

CST Review Set #1**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- _____ 1. As a pendulum swings back and forth
- at the end points of its swing, its energy is all potential.
 - at the lowest part of its swing, its energy is all kinetic.
 - kinetic energy is transformed into potential energy.
 - potential energy is transformed into kinetic energy.
 - all of the above
- _____ 2. If the velocity of a moving object doubles, then what else doubles?
- acceleration.
 - kinetic energy.
 - momentum.
 - all of the above
 - none of the above
- _____ 3. A popular toy consists of an aligned row of identical elastic balls suspended by strings so they touch each other. When two balls on one end are elevated and released, they slam into the array of balls and two balls pop out the other side. If instead, one ball popped out with twice the speed, this would be a violation of the conservation of
- both energy and momentum.
 - energy.
 - momentum.
- _____ 4. As an object falls freely in a vacuum, its
- velocity increases.
 - acceleration increases.
 - both A and B.
 - none of the above.
- _____ 5. If a freely falling object were somehow equipped with a speedometer, its speed reading would increase each second by
- about 5 m/s.
 - about 10 m/s.
 - about 15 m/s.
 - a variable amount.
 - a rate that depends on its initial speed.
- _____ 6. A 1-N apple falls to the ground. The apple hits the ground with an impact force of
- 1 N.
 - 2 N.
 - 4 N.
 - 9.8 N.
 - Not enough information to say

- _____ 7. A 2-kg ball is thrown at 3 m/s. What is the ball's momentum?
- 2 kg·m/s
 - 3 kg·m/s
 - 6 kg·m/s
 - 9 kg·m/s
 - none of the above
- _____ 8. Suppose a particle is accelerated through space by a constant 10-N force. Suddenly the particle encounters a second force of 10-N in a direction opposite to that of the first force. The particle
- is brought to a rapid halt.
 - theoretically accelerates to speeds approaching the speed of light.
 - continues at the speed it had when it encountered the second force.
 - gradually decelerates to a halt.
 - none of the above
- _____ 9. The terminal speed for a person parachuting (with the chute open) is about
- 0 km/h.
 - 15 km/h.
 - 150 km/h.
 - 1500 km/h.
- _____ 10. A block is at rest on an incline. The force of friction necessary to prevent the block from sliding increases when the incline angle is
- increased.
 - decreased.
 - neither A nor B (Force of friction stays the same.)
- _____ 11. A high school student hits a nail with a hammer. During the collision, there is a force
- on the nail but not on the hammer.
 - on the nail and also on the hammer.
 - on the hammer but not on the nail.
- _____ 12. Forces always occur
- as single quantities.
 - by themselves.
 - in pairs.
 - in triplets.
- _____ 13. If your car runs out of gas, why can't you push on the car's windshield from the inside to move it?
- In order for the car to move, a force must be exerted by you on the car's windshield.
 - In order for the car to move, a force must be exerted by the car's windshield on you.
 - In order for the car to move, an outside force must be exerted on the car.
 - In order for the car to move, a force must be exerted by the car on the ground.
- _____ 14. Which has more rotational inertia, a girl running with her legs bent or the same girl running with her legs straight?
- With straight legs.
 - With bent legs.
 - Both have the same rotational inertia.

- _____ 15. A ring and a disk roll down a hill together. Which reaches the bottom first?
- Both reach the bottom at the same time
 - Depends on the moments of inertia
 - The disk
 - Depends on the masses
 - The ring
- _____ 16. Suppose a carnival Ferris wheel has seats that are located halfway between the center and the outside rim. Compared to the ordinary Ferris wheel, where the seats are on the outside rim, your rotational speed on this Ferris wheel would be _____.
- greater
 - the same
 - smaller
- _____ 17. If Earth's mass decreased to one half its original mass, with no change in radius, then your weight would _____.
- stay the same
 - decrease to one half your original weight
 - decrease to one quarter your original weight
 - none of the above
- _____ 18. Which is greater, the gravitational force between Earth and the moon, or the force between Earth and the sun?
- Earth–moon
 - equal
 - Earth–sun
- _____ 19. If you stood atop a ladder on Earth that was as tall as Earth's radius (so you were twice as far from Earth's center) your weight atop the ladder would be _____.
- one-eighth its normal value
 - one-quarter its normal value
 - half its normal value
 - none of the above

Problem

20. What is the work done in lifting 60 kg of blocks to a height of 20 m?
21. What amount of work is done on a chair that is pushed 9 m across a floor by a horizontal 30-N net force?
22. In raising a 3000-N piano with a pulley system, it is noted that for every 2 m of rope pulled down, the piano rises 0.2 m. Ideally, what force is needed to lift the piano?
23. What speed must you toss a ball straight up so that it takes 4 s to return to you?
24. You toss a ball at 5 m/s straight upward. How much time will the ball take to reach the top of its path?
25. A stone is dropped from a cliff. After it has fallen 10 m, what is the stone's velocity?

Name: _____

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26. An 8-kg blob of clay moving horizontally at 2 m/s hits a 3-kg blob of clay at rest. What is the speed of the two blobs stuck together immediately after the collision?
27. A loaded freight car has 5 times as much mass as an empty freight car. If the loaded car coasts at 5 m/s and collides with and attaches to the empty car at rest, what will be the speed of both cars after collision?
28. A 50-kg cart moving at 100 km/h collides head-on with an approaching 50-kg cart moving at 10 km/h (in the opposite direction). If the two carts stick together, what will be their speed?
29. A 70-kg free-floating astronaut fires 0.10-kg of gas at a speed of 30 m/s from her propulsion pistol. What is the astronaut's recoil speed?
30. Assume that a 15-kg ball moving at 8 m/s strikes a wall perpendicularly and rebounds elastically at the same speed. What is the amount of impulse given to the wall?
31. How much (in newtons) does 0.60 kg of salami weigh?
32. On the surface of Jupiter, the acceleration due to gravity is about 3 times that on Earth. How much would a 0.40-kg rock weigh on Jupiter?
33. A net force of 1.0 N acts on a 4.0-kg object, initially at rest, for 4.0 seconds. What is the distance the object moves during that time?
34. Suppose that you exert 300 N horizontally on a 50-kg crate on a factory floor, where friction between the crate and the floor is 100 N. What is the acceleration of the crate?
35. Bronco the skydiver, whose mass is 80 kg experiences 200 N of air resistance. What is the acceleration of his fall?
36. What engine thrust (in newtons) is required for a rocket of mass 35 kg to leave the launching pad?
37. By what factor would your weight be multiplied if Earth were $\frac{1}{2}$ as massive and Earth's diameter remained unchanged?
38. Imagine you are standing atop a ladder so tall that you are 2 Earth radii from Earth's center. What is your weight at the top of the ladder, relative to your weight on the ground?