

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.

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

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

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

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

Putting it in equation we get

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

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

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

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