

Physics 1 - Self Test Chapter 8

Name _____

(40 total points)

Acceleration of gravity: $g = 10 \text{ m/s}^2$

$$v = \Delta d / \Delta t$$

$$a = \Delta v / \Delta t$$

$$v_f = at$$

$$d = 1/2 at^2$$

$$F = ma$$

$$W = mg$$

$$W_{\text{ork}} = \text{force} * \text{distance}$$

$$\text{Power} = W_{\text{ork}} / \text{time}$$

$$\text{KE} = 1/2 mv^2$$

$$\text{PE} = mgh$$

$$\text{PE} = \text{KE}$$

Multiple Choice

- _____ 1. Work is defined in physics as
- force/distance
 - force x time
 - force/time
 - force x distance
- _____ 2. A joule is a unit of
- energy
 - work
 - power
 - a and b
 - a and c
- _____ 3. The quantity *mg* represents what property?
- mass
 - momentum
 - work
 - energy
 - weight
- _____ 4. If an object is moving it must have
- kinetic energy
 - momentum
 - both of these
 - neither of these
- _____ 5. A person walks up a flight of stairs slowly and then walks up an identical flight of stairs rapidly. What is the *same* in both cases?
- work done
 - power used
 - both
 - neither
- _____ 6. A person walks up a flight of stairs slowly and then walks up an identical flight of stairs rapidly. What is the *difference* in these two cases?
- work done
 - power used
 - both
 - neither
- _____ 7. If the speed of an object is doubled, what happens to the object's kinetic energy?
- remains the same
 - doubled
 - halved
 - quadrupled
- _____ 8. Dinglewood goes from the first floor to the second floor in 3 ways. He
- 1) He walks up the stairs
 - 2) He runs up the stairs
 - 3) He climbs a ladder.
- In which case does he do the most work?
- 1
 - 2
 - 3
 - same in all three

- ___ 9. Dinglewood goes from the first floor to the second floor in 3 ways. He
- 1) He walks up the stairs
 - 2) He runs up the stairs
 - 3) He climbs a ladder.
- In which case does he generate the most power?
- a. 1 b. 2 c. 3 d. same in all three
- ___ 10. Two identical arrows, one with twice the speed of the other, are shot into a haystack. The faster one goes into the haystack
- a. the same distance as the slower arrow
 - b. twice as far as the slower arrow
 - c. four times as far as the slower arrow
- ___ 11. A 1.0 kg ball is moving at 2.0 m/s and a 2.0 kg ball is moving at 1.0 m/s. Which has more momentum?
- a. the 1.0 kg ball b. the 2.0 kg ball c. both the same
- ___ 12. A 1.0 kg ball is moving at 2.0 m/s and a 2.0 kg ball is moving at 1.0 m/s. Which has more kinetic energy?
- a. the 1.0 kg ball b. the 2.0 kg ball c. both the same
- ___ 13. A 1.0 kg ball and a 2.0 kg ball are at the top of a 10.0 m building. Which has more potential energy?
- a. the 1.0 kg ball b. the 2.0 kg ball c. both the same
- ___ 14. Dimwood can lift a barrel from the ground onto a platform 1.5 m above the ground, or he can roll the barrel up a 3.0 m ramp onto the same platform. In which case does he do more work?
- a. lifting b. rolling c. both the same
- ___ 15. Dimwood can lift a barrel from the ground onto a platform 1.5 m above the ground, or he can roll the barrel up a 3.0 m ramp onto the same platform. In which case does he use more force?
- a. lifting b. rolling c. both the same
- ___ 16. Dimwood can lift a barrel from the ground onto a platform 1.5 m above the ground, or he can roll the barrel up a 3.0 m ramp onto the same platform. In which case is the task easier?
- a. lifting b. rolling c. both the same
- ___ 17. All machines are less than 100% efficient. This means that machines waste energy. We mean that the energy;
- a. disappears
 - b. is destroyed
 - c. is used up
 - d. is changed into a form that is not useful
- ___ 18. An object of mass 2.0 kg is sitting on a table 1.0 m high. What is the potential energy of the object?
- a. 0 J b. 1.0 J c. 2.0 J d. 20 J
- ___ 19. The object in #18 is taken to the moon and placed on a table 1.0 m high. Its potential energy is _____ than it was on the earth.
- a. more b. less c. the same
- ___ 20. The purpose of a machine is to
- a. cut down on the amount of work
 - b. make it possible to use less energy
 - c. increase efficiency to 100%
 - d. make work easier



Questions/Problems

21. A 40 kg diver steps off a diving board that is 5 m above the water surface. How fast is she going when she hits the water?
Solve this problem in two ways

a. Use the motion equations to find the speed.

b. Use energy conservation to find the speed.

22. a. The unit for work is the _____.
- b. The unit for power is the _____.
- c. The unit for energy is the _____.
- d. A $\text{kg}\cdot\text{m}/\text{s}^2$ is a unit for _____.
- e. A $\text{N}\cdot\text{m}$ is a unit for _____.
- f. A $\text{N}\cdot\text{m}/\text{s}$ is a unit for _____.
- g. A J/s is a unit for _____.

23. A pulley system is used to raise a 300 N load a vertical distance of 2.0 meters by pulling on a rope with a force of 75 N for 10 m.

a. Calculate the work input

b. Calculate the work output

c. Calculate the efficiency

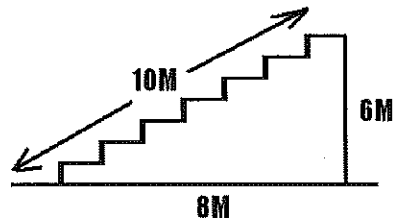
d. Calculate the mechanical advantage

24. Esmerelda, who weighs 400 N, steps off a diving board that is 5.0 meters above the water surface. (Note: $W = mg$)

Complete the table below giving energy information for different heights above the water.

Height above Water	Potential energy	Kinetic energy	Total energy
5.0 m			
4.0 m			
3.0 m			
2.0 m			
1.0 m			
0.0 m			

25. A student weighting 500 N runs up these stairs in 10 seconds.
- Calculate the work done.



- Calculate the power she develops.

- 26.
- What is the difference between work and power?
 - How are work and energy related?
 - How is it possible for ComEd to generate all the energy we need but not all the power we need?
 - How is it possible for machines to make work easier?