Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Chapter 5 Review

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. A force does work on an object if a component of the force
a. is perpendicular to the displacement of the object.
b. is parallel to the displacement of the object.
c. perpendicular to the displacement of the object moves the object along a path that returns the object to its starting position.
d. parallel to the displacement of the object moves the object along a path that returns the object to its starting position.

____ 2. What is the common formula for work?
a. $W = Fd(\sin \theta)$
b. $W = Fd$
c. $W = Fd^2$
d. $W = F^2d$

____ 3. Work is done when
a. the displacement is not zero.
b. the displacement is zero.
c. the force is zero.
d. the force and displacement are perpendicular.

____ 4. A 1.00×10^3 kg sports car accelerates from rest to 25.0 m/s in 7.50 s. What is the average power output of the automobile engine?
a. 20.8 kW
b. 30.3 kW
c. 41.7 kW
d. 52.4 kW

____ 5. The more powerful the motor is,
a. the longer the time interval for doing the work is.
b. the shorter the time interval for doing the work is.
c. the greater the ability to do the work is.
d. the shorter the workload is.

____ 6. The magnitude of the component of the force that does the work is 43.0 N. How much work is done on a bookshelf being pulled 5.00 m at an angle of 37.0° from the horizontal?
a. 172 J
b. 215 J
c. 129 J
d. 792 J

____ 7. A worker pushes a wheelbarrow with a horizontal force of 50.0 N over a level distance of 5.0 m. If a frictional force of 43 N acts on the wheelbarrow in a direction opposite to that of the worker, what net work is done on the wheelbarrow?
a. 250 J
b. 0.0 J
c. 35 J
d. 10.0 J

____ 8. A hill is 100 m long and makes an angle of 12° with the horizontal. As a 50 kg jogger runs up the hill, how much work does gravity do on the jogger?
a. 50 000 J
b. 10 000 J
c. –10 000 J
d. 0.0 J

____ 9. A child moving at constant velocity carries a 2 N ice-cream cone 1 m across a level surface. What is the net work done on the ice-cream cone?
a. 0 J
b. 0.5 J
c. 2 J
d. 20 J

____ 10. A construction worker pushes a wheelbarrow 5.0 m with a horizontal force of 50.0 N. How much work is done by the worker on the wheelbarrow?
a. 10 J
b. 1250 J
c. 250 J
d. 55 J

____ 11. A horizontal force of 200 N is applied to move a 55 kg television set across a 10 m level surface. What is the work done by the 200 N force on the television set?
a. 4000 J
b. 5000 J
c. 2000 J
d. 6000 J

____ 12. A flight attendant pulls a 50.0 N flight bag a distance of 250.0 m along a level airport floor at a constant speed. A 30.0 N force is exerted on the bag at an angle of 50.0° above the horizontal. How much work is done on the flight bag?
a. 12 500 J
b. 7510 J
c. 4820 J
d. 8040 J

____ 13. Which of the following energy forms is the sum of kinetic energy and all forms of potential energy?
a. total energy
b. sum (Σ) energy
c. nonmechanical energy
d. mechanical energy

____ 14. Which of the following energy forms is involved in winding a pocket watch?
a. electrical energy
b. nonmechanical energy
c. gravitational potential energy
d. elastic potential energy

____ 15. Which of the following energy forms is NOT involved in hitting a tennis ball?
a. kinetic energy
b. chemical potential energy
c. gravitational potential energy
d. elastic potential energy

____ 16. Which of the following energy forms is involved in a pencil falling from a desk?
a. kinetic energy
b. nonmechanical energy
c. gravitational potential energy
d. elastic potential energy and kinetic energy

____ 17. A 3.00 kg toy falls from a height of 10.0 m. Just before hitting the ground, what will be its kinetic energy? (Disregard air resistance. $g = 9.81\ m/s^2$.)
a. 98.0 J
b. 0.98 J
c. 29.4 J
d. 294 J

____ 18. If the only force acting on an object is friction during a given physical process, which of the following assumptions must be made in regard to the object's kinetic energy?
a. The kinetic energy decreases.
b. The kinetic energy increases.
c. The kinetic energy remains constant.
d. The kinetic energy decreases and then increases.

____ 19. What is the kinetic energy of a 0.135 kg baseball thrown at 40.0 m/s?
a. 54.0 J
b. 87.0 J
c. 108 J
d. 216 J

____ 20. If both the mass and the velocity of a ball are tripled, the kinetic energy of the ball is increased by a factor of
a. 3.
b. 6.
c. 9.
d. 27.

____ 21. Which of the following energy forms is associated with an object in motion?
a. potential energy
b. elastic potential energy
c. nonmechanical energy
d. kinetic energy

____ 22. Which of the following energy forms is associated with an object due to its position?
a. potential
b. positional
c. total
d. kinetic

____ 23. The main difference between kinetic energy and potential energy is that
a. kinetic energy involves position and potential energy involves motion.
b. kinetic energy involves motion and potential energy involves position.
c. although both energies involve motion, only kinetic involves position.
d. although both energies involve position, only potential involves motion.

____ 24. Which of the following energy forms is associated with an object due to its position relative to Earth?
a. potential energy
b. elastic potential energy
c. gravitational potential energy
d. kinetic energy

____ 25. Which of the following energy forms is stored in any compressed or stretched object?
a. nonmechanical energy
b. elastic potential energy
c. gravitational potential energy
d. kinetic energy

____ 26. The equation for determining gravitational potential energy is $PE_g = mgh$. Which factor(s) in this equation is (are) NOT a property of an object?
a. g
b. h
c. m
d. both g and h

____ 27. Which of the following parameters does not express how resistant a spring is to being compressed or stretched?
a. compression distance
b. relaxed length
c. spring constant
d. stretching distance

____ 28. Which form of energy is involved in weighing fruit on a spring scale?
a. kinetic energy
b. nonmechanical energy
c. gravitational potential energy
d. elastic potential energy

____ 29. Which of the following energy forms is associated with an object's interaction with the environment?
a. potential energy
b. kinetic energy
c. mechanical energy
d. nonmechanical energy

____ 30. As an object is lowered into a deep hole in the ground, which of the following assumptions must be made in regard to the object's potential energy?
a. The potential energy increases.
b. The potential energy decreases.
c. The potential energy remains constant.
d. The potential energy increases and then decreases.

____ 31. A 40.0 N crate is pulled up a 5.0 m inclined plane at a constant velocity. If the plane is inclined at an angle of 37° to the horizontal and there is a constant force of friction of 10.0 N between the crate and the surface, what is the net gain in potential energy by the crate?
a. 120 J
b. –120 J
c. 210 J
d. –210 J

____ 32. A 0.002 kg coin, which has zero potential energy at rest, is dropped into a 10.0 m well. After the coin comes to a stop in the mud, what is its potential energy?
a. 0.000 J
b. 0.196 J
c. –0.196 J
d. 0.020 J

____ 33. An 80.0 kg climber with a 20.0 kg pack climbs 8848 m to the top of Mount Everest. What is the climber's potential energy?
a. 6.94×10^6 J
b. 4.16×10^6 J
c. 2.47×10^6 J
d. 1.00×10^6 J

____ 34. A 5.00×10^2 N crate is at the top of a 5.00 m ramp, which is inclined at 20.0° with the horizontal. What is its potential energy? ($g = 9.81$ m/s^2.)
a. 855 J
b. 2350 J
c. 815 J
d. 8390 J

____ 35. In the presence of frictional force,
a. nonmechanical energy is negligible and mechanical energy is no longer conserved.
b. nonmechanical energy is negligible and mechanical energy is conserved.
c. nonmechanical energy is no longer negligible and mechanical energy is conserved.
d. nonmechanical energy is no longer negligible and mechanical energy is no longer conserved.

____ 36. Why doesn't the principle of mechanical energy conservation hold in situations when frictional forces are present?
a. Kinetic energy is not simply converted to a form of potential energy.
b. Potential energy is simply converted to a form of gravitational energy.
c. Chemical energy is not simply converted to electrical energy.
d. Kinetic energy is simply converted to a form of gravitational energy.

____ 37. Which of the following are examples of conservable quantities?
a. potential energy and length
b. mechanical energy and length
c. mechanical energy and mass
d. kinetic energy and mass

____ 38. A 16.0 kg child on roller skates, initially at rest, rolls 2.0 m down an incline at an angle of 20.0° with the horizontal. If there is no friction between incline and skates, what is the kinetic energy of the child at the bottom of the incline? ($g = 9.81$ m/s^2.)
a. 210 J
b. 610 J
c. 11 J
d. 110 J

____ 39. Old Faithful geyser in Yellowstone National Park shoots water every hour to a height of 40.0 m. With what velocity does the water leave the ground? (Disregard air resistance. $g = 9.81$ m/s^2.)
a. 7.00 m/s
b. 14.0 m/s
c. 19.8 m/s
d. 28.0 m/s

____ 40. A pole vaulter clears 6.00 m. With what velocity does the vaulter strike the mat in the landing area? (Disregard air resistance. $g = 9.81$ m/s^2.)
a. 2.70 m/s
b. 5.40 m/s
c. 10.8 m/s
d. 21.6 m/s

____ 41. A bobsled zips down an ice track starting at 150 m vertical distance up the hill. Disregarding friction, what is the velocity of the bobsled at the bottom of the hill? ($g = 9.81$ m/s^2.)
a. 27 m/s
b. 36 m/s
c. 45 m/s
d. 54 m/s

____ 42. A professional skier starts from rest and reaches a speed of 56 m/s on a ski slope 30.0° above the horizontal. Using the work–kinetic energy theorem and disregarding friction, find the minimum distance along the slope the skier would have to travel in order to reach this speed.
a. 110 m
b. 160 m
c. 320 m
d. 640 m

____ 43. A 40.0 N crate starting at rest slides down a rough 6.0 m long ramp inclined at 30.0° with the horizontal. The force of friction between the crate and ramp is 6.0 N. Using the work–kinetic energy theorem, find the velocity of the crate at the bottom of the incline.
a. 8.7 m/s
b. 3.3 m/s
c. 4.5 m/s
d. 6.4 m/s

____ 44. A 15.0 kg crate, initially at rest, slides down a ramp 2.0 m long and inclined at an angle of 20.0° with the horizontal. Using the work–kinetic energy theorem and disregarding friction, find the velocity of the crate at the bottom of the ramp. ($g = 9.81$ m/s^2.)

a. 6.1 m/s
c. 9.7 m/s
b. 3.7 m/s
d. 8.3 m/s

____ 45. A parachutist with a mass of 50.0 kg jumps out of an airplane at an altitude of 1.00×10^3 m. After the parachute deploys, the parachutist lands with a velocity of 5.00 m/s. Using the work–kinetic energy theorem, find the energy that was lost to air resistance during this jump. ($g = 9.81$ m/s^2.)

a. 49 300 J
c. 198 000 J
b. 98 800 J
d. 489 000 J

____ 46. A horizontal force of 2.00×10^2 N is applied to a 55.0 kg cart across a 10.0 m level surface, accelerating it 2.00 m/s^2. Using the work–kinetic energy theorem, find the force of friction that slows the motion of the cart? (Disregard air resistance. $g = 9.81$ m/s^2.)

a. 110 N
c. 80.0 N
b. 90.0 N
d. 70.0 N

____ 47. A child riding a bicycle has a total mass of 40.0 kg. The child approaches the top of a hill that is 10.0 m high and 100.0 m long at 5.0 m/s. If the force of friction between the bicycle and the hill is 20.0 N, what is the child's velocity at the bottom of the hill? (Disregard air resistance. $g = 9.81$ m/s^2.)

a. 5.0 m/s
b. 10.0 m/s
c. 11 m/s
d. The child stops before reaching the bottom.

____ 48. Which of the following is the rate at which energy is transferred?

a. potential energy
c. mechanical energy
b. kinetic energy
d. power

____ 49. Which of the following equations is NOT an equation for power?

a. $P = F\dfrac{d}{\Delta t}$
c. $P = Fv$
b. $P = \dfrac{W}{\Delta t}$
d. $P = \dfrac{Fv}{\Delta t}$

____ 50. What is the average power supplied by a 60.0 kg secretary running up a flight of stairs rising vertically 4.0 m in 4.2 s?

a. 380 W
c. 610 W
b. 560 W
d. 670 W

____ 51. What is the average power output of a weight lifter who can lift 250 kg 2.0 m in 2.0 s?

a. 5.0×10^2 W
c. 4.9 kW
b. 2.5 kW
d. 9.8 kW

____ 52. A jet engine develops 1.0×10^5 N of thrust to move an airplane forward at a speed of 9.0×10^2 km/h. What is the power output of the engine?

a. 550 kW
c. 25 MW
b. 1.0 MW
d. 5.0 MW

____ 53. Water flows over a section of Niagara Falls at a rate of 1.20×10^6 kg/s and falls 50.0 m. What is the power of the waterfall?

a. 589 MW
c. 147 MW
b. 294 MW
d. 60.0 MW