Puzzle
- The Bus -

The Puzzle

At the beginning of the route, 40% of the passengers on a bus are girls. At the first stop, 2 girls get *off* the bus. At the second stop, 2 boys get *on* the bus. Now, 30% of the passengers are girls.

Beginning: 40 % girls
Stop 1: 2 girls exit
Stop 2: 2 boys board
Now: 30% girls
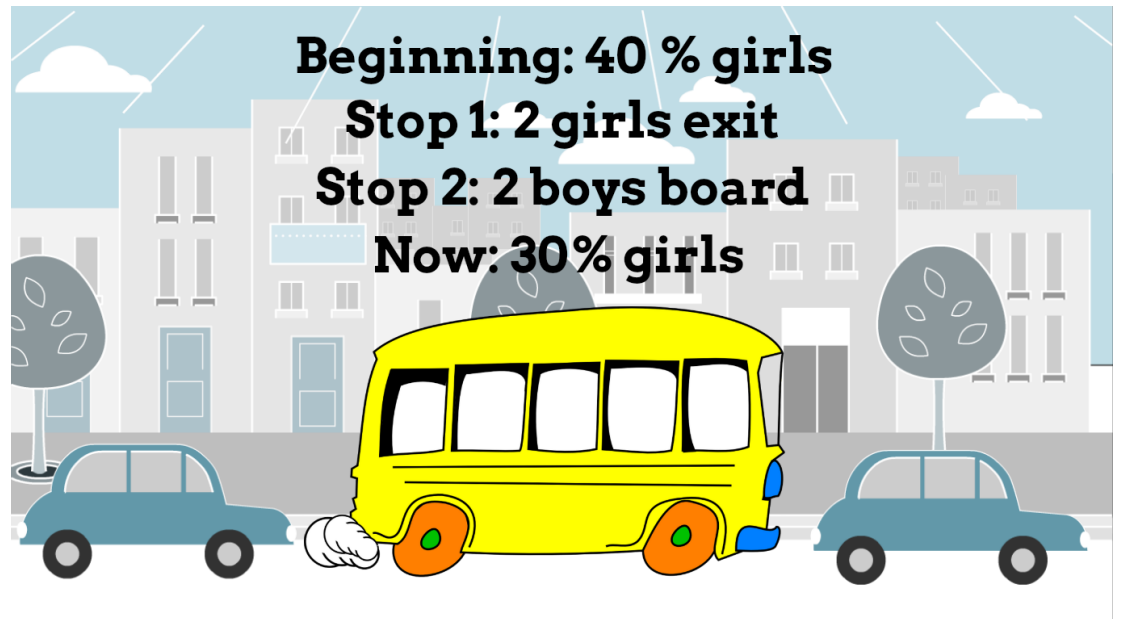
How many girls are now on the bus?

Puzzle Solution

The answer:

There are now 6 girls on the bus.

First possible solution:

After the 1st stop, once the two girls have gotten off the bus, the number of girls on the bus stays the same for the rest of the route. **The arrival of the two boys on the bus allows for the total number of passengers to return to its initial number.**

The number of girls on the bus was 40% of the total number of passengers. However, after the first stop, the number of girls in relation to the total number of passengers is now at 30%.

We can therefore conclude that a decrease of 2 girls on the bus equals to a decrease of 10% of girls in regards to the total number of passengers on the bus.

Let's suppose that

n: total number of passengers on the bus

a: number of girls on the bus after both stops

We can start by finding out the total number of passengers since we know that 10% of that number equals 2 girls.

$$\frac{10}{100} = \frac{2}{n}$$

$$\Rightarrow \quad 10 \times n = 100 \times 2$$

$$\Rightarrow \quad n = \frac{200}{10}$$

$$\Rightarrow \quad n = 20$$

Furthermore, since we know that the number of girls on the bus after both stops is now 30% of the total number of passengers, we can calculate that:

$$a = \frac{30}{100} \times n = \frac{30}{100} \times 20 = 6$$

So, there are now 6 girls on the bus.

Second possible solution (algebraic):

Knowing that at the first bus stop 2 girls got off the bus and that at the second bus stop 2 boys got on the bus, we can conclude that the **total number of passengers on the bus before the two stops and that the total number of passengers on the bus after the two stops stays the same.** Therefore, the total number of passengers on the bus does not change.

Let's suppose that

b: total number of passengers

We need to find 30% of b, or $0.3b$.

We know that the number of girls on the bus before the first stop minus the two girls that got off, equals the number of girls left on the bus after both stops.
That means that 40% of the total number of passengers, minus the 2 girls that got off at the first stop, equals to 30% of the total number of passengers. We can translate this statement to the following equation:

$$0.4b - 2 = 0.3b$$

By solving it, we can find that:

$$0.1b = 2$$
$$\Rightarrow b = 20$$

Therefore, 30% of the total number of passengers is:

$$0.3b = 0.3 \times 20 = 6$$

So, there are now 6 girls on the bus.