

Quiz.

1. A force interaction requires at least a(n)
 - a) single force.
 - b) pair of forces.
 - c) action force.
 - d) reaction force

2. The force that directly propels a motor scooter along a highway is that provided by the
 - a) engine.
 - b) fuel.
 - c) tires.
 - d) road.

3. When you jump vertically upward, strictly speaking, you cause Earth to
 - a) move downward.
 - b) also move upward with you.
 - c) remain stationary.
 - d) move sideways a bit.

4. A system undergoes acceleration only when acted on by a(n)
 - a) net force.
 - b) pair of forces.
 - c) action and reaction forces.
 - d) internal interactions.

5. If a net force acts on a horse while it is pulling a wagon, the horse
 - a) accelerates.
 - b) is restrained.
 - c) is pulled backward by an equal and opposite net force.
 - d) cannot move.

6. A player catches a ball. Consider the action force to be the impact of the ball against the player's glove. The reaction to this force is the
 - a) friction of the ground against the player's shoes.
 - b) force the glove exerts on the ball.
 - c) muscular effort in the player's arms.
 - d) player's grip on the glove.
 - e) all of these

7. A person is attracted toward the center of Earth by a 500- N gravitational force. The Earth is attracted toward the person with a force of
 - a) 250 N.
 - b) 500 N.
 - c) zero.
 - d) 1000 N.

8. A karate chop delivers a blow of 3000 N to a board that breaks. The force that acts on the hand during this event is
- 6000 N.
 - zero.
 - 3000 N.
 - 1500 N.
9. A Mack truck and a Volkswagen traveling at the same speed have a head-on collision. The vehicle that undergoes the greatest change in velocity will be the
- Volkswagen.
 - same for both.
 - Mack truck.
10. A car traveling at 100 km/hr strikes an unfortunate bug and splatters it. The force of impact is
- greater on the car.
 - the same for both.
 - greater on the bug.
11. A piece of rope is pulled by two people in a tug-of-war. Each pulls with 400 N of force. What is the tension in the rope?
- zero
 - 800 N
 - 600 N
 - 400 N
 - none of these
12. Your friend says that the heavyweight champion of the world cannot exert a force of 50 N on a piece of tissue paper with his best punch. The tissue paper is held in midair – no wall, no tricks. You
- have reservations about this assertion.
 - disagree, for a good punch easily delivers this much force.
 - agree that it can't be done.

Answer Key.

1. b)

A force interaction involves at least two forces.

2. d)

The net force required to accelerate you forward while walking is provided by the friction of the road.

3. a)

You exert an exactly equal and opposite on the earth as it exerts on you. The reason you move much more is that you are far less massive.

4. a)

A net force is required to accelerate an object (to change its velocity).

5. a)

Initially, there must be a net force acting on the horse and wagon in order to overcome the balance of forces and accelerate the system.

6. b)

While all of the forces may be present as the player catches the ball, only one of them is exactly equal and opposite to the force the ball exerts on the glove.

7. b)

This is simply a quantitative way to show that action and reaction forces are equal in magnitude.

8. c)

This question is similar to the previous one.

9. a)

Since the small car has less mass it also contains less inertia and will be easier to accelerate.

10. b)

The force of impact is still equal and opposite for the windshield and the bug.

11. d)

The tension in the rope is the same as it would be if one of the people were replaced by a solid tree or if a mass of 400 N were hanging from a rope suspended from the ceiling.

12. c)

A piece of tissue paper cannot exert a force of 50 N on the heavyweight champion, therefore the heavyweight champion cannot exert a force of 50 N on the tissue paper, world champion or not.