

### Answer on Question #44203-Physics-Mechanics-Kinematics-Dynamics

Men are running along a road at 15km/hr behind one another at equal intervals of 20m. Cyclists are riding in the same direction at equal intervals of 30m at what speed in km/hr an observer travelling along the road in opposite direction so that whenever he meets a runner he also meets a cyclist.

#### Solution

Suppose runner and cyclist reach at same position in time  $t$ , and the observer has travelled  $x$  distance in this time.

$$\text{Speed of runner is } 15 \frac{\text{km}}{\text{h}} = \frac{25 \text{ m}}{6 \text{ s}}.$$

$$\text{Speed of cyclist is } 25 \frac{\text{km}}{\text{h}} = \frac{125 \text{ m}}{18 \text{ s}}.$$

$$\text{Time } t \text{ is } \frac{\text{distance travelled}}{\text{speed}};$$

$$t = \frac{20 - x}{\frac{25}{6}} = \frac{30 - x}{\frac{125}{18}} \rightarrow x = 5\text{m}.$$

Putting it in equation we get

$$t = \frac{18}{5} \text{ s} = 3.6 \text{ s}$$

Speed of observer to travel 5 meter distance in 3.6 sec is

$$v = \frac{5\text{m}}{\frac{18}{5} \text{ s}} = \frac{25 \text{ m}}{18 \text{ s}} = 5 \frac{\text{km}}{\text{h}}.$$

$$\text{Answer: } 5 \frac{\text{km}}{\text{h}}.$$