SAMPLE PROBLEM A

Average Velocity and Displacement

PROBLEM

During a race on level ground, Andra runs with an average velocity of 6.02 m/s to the east. What is Andra's displacement after 137 s?

SOLUTION

Given: $v_{avg} = 6.02$ m/s
$\Delta t = 137$ s

Unknown: $\Delta x = ?$

Rearrange the average velocity equation to solve for displacement.

$$v_{avg} = \frac{\Delta x}{\Delta t}$$

$$\Delta x = v_{avg}\Delta t$$

$$\Delta x = v_{avg}\Delta t = (6.02 \text{ m/s})(137 \text{ s}) = \boxed{825 \text{ m to the east}}$$

CALCULATOR SOLUTION

The calculator answer is 824.74 m, but both the values for velocity and time have three significant figures, so the displacement must be reported as 825 m.

PRACTICE A

Average Velocity and Displacement

1. Heather and Matthew walk with an average velocity of 0.98 m/s eastward. If it takes them 34 min to walk to the store, what is their displacement?
2. If Joe rides his bicycle in a straight line for 15 min with an average velocity of 12.5 km/h south, how far has he ridden?
3. It takes you 9.5 min to walk with an average velocity of 1.2 m/s to the north from the bus stop to the museum entrance. What is your displacement?
4. Simpson drives his car with an average velocity of 48.0 km/h to the east. How long will it take him to drive 144 km on a straight highway?
5. Look back at item 4. How much time would Simpson save by increasing his average velocity to 56.0 km/h to the east?
6. A bus travels 280 km south along a straight path with an average velocity of 88 km/h to the south. The bus stops for 24 min. Then, it travels 210 km south with an average velocity of 75 km/h to the south.
   a. How long does the total trip last?
   b. What is the average velocity for the total trip?