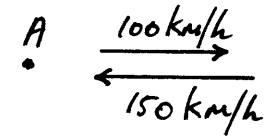
Solution to Example 2:



$$\begin{cases} V_{AB} = 100\ \text{km/h} \\ V_{BA} = -150\ \text{km/h} \end{cases}$$

$$\text{Average velocity} = \frac{\text{Total Displacement}}{\text{Total Time}}$$

Total Displacement of train = 0, since it starts and finishes at same station.

$\therefore$ Average velocity of train = 0 km/h.

Now let the distance between the two stations be d.

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total Time}}$$

Total distance covered by train = $2d$

Total time taken by train = $\frac{d}{100} + \frac{d}{150}$

$= 0.016\dot{}\, d$

(since time = $\frac{\text{distance}}{\text{speed}}$)

$\therefore$ Average speed of train = $\frac{2d}{0.016\dot{}\, d} = 120$ km/h.

Clearly, the average speed of the train, 120 km/h, is of larger magnitude than the average velocity of the train, 0 km/h.

(Note: If you make a mistake, cross it out neatly. Don't make a mess!)