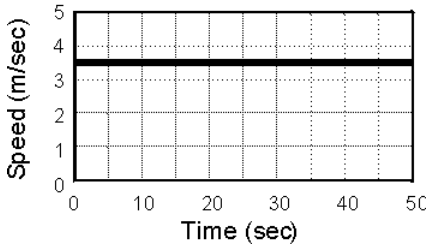


Forces and Friction

Multiple Choice

- ___ 1. The graph shows the motion of a an object moving in a straight line. From the graph, you may conclude that:
Speed vs. Time



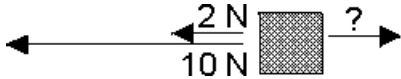
- a. the total force acting on the object is zero.
b. the object is moving from left to right.
c. the object is weightless as if it were in outer space.
d. the object is accelerating at a constant rate of 3.5 m/sec^2 .
- ___ 2. The magnitude of the gravitational force acting on an object is
a. frictional force. b. inertia. c. mass. d. weight.
- ___ 3. Which of the following forces is an example of a field force?
a. gravitational force c. tension
b. frictional force d. normal force
- ___ 4. If a nonzero net force is acting on an object, then the object is definitely
a. being accelerated. c. at rest.
b. losing mass. d. moving with a constant velocity.
- ___ 5. A hockey stick hits a puck on the ice. Identify an action-reaction pair, and compare the forces exerted by each object.
a. The stick exerts a force on the ice; the ice exerts a force on the puck.
b. The stick exerts a force on the puck; the puck exerts a force on the ice.
c. The puck exerts a force on the stick; the stick exerts a force on the ice.
d. The stick exerts a force on the puck; the puck exerts a force on the stick.
- ___ 6. A free-body diagram of a ball in free fall in the presence of air resistance would show
a. only a downward arrow to represent the force of gravity.
b. an upward arrow to represent the force of gravity and a downward arrow to represent the force of air resistance.
c. a downward arrow to represent the force of gravity and an upward arrow to represent the force of air resistance.
d. a downward arrow to represent the force of air resistance.
- ___ 7. A newton is equivalent to which of the following quantities?
a. kg b. $\text{kg}\cdot\text{m/s}^2$ c. $\text{kg}\cdot(\text{m/s})^2$ d. $\text{kg}\cdot\text{m/s}$
- ___ 8. Which of the following forces exists between objects even in the absence of direct physical contact?
a. frictional force c. field force
b. contact force d. fundamental force
- ___ 9.



A boy on a skateboard throws a ball. The skateboard moves in the opposite direction from the thrown ball because:

- the skateboard resists acceleration due to Newton's second law.
- the ball exerts a reaction force on the boy as it is being thrown.
- the ball carries away some inertia.
- the ball has positive energy, and the boy and skateboard are left with negative energy.

___ 10.



Three forces are acting on an object as shown in the diagram. The object is not moving. Two forces are 2 newtons and 10 newtons. The third force is:

- 8 newtons.
- 10 newtons.
- 12 newtons.
- 20 newtons.

___ 11. Which of the following forces arises from direct physical contact between two objects?

- contact force
- gravitational force
- fundamental force
- field force

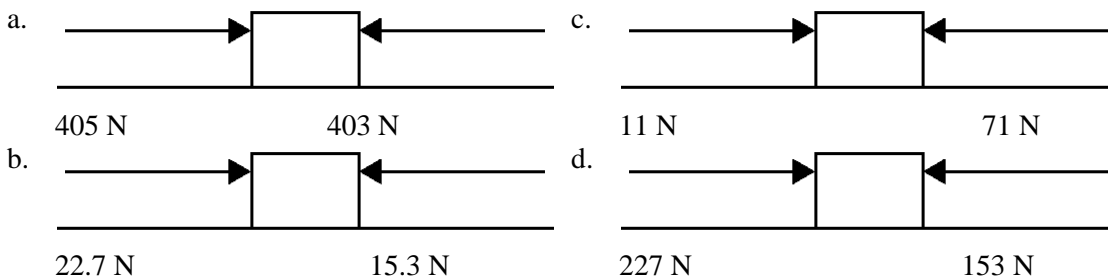
___ 12. The length of a force vector represents the

- direction of the force.
- type of force.
- cause of the force.
- magnitude of the force.

___ 13. According to Newton's second law, when the same force is applied to two objects of different masses,

- the object with greater mass will experience a greater acceleration and the object with less mass will experience a smaller acceleration.
- the object with greater mass will experience a small acceleration and the object with less mass will experience an even smaller acceleration.
- the object with greater mass will experience a smaller acceleration and the object with less mass will experience a greater acceleration.
- the object with greater mass will experience a great acceleration and the object with less mass will experience an even greater acceleration.

___ 14. Which of the following system of forces provides the block the highest net force?



___ 15. The statement by Newton that for every action there is an equal but opposite reaction is which of his laws of motion?

- first
- fourth
- third
- second

___ 16. Which of the following is the tendency of an object to maintain its state of motion?

- force
- velocity
- inertia
- acceleration

___ 17. Which of the following forces arises from direct physical contact between two objects?

- gravitational force
- fundamental force
- field force
- contact force

___ 18. Which of the following forces is an example of a contact force?

- magnetic force
- gravitational force

Problem. For these problems $g = 9.8 \text{ m/s}^2$

26. A 12-kg person on in-line skates pushes against a wall with a force of 4500 N and moves away from the wall. What acceleration does that person experience?
27. A sled is trying to be pulled across a horizontal snow surface. The friction from the snow is keeping it at rest. If a force of 120 N is being applied to the sled rope at an angle of 36° to the ground, what is the magnitude of friction force?
28. A wagon is accelerating and falling/rolling down a grassy hill. Draw free-body diagrams for the wagon moving down the hill. Label which forces are in equilibrium and which are not (if any).
29. A stagehand starts sliding a large piece of stage scenery originally at rest by pulling it horizontally with a force of 146 N. What is the coefficient of static friction between the stage floor and piece of scenery that weighs 520N?
30. A train car has a mass of 3200kg. The train car is transporting a truck that has a mass of 1400kg. If the train car provides a net force of $2.5 \times 10^4 \text{ N}$, what is the acceleration of train car with the truck inside?