NAME __Key__
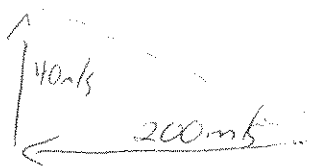
All Answers use
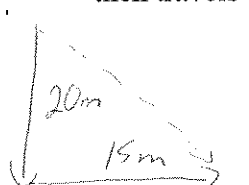$$g = 10 \text{ m/s}^2$$

Chapter 3 Review Problems

1. A plane is heading west at 200 m/s and is being blown off course by a 40 m/s wind blowing north. What is the resultant velocity?

$$V = \sqrt{W^2 + N^2} \qquad = \sqrt{(200 \text{ m/s})^2 + (40 \text{ m/s})^2}$$

40 m/s
200 m/s

$$\boxed{204 \text{ m/s NW}}$$

2. Kevin leaves home and rides his bike 20 miles South. He stops and has lunch under a tree. He then travels 15 miles east. How far is he from home?

20 m
15 m

$$D = \sqrt{5^2 + E^2} \qquad = \sqrt{(20 \text{ m})^2 + (15 \text{ m})^2}$$

$$\boxed{25 \text{ m SE}}$$

3. While investigating an accident, a police man notices a car is 30 meters from the base of a 35 meter tall cliff. How fast was the car going when it went off the cliff?

$$V_\rightarrow$$
$$D_\rightarrow = 30 \text{ m}$$
$$t = 2.65 \text{ s}$$

$$V_\rightarrow = \frac{D_\rightarrow}{t} \qquad \frac{30 \text{ m}}{2.65 \text{ s}} \qquad \boxed{11.3 \text{ m/s}}$$

$$D_\downarrow = 35 \text{ m}$$
$$g = 10 \text{ m/s}^2$$

$$t = \sqrt{\frac{2D}{g}} \qquad = \sqrt{\frac{2(35 \text{ m})}{10 \text{ m/s}^2}} \qquad 2.65 \text{ s}$$

4. An out of control car is heading toward a 15 m tall cliff at 35 m/s. How far from the base of the cliff does the car land?

$$V_\rightarrow = 35 \text{ m/s}$$
$$D_\rightarrow =$$
$$t = 1.73 \text{ s}$$

$$D_\rightarrow = V_\rightarrow \cdot t \qquad (35 \text{ m/s})(1.73 \text{ s}) \qquad = \boxed{60.6 \text{ m}}$$

$$D_\downarrow = 15 \text{ m}$$
$$g = 10 \text{ m/s}^2$$

$$t = \sqrt{\frac{2(15 \text{ m})}{10 \text{ m/s}^2}} \qquad = \sqrt{\frac{2D}{g}} \qquad 1.73 \text{ s}$$

5. While investigating an accident, a police man notices a car is 50 meters from the base of a cliff. If the driver of the car swears he was going 40 mph (about 18 m/s), how tall is the cliff?

$$V_\rightarrow = 18 \text{ m/s}$$
$$D_\rightarrow = 50 \text{ m}$$
$$t = ?$$

$$t = \frac{D_\rightarrow}{V_\rightarrow} \qquad = \frac{50 \text{ m}}{18 \text{ m/s}} \qquad 2.78 \text{ s}$$

$$D = \frac{1}{2} g t^2$$
$$g = 10 \text{ m/s}^2$$

$$= \frac{1}{2}(10 \text{ m/s}^2)(2.78 \text{ s})^2 = \boxed{38.6 \text{ m}}$$

6. Diver Dan decides to do one of his spectacular dives off a cliff. The cliff is 20 meters high. In order to reach the water, he figures he needs to go about 15 meters horizontally. How fast must he run off the cliff?

$$V_\rightarrow$$
$$D_\rightarrow = 15 \text{ m}$$
$$t = 2 \text{ s}$$

$$V_\rightarrow = \frac{D_\rightarrow}{t} \qquad = \frac{15 \text{ m}}{2 \text{ s}} \qquad \boxed{7.5 \text{ m/s}}$$

$$D_\downarrow = 20 \text{ m}$$
$$g_\downarrow = 10 \text{ m/s}^2$$

$$t = \sqrt{\frac{2D}{g}} \qquad = \sqrt{\frac{2(20 \text{ m})}{10 \text{ m/s}^2}} \qquad 2 \text{ s}$$