Physics Chapter Revie

Name: _____ Class: _____ Date: _____

Assessment

Work and Energy 5.1

Section Quiz: Work

Write the letter of the correct answer in the space provided.

_____ 1. Which of the following sentences uses *work* in the scientific sense?
a. Stan goes to work on the bus.
b. Anne did work on the project for 5 hours.
c. Joseph found that holding the banner in place was hard work.
d. An engine does work on a car when the car is moving.

_____ 2. Work is done on an object
a. whenever a force acts on the object.
b. whenever a force is perpendicular to the displacement of the object.
c. whenever a force causes a displacement of the object.
d. whenever a net force acts on the object.

_____ 3. In which of the following cases is *no* work done?
a. A weightlifter lifts a barbell.
b. A weightlifter holds a barbell overhead.
c. A weightlifter slowly lowers a barbell.
d. A weightlifter drops a barbell and the barbell falls to the ground.

_____ 4. If the sign of work is negative,
a. the force is in the same direction as the displacement.
b. the force is perpendicular to the displacement.
c. the component of the force that does work is in the direction opposite the displacement.
d. the component of the force that does work is perpendicular to the displacement.

_____ 5. A painter lifts a bucket of paint, carries it 5 m horizontally, then sets it back down. Which of the following is true?
a. The force of gravity does negative work when the worker lifts the bucket.
b. The painter does positive work on the bucket when carrying it horizontally at constant speed.
c. The painter does positive work on the bucket when setting it down.
d. No net work is done on the bucket.

_____ 6. Which equation is used to calculate the work done on an object by a force at an angle, θ, to the displacement?
a. $W = Fd$
b. $W = Fd\cos\theta$
c. $W = Fd\sin\theta$
d. $W = mg\sin\theta$

_____ 7. A joule is equivalent to a
   a. N.
   b. N•m.
   c. N/m.
   d. $kg•m/s^2$.

_____ 8. A parachutist falls at a constant speed for 200 m. Which of the following is true?
   a. The force of gravity is the only force doing work on the parachutist.
   b. Air resistance is the only force doing work on the parachutist.
   c. No forces are doing work on the parachutist.
   d. No net work is done on the parachutist.

9. A construction worker lifts a heavy cinder block 1 m off the ground, holds it in place for 3 s, then sets it back down in the same place. Describe the forces doing work on the block and the net work on the block throughout this action.

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10. A child pulls a wagon 3.0 m using a force of 55 N at an angle 35° above horizontal. The force of friction on the wagon is 12 N. Calculate the net work done on the wagon.

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Work and Energy 5.2

Section Quiz: Energy

Write the letter of the correct answer in the space provided.

_____ 1. Energy that is due to the motion of an object is
a. kinetic energy.
b. potential energy.
c. gravitational potential energy.
d. elastic potential energy.

_____ 2. Energy stored in the gravitational field of interacting bodies is
a. kinetic energy.
b. nonmechanical energy.
c. gravitational potential energy.
d. elastic potential energy.

_____ 3. Energy associated with a compressed or stretched object is
a. kinetic energy.
b. potential energy.
c. gravitational potential energy.
d. elastic potential energy.

_____ 4. How does the kinetic energy of an object change if the object's speed doubles?
a. The kinetic energy decreases to half its original value.
b. The kinetic energy doubles.
c. The kinetic energy increases by a factor of 4.
d. The kinetic energy does not change.

_____ 5. The work-kinetic energy theorem states that
a. the net work done on an object equals the kinetic energy of the object.
b. the net work done on an object equals the change in the kinetic energy of the object.
c. the change in the net work done on an object equals the kinetic energy of the object.
d. the change in the net work done on an object equals the change in the kinetic energy of the object.

_____ 6. Friction does –400 J of net work on a moving car. How does this affect the kinetic energy of the car?
a. The kinetic energy increases by 400 J.
b. The kinetic energy decreases by 400 J.
c. The kinetic energy decreases by 160 kJ.
d. The kinetic energy does not change.

_____ 7. Which of the following does *not* affect gravitational potential energy?
a. an object's mass
b. an object's height relative to a zero level
c. the free-fall acceleration
d. an object's speed

_____ 8. How does the elastic potential energy in a mass-spring system change if the displacement of the mass is doubled?
a. The elastic potential energy decreases to half its original value.
b. The elastic potential energy doubles.
c. The elastic potential energy increases or decreases by a factor of 4.
d. The elastic potential energy does not change.

9. Which has more kinetic energy, a 4.0 kg bowling ball moving at 1.0 m/s or a 1.0 kg bocce ball moving at 4.0 m/s? Explain your answer.

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10. A 1.0×10^3 kg sports car is initially traveling at 15 m/s. The driver then applies the brakes for several seconds so that –25 kJ of net work is done on the car. Calculate the initial and final kinetic energy of the car.

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Assessment

Work and Energy 5.3

Section Quiz: Conservation of Energy

Write the letter of the correct answer in the space provided.

_____ 1. Which of the following is true of the conservation of energy in a closed system?
   a. Kinetic energy is always conserved.
   b. Potential energy is always conserved.
   c. Mechanical energy is always conserved.
   d. Total energy is always conserved.

_____ 2. The mechanical energy of a system of objects is
   a. the sum of kinetic energy and gravitational potential energy.
   b. the sum of kinetic energy and elastic potential energy.
   c. the sum of kinetic energy and all relevant forms of potential energy.
   d. the sum of all forms of energy.

_____ 3. Mechanical energy is *not* conserved when
   a. gravitational potential energy is converted to kinetic energy.
   b. kinetic energy is converted to gravitational potential energy.
   c. kinetic energy is converted to elastic potential energy.
   d. friction is not negligible.

_____ 4. In which of the following situations is mechanical energy most likely to be conserved?
   a. A football flies through the air.
   b. A feather falls from the sky.
   c. A skateboard rolls into the grass.
   d. A hockey player digs his skates into the ice.

_____ 5. If mechanical energy is conserved in a system, the energy at any point in time can be in the form of
   a. kinetic energy.
   b. gravitational potential energy.
   c. elastic potential energy.
   d. all of the above

_____ 6. Which of the following is *not* a form of mechanical energy?
   a. kinetic energy
   b. chemical potential energy
   c. gravitational potential energy
   d. elastic potential energy

_____ 7. Which of the following is evidence that frictional forces are present in a system?
a. Interactions in the system cause an increase in temperature.
b. Interactions in the system produce sound.
c. Mechanical energy is not conserved.
d. all of the above

_____ 8. An egg suspended above the ground has 2.0 J of gravitational potential energy. The egg is then dropped and falls to the ground. What is the kinetic energy of the egg just as it reaches the ground?
a. –2.0 J
b. 0 J
c. 2.0 J
d. 4.0 J

9. A tennis ball is thrown up into the air starting from a height of 1.5 m. The ball reaches a peak height, then falls down to the ground. Assuming air resistance is negligible, describe the energy transfers that take place during the flight of the ball. Is mechanical energy conserved in this situation?

10. The tennis ball in question 9 above has a mass of 5.7×10^{-2} kg and has an initial speed of 2.0 m/s. Calculate the speed of the ball when it hits the ground. Ignore air resistance.

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Work and Energy 5.4

Section Quiz: Power

Write the letter of the correct answer in the space provided.

_____ 1. Which of the following refers to the rate at which energy is transferred?
a. work
b. kinetic energy
c. mechanical energy
d. power

_____ 2. Which of the following refers to the rate at which work is done?
a. energy
b. kinetic energy
c. mechanical energy
d. power

_____ 3. Which of the following is *not* a valid equation for power?
a. $P = \frac{W}{\Delta t}$
b. $P = \frac{Fd}{\Delta t}$
c. $P = \frac{Fv}{\Delta t}$
d. $P = Fv$

_____ 4. The SI unit for power is
a. N•m.
b. J.
c. W.
d. hp.

_____ 5. How much work can a motor with a power output of 25 W do in 1 s?
a. $\frac{1}{25}$ J
b. 1 J
c. 25 J
d. 25 W

_____ 6. If a machine increases the distance over which work is done,
a. the force required to do the work is less.
b. the force required to do the work is greater.
c. the force required to do the work is the same.
d. the amount of work done is increased.

_____ 7. If a machine decreases the distance over which work is done,
   a. the force the machine applies is less.
   b. the force the machine applies is greater.
   c. the force the machine applies is the same.
   d. the amount of work done is decreased.

_____ 8. A 100 W light bulb
   a. converts 100 J of kinetic energy to potential energy each second.
   b. converts 100 J of potential energy to kinetic energy each second.
   c. converts 100 J of mechanical energy to nonmechanical energy each second.
   d. converts 100 J of electrical energy to other forms of energy each second.

9. Describe the relationship between energy, time, and power.

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10. An engine uses 29 kN of force to power a car at an average speed of 7.5 m/s. What is the average power output of the engine?