2010 Primary Set 2 solutions

P2.1 There are 100 nuts on five trays:

- on trays 1 and 2 there are 52 nuts altogether;
- on trays 2 and 3 there are 43 nuts altogether;
- on trays 3 and 4 there are 34 nuts altogether;
- on trays 4 and 5 there are 30 nuts altogether.

How many nuts does each tray contain?

Solution

Trays 1 and 2 contain 52 nuts and trays 3 and 4 contain 34 nuts.
So on trays 1,2, 3 and 4 together there are $52 + 34 = 86$ nuts.

So tray 5 must have 14 nuts.
So tray 4 must have 16 nuts.
So tray 3 must have 18 nuts.
So tray 2 must have 25 nuts.
So tray 1 must have 27 nuts.

P2.2 "Please may I have two boxes of matches at 9p each and two bars of soap at 27p each" said the customer in a small store. "I would also like three packets of sugar and six sausage rolls; however, I don't know the price of the sugar or the rolls."
"Thank you", said the shop assistant, " that will be £2.92 altogether."
The customer thought for a few moments and then said, "That cannot be correct."
How did she know?

Solution 1

The cost of the matches and the soap was 72 p. That leaves £2.20 for the sugar and the pasties. But since she buys 3 packets of sugar and six Cornish pasties, the price must be divisible by 3 and £2.20 is not divisible by 3.

Solution 2

The prices of the matches and the soap are both divisible by 3.
The quantities of the sugar and the sausage rolls are both divisible by 3.
These facts mean that the total price should be divisible by 3.
But £2.92 is not.

P2.3 Luke wanted to make 12 litres of orange squash for a party. He intended mixing 10 litres of water with 2 litres of concentrated orange. However he absent-mindedly confused the two values and mixed 10 litres of concentrated orange with 2 litres of water. How much of this mixture would he have to pour away before he would be able to add water to make the 12 litres of squash in the correct proportions?

Solution

As he made the squash, Luke used 10 litres of concentrate instead of 2 litres so he needs to pour away 8 litres of concentrate.

The ratio in his mixture is 10:2, i.e. the concentrate is $\frac{5}{6}$ of the total. 8 litres is $\frac{5}{6}$ of 9.6 litres.

Pouring away 9.6 litres would leave 2.4 litres (2 litres orange, 0.4 litres water).

Adding 9.6 litres water would give the proportions asked for. {*Not needed.*}