

(8E) An automobile travels on a straight road for 40 km at 30 km/h. It then continues in the same direction for another 40 km at 60 km/h. (a) What is the average velocity of the car during this 80 km trip? (Assume that it moves in the positive x direction.) (b) What is its average speed? (c) Graph x versus t and indicate how the average velocity is found on the graph.

part 1: 40 km @ 30 km/hr

How long does it take for part 1?

$$v_1 = \frac{\Delta x_1}{\Delta t_1} \Rightarrow \Delta t_1 = \frac{\Delta x_1}{v_1}$$

$$\Delta t_1 = \frac{40 \text{ km}}{30 \text{ km/hr}} = \frac{4}{3} \text{ hr}$$

part 2: 40 km @ 60 km/hr

$$\Delta t_2 = \frac{\Delta x_2}{v_2} = \frac{40 \text{ km}}{60 \text{ km/hr}} = \frac{2}{3} \text{ hr}$$

Total time? $t = \Delta t_1 + \Delta t_2 = \frac{6}{3} \text{ hr}$
 $t = 2 \text{ hr}$

Total distance? $x = \Delta x_1 + \Delta x_2 = 80 \text{ km}$

Average speed:

$$v_{\text{avg}} = \frac{x}{t} = \frac{80 \text{ km}}{2 \text{ hr}} = 40 \text{ km/hr}$$

Note this is not the simple average of the two speeds!



