

A cyclist is travelling six times as fast as a pedestrian. The difference in their speeds is 17.5 km/h. What is the cyclist's speed?

Suppose, cyclist has speed v_c and pedestrian has speed v_p .

A cyclist is travelling six times as fast as a pedestrian:

$$v_c = 6v_p$$

The difference in their speeds is 17.5 km/h:

$$v_c - v_p = 17.5$$

So, we have system of equation:

$$\begin{cases} v_c = 6v_p \\ v_c - v_p = 17.5 \end{cases}$$

Substitute first to second:

$$6v_p - v_p = 17.5$$

$$5v_p = 17.5 \quad \Rightarrow \quad v_p = \frac{17.5}{5} = 3.5$$

From first:

$$v_c = 6v_p = 6 * 3.5 = 21$$

Answer: $v_p = 3.5 \text{ km/h}$, $v_c = 21 \text{ km/h}$

During a camping trip, Nina was making a lean-to for sleeping. She cut a 2.5-m long post into two pieces, so that one piece was 26 cm longer than the other. What was the length of each piece?

Suppose, the length of one piece equals X and the length of other equals Y.

She cut a 2.5-m long post into two pieces:

$$X + Y = 2.5$$

one piece was 26 cm longer than the other ($26\text{cm} = 0.26\text{m}$):

$$X - Y = 0.26$$

So, we have system of equation:

$$\begin{cases} X + Y = 2.5 \\ X - Y = 0.26 \end{cases}$$

first equation + second:

$$2X = 2.76 \quad \Rightarrow \quad X = \frac{2.76}{2} = 1.38$$

From second:

$$Y = X - 0.26 = 1.38 - 0.26 = 1.12$$

Answer: 1.38 m and 1.12 m