

Quiz 1; Phys 100

Name _____

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

1. (2 points) Which of the following is *true*?

- (a) **Aristotelian physics distinguishes between horizontal and vertical motion.**
- (b) Our intuitive, commonsense "folk physics" is always correct.
- (c) The Greek conception of the universe included a flat earth.
- (d) Everyday objects are composed of various mixtures of earth, fire, earth and water.
- (e) Isaac Newton lived approximately 2000 years ago

2. (4 points) It takes light about 8 minutes to travel here from the sun. Given that the speed of light is 300,000 km/s, how far is it to the sun?

Answer:

$$(8 \text{ min})(300000 \text{ km/s}) \frac{60\text{s}}{1 \text{ min}} = 1.44 \times 10^8 \text{ km}$$

3. (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

4. (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.

5. (4 points) Neil DeGrasse Tyson writes about the difficult questions Galileo faced when he claimed that the Earth moved, and gives “If you jumped vertically, wouldn’t you land in a very different spot as Earth traveled swiftly below your feet?” as an example. What’s the answer?

Answer: In Tyson’s words, “while you are airborne, you, the atmosphere, and everything else around you get carried away with the rotating, orbiting Earth. For the same reason, if you stand in the aisle of a cruising airplane and jump, you do not catapult backward past the rear seats and get pinned against the lavatory doors.” (page 41)

You don’t need to express it in the same words; the idea is that of inertia. Moving objects with negligible outside influences on them don’t slow down, they keep moving.

6. (3 points) Which of the following is a *not* misconception discussed by Tyson?

- (a) The Sun is a yellow star
- (b) There is no gravity in outer space
- (c) The Moon comes out at night
- (d) On the equinox there are 12 hours of day and 12 hours of night
- (e) **There only about a thousand stars in the universe**