

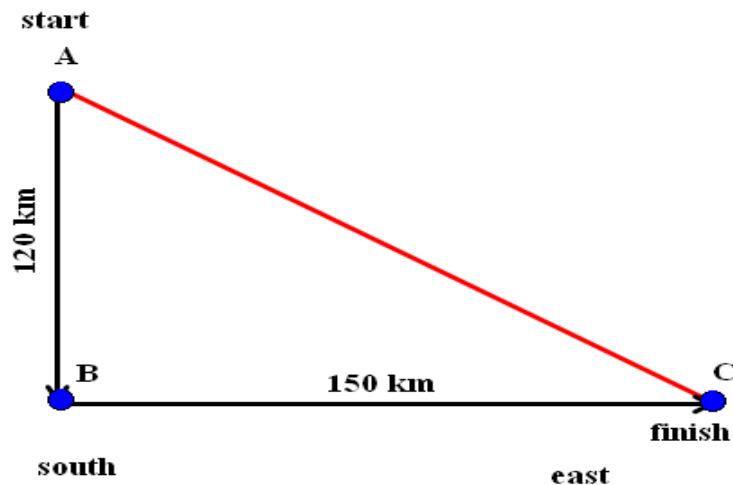
Answer on question #61642, Physics, Solid State Physics

John drove south 120km at 60km/h and then east 150km at 50km/h.

Determine:

- The average speed for the whole journey.
- The magnitude of the average velocity for the whole journey.

Solution:



a)

The time t_1 to cover 120 km at a speed of 60 km/h is given by

$$t_1 = \frac{120 \text{ km}}{60 \text{ km/h}} = 2 \text{ hours}$$

The time t_2 to cover 150 km at a speed of 50 km/h is given by

$$t_2 = \frac{150 \text{ km}}{50 \text{ km/h}} = 3 \text{ hours}$$

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{average speed} = \frac{120 \text{ km} + 150 \text{ km}}{2 \text{ h} + 3 \text{ h}} = 54 \text{ km/h}$$

b)

The magnitude of the displacement is the distance AC between the final point and the starting point and is calculated using Pythagora's theorem as follows

$$AC^2 = AB^2 + BC^2$$

$$AC = \sqrt{120^2 + 150^2} = \sqrt{14400 + 22500} = 30\sqrt{41} \text{ km}$$

$$\text{average velocity} = \frac{\text{displacement}}{\text{time}}$$

$$\text{average velocity} = \frac{30\sqrt{41} \text{ km}}{2h + 3h} \approx 38.4 \text{ km/h}$$

Answer: a) 54 km/h b) 38.4 km/h