

Chapter 1 HW Answers

Review Questions:

7. Weight is greater on Earth. Mass is the same on Earth and the Moon.
14. $\sum f = 0$ means the net force is zero, that all forces are balanced.
20. The friction is to the left if the movement is to the right.
23. Velocity is a vector because it depends partially on direction. Speed does not depend on direction.
27. The acceleration is zero. The net force is also zero.

Exercises:

2. Inertia
6. Mass
20. The force of friction is equal to the 600 N horizontal force. The two forces balance each other allowing constant motion to occur.
22. It is not possible to round a corner at a constant velocity. As the dragster rounds the corner, it is constantly changing direction so it is constantly changing velocity, even if speed is maintained.
26. 9.81 m/s each second
27. $d = 1/2at^2$

Unequal distances will be indicated because the object is increasing speed, increasing distance per second, as it falls.

29. The ball that is thrown down will have the greater speed because it starts its descent with a downward velocity. The ball that is thrown upward will start its descent with zero downward velocity. Each ball will gain 9.81 m/s of speed as it falls.

| Time Falling | Speed Ball Thrown Downward | Speed Ball Thrown Upward |
|---------------------|--|-------------------------------------|
| 1 sec | $v + 9.81 \text{ m/s}$ | 9.81 m/s |
| 2 sec | $v + 9.81 \text{ m/s} + 9.81 \text{ m/s}$ | 9.81 m/s + 9.81 m/s |
| 3 sec | $v + 9.81 \text{ m/s} + 9.81 \text{ m/s} + 9.81 \text{ m/s}$ | 9.81 m/s + 9.81 m/s + 9.81 m/s |

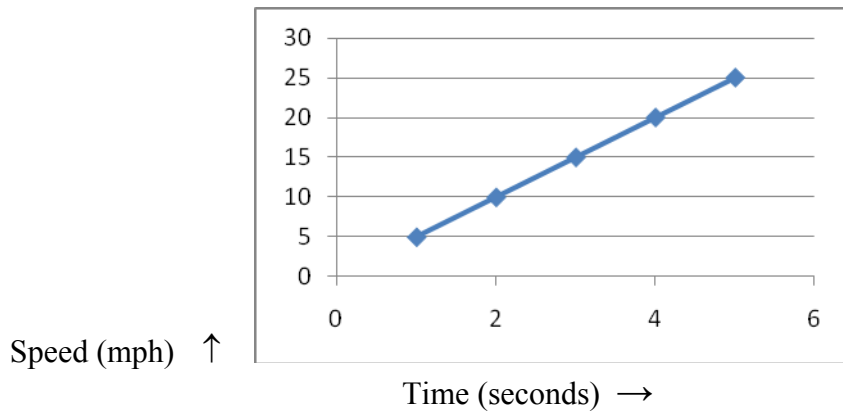
Problem:

10. a. 0 b. 9.81 m/s c. $\Delta v = 9.81 \text{ m/s}$
 d. 9.81 m/s e. $\Delta v = 9.81 \text{ m/s}$ f. $\Delta v = v_f - v_i = (9.81 \text{ m/s} - (-9.81 \text{ m/s})) = 19.62 \text{ m/s}$

Additional:

A. $s = d/t$ $t = \frac{d}{s} = \frac{3000 \text{ mi}}{70 \text{ mi/hr}} = 42.86 \text{ hr (1.8 days)}$

B. linear



C. An automobile would be slowing down or decelerating when the net acceleration is in the opposite direction as velocity.

D. $a = ?$
 $\Delta v = 50 \text{ mph}$
 $t = 10 \text{ sec}$

First we need to put 50 mph hour in standard units.

$$\frac{50 \text{ miles}}{\text{hour}} \times \frac{1609 \text{ meters}}{1 \text{ mile}} \times \frac{1 \text{ hour}}{3600 \text{ seconds}} = 22.3 \text{ m/s}$$

$$a = \frac{\Delta v}{t} = \frac{22 \text{ m/s}}{2 \text{ sec}} = 11 \text{ m/s/s} = \mathbf{11 \text{ m/s}^2}$$

- E. What we are told: $d = 3 \text{ m}$
 What we need: $t = ?$
 What we need to realize: $a = g = 9.81 \text{ m/s}^2$ (because the apple is falling)

$d = 1/2at^2$ Need to solve for the unknown, t.

$$t = \sqrt{(2d/a)} = \sqrt{[2(3\text{m})/9.81 \text{ m/s}^2]} = \sqrt{(0.61 \text{ s}^2)} = \mathbf{0.78 \text{ s}}$$