DATE: NAME: CLASS:

CHAPTER 10
PROBLEM SOLVING

Uniform Motion

BLM 10-5

Goal • Use the uniform motion formula to solve motion problems.

What to Do

Solve each problem in the space provided. Show all your work.

1. Use the uniform motion formula to complete the table below.

Δt	$\Delta \vec{d}$	$\vec{v}_{av}$
3.0 s	+12 m	+4.0 m/s
7.0 s	+28 m	+4.0 m/s
15.1 s	+30.2 m	+2.00 m/s
1.5 h	+75 km	+50 km/h
1.7 h	+84 km	+49 km/h
8.0 h	+120 km	+15 km/h

2. (a) A student rides a bicycle along a straight road for 30.0 s. She travels 254 m away from her home. Find her average velocity.

$$\vec{v} = \frac{\Delta \vec{d}}{\Delta t} = \frac{254 \text{ m}}{30.0 \text{ s}}$$

$$= 8.47 \text{ m/s}$$

(b) A car is moving east, at 90 km/h, along a straight highway. Find the displacement of the car after 1.2 h.

$$\vec{v} = \frac{\Delta \vec{d}}{\Delta t} \qquad \Delta \vec{d} = \vec{v} \cdot \Delta t$$

$$= (90 \text{ km/h})(1.2 \text{ h})$$

$$= 108 \text{ km}$$

$$(= 100 \text{ km})$$

(c) A person is walking west at 4.2 m/s. How long will it take the person to go 110 m west?

$$\vec{v} = \frac{\Delta \vec{d}}{\Delta t} \qquad \Delta t = \frac{110 \text{ m}}{4.2 \text{ m/s}}$$

$$\vec{v} \cdot \Delta t = \Delta \vec{d}$$

$$\Delta t = \frac{\Delta \vec{d}}{\vec{v}}$$

$$= 26.2 \text{ s}$$

$$(= 26 \text{ s})$$

Uniform Motion (continued)

3. A car starts from a position of 18 m at a time of 7.2 s. The velocity of the car is 17 m/s. Find the position of the car at a time of 9.8 s.

$$\vec{v} = \frac{\vec{\Delta d}}{\Delta t} = \frac{\vec{d}_2 - \vec{d}_1}{t_2 - t_1}$$

$$17 \text{ m/s} = \frac{d_2 - 18 \text{ m}}{9.8 \text{ s} - 7.2 \text{ s}}$$

$$d_2 - 18 \text{ m} = 44.2$$

$$d_2 = \boxed{62.2 \text{ m}}$$

$$(= 62 \text{ m})$$

4. A student is walking with a constant velocity along a straight sidewalk. At a time of 1.4 s, his position is 31.4 m. Later, at a time of 6.1 s, his position is 9.6 m.

(a) What is the student's velocity?

$$\vec{v} = \frac{\vec{d}_2 - \vec{d}_1}{t_2 - t_1} = \frac{9.6 \text{ m} - 31.4 \text{ m}}{6.1 \text{ s} - 1.4 \text{ s}} = \boxed{-4.6 \text{ m/s}}$$

(b) What is his position at 4.4 s?

$$\vec{\Delta d} = \vec{v} \cdot \Delta t$$

$$d_2 - d_1 = \vec{v}(t_2 - t_1)$$

$$d_2 - (31.4) = (-4.6)(4.4 - 1.4)$$

$$d_2 - 31.4 = -13.9$$

$$\vec{d}_2 = \boxed{+17.5 \text{ m}}$$

$$(= 18 \text{ m})$$

(c) At what time is the student's position 12.0 m?

$$\Delta t = \frac{\vec{\Delta d}}{\vec{v}}$$

$$t_2 - t_1 = \frac{\vec{d}_2 - \vec{d}_1}{\vec{v}}$$

$$t_2 - 1.4 = \frac{(+12) - (+31.4)}{(-4.6)}$$

$$t_2 - 1.4 = 4.18 \text{ s}$$

$$t_2 = \boxed{5.6 \text{ s}}$$

