Multiple Choice

Choose the best answer to each question. Write the letter for that answer to the left of the question number.

1. Whenever an object exerts a force on another object, the second object exerts a force of the same magnitude, but in the opposite direction to that of the first object.

   a) Always true
   b) Sometimes true
   c) Always false

2. A high school student hits a nail with a hammer. During the collision, there is a force

   a) on the hammer but not on the nail.
   b) on the nail but not on the hammer.
   c) on the nail and also on the hammer.

3. A woman weighing 500 N sits on the floor. She exerts a force on the floor of

   a) 1000 N.
   b) 500 N.
   c) 250 N.
   d) 50 N.
   e) 5 N.

4. As a 500 N woman sits on the floor, the floor exerts a force on her of

   a) 1000 N.
   b) 500 N.
   c) 250 N.
   d) 50 N.
   e) 5 N.

5. Forces always occur

   a) by themselves.
   b) as single quantities.
   c) in pairs.
   d) in triplets.

6. An archer shoots an arrow. Consider the action force to be the bow string against the arrow. The reaction to this force is the

a) weight of the arrow.
b) air resistance against the bow.
c) friction of the ground against the archer's feet.
d) grip of the archer's hand on the bow.
e) arrow's push against the bowstring.

7. A player catches a ball. Consider the action force to be the impact of the ball against the player's glove. What is the reaction to this force?

a) The player's grip on the glove
b) The force the glove exerts on the ball
c) Friction of the ground against the player's shoes
d) The muscular effort in the player's arms
e) none of the above

8. A player hits a ball with a bat. The action force is the impact of the bat against the ball. What is the reaction to this force?

a) Air resistance on the ball
b) The weight of the ball
c) The force of the ball against the bat
d) The grip of the player's hand against the ball
e) none of the above

9. As a ball falls, the action force is the pull of the earth's mass on the ball. What is the reaction to this force?

a) Air resistance acting against the ball
b) The acceleration of the ball
c) The pull of the ball's mass on the earth
d) Nonexistent in this case
e) none of the above

10. A person is attracted towards the center of the earth by a 500-N gravitational force. The force with which the earth is attracted toward the person is

a) very very small.
b) very very large.
c) 500 N.

11. An unfortunate bug splatters against the windshield of a moving car. Compared to the force of the car on the bug, the force of the bug on the car is

a) larger.
b) smaller.
c) the same.
d) Need more information to say

12. An unfortunate bug splatters against the windshield of a moving car. Compared to the deceleration of the car, the deceleration of the bug is

a) larger.
b) smaller.
c) the same.

13. If a horse pulls on a wagon at rest, the wagon pulls back equally as much on the horse. Will the wagon be set into motion?

a) No, because the forces cancel each other.
b) Yes, because there is a net force acting on the wagon.
c) Yes, because there is a time delay between action and reaction.
d) Yes - The horse's pull on the wagon is larger than the wagon's pull on the horse.

14. A Mack truck and a Volkswagen traveling at the same speed have a head-on collision. The vehicle to undergo the greater change in velocity will be the

a) Volkswagen.
b) Mack truck.
c) Both the same

15. Two people pull on a rope in a tug-of-war. Each pulls with 400 N of force. What is the tension in the rope?

a) Zero
b) 400 N
c) 600 N
d) 800 N
e) none of the above

16. According to Newton's third law, if you push gently on something, it will push

a) gently on you.
b) gently on something else.
c) on something only under the right conditions.
d) on you only if you aren't moving.

17. The earth pulls on the moon, and similarly the moon pulls on the earth. This is evidence that the

a) earth and moon are simply pulling on each other.
b) earth's and moon's pulls comprise an action-reaction pair.
c) both a and b
d) neither a or b

18. Nellie Newton holds an apple in her hand. If action is the earth pulling on the apple, then reaction is

a) her hand pushing up on the apple.
b) her hand providing a normal force on the apple.
c) both a and b
d) neither a or b

19. Bronco the skydiver falls toward the earth. The attraction of the earth on Bronco pulls him down. The reaction to this force is

a) Bronco finally pushing against the earth's surface.
b) the earth's surface finally pushing against Bronco.
c) Bronco pulling up on the earth.
d) neither a, b or c

20. A force is exerted on the tires of a car to accelerate the car along the road. The force is exerted by the

a) engine.
b) tires.
c) air.
d) road.

21. A rocket is able to accelerate in the vacuum of space when it fires its engines. The force that propels the rocket is the force

a) by the exhaust gases on the rocket.
b) of the rocket on the exhaust gases.
c) neither a or b

22. Two people, one having twice the mass of the other, play tug-of-war with a 12 meter rope on frictionless ice. After a brief time, they meet. The heavier person slides a distance of

a) 3 m.
b) 4 m.
c) 5 m.
d) 6 m.

23. A karate chop delivers a blow of 3000 N to a board that breaks. The force that acts on the hand during this feat

a) is less than 3000 N.
b) is 3000 N.
c) is more than 3000 N.
d) cannot be determined.

24. 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.

a) You agree that it can't be done.
b) You have reservations about this claim.
c) You disagree, for a good punch easily delivers this much force.