Assessment

Forces and the Laws of Motion

Chapter Test A

MULTIPLE CHOICE

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

_____ 1. Which of the following is the cause of an acceleration?
a. speed
b. inertia
c. force
d. velocity

_____ 2. What causes a moving object to change direction?
a. acceleration
b. velocity
c. inertia
d. force

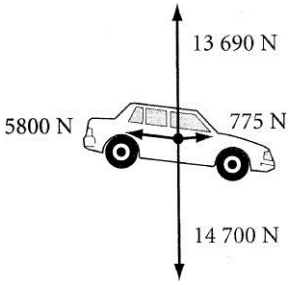
_____ 3. Which of the following forces exists between objects even in the absence of direct physical contact?
a. frictional force
b. fundamental force
c. contact force
d. field force

_____ 4. A newton is equivalent to which of the following quantities?
a. kg
b. kg•m/s
c. kg•m/s^2
d. kg•$(m/s)^2$

_____ 5. The length of a force vector represents the
a. cause of the force.
b. direction of the force.
c. magnitude of the force.
d. type of force.

_____ 6. A free-body diagram represents all of the following *except*
a. the object.
b. forces as vectors.
c. forces exerted by the object.
d. forces exerted on the object.

_____ 7. In the free-body diagram shown to the right, which of the following is the gravitational force acting on the car?
a. 5800 N
b. 775 N
c. 14 700 N
d. 13 690 N



_____ 8. Which of the following is the tendency of an object to maintain its state of motion?
a. acceleration
b. inertia
c. force
d. velocity

_____ 9. A crate is released on a frictionless plank inclined at angle θ with respect to the horizontal. Which of the following relationships is true? (Assume that the *x*-axis is parallel to the surface of the incline.)
a. $F_y = F_g$
b. $F_x = 0$
c. $F_y = F_x$
d. none of the above

_____ 10. A car goes forward along a level road at constant velocity. The additional force needed to bring the car into equilibrium is
a. greater than the normal force times the coefficient of static friction.
b. equal to the normal force times the coefficient of static friction.
c. the normal force times the coefficient of kinetic friction.
d. zero.

_____ 11. If a nonzero net force is acting on an object, then the object is definitely
a. at rest.
b. moving with a constant velocity.
c. being accelerated.
d. losing mass.

_____ 12. Which statement about the acceleration of an object is correct?
a. The acceleration of an object is directly proportional to the net external force acting on the object and inversely proportional to the mass of the object.
b. The acceleration of an object is directly proportional to the net external force acting on the object and directly proportional to the mass of the object.
c. The acceleration of an object is inversely proportional to the net external force acting on the object and inversely proportional to the mass of the object.
d. The acceleration of an object is inversely proportional to the net external force acting on the object and directly proportional to the mass of the object.

_____ 13. Which are simultaneous equal but opposite forces resulting from the interaction of two objects?
a. net external forces
b. field forces
c. gravitational forces
d. action-reaction pairs

_____ 14. Newton's third law of motion involves the interactions of
a. one object and one force.
b. one object and two forces.
c. two objects and one force.
d. two objects and two forces.

_____ 15. The magnitude of the gravitational force acting on an object is
a. frictional force.
b. weight.
c. inertia.
d. mass.

_____ 16. A measure of the quantity of matter is
a. density.
b. weight.
c. force.
d. mass.

_____ 17. A change in the gravitational force acting on an object will affect the object's
a. mass.
b. coefficient of static friction.
c. weight.
d. inertia.

_____ 18. What are the units of the coefficient of friction?
a. N
b. 1/N
c. N^2
d. The coefficient of friction has no units.

SHORT ANSWER

19. In a free-body diagram of an object, why are forces exerted by the object not included in the diagram?

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20. State Newton's first law of motion.

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21. In the equation form of Newton's second law, $\Sigma\mathbf{F} = m\mathbf{a}$, what does $\Sigma\mathbf{F}$ represent?

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22. What happens to air resistance when an object accelerates?

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PROBLEM

23. In a game of tug-of-war, a rope is pulled by a force of 75 N to the left and by a force of 102 N to the right. What is the magnitude and direction of the net horizontal force on the rope?

24. A wagon having a mass of 32 kg is accelerated across a level road at 0.50 m/s^2. What net force acts on the wagon horizontally?

25. A 95 kg clock initially at rest on a horizontal floor requires a 650 N horizontal force to set it in motion. After the clock is in motion, a horizontal force of 560 N keeps it moving with a constant velocity. Find the coefficient of static and kinetic friction between the clock and the floor.