Short Answer

4.1 Force 39.

True or False—An external force is defined as a force generated outside the system of interest that acts on an object inside the system.

a. True
b. False

40.

By convention, which sign is assigned to an object moving downward?

a. A positive sign (+)
b. A negative sign (-)
c. Either a positive or negative sign (\pm)
d. No sign is assigned

41.

A body is pushed downward by a force of 5 units and upward by a force of 2 units. How would you draw a free-body diagram to represent this?

a. Two force vectors acting at a point, both pointing up with lengths of 5 units and 2 units
b. Two force vectors acting at a point, both pointing down with lengths of 5 units and 2 units
c. Two force vectors acting at a point, one pointing up with a length of 5 units and the other pointing down with a length of 2 units
d. Two force vectors acting at a point, one pointing down with a length of 5 units and the other pointing up with a length of 2 units

42.

A body is pushed eastward by a force of four units and southward by a force of three units. How would you draw a free-body diagram to represent this?

a. Two force vectors acting at a point, one pointing left with a length of 4 units and the other pointing down with a length of 3 units
b. Two force vectors acting at a point, one pointing left with a length of 4 units and the other pointing up with a length of 3 units
c. Two force vectors acting at a point, one pointing right with a length of 4 units and the other pointing down with a length of 3 units
d. Two force vectors acting at a point, one pointing right with a length of 4 units and the other pointing up with a length of 3 units

4.2 Newton's First Law of Motion: Inertia 43.

A body with mass m is pushed along a horizontal surface by a force F and is opposed by a frictional force *f*. How would you draw a free-body diagram to represent this situation?

a. A dot with an arrow pointing right, labeled F, and an arrow pointing left, labeled *f*, that is of equal length or shorter than F
b. A dot with an arrow pointing right, labeled F, and an arrow pointing right, labeled *f*, that is of equal length or shorter than F
c. A dot with an arrow pointing right, labeled F, and a smaller arrow pointing up, labeled *f*, that is of equal length or longer than F
d. A dot with an arrow pointing right, labeled F, and a smaller arrow pointing down, labeled *f*, that is of equal length or longer than F

44.

Two objects rest on a uniform surface. A person pushes both with equal force. If the first object starts to move faster than the second, what can be said about their masses?

a. The mass of the first object is less than that of the second object.
b. The mass of the first object is equal to the mass of the second object.
c. The mass of the first object is greater than that of the second object.
d. No inference can be made because mass and force are not related to each other.

45.

Two similar boxes rest on a table. One is empty and the other is filled with pebbles. Without opening or lifting either, how can you tell which box is full? Why?

a. By applying an internal force; whichever box accelerates faster is lighter and so must be empty
b. By applying an internal force; whichever box accelerates faster is heavier and so the other box must be empty
c. By applying an external force; whichever box accelerates faster is lighter and so must be empty
d. By applying an external force; whichever box accelerates faster is heavier and so the other box must be empty

46.

True or False—An external force is required to set a stationary object in motion in outer space away from all gravitational influences and atmospheric friction.

a. True
b. False

4.3 Newton's Second Law of Motion

47.

A steadily rolling ball is pushed in the direction from east to west, which causes the ball to move faster in the same direction. What is the direction of the acceleration?

a. North to south

b. South to north
c. East to west
d. West to east

48.

A ball travels from north to south at 60 km/h. After being hit by a bat, it travels from west to east at 60 km/h. Is there a change in velocity?

a. Yes, because velocity is a scalar.
b. Yes, because velocity is a vector.
c. No, because velocity is a scalar.
d. No, because velocity is a vector

49.

What is the weight of a 5-kg object on Earth and on the moon?

a. On Earth the weight is 1.67 N, and on the moon the weight is 1.67 N.
b. On Earth the weight is 5 N, and on the moon the weight is 5 N.
c. On Earth the weight is 49 N, and on the moon the weight is 8.35 N.
d. On Earth the weight is 8.35 N, and on the moon the weight is 49 N.

50.

An object weighs 294 N on Earth. What is its weight on the moon?

a. 50.1 N
b. 30.0 N
c. 249 N
d. 1461 N

4.4 Newton's Third Law of Motion 51.

A large truck with mass $30m$ crashes into a small sedan with mass m. If the truck exerts a force F on the sedan, what force will the sedan exert on the truck?

a. $\frac{\text{F}}{30}$
b. F
c. 2F
d. 30F

52.

A fish pushes water backward with its fins. How does this propel the fish forward?

a. The water exerts an internal force on the fish in the opposite direction, pushing the fish forward.
b. The water exerts an external force on the fish in the opposite direction, pushing the fish forward.

c. The water exerts an internal force on the fish in the same direction, pushing the fish forward.
d. The water exerts an external force on the fish in the same direction, pushing the fish forward.

53.

True or False—Tension is the result of opposite forces in a connector, such as a string, rope, chain or cable, that pulls each point of the connector apart in the direction parallel to the length of the connector. At the ends of the connector, the tension pulls toward the center of the connector.

a. True
b. False

54.

True or False—Normal reaction is the force that opposes the force of gravity and acts in the direction of the force of gravity.

a. True
b. False