

Questions 1-2

A rock weighing 10 newtons is lifted a distance d from the ground. The work done by the force that lifts the rock is 10 joules. The rock is then dropped on a wooden stake, thus driving the stake into the ground.

1. The distance d is most nearly

- (A) 0.01 m
- (B) 0.1 m
- (C) 1 m
- (D) 10 m
- (E) 100 m

2. The work done by the rock in driving the stake into the ground is most nearly

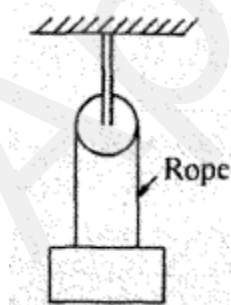
- (A) 0.01 J
- (B) 0.1 J
- (C) 1 J
- (D) 10 J
- (E) 100 J

3. Which of the following particles travels at the speed of light?

- (A) Alpha particle
- (B) Electron
- (C) Neutron
- (D) Proton
- (E) Photon

4. The photoelectric effect can be described by which of the following?

- (A) Electrons striking the surface of a metal and atoms of the metal being emitted
- (B) Neutrons striking the surface of a metal and other neutrons being emitted
- (C) Photons striking the surface of a metal and electrons being emitted
- (D) Positive ions striking the surface of a metal and negative ions being emitted
- (E) Protons striking the surface of a metal and alpha particles being emitted



5. A block weighing 200 newtons is suspended from both ends of a massless rope that goes over a pulley, as shown above. What is the tension in the rope?

- (A) 50 N

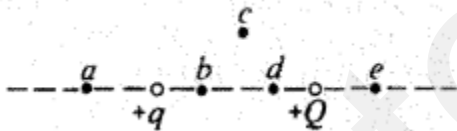
- (B) 100 N
- (C) 150 N
- (D) 200 N
- (E) 400 N

6. A disk, mounted on an axle through its center, is set into rotation by a force acting tangentially to the rim of the disk. The force is applied for 10 seconds and then withdrawn. After removal of the force, the wheel comes to rest in 50 seconds.

Correct statements about the motion of the disk include which of the following?

- I. The applied torque and the frictional torque are in opposite directions.
- II. While the force is being applied, the magnitude of the applied torque is greater than the magnitude of the frictional torque.
- III. The angular momentum of the disk remains constant during the entire 60 seconds interval.

- (A) I only
- (B) II only
- (C) I and II only
- (D) I and III only
- (E) II and III only



7. Two positive charges of magnitudes q and Q ($Q > q$) are located as shown above. If a negative charge is to experience no electrical force, at which point is it most likely to be located?

- (A) a
- (B) b
- (C) c
- (D) d
- (E) e

8. A bar magnet is placed near a coil of wire. A current will be generated in the coil in which of the following cases?

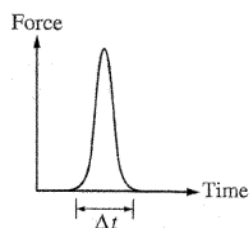
- I. The magnet and coil move relative to each other.
- II. The coil has a constant charge and the magnet and coil are stationary.
- III. The magnet has a constant charge and the magnet and coil are stationary.

- (A) I only

- (B) II only
- (C) III only
- (D) II and III only
- (E) I and III only

9. Cart P, which has a mass of 4 kilograms and a velocity of 6 meters per second east, collides with cart Q, which has the same mass and is at rest. If cart Q has a velocity of 6 meters per second east after the collision, the velocity of cart P after the collision will be

- (A) 6 m/s west
- (B) 0 m/s
- (C) 4 m/s east
- (D) 6 m/s east
- (E) 24 m/s east



10. A force acts on an object for a short time interval Δt , as shown on the graph above. Which of the following quantities is equal to the area under the curve?

- (A) Speed
- (B) Acceleration
- (C) Work
- (D) Kinetic energy
- (E) Impulse