

Name \_\_\_\_\_

## Unit 2 Conceptual Questions

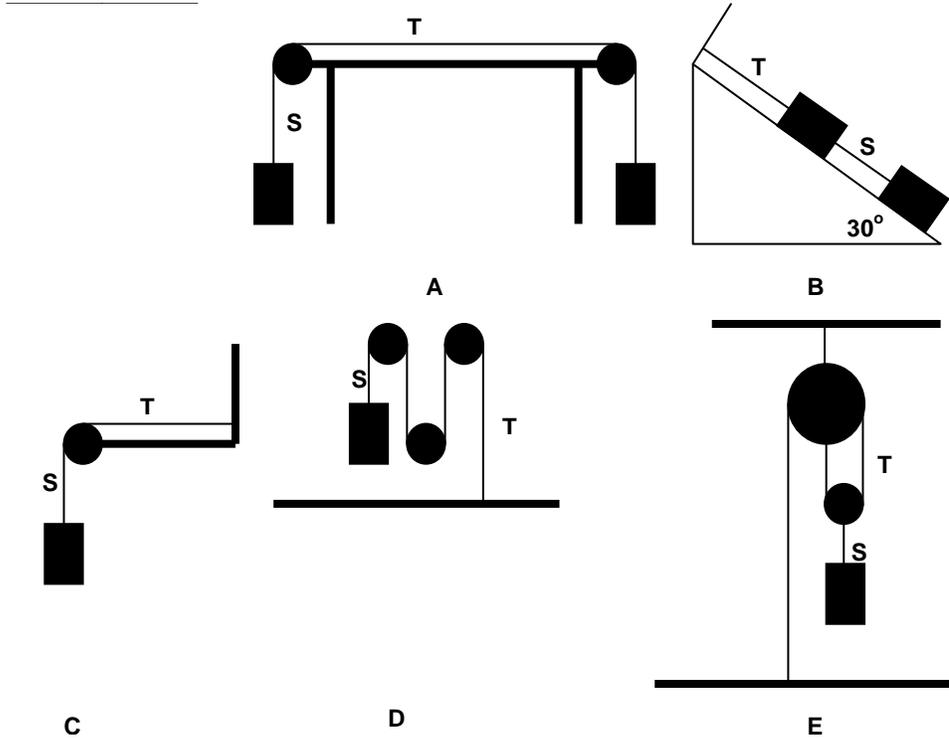
**Please answer questions on Scantron form 882-ES. Otherwise you will receive a zero. Poorly erased responses will not be re-graded. Turn in two days before unit exam. You are encouraged to work together and discuss these questions!!!**

1. An object can have motion only if a net force acts on it. This statement is
  - a. true
  - b. false
2. And the reason for this (refer to previous question) is due to
  - a. Newton's 1<sup>st</sup> law
  - b. Newton's 2<sup>nd</sup> law
  - c. Newton's 3<sup>rd</sup> law
  - d. Newton's 4<sup>th</sup> law
  - e. Murphy's law
3. Suppose you throw two objects into the air. One object is 1kg and the other is 2kg. Neglecting air resistance, which object has the greatest acceleration while they are in the air?
  - a. the 1kg object
  - b. the 2 kg object
  - c. their accelerations are the same
4. Suppose you throw two objects into the air. One object is 1kg and the other is 2kg. Neglecting air resistance, which object has the greatest net force while they are in the air?
  - a. the 2kg object
  - b. the 1 kg object
  - c. the forces are the same
5. If you install tires on your car which are half as wide as your present tires, your stopping distance would be (compared to the case with the wide tires) about
  - a. same
  - b. twice
  - c. half
6. If you made your car twice as heavy as it is now, stopping distance (assuming skidding, i.e. the wheels lock) of your car will be (compared to the lighter car) about
  - a. same
  - b. twice
  - c. half
7. A brick hits you on your toe (OUCH!). The greater force of impact will be on
  - a. the brick
  - b. your toe
  - c. same force on both
  - d. can't tell with information given
8. Assume that you weigh 2000 N. If you are falling down through the air at CONSTANT speed, the force of the air against your body (which actually depends on your speed) is
  - a. zero
  - b. more than 0 but less than 2000 N
  - c. 2000 N
  - d. more than 2000N
  - e. need more info
9. And the NET force on your body is
  - a. zero
  - b. more than 0 but less than 2000 N
  - c. 2000 N
  - d. more than 2000N
  - e. need more info
10. And before you reach constant speed of fall through the air, your acceleration is
  - a. increasing
  - b. decreasing
  - c. not changing
11. Team A beat team B in a game of Tug-O-War. We therefore know that if the winning team pulled on the rope with a force of 10000 N, the losing team pulled on the rope with a force of
  - a. 10,000 N
  - b. less than 10,000 N
  - c. more than 10,000 N
  - d. need more info
12. Your physics book weighs 40 N. If you drop it on the floor, the force of impact will be (draw a free-body diagram)
  - a. more than 40 N
  - b. 40 N
  - c. less than 40 N
13. What force causes you to move forward when you walk?
  - a. The static frictional force of your foot on the sidewalk.
  - b. The static frictional force of the sidewalk on your foot.
  - c. The gravitational force of attraction between your feet and the sidewalk.
14. You are standing on a scale in an elevator that is accelerating downward at a constant rate of  $1.0\text{m/s}^2$ . Your mass is 100kg. You look at the scale to determine your weight, it reads
  - a. 101N
  - b. 880N
  - c. 980N
  - d. 1080N
15. An isolated object of mass  $m$  rests on a horizontal surface. The coefficient of static and kinetic friction is  $\mu_s$  and  $\mu_k$ , respectively. The frictional force acting on the object.
  - a.  $\mu_s mg$
  - b.  $\mu_k mg$
  - c. 0

16. As a car moves up a hill, there is a force of friction between the road and the tires rolling on the road. The maximum force of friction is equal to
- the weight of the car times the coefficient of kinetic friction.
  - the normal force of the road times the coefficient of kinetic friction.
  - the normal force of the road times the coefficient of static friction.
  - the weight of the car times the coefficient of static friction.
17. The force of static friction is always equal to  $\mu_s N$ , where  $N$  is the normal force acting on an object. This statement is
- true
  - false

The following five figures show various situations where blocks of the same mass  $m$  are supported by ropes either with pulleys or fixed objects. We are interested in the ropes that are labeled **T** and **S** in each figure.

18. In which figure is the tension **S** not equal to  $mg$ ? \_\_\_\_\_
19. In which figure is the tension **S** greater than tension **T**? \_\_\_\_\_
20. In which figure is the tension **T** not equal to  $mg$ ? \_\_\_\_\_



21. A rock sitting at the edge of a cliff contains energy called ----- energy.
- potential
  - kinetic
  - chemical
  - radiation
  - electrical
22. If the rock falls off of the cliff, it gains energy called ----- energy.
- potential
  - kinetic
  - chemical
  - radiation
  - electrical
23. You push a block up a frictionless hill at constant speed. The work done by gravity when you push the block up the hill is equal to
- $-\Delta U$
  - $\Delta U$
  - 0
  - none of the above
24. You push a block up a frictionless hill at constant speed. The work that you do in pushing the block up the hill is equal to
- $-\Delta U$
  - $\Delta U$
  - 0
  - none of the above
25. You push a block up a frictionless hill at constant speed. The total work done on the object when you push the block up the hill is equal to
- $-\Delta U$
  - $\Delta U$
  - 0
  - none of the above
26. The power you must deliver to the block in the above question
- Increases
  - decreases
  - remains constant
- as the distance traveled up the hill increases.

Physics 2A

27. Why is the concept of work important?
- Because work describes the position of an object as a function of time.
  - Because the work done on an object is always independent of the path.
  - Because the work done on an object depends on its path.
  - Because work is a form of energy.
  - Because work provides a link between force and energy.
28. A block that is on a table (not frictionless) is pushed to the left by a force equal to 5N. The block moves to the left at a constant speed of 2m/s. We can conclude that the total work done by all forces acting on the object is
- greater than zero.
  - less than zero
  - equal to zero
  - unknown
29. Balls A, B, and C are thrown off a 45m high cliff. Ball A is thrown horizontally with a speed of 25m/s. Ball B is thrown 25 degrees above the horizontal with a speed of 25m/s. Ball C is thrown 25 degrees below the horizontal with a speed of 25m/s. When the balls hit the ground, we can conclude that (assume no air friction)
- ball A hits the ground with the highest speed
  - ball B hits the ground with the highest speed
  - ball C hits the ground with the highest speed
  - they all hit the ground with the same speed
30. Two blocks are released from the top of a height  $h$ . One falls straight down while the other slides down a smooth ramp. If all friction is ignored, which one is moving faster when it reaches the bottom?
- The block that went straight down.
  - The block that went down the ramp.
  - They both will have the same speed.
  - Insufficient information to work the problem.
31. A woman runs up a flight of stairs. The gain in her gravitational potential energy is  $U$ . If she runs up the same stairs at half the speed, her gain in gravitational potential energy will be
- $U/4$
  - $U/2$
  - $U$
  - $2U$
  - $4U$
32. Two identical objects are accelerated through the same distance by different forces such that one object gains a velocity twice that of the other object. One can conclude that the force on the faster object is
- Half that of the slower object
  - One-fourth that of the slower object.
  - Twice that of the slower object
  - Four times that of the slower object.
33. An open railroad car is coasting horizontally along frictionless rails. A girl on board starts throwing coal backward straight off the car. As a result, the railroad car
- speeds up
  - slows down
  - first speeds up then slows down
  - travels at a constant speed
34. A stunt person jumps from a tall building onto a large inflated pad. One reason why the pad reduces the force of impact is because
- the interaction time is reduced
  - the interaction time is increased
  - the change in velocity is increased
  - the change in velocity is decreased
35. Suppose a ping-pong ball and a bowling ball are rolling toward you. Both have the same momentum, and you exert the same force to stop each. How do the time intervals needed to stop them compare?
- The time interval is greater for the bowling ball.
  - The time interval is greater for the ping-pong ball.
  - The time intervals are the same for both.
36. A bullet is fired into a block that is at rest on a frictionless horizontal surface? A student at measures the final speed of the bullet after it is imbedded into the block. The measured speed of the bullet is zero. This statement is
- True
  - False
37. The momentum of a system may be conserved even when the mechanical energy is not. This statement is
- true
  - false

Physics 2A

38. In a perfectly inelastic collision, all of the kinetic energy of the objects is lost. This statement is  
a. true                      b. false
39. All inelastic collisions imply that the objects stick together. This statement is  
b. true                      b. false
40. A bowling ball traveling with a speed  $v$  collides with a ping-pong ball moving at a speed  $v$ , but in the opposite direction. One can conclude that the magnitude of the impulse imparted to the ping-pong ball is  
a. less than that of the bowling ball  
b. greater than that of the bowling ball  
c. the same as that of the bowling ball.
41. A person standing on a horizontal frictionless floor might be able to move by  
a. Walking                      b. crawling slowly                      c. rolling                      d. throwing a shoe