



1.) A large truck breaks down out on the road, and receives a push back into town by a small car. While the car is speeding up to get to cruising speed (pushing truck at same time), _____

- a) the force of the car pushing against the truck is equal in amount to that of the truck pushing back against the car.
- b) the force of the car pushing against the truck is less than that of the truck pushing back against the car.
- c) the force of the car pushing against the truck is greater than that of the truck pushing back against the car
- d) the car's engine is running so it applies a force as it pushes against the truck but the truck's engine is not running so it can't push back with a force against the car.
- e) neither the car nor the truck exert any force on the other, the truck is pushed forward simply because it is in the way of the car.

2.) A rabbit (2 kg) must push down on the earth with a force of _____ so that the earth can push back with a reaction force that allows the rabbit to jump over a water puddle in the yard.

- a) 20 kg
- b) less than 19.6 N
- c) more than 2 kg
- d) 19.6 N
- e) more than 19.6 N

3.) According to Newton's First Law of Motion, _____

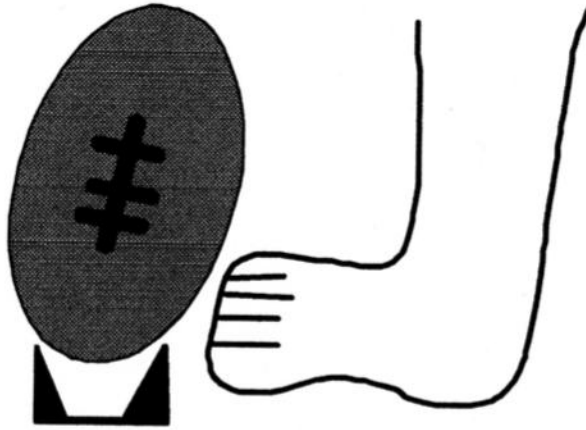
- a) a body can be in motion if and only if it experiences a net external force.
- b) if there are any external forces acting on an object, it will not sit still.
- c) if the net external force acting on a body is zero, its state of motion will not change.
- d) if the net external force acting on a body is zero, it must be at rest.
- e) none of the above.

4.) Two student groups are in a tug-of-war contest with a 400 kg lawnmower. If the Habitat group has 6 people pulling with 700 N each to the left and the College Students for Social Change group has 6 people pulling with 850 N each to the right, what is the lawn mower's acceleration?

- a) 10 m/s² toward the left
- b) 1.5 m/s² toward the right
- c) 3.0 m/s² toward the left
- d) 2.25 m/s² toward the right
- e) 0.75 m/s² toward the right

5.) A 0.5 kg rock is dropped into a still pool of water. If the water resistance is 1.1 N, what is the net force experienced by the rock?

- a) 4.9 N downward
- b) 1.1 N upward
- c) 3.8 N downward
- d) 105.1 N upward
- e) 60 N to right



6) In order to get the football pictured above into the air when kicked by the foot, which of the below statements must be TRUE?

- a) The force of the ball on the tee must be greater than the force of the foot on the ball.
- b) The force of the foot on the football must be greater than the force of the football on the foot.
- c) The force of the ball on the foot must be greater than the force of the foot on the ground.
- d) The force of the foot on the ball must be greater than the force of the ball on the tee.
- e) The force of the foot on the ground must be less than the force of the ball on the tee.

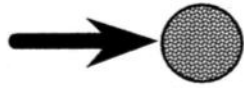
7.) How much force is required to stop a falling 9.1 kg baby that hits the floor (on its bottom) at 0.7m/s if the diaper allows for a 0.02 second stopping time?

- a. 318.5 N up
- b. 0.089 N down
- c. 222.7 N down
- d. 0.127 N up
- e. 23 N up

8.) How much impulse is required to stop a bowling ball (7kg) which is rolling at 3 m/s?

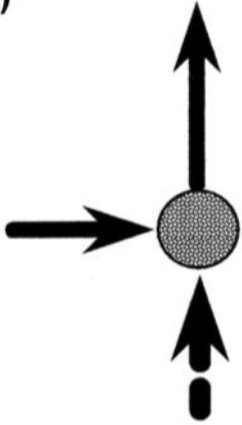
- a. 6.3 kg m/s toward the ball
- b. 21 kg m/s toward the ball
- c. 32 kg m/s toward the ball
- d. 147 kg m/s toward the ball
- e. 63 kg m /s toward the ball

9.) The hockey puck pictured below is originally moving from left to right as indicated by the arrow to left of puck. A hockey stick hits the puck from below as indicated by the dashed arrow. Along which of the paths pictured below will the hockey puck move AFTER receiving an upward hit?

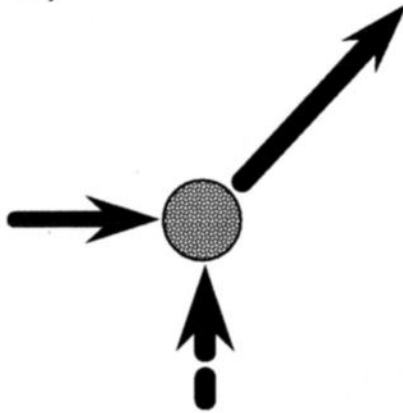


Originally, moving from left to right.

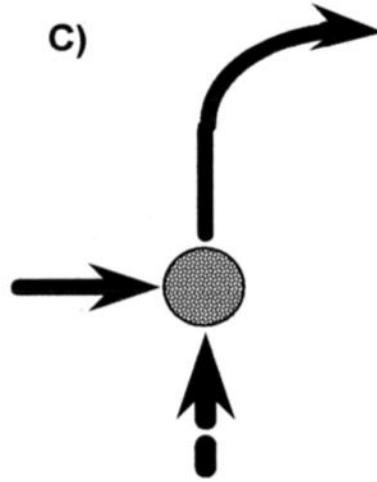
A)



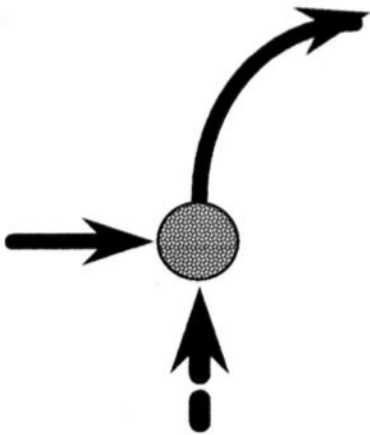
B)



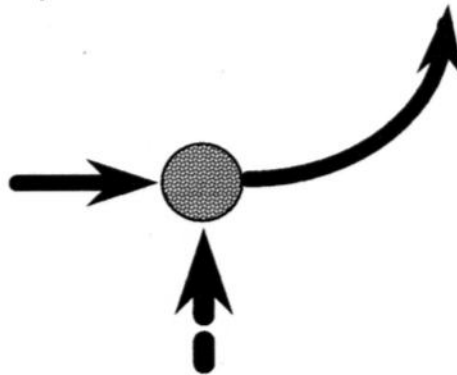
C)



D)



E)



10.) Two Olympic skaters collide during practice. Bayul has a mass of 3.5 slugs and is standing still. Szewczenko has a mass of 5 slugs. If Szewczenko hits Bayul at a velocity of 5 ft/s to the left, what is the total final momentum of the two skaters as they move off together?

- a) 25 slugs ft/s to the left
- b) 17.5 ft/s to the right
- c) 42.5 slugs ft/s to the left
- d) 250 slugs ft/s to the left
- e) 50 ft/s to the right

11.) How much work must be done to accelerate a 5000 kg boat from a speed of 0.5 m/s to 3.5 m/s?

- a. 22500 J
- b. 45000 J
- c. 60000 J
- d. 12000 J
- e. 30000J

12.) An ant, an elephant, and your instructor jump from the lab bench in the front of the room. Assuming no air resistance, which of the following is TRUE?

- a. Just before hitting the floor, they all have the same kinetic energy.
- b. Just before jumping, they all have the same potential energy.
- c. They all experience the same force upon landing.
- d. They all have the same speed just before hitting the floor.
- e. Their potential energies are equal half way down to the floor.

13.) How much work can be done on your toe by a 2 kg book that drops 1.5 m to your foot?

- a. 30 J
- b. 3 J
- c. 15 J
- d. 20 J
- e. 4.5 J