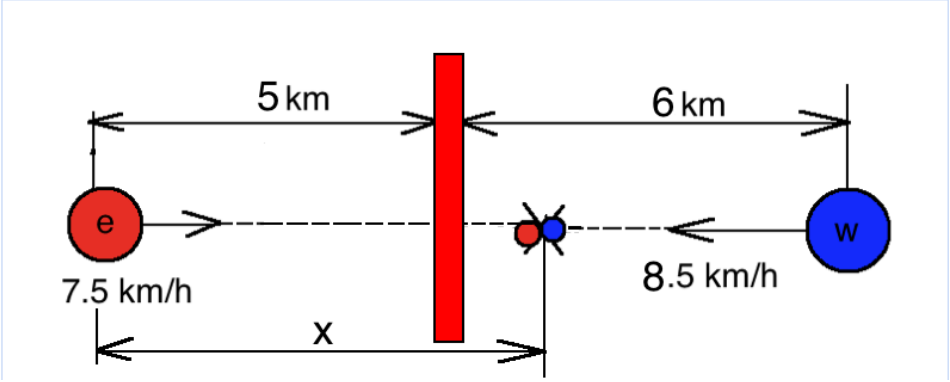
Runner A is initially 5.0 km west of a flagpole and is running with a constant velocity of 7.5 km/h due east. Runner B is initially 6.0 km east of the flagpole and is running with a constant velocity of 8.5 km/h due west. How far are the runners from the flagpole when their paths cross?

Solution:



At the start runner A and runner B are 5+6=11 km apart.

Eastbound runner data:

$$distance = x\ km; rate = 7.5\frac{km}{h}; time = \frac{d}{r} = \frac{x}{7.5}$$

Westbound runner data:

$$distance = 11 - x; rate = 8.5\frac{km}{h}; time = \frac{d}{r} = \frac{11 - x}{8.5}$$

time east= time west:

$$\frac{x}{7.5} = \frac{11 - x}{8.5}$$

$$8.5x = 82.5 - 7.5x$$

$$16x = 82.5$$

$x = 5.15$ (distance eastbound runner goes)
He will meet the westbound runner 5.15-5=0.54 km east of the flagpole.

Answer: eastbound runner will meet the westbound runner 0.54 km east of the flagpole.