

Science 101
Fall Quarter, 2001
Exam 1, version A

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

Buena suerte

Name _____

- 1) The attraction of a person's body toward the Earth is called weight. The reaction to this force is
 - A) the person's body pushing against the Earth's surface.
 - B) Earth's surface pushing against the person's body.
 - C) the person's body pulling on the Earth.
 - D) none of these.

- 2) Inside a freely falling elevator, there would be no
 - A) gravitational force on you.
 - B) apparent weight for you.
 - C) both of these.
 - D) none of these.

- 3) The force of gravity acts on all apples on an apple tree. Some apples are twice as far from the ground as others. These twice-as-high apples, for the same mass, have
 - A) $\frac{1}{4}$ the weight.
 - B) $\frac{1}{2}$ the weight.
 - C) practically the same weight.

- 4) A 10-kg brick and a 1-kg book are dropped in a vacuum. The force of gravity on the 10-kg brick is
 - A) the same as the force on the 1-kg book.
 - B) 10 times as much as the force on the 1-kg book.
 - C) zero.

- 5) A satellite in an elliptical orbit travels at constant
 - A) velocity.
 - B) speed.
 - C) acceleration.
 - D) all of these.
 - E) none of these.

- 6) It takes 40 J to push a large box 4 m across a floor. Assuming the push is in the same direction as the move, what is the magnitude of the force on the box?
 - A) 4 N
 - B) 10 N
 - C) 40 N
 - D) 160 N
 - E) none of these

- 7) According to Newton, the greater the masses of interacting objects, the
- A) less the gravitational force between them.
 - B) greater the gravitational force between them.
 - C) greater the force between them by the square of the masses.
- 8) Whirl a rock at the end of a string and it follows a circular path. If the string breaks, the tendency of the rock is to
- A) continue to follow a circular path.
 - B) follow a straight-line path.
- 9) Drop a rock from a 5-m height and it accelerates at 10 m/s/s and strikes the ground 1 s later. Drop the same rock from a height of 2.5 m and its acceleration of fall is
- A) about half.
 - B) the same.
 - C) more.
- 10) An Earth satellite is simply a projectile freely falling around the Earth.
- A) True
 - B) False
- 11) The force of friction on a sliding object is 10 N. The applied force needed to maintain a constant velocity is
- A) more than 10 N.
 - B) less than 10 N.
 - C) 10 N.
- 12) If you push an object twice as far while applying the same force, you do
- A) twice as much work.
 - B) four times as much work.
 - C) the same amount of work.
- 13) A car accelerates at 2 m/s/s. Assuming the car starts from rest, how far will it travel in 10 s?
- A) 2 m
 - B) 10 m
 - C) 40 m
 - D) 100 m
 - E) 200 m
- 14) Exert 1 N for a distance of 1 m in 1 s and you deliver a power of
- A) 1 W.
 - B) 2 W.
 - C) 1/3 W.
 - D) 3 W.
 - E) none of these.
- 15) The average speed of a horse that gallops a distance of 10 km in a time of 30 min is
- A) 10 km/h.
 - B) 20 km/h.
 - C) 30 km/h.
 - D) more than 30 km/h.

- 16) Which has zero acceleration? An object
- A) at rest.
 - B) moving at constant velocity.
 - C) in mechanical equilibrium.
 - D) all of these.
 - E) none of these.
- 17) An object that has kinetic energy must be
- A) moving.
 - B) falling.
 - C) at an elevated position.
 - D) at rest.
 - E) none of these.
- 18) Consider two planets in space that gravitationally attract each other. If the masses of both planets is doubled, and the distance between them is also doubled, then the force between them is
- A) one-quarter.
 - B) half as much.
 - C) twice as much.
 - D) four times as much.
 - E) none of these.
- 19) If a rocket initially at rest accelerates at a rate of 50 m/s/s for 1 min, its speed will be
- A) 50 m/s.
 - B) 500 m/s.
 - C) 3000 m/s.
 - D) 3600 m/s.
 - E) none of these.
- 20) One object has twice as much mass as another object, and also has twice as much
- A) inertia.
 - B) velocity.
 - C) gravitational acceleration.
 - D) volume.
 - E) all of these.
- 21) When a basketball player jumps to make a shot, once his or her feet are off the ground, the jumper's acceleration
- A) depends on launch speed.
 - B) varies with body orientation.
 - C) is usually greater for taller players (but not always).
 - D) depends on all the above.
 - E) is g , no more, no less.
- 22) If a freely falling object were somehow equipped with a speedometer, its speed reading would increase each second by about
- A) 5 m/s.
 - B) 10 m/s.
 - C) 15 m/s.
 - D) a variable amount.
 - E) depends on its initial speed.

- 23) A player catches a ball. Consider the action force to be the impact of the ball against the player's glove. The reaction to this force is the
- A) player's grip on the glove.
 - B) force the glove exerts on the ball.
 - C) friction of the ground against the player's shoes.
 - D) muscular effort in the player's arms.
 - E) none of these.
- 24) Two objects move toward each other because of gravity. As the objects get closer and closer, the acceleration of each
- A) increases.
 - B) decreases.
 - C) remains constant.
- 25) When an object is lifted 10 m, it gains a certain amount of potential energy. If the same object is lifted 20 m, its potential energy gain is
- A) less.
 - B) the same.
 - C) twice as much.
 - D) four times as much.
 - E) more than four times as much.
- 26) On the surface of Jupiter, where the acceleration due to gravity is about 3 times that of Earth, a 100-kg rock would have a weight of about
- A) 1000 N.
 - B) 3000 N.
 - C) 6000 N.
 - D) 9000 N.
- 27) Which of the following has the largest momentum relative to the Earth?
- A) a tightrope walker crossing Niagara Falls
 - B) a pickup truck speeding along a highway
 - C) a Mack truck parked in a parking lot
 - D) the Science building on campus
 - E) a dog running down the street
- 28) A very massive object A and a less massive object B move toward each other under the influence of gravitation. Which force, if either, is greater?
- A) the force on A
 - B) the force on B
 - C) both forces are the same
- 29) While a car travels around a circular track at constant speed, its
- A) acceleration is zero.
 - B) velocity is zero.
 - C) both of these.
 - D) none of these.
- 30) Compared with a 1-kg block of solid iron, a 2-kg block of solid iron has the same
- A) mass.
 - B) volume.
 - C) weight.
 - D) all of these.
 - E) none of these.

- 31) Recoil is noticeable if we throw a heavy ball while standing on roller skates. If instead we go through the motions of throwing the ball but hold onto it, our net recoil will be
- A) zero.
 - B) the same as before.
 - C) small, but noticeable.
- 32) An object falls freely from rest on a planet where the acceleration due to gravity is 20 m/s^2 . After 5 s it falls a distance of
- A) 100 m .
 - B) 150 m .
 - C) 250 m .
 - D) 500 m .
 - E) none of these.
- 33) Compared with falling on a wooden floor, a wine glass may not break when it falls to a carpeted floor because of the
- A) lesser impulse in stopping.
 - B) longer time to stop.
 - C) both of these.
 - D) neither of these.
- 34) In each second of fall, the distance a freely falling object will fall is
- A) about 5 m .
 - B) about 10 m .
 - C) the same, but not 5 m or 10 m .
 - D) increasing.
 - E) none of these.
- 35) Two objects, A and B, have the same size and shape, but A is twice as heavy as B. When they are dropped simultaneously from a tower, they reach the ground at the same time, but A has greater
- A) speed.
 - B) acceleration.
 - C) momentum.
 - D) all of these.
 - E) none of these.
- 36) A 5-kg fish swimming at a speed of 1 m/s swallows an absent-minded 1-kg fish at rest. The speed of the larger fish after lunch is
- A) $1/2 \text{ m/s}$.
 - B) $2/5 \text{ m/s}$.
 - C) $5/6 \text{ m/s}$.
 - D) $6/5 \text{ m/s}$.
 - E) 1 m/s .
- 37) If a projectile is fired straight up at a speed of 10 m/s , the time it takes to reach the top of its path is about
- A) 1 s .
 - B) 2 s .
 - C) 10 s .
 - D) not enough information to estimate.

38) Arnold Strongman and Suzie Small have a tug-of-war on a polished floor. Arnold wears socks and Suzie wears gym shoes. The likely winner is

- A) Arnold.
- B) Suzie.
- C) neither, for they should be tied.
- D) no basis for predicting.

39) The space shuttle orbits at altitudes greater than 150 km so as to be above Earth's

- A) atmosphere.
- B) gravitational field.
- C) both.

40) Roll a bowling ball off the edge of a table. As it falls, its horizontal component of motion

- A) decreases.
- B) remains constant.
- C) increases.