

Quiz 1; Phys 100

Name _____

Speed $s = d/t$. Newton's Law of Motion: $F = ma$.

1. (2 points) For an object freely falling to Earth, which of the following is true, ignoring air resistance?

- (a) Its distance from the starting point, speed, and acceleration all increase.
- (b) Distance increases, speed decreases, acceleration increases.
- (c) Distance increases, speed stays the same, acceleration stays the same.
- (d) Distance increases, speed increases, acceleration stays the same.**
- (e) Distance, speed, and acceleration all decrease.

2. (3 points) Can a slow-moving object have a large acceleration? Can a fast-moving object have a small acceleration? Explain.

Answer: Yes, in both cases. Acceleration is the *rate of change* of velocity, which is completely independent of the velocity.

3. (4 points) You call a friend who is visiting India, 13,000 km away. Given that the speed of light is 300,000 km/s, how long would it take light to travel that distance? If you were to have a phone conversation, would you notice a delay?

Answer: The time to travel would be

$$t = \frac{d}{s} = \frac{13,000 \text{ km}}{300,000 \text{ km/s}} = 0.043 \text{ s}$$

About 4% of a second would also be the time delay—hard to notice.

4. (3 points) Which of the following is *false*?

- (a) Objects, whether they are moving or not, do not contain forces.
- (b) An object moving in a circle has zero net force acting on it.**
- (c) If an object slows down, a net force must be acting on it.
- (d) The net force on an object is proportional to its acceleration.
- (e) Velocity includes speed and direction

5. (4 points) When you stand on the floor, does the floor exert a force on your feet? In which direction? Why, then, don't you accelerate in that direction?

Answer: Yes, it exerts a force; otherwise your weight would push you through the floor. The force is upwards, opposite your weight. You don't accelerate because the perpendicular force from the floor is equal and opposite to your weight, so the net force on you is zero.

6. (4 points) Write a *question* that occurred to you while reading the first chapter of *Astrophysics for People in a Hurry*.

Answer: Your answers will differ; I will grade them according to my judgment of how good a question it is.