

Exam #1 ---- (motion, inertia, force, acceleration, etc.)

1. A book is at rest on top of a table. Which of the following is correct?
 - A. There is no force acting on the book.
 - B. The book has no inertia.
 - C. There is no force acting on the table.
 - D. The book is in equilibrium.
 - E. The inertia of the book is equal to the inertia of the table.

2. The property of a moving object to continue moving is what Galileo called
 - A. velocity.
 - B. speed.
 - C. acceleration.
 - D. inertia.
 - E. direction.

3. According to Newton's First Law of Motion,
 - A. an object in motion eventually comes to a halt.
 - B. an object at rest eventually begins to move.
 - C. an object in motion moves in a parabolic trajectory unless acted upon by a net force.
 - D. an object at rest always remains at rest.
 - E. an object at rest remains at rest unless acted upon by a net force.

4. If an object is moving, then the magnitude of its _____ cannot be zero.
 - A. speed
 - B. velocity
 - C. acceleration
 - D. A and B
 - E. A, B, and C

5. A car initially at rest accelerates in a straight line at 3 m/s^2 . What will be its speed after 2 seconds?
 - A. 0 m/s
 - B. 5 m/s
 - C. 3 m/s
 - D. 6 m/s
 - E. 2 m/s

6. A body in free fall in a vacuum
 - A. will drop the same distance during each second of its fall.
 - B. will have the same average speed during each second of its fall.
 - C. will have a constant velocity during each second of its fall.

- D. will not be accelerated during its fall.
- E. will have the same acceleration during each second of its fall.

7. A bowling ball at a height of 36 meters above the ground is falling vertically at a rate of 12 meters per second. Which of these best describes its fate?

- A. It will hit the ground in exactly three seconds at a speed of 12 m/s.
- B. It will hit the ground in less than three seconds at a speed greater than 12 m/s.
- C. It will hit the ground in more than three seconds at a speed less than 12 m/s.
- D. It will hit the ground in less than three seconds at a speed less than 12 m/s.
- E. It will hit the ground in more than three seconds at a speed greater than 12 m/s.

8. The speedometer in your car tells you the ____ of your car.

- A. acceleration
- B. average speed
- C. instantaneous speed
- D. velocity
- E. inertia

9. To report the ____ of an object, we must specify both its speed and its direction .

- A. acceleration
- B. mass
- C. velocity
- D. length
- E. position

10. Projectile 'A' is fired at an angle of 50° above the horizontal; projectile 'B' is fired with the same speed at an angle of 40° above the horizontal. Assuming level ground and negligible air resistance, which of the following is true?

- A. 'A' will reach a greater height and have a greater range than 'B'.
- B. 'A' will reach a greater height and have the same range as 'B'.
- C. 'A' will reach a greater height and have a shorter range than 'B'.
- D. 'A' will reach the same height and have the same range as 'B'.
- E. 'A' will reach the same height and have a shorter range than 'B'.

11. In the absence of air resistance, the magnitude of the vertical component of a projectile's acceleration

- A. is constant until the projectile hits the ground.
- B. always decreases with time until the projectile hits the ground.
- C. is equal to the magnitude of the horizontal component of the projectile's acceleration.
- D. increases and/or decreases with time, depending on the projectile's velocity.
- E. always increases with time until the projectile hits the ground.

12. A ball is thrown horizontally with a speed of 25 m/s from the top of a tower 20 meters high. Assuming level ground below and negligible air resistance, what will be the magnitude of the vertical velocity component when the ball hits the ground?

- A. 25 m/s
- B. 15 m/s
- C. 20 m/s
- D. 50 m/s
- E. 10 m/s

13. Which of these is the best description of the trajectory of a projectile shot from the top of a high cliff at an angle of 60° below the horizontal (neglecting air resistance)?

- A. The projectile will move downwards at a 60° angle in a straight line at a constant speed until it stops and then falls straight down.
- B. The projectile will move downwards at a 60° angle in a straight line at a gradually diminishing speed until it stops and then falls straight down.
- C. The projectile will move downwards at a 60° angle in a straight line at a gradually increasing speed until it stops and then falls straight down.
- D. The projectile will gradually arc downward, following the curve of a circle.
- E. The projectile will gradually arc downward, following the curve of a parabola.

14. A firefighter with a mass of 70 kg slides down a vertical pole, accelerating at 2 m/s^2 . The force of friction that acts on the firefighter is

- A. 70 N.
- B. 560 N.
- C. 140 N.
- D. 700 N.
- E. 0 N.

15. The _____ of an object on the Earth's surface are directly proportional to each other.

- A. acceleration and mass
- B. mass and weight
- C. force and velocity
- D. weight and acceleration
- E. speed and velocity

16. The Moon's gravity is $1/6$ of the Earth's gravity. The weight of a bowling ball on the Earth would be _____ its weight on the Moon.

- A. equal to
- B. $1/6$ of
- C. 6 times
- D. 36 times

E. 1/36 of

17. When a certain net force is applied to one brick on a frictionless surface, it accelerates at 6 m/s^2 . When the same net force is applied to three bricks that are cemented together,

- A. they accelerate at 3 m/s^2 .
- B. they accelerate at 6 m/s^2 .
- C. they accelerate at 18 m/s^2 .
- D. they accelerate at 2 m/s^2 .
- E. they do not accelerate at all.

18. To accelerate a 6 kg mass at 2 m/s^2 requires a net force of _____ .

- A. 3 N
- B. 8 N
- C. 12 N
- D. 6 N
- E. 2 N

19. A falling object is said to reach terminal speed

- A. when it lands on the ground.
- B. when its air resistance equals the force of gravity on it.
- C. when there is no air resistance acting on it.
- D. when there is no gravitational force acting on it.
- E. when it stops falling.

20. For every action there is an equal and opposite reaction. This is a statement of

- A. Newton's First Law of Motion.
- B. Newton's Second Law of Motion.
- C. Newton's Third Law of Motion.
- D. Newton's Fourth Law of Motion.
- E. Newton's Law of Action.

21. An airplane flying east at an airspeed of 200 km/h has a headwind blowing from the east at 50 km/h . How far will the plane fly relative to the ground in two hours?

- A. 500 km
- B. 250 km
- C. 300 km
- D. 400 km
- E. 200 km

22. An airplane heading west at an airspeed of 100 km/h has a crosswind blowing from the south at 100 km/h . What will be the airplane's speed relative to the ground?

- A. 0 km/h

- B. 71 km/h
- C. 100 km/h
- D. 141 km/h
- E. 200 km/h

23. _____ are examples of vector quantities.

- A. Acceleration and time
- B. Velocity and acceleration
- C. Volume and velocity
- D. Mass and volume
- E. Time and mass