

1. A baseball pitcher throws at pitch at 42 m/s. If the batter is 18 meters from the pitcher, approximately how much time does it take the ball to reach the batter?

- A. 1.8 seconds
- B. 2.0 seconds
- C. .87 seconds
- D. .43 seconds

2. How much work is done on a downhill skier by an average breaking force of  $9.9 \times 10^2$  newtons to stop her in a distance of 10 meters?

- A.  $2.0 \times 10^2$  J
- B.  $3.5 \times 10^2$  J
- C.  $8.4 \times 10^3$  J
- D.  $9.8 \times 10^3$  J

3. A bicyclist accelerates from rest to a speed of 5.0 meters per second in 10 seconds. During the same 10 seconds, a car accelerates from a speed of 22 meters per second to a speed of 27 meters per second. Compared to the acceleration of the bicycle the acceleration of the car is?

- A. The same
- B. Greater
- C. Less

4. A baseball player throws a baseball at a speed of 40 meters per second at an angle of 30 degrees. The horizontal component of the baseball's speed is?

- A. 20 m/s
- B. 25 m/s
- C. 30 m/s
- D. 35 m/s

5. What is the average velocity of a car that travels due West at 30 kilometers in .5 hr?

- A. 60 km/hr west
- B. 60 km/hr
- C. 15 km/hr west
- D. 15 km/hr

6. A man weighs 900 Newtons standing on a scale in a stationary elevator. If some time later the reading on the scale is 1200 Newtons the elevator must be moving with?

- A. Constant acceleration downward
- B. Constant speed downward
- C. Constant acceleration upward
- D. Constant speed upward

7. Net force  $F$  causes mass  $m_1$  to accelerate at rate  $a_1$ . A net force of  $3F$  causes  $m_2$  to accelerate at a rate of  $2a$ . What is the ratio of  $m_1$  to  $m_2$ ?

- A. 2 : 3

- B. 3 : 4
- C. 1 : 2
- D. 2 : 1

8. An artillery shell is fired at an angle to the horizontal. Its initial velocity has a vertical component of 150 meters per second and a horizontal component of 260 meters per second. What is the magnitude of the initial velocity of the shell?

- A.  $2.5 \times 10^2$  m/s
- B.  $3.0 \times 10^2$  m/s
- C.  $3.5 \times 10^3$  m/s
- D.  $3.5 \times 10^4$  m/s

9. Into how many possible components can a single force be resolved?

- A. An unlimited number
- B. Two components
- C. Three components
- D. Four components at right angles to each other

10. What is the magnitude of the gravitational force between two 5.0 kilogram masses separated by a distance of 5.0 meters?

- A.  $1.3 \times 10^{-14}$  N
- B.  $3.3 \times 10^{-10}$  N
- C.  $6.7 \times 10^{-11}$  N
- D.  $1.3 \times 10^{-11}$  N

11. Two cars having different weights are traveling on a level surface at different constant velocities. Within the same time interval, greater force will always be required to stop the car that has greater \_\_\_\_\_.

- A. Weight
- B. KE
- C. Velocity
- D. Momentum

12. A .050 kilogram bullet is fired from a 4.0 kilogram rifle that is initially at rest. If the bullet leaves the rifle with momentum having a magnitude of 20 kilograms  $\square$  meters per second, the rifle will recoil with a momentum having a magnitude of \_\_\_\_.

- A. 1,600 kg  $\square$  m/s
- B. 80 kg  $\square$  m/s
- C. 20 kg  $\square$  m/s
- D. .25 kg  $\square$  m/s

13. A wooden block is at rest on a horizontal steel surface. If a 10 N force applied parallel to the surface is required to put the block in motion, how much force is required to keep the block moving at a constant velocity?

- A. Less than 10 Newtons
- B. Greater than 10 Newtons
- C. 10 Newtons

14. A girl weighing 500 Newtons takes 50 seconds to climb a flight of stairs 18 meters high. Her power output vertically is \_\_\_\_.

- A. 120 W
- B. 150 W
- C. 180 W
- D. 220 W

15. The path of a projectile fired at a 30 degree angle to the horizontal is best described as

- A. Parabolic
- B. Linear
- C. Circular
- D. Hyperbolic

16. A projectile is launched with an initial velocity of 20 meters per second at an angle of 30 degrees above the horizontal. What is the magnitude of the vertical component of the projectile's initial velocity?

- A.  $200 \text{ m/s} \times \cos 30^\circ$
- B.  $200 \text{ m/s} \times \sin 30^\circ$
- C.  $(200 \text{ m/s}) / (\sin 30^\circ)$
- D.  $(200 \text{ m/s}) / (\cos 30^\circ)$

## Answer Key

1. D

2. D

3. A

4. D

5. A

6. C

7. A

8. B

9. A

10. C

11. D

12. C

13. A

14. C

15. A

16. B