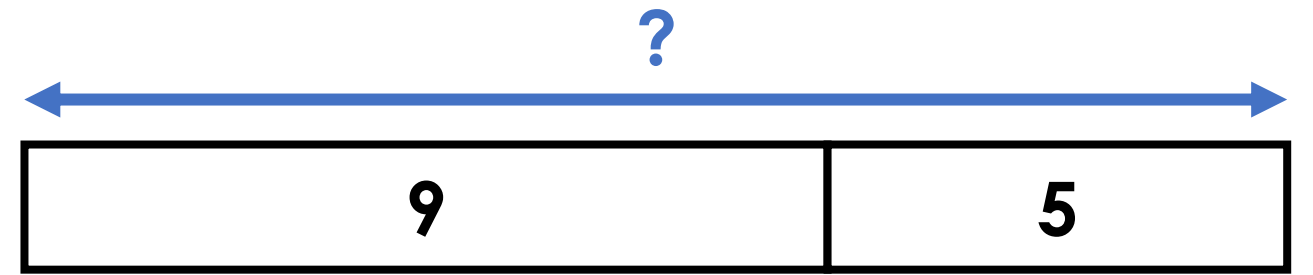
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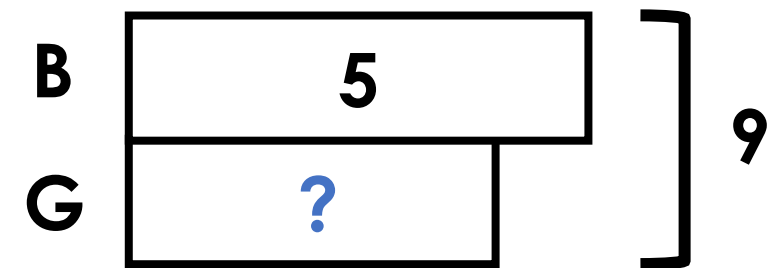
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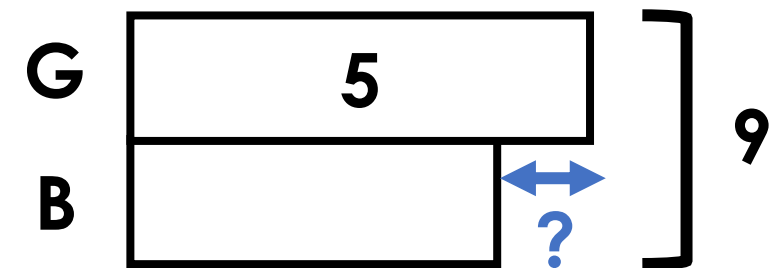
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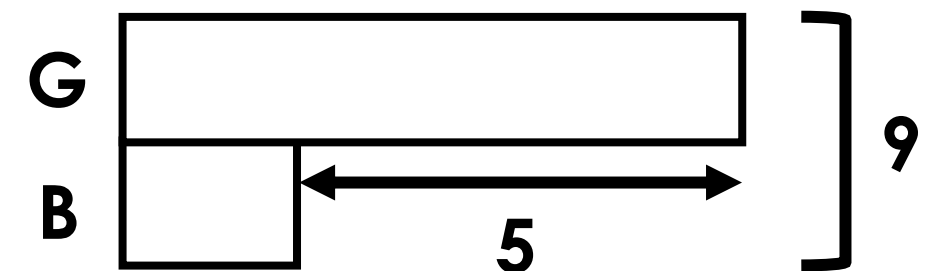
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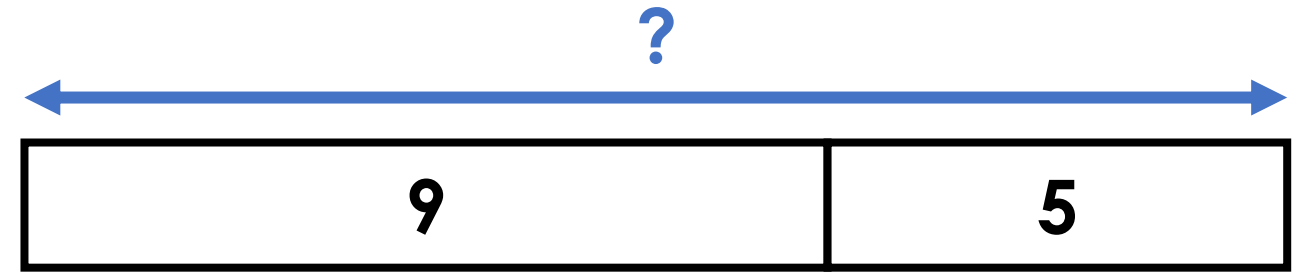
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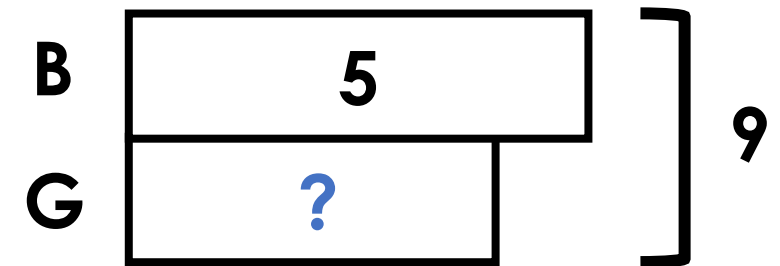
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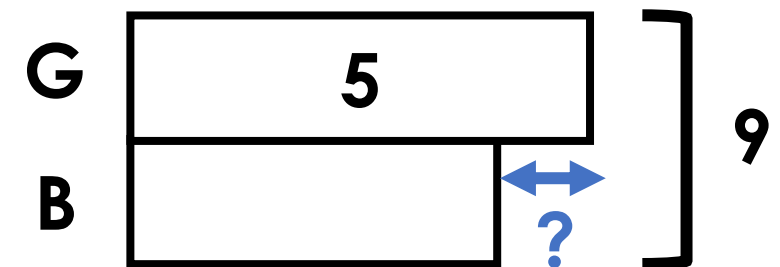
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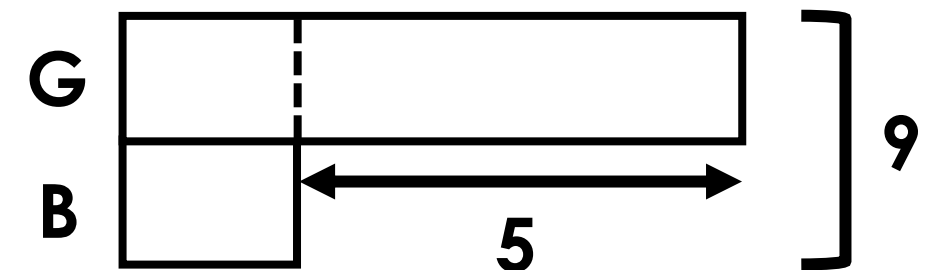
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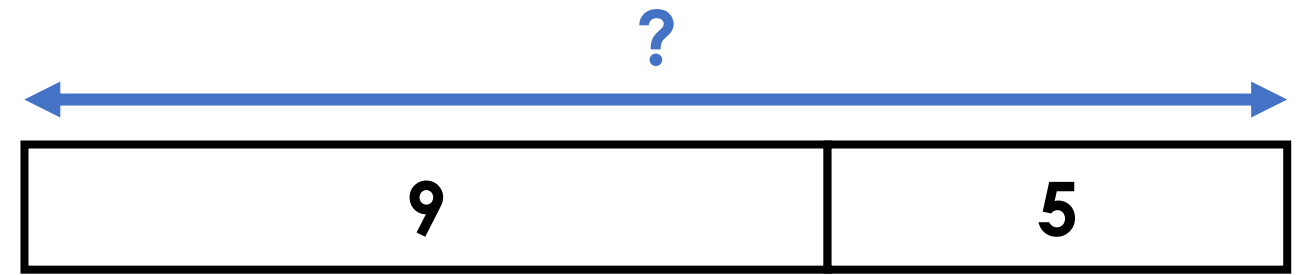


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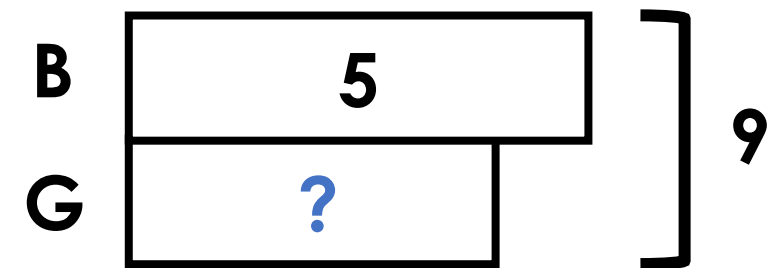




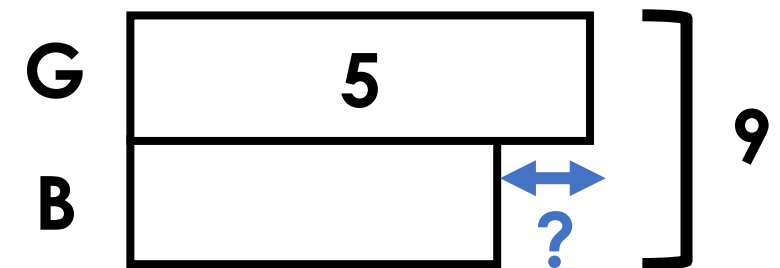
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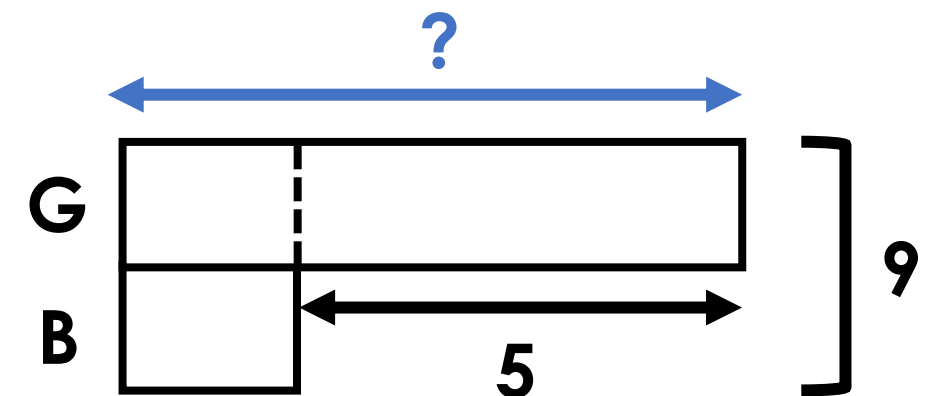
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**How many more girls than boys in the pool?**



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**How many girls are at the shop?**



There are 9 children in the pool. 5 are girls.

**How many more girls than boys in the pool?**

Beth and Lucy have £30 in total. Beth has £18.

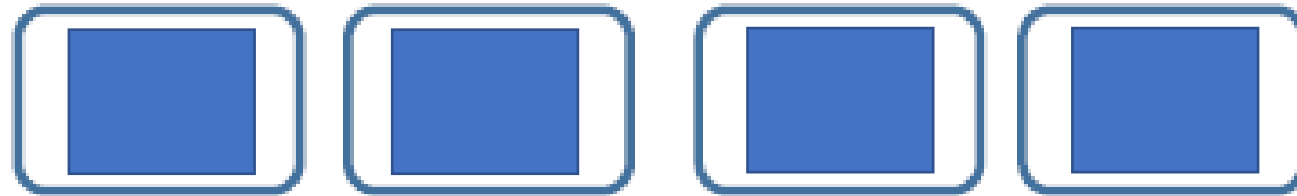
**How much more money does Beth have than Lucy?**

Dan and Tom ran a 200m race.

Dan finished in 32 seconds. Tom finished in 29 seconds.

**Tom won the race by how many seconds?**

**1** Max has 4 number cards.



He uses them to make 2 calculations.

$$\square + \square = 70$$

$$\square - \square = 20$$

Work out where the numbers should go.

**I** Max has 4 number cards.

60 50 30 10

He uses them to make 2 calculations.

$$\square + \square = 70$$

$$\square - \square = 20$$

Work out where the numbers should go.

**I** Max has 4 number cards.

**25** **35** **45** **55**

He uses them to make 2  
calculations.

$$\square + \square = 70$$

$$\square - \square = 20$$

Work out where the numbers  
should go.

## Small Difference Questions

(a) 18 people camping. Each tent fits 3 people.

***How many tents are needed?***

(b) 36 people camping. Each tent fits 6 people.

***How many tents are needed?***

(c) 31 people camping. Each tent fits 6 people.

***How many tents are needed?***

(d) 25 people camping. They use 7 tents.

***How many people fit in each tent?***

## Small Difference Questions

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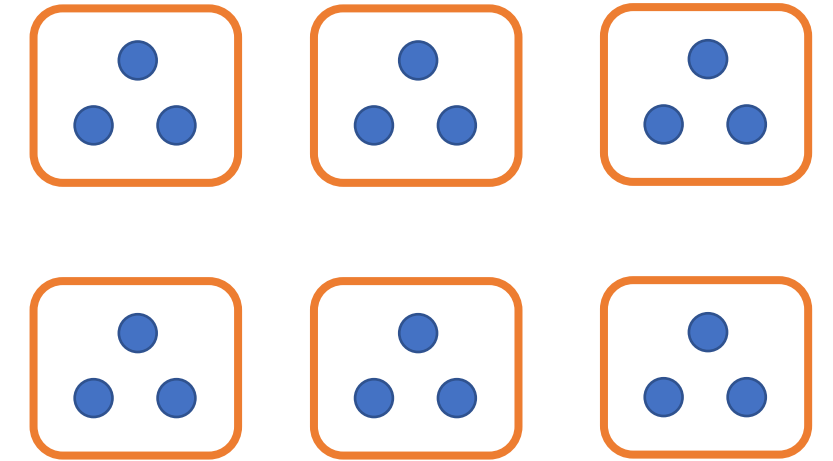
***How many tents are needed?***

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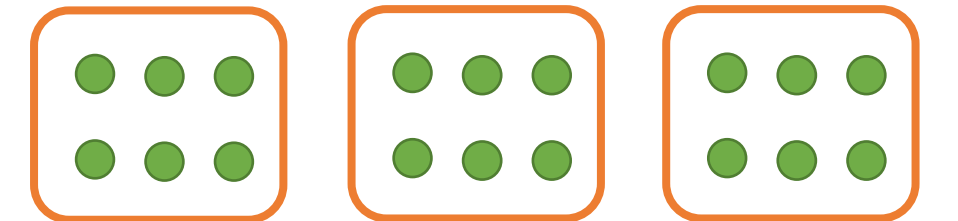
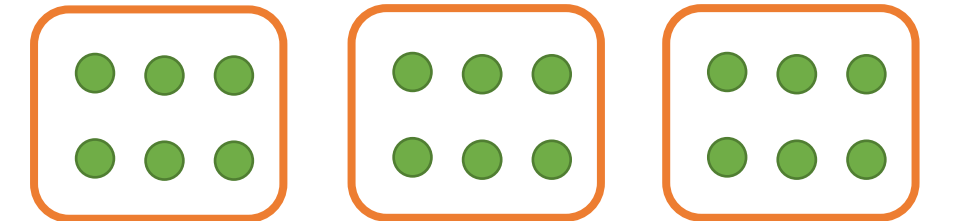
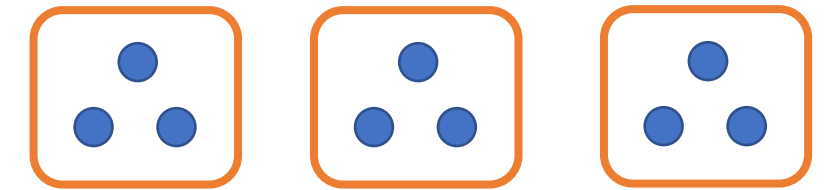
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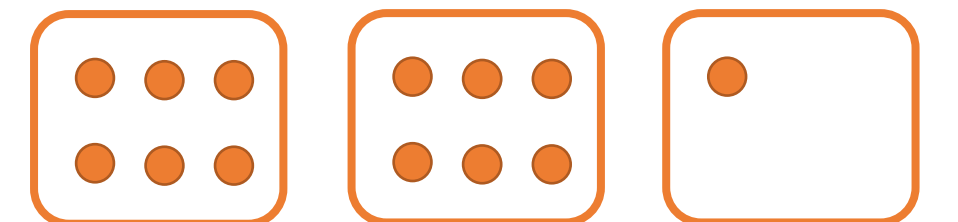
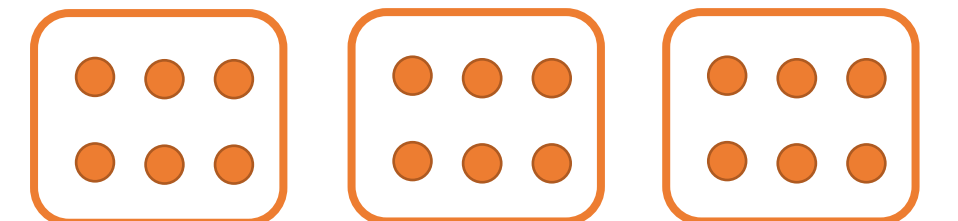
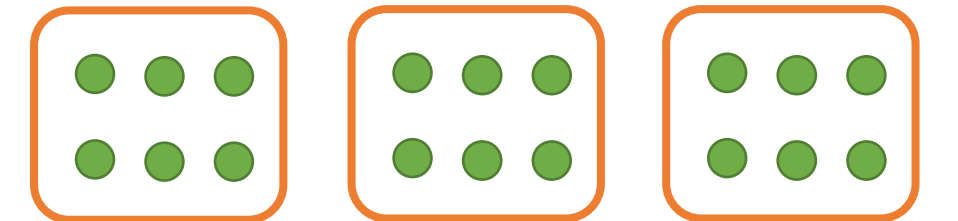
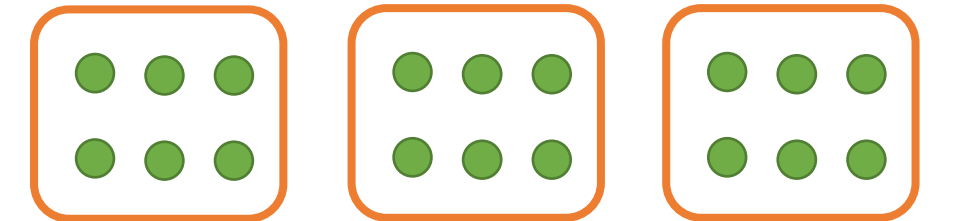
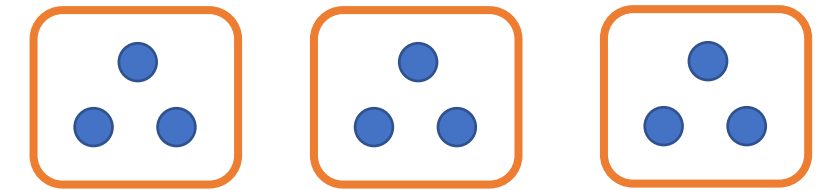
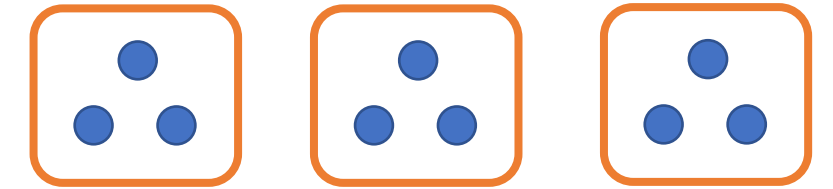
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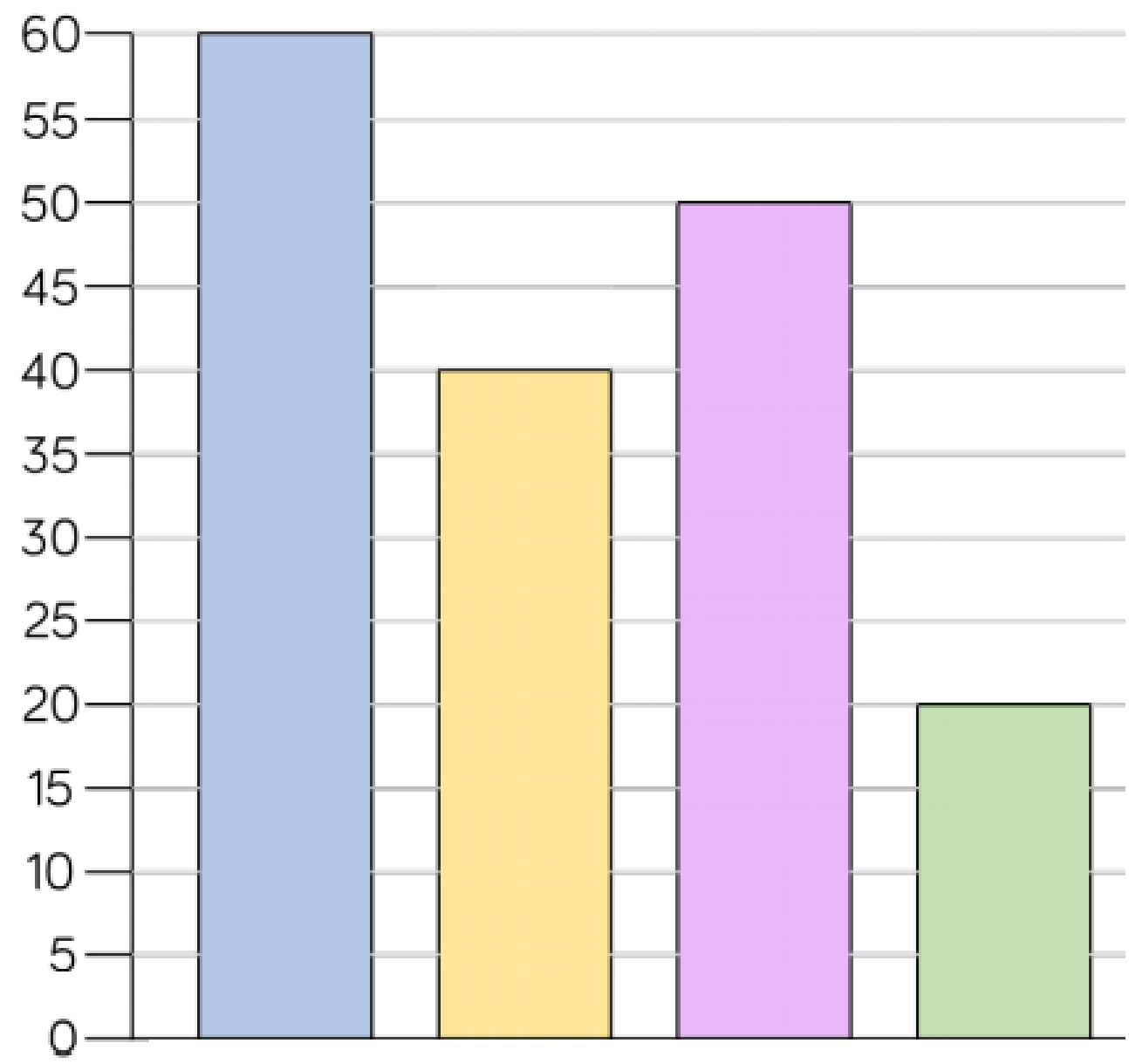
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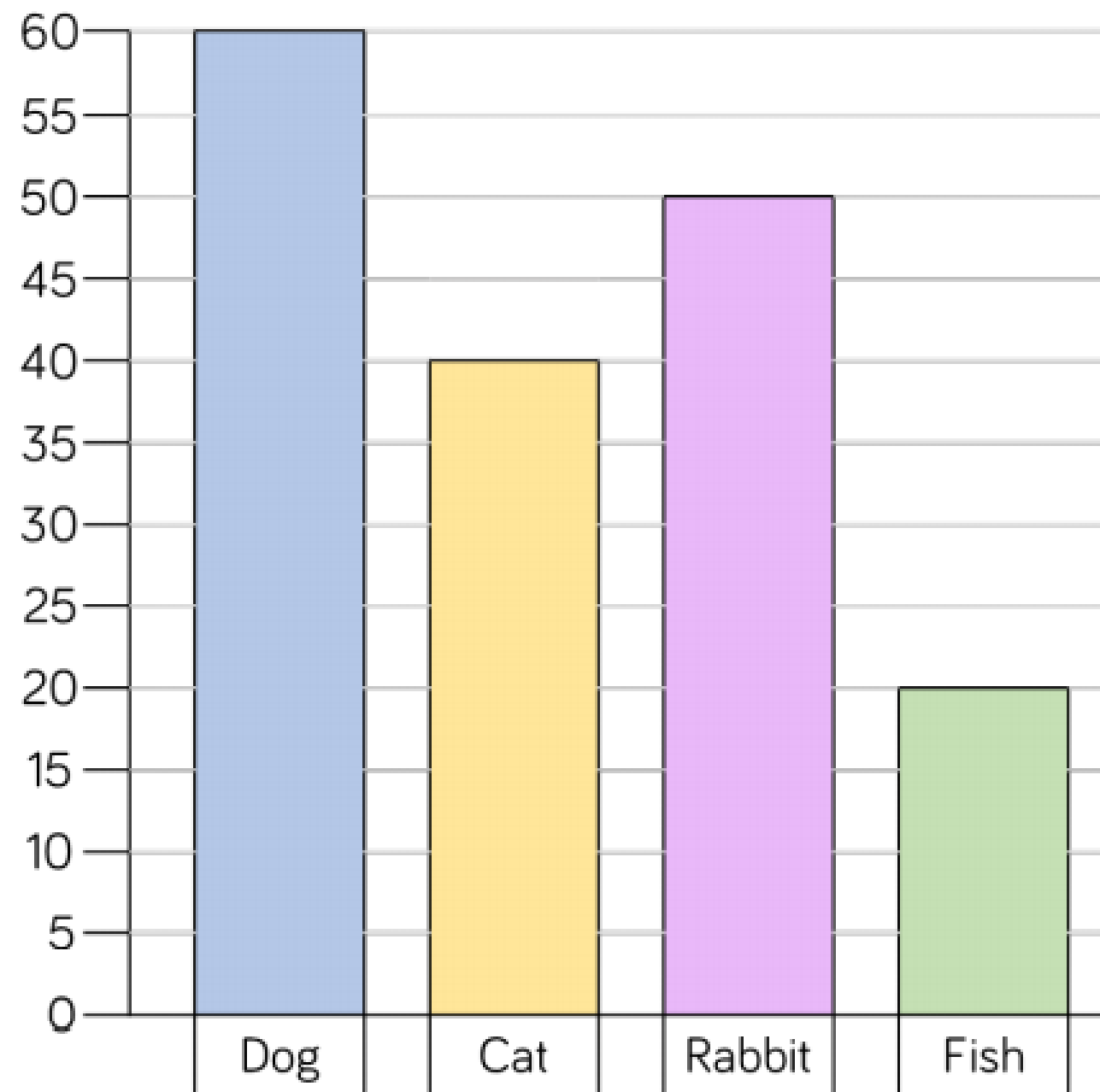
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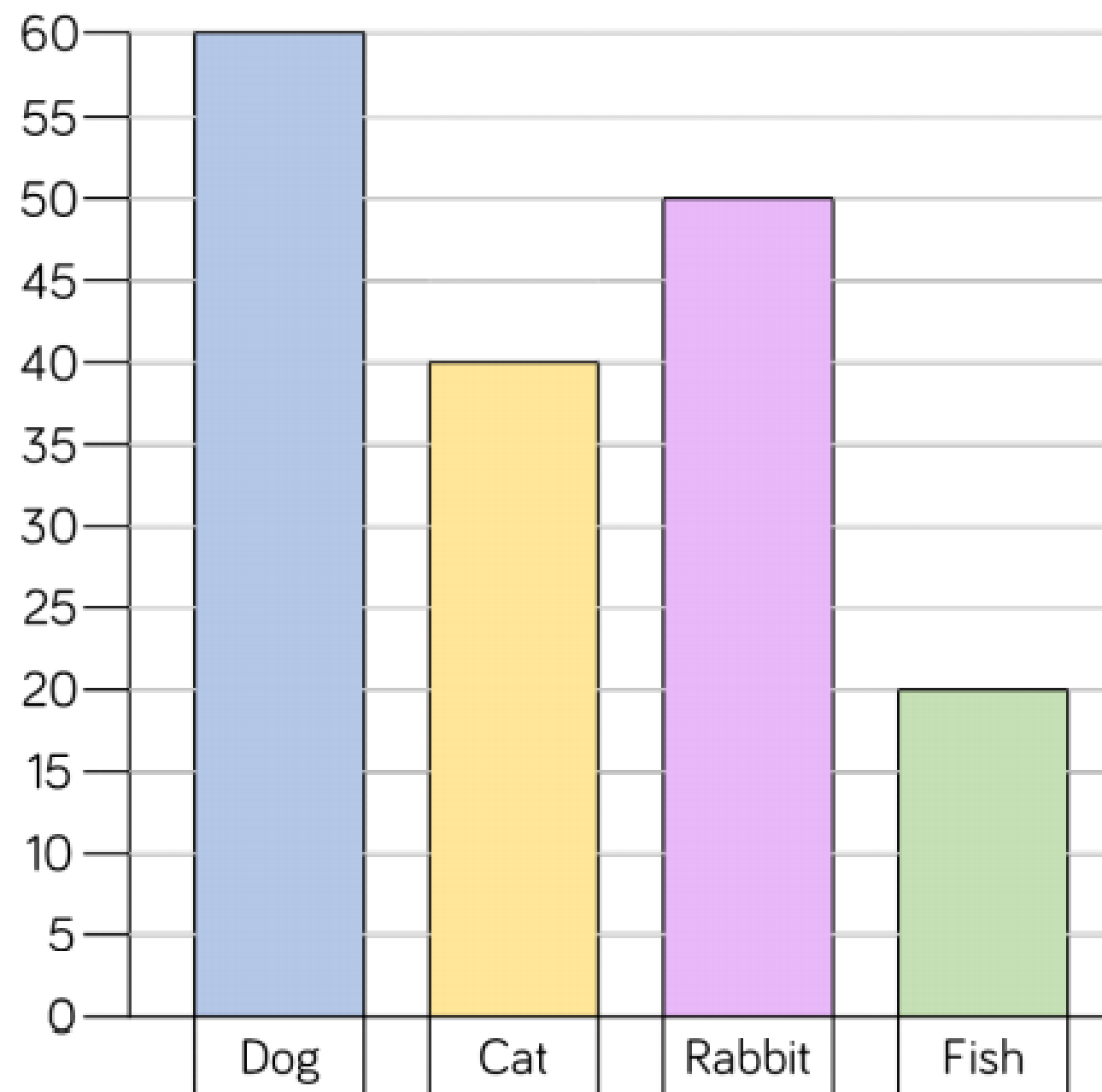




# Number of Pets



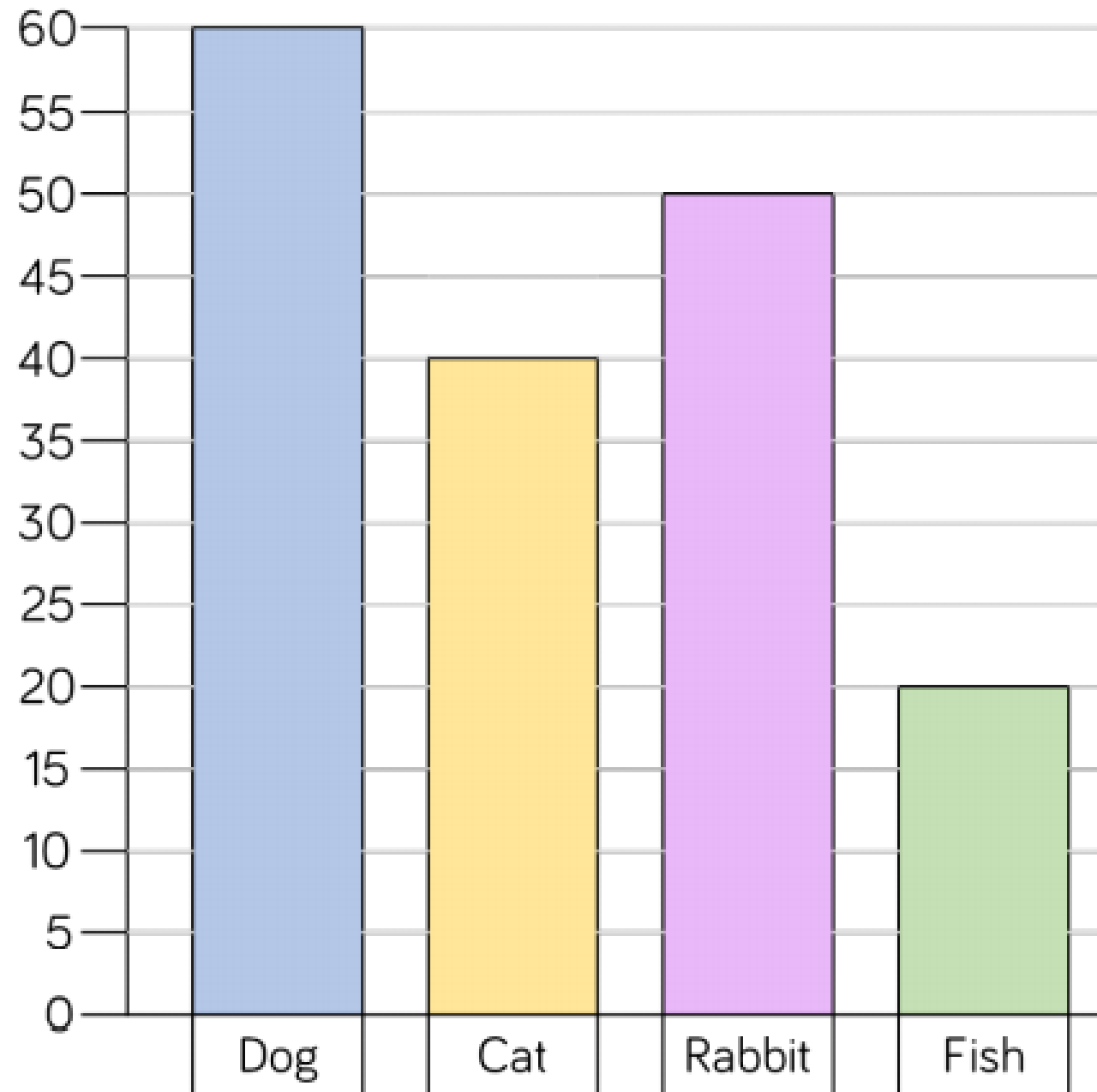
## Number of Pets



## True or False?

Four horizontal blue bars, each representing a line for a true or false question.

# Number of Pets



## True or False?

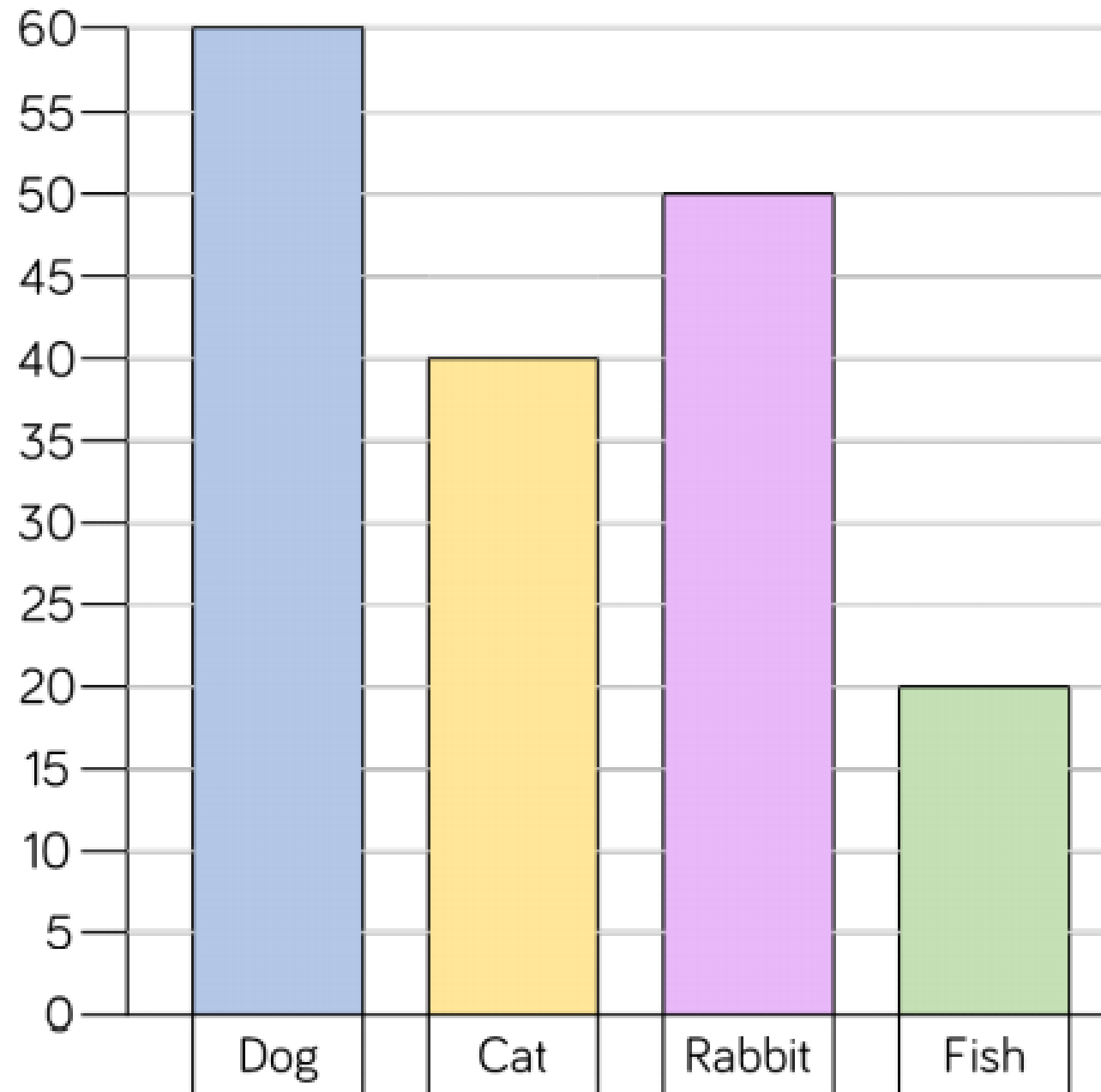
There are

There are 10 more

Altogether,

Most of

Number of Pets



### True or False?

There are 50 cats in total.

There are 10 more rabbits than cats.

Altogether, there are 180 pets.

Most of the pets are dogs.



# Recap

**Predicting questions**

**Removing numbers**

**Writing sequences of questions with small differences**

**Building visual working memory, visual representations**

**Deepening or opening up challenges**

