

2008 Primary Set 1 solutions

P1.1. Rachel can get to and from the leisure centre by either walking or taking the bus. If she walks to the centre and takes the bus home, the travelling time is one hour. If she takes the bus both ways, then the travelling time is reduced to half an hour.

How long would it take her to walk to the centre and back?

Assume that the time for a particular journey is always the same.

Solution 1: (no algebra)

Doing the journey twice: walking there, bus home and then bus there, walking home, takes two hours. But that is the same as bus there, bus home and walk there, walk home. But bus there, bus home takes $\frac{1}{2}$ hour. So walk there, walk home takes $1\frac{1}{2}$ hours.

Solution 2:

Let the walking time be w minutes and the bus time be b minutes.

$$w + b = 60$$

$$b + b = 30 \quad b = 15 \text{ and } w = 45.$$

So if Rachel walked both ways, the total time would be 90 minutes.

P1.2. After taking part in a diving competition, and before the results were announced, the five girls who had taken part were discussing how they thought the competition had gone.

Alice said: "Beth was first; Deb was last."

Beth said: "I was second; Alice was third."

Claire said: "I was third; Deb was fourth."

Deb said: "Beth was third; Alice was fourth."

Emma said: "I was first; Claire was last."

When the results were announced, there were no ties and it turned out that each girl had made one true statement and one false statement. Find the placings of the five girls and explain your reasoning.

Solution

Since one of Beth's statements is true, either Beth was second or Alice was third. So Beth was not third.

Since one of Deb's statements is true, and Beth was not third, Alice must have been fourth.

Since one of Claire's statements is true and Alice was fourth, Claire must have been third.

Since one of Beth's statements is true and Claire was third, Beth must have been second.

Since one of Emma's statements is true and Claire was third, Emma must have been first.

That leaves Deb to be last.

So the order was 1. Emma 2. Beth 3. Claire 4. Alice 5. Deb.

It is then straightforward to check that then each made one true and one false statement.

P1.3. On his way home on Saturday night, generous Chick met three Big Issue sellers. To the first one he gave 10p more than half the money he had in his pocket. To the second one he gave 20p more than half of what he then had in his pocket. To the last one he gave 30p more than half of what was left in his pocket. When he got home, Chick had only 10p in his pocket. How much did he have when he started to make his way home?

Solution

As he finished with 10p, this is the difference between what he had before he met the last Big Issue seller and what he gave to him which was half of what he had plus 30p. So half of what he had was $30\text{p} + 10\text{p} = 40\text{p}$. So before he met the last Big Issue seller he had 80p. In the same way, half of what he had before he met the second Big Issue seller was $20\text{p} + 80\text{p}$. So at that stage he had £2. So half of what he had initially was $10\text{p} + £2$. So he originally had £4 and 20p.