

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) A baseball player bats a ball with a force of 1000 N. The reaction force that the ball exerts against the bat is
A) 1000 N. B) less than 1000 N.
C) more than 1000 N. D) impossible to determine.
- 2) Earth pulls on the moon. Similarly the moon pulls on Earth, evidence that
A) these two pulls comprise an action-reaction pair.
B) the moon is smaller so its pull is smaller.
C) larger objects pull harder.
D) Earth is larger so its pull is larger.
- 3) A car traveling at 100 km/hr strikes an unfortunate bug and splatters it. The force of impact is
A) the same for both. B) greater on the car. C) greater on the bug.
- 4) 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?
A) 600 N
B) 800 N
C) 400 N
D) zero
E) none of these
- 5) Two people, one twice as massive as the other, attempt a tug-of-war with 12 meters of massless rope on frictionless ice. After a brief time, they meet. The heavier person slides a distance of
A) 0 m. B) 3 m. C) 6 m. D) 4 m.
- 6) A freight train rolls along a track with considerable momentum. If it rolls at the same speed but has twice as much mass, its momentum is
A) zero. B) unchanged. C) doubled. D) quadrupled.
- 7) The force on an apple hitting the ground depends upon
A) the time of impact with the ground.
B) whether or not the apple bounces.
C) the speed of the apple just before it hits.
D) all of these

- 8) A ball is moving at 3 m/s and has a momentum of 48 kg m/s. What is the ball's mass?
- A) 144 kg
 - B) 4 kg
 - C) 12 kg
 - D) 16 kg
 - E) none of these
- 9) A karate expert executes a swift blow and breaks a cement block with her bare hand. The magnitude of the force experienced by her hand is
- A) identical to the force applied to the block.
 - B) more than the force applied to the block.
 - C) zero.
 - D) less than the force applied to the cement block.
 - E) impossible to predict without additional information.
- 10) Two billiard balls having the same mass and speed roll toward each other. What is their combined momentum after they meet?
- A) half the sum of their original momentums
 - B) 0
 - C) twice the sum of their original momentums
 - D) impossible to determine without additional information
- 11) If you push for a half hour or a whole hour against a stationary wall
- A) twice as much work is done during the half hour.
 - B) half as much work is done during the half hour.
 - C) no work on the wall is done in either case.
 - D) it is impossible to determine how much work is done.
- 12) If you push an object twice as far while applying the same force, you do
- A) half as much work. B) four times as much work.
 - C) twice as much work. D) the same amount of work.
- 13) If an object is raised twice as high, its potential energy will be
- A) twice as much.
 - B) four times as much.
 - C) half as much
 - D) impossible to determine unless the time is given.
- 14) A clerk can lift containers a vertical distance of 1 meter or can roll them up a 2 meter-long ramp to the same elevation. With the ramp, the applied force required is about
- A) the same. B) half as much.
 - C) twice as much. D) four times as much.

- 15) Whereas impulse involves the time that a force acts, work involves the
- A) time and distance that a force acts.
 - B) distance that a force acts.
 - C) acceleration that a force produces.
- 16) A moving object has
- A) speed.
 - B) momentum.
 - C) energy.
 - D) velocity.
 - E) all of these
- 17) If an object has kinetic energy, then it also must have
- A) force.
 - B) momentum.
 - C) impulse.
 - D) acceleration.
 - E) none of these
- 18) A popular swinging-balls apparatus called a Newton's cradle consists of an aligned row of identical elastic balls that are suspended by strings so they barely touch each other. When two balls are lifted from one end and released, they strike the row and two balls pop out from the other end. If instead one ball popped out with twice the speed of the two, this would be a violation of conservation of
- A) energy. B) momentum. C) both of these D) none of these
- 19) If several balls are thrown straight up with varying initial velocities, the quantity that will have the same value for each trial is the ball's
- A) time of travel.
 - B) maximum height.
 - C) acceleration.
 - D) initial momentum.
 - E) None of the above choices are correct.
- 20) The total momentum of a flock of identical birds could be zero only if the birds are
- A) flying in different directions. B) taking off from the ground.
 - C) very tired and coming down to rest. D) flying in the same direction.