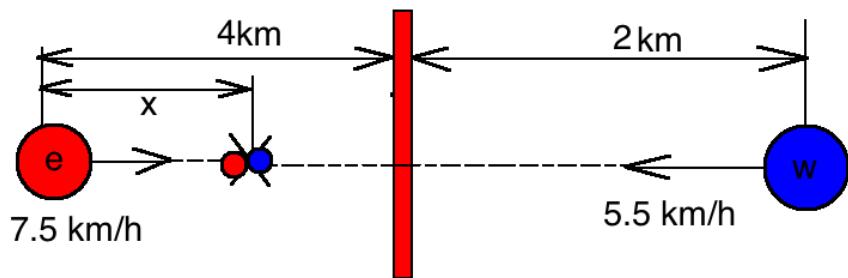


Runner A is initially 4.0 km west of a flagpole and is running with a constant velocity of 7.5 km/h due east. Runner B is initially 2.0 km east of the flagpole and is running with a constant velocity of 5.5 km/h due west. How far are the runners from the flagpole when their paths cross?

Solution:



At the start runner A and runner B are $4+2=6$ km apart.

Eastbound runner data:

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

Westbound runner data:

$$\text{distance} = 6 - x; \text{rate} = 5.5 \frac{\text{km}}{\text{h}}; \text{time} = \frac{d}{r} = \frac{6 - x}{5.5}$$

time east = time west:

$$\frac{x}{7.5} = \frac{6 - x}{5.5}$$

$$5.5x = 45 - 7.5x$$

$$13x = 45$$

$$x = 3.46 \text{ (distance eastbound runner goes)}$$

He will meet the westbound runner $4 - 3.46 = 0.54$ km west of the flagpole.

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