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

Fall Final Review 2014

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. $W = Fd(\cos \theta)$
b. $W = Fd$
c. $W = Fd^2$
d. $W = F^2d$

____ 3. 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

____ 4. 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

____ 5. 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

____ 6. 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

____ 7. 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

____ 8. 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

____ 9. Which of the following energy forms is associated with an object due to its position?
a. potential
b. positional
c. total
d. kinetic

____ 10. 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.

____ 11. 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

____ 12. 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

____ 13. 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
b. 98 800 J
c. 198 000 J
d. 489 000 J

____ 14. Which of the following equations is NOT an equation for power?
a. $P = F\dfrac{d}{\Delta t}$
b. $P = \dfrac{W}{\Delta t}$
c. $P = Fv$
d. $P = \dfrac{Fv}{\Delta t}$

____ 15. 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
b. 560 W
c. 610 W
d. 670 W

____ 16. 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
b. 1.0 MW
c. 25 MW
d. 5.0 MW

____ 17. When comparing the momentum of two moving objects, which of the following is correct?
a. The object with the higher velocity will have less momentum if the masses are equal.
b. The more massive object will have less momentum if its velocity is greater.
c. The less massive object will have less momentum if the velocities are the same.
d. The more massive object will have less momentum if the velocities are the same.

____ 18. A baseball is pitched very fast. Another baseball of equal mass is pitched very slowly. Which of the following statements is correct?
a. The fast-moving baseball is harder to stop because it has more momentum.
b. The slow-moving baseball is harder to stop because it has more momentum.
c. The fast-moving baseball is easier to stop because it has more momentum.
d. The slow-moving baseball is easier to stop because it has more momentum.

____ 19. A student walks to class at a velocity of 3 m/s. To avoid walking into a door as it opens, the student slows to a velocity of 0.5 m/s. Now late for class, the student runs down the corridor at a velocity of 7 m/s. The student had the least momentum
a. while walking at a velocity of 3 m/s.
b. while dodging the opening door.
c. immediately after the door opened.
d. while running to class at a velocity of 7 m/s.

____ 20. The change in an object's momentum is equal to
a. the product of the mass of the object and the time interval.
b. the product of the force applied to the object and the time interval.
c. the time interval divided by the net external force.
d. the net external force divided by the time interval.

____ 21. Which of the following situations is an example of a visible change in momentum?
a. A hiker walks through a spider's web.
b. A car drives over a pebble.
c. A volleyball hits a mosquito in the air.
d. A baseball is hit by a bat.

____ 22. Which of the following situations is an example of change in momentum?
a. A tennis ball is hit into a net.
b. A helium-filled balloon rises upward into the sky.
c. An airplane flies into some scattered white clouds.
d. A bicyclist rides over a leaf on the pavement.

____ 23. The impulse experienced by a body is equivalent to the body's change in
a. velocity.
b. kinetic energy.
c. momentum.
d. force.

____ 24. Which of the following statements properly relates the variables in the equation $\mathbf{F}\Delta t = \Delta\mathbf{p}$?
a. A large constant force changes an object's momentum over a long time interval.
b. A large constant force acting over a long time interval causes a large change in momentum.
c. A large constant force changes an object's momentum at various time intervals.
d. A large constant force does not necessarily cause a change in an object's momentum.

____ 25. A soccer ball collides with another soccer ball at rest. The total momentum of the balls
a. is zero.
b. increases.
c. remains constant.
d. decreases.

____ 26. An astronaut with a mass of 70.0 kg is outside a space capsule when the tether line breaks. To return to the capsule, the astronaut throws a 2.0 kg wrench away from the capsule at a speed of 14 m/s. At what speed does the astronaut move toward the capsule?
a. 5.0 m/s
b. 0.4 m/s
c. 3.5 m/s
d. 7.0 m/s

____ 27. Two skaters, each with a mass of 50 kg, are stationary on a frictionless ice pond. One skater throws a 0.2 kg ball at 5 m/s to the other skater, who catches it. What are the velocities of the skaters when the ball is caught?
a. 0.02 m/s moving apart
b. 0.04 m/s moving apart
c. 0.02 m/s moving toward each other
d. 0.04 m/s moving toward each other

____ 28. Two objects stick together and move with the same velocity after colliding. Identify the type of collision.
a. elastic
b. perfectly elastic
c. inelastic
d. perfectly inelastic

____ 29. Two billiard balls collide. Identify the type of collision.
a. elastic
b. perfectly elastic
c. inelastic
d. perfectly inelastic

____ 30. A bowling ball with a mass of 7.0 kg strikes a pin that has a mass of 2.0 kg. The pin flies forward with a velocity of 6.0 m/s, and the ball continues forward at 4.0 m/s. What was the original velocity of the ball?
a. 4.0 m/s
b. 5.7 m/s
c. 6.6 m/s
d. 3.3 m/s

____ 31. What is the temperature of a system in thermal equilibrium with another system made up of ice and water at 1 atm of pressure?
a. 0°F
b. 273 K
c. 0 K
d. 100°C

____ 32. All of the following are widely used temperature scales EXCEPT
a. Kelvin.
b. Fahrenheit.
c. Celsius.
d. Joule.

____ 33. A substance registers a temperature change from 20°C to 40°C. This corresponds to an incremental change of
a. 20°F.
b. 40°F.
c. 36°F.
d. 313°F.

____ 34. If energy is transferred from a table to a block of ice moving across the table, which of the following statements is true?
a. The table and the ice are at thermal equilibrium.
b. The ice is cooler than the table.
c. The ice is no longer 0°C.
d. Energy is being transferred from the ice to the table.

____ 35. High temperature is related to
a. low kinetic energy.
b. high kinetic energy.
c. no difference in kinetic energy.
d. zero net energy.

____ 36. What is the temperature increase of water per kilogram at the bottom of a 145 m waterfall if all of the initial potential energy is transferred as heat to the water? (g = 9.81 m/s^2 and c_p = 4186 J/kg•°C)
a. 0.170°C
b. 0.340°C
c. 0.680°C
d. 1.04°C

____ 37. Find the final equilibrium temperature when 10.0 g of milk at 10.0°C is added to 1.60×10^2 g of coffee with a temperature of 90.0°C. Assume the specific heats of coffee and milk are the same as for water (c_w = 4.19 J/g•°C), and disregard the heat capacity of the container.
a. 85.3°C
b. 77.7°C
c. 71.4°C
d. 66.7°C

____ 38. A slice of bread contains about 4.19×10^5 J of energy. If the specific heat of a person is 4.19×10^3 J/kg•°C, by how many degrees Celsius would the temperature of a 70.0 kg person increase if all the energy in the bread were converted to heat?
a. 2.25°C
b. 1.86°C
c. 1.43°C
d. 1.00°C

____ 39. The use of fiberglass insulation in the outer walls of a building is intended to minimize heat transfer through what process?
a. conduction
b. radiation
c. convection
d. vaporization

____ 40. On a sunny day at the beach, the reason the sand gets hot and the water stays relatively cool is attributed to the difference in which property between water and sand?
a. mass density
b. specific heat
c. temperature
d. thermal conductivity

____ 41. A mass attached to a spring vibrates back and forth. At the equilibrium position, the
a. the acceleration reaches a maximum.
b. velocity reaches a maximum.
c. net force reaches a maximum.
d. velocity reaches zero.

____ 42. A 0.20 kg mass suspended from a spring moves with simple harmonic motion. At the instant the mass is displaced from equilibrium by –0.05 m, what is its acceleration? (The spring constant is 10.0 N/m.)
a. 1200 m/s^2
b. 41 m/s^2
c. 0.10 m/s^2
d. 2.5 m/s^2

____ 43. The angle between the string of a pendulum at its equilibrium position and at its maximum displacement is its
a. period.
b. frequency.
c. vibration.
d. amplitude.

____ 44. How are frequency and period related in simple harmonic motion?
a. They are directly related.
b. They are inversely related.
c. They both measure the time per cycle.
d. They both measure the number of cycles per unit of time.

____ 45. Imagine that you could transport a simple pendulum from Earth to the moon, where the free-fall acceleration is one-sixth that on Earth. By what factor would the pendulum's frequency be changed?
a. almost 6.0
b. almost 2.5
c. almost 0.4
d. almost 0.17

____ 46. An amusement park ride swings back and forth once every 40.0 s. What is the ride's frequency?
a. 2.50×10^{-2} Hz
b. 5.00×10^{-2} Hz
c. 25.0×10^{-2} Hz
d. 40.0×10^{-2} Hz

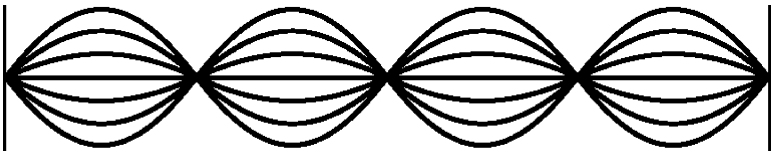
____ 47. A mass on a spring vibrates in simple harmonic motion at an amplitude of 8.0 cm. If the mass of the object is 0.20 kg and the spring constant is 130 N/m, what is the frequency?
a. 1.5 Hz
b. 8.7 Hz
c. 4.0 Hz
d. 1.6 Hz

____ 48. A periodic wave has a wavelength of 0.50 m and a speed of 20 m/s. What is the wave frequency?
a. 0.02 Hz
b. 20 Hz
c. 40 Hz
d. 10 Hz

____ 49. Waves propagate along a stretched string at a speed of 8.0 m/s. The end of the string vibrates up and down once every 1.5 s. What is the wavelength of the waves traveling along the string?
a. 3.0 m
b. 12 m
c. 6.0 m
d. 5.3 m

____ 50. What happens to the energy carried in a given time interval by a mechanical wave when the wave's amplitude is doubled?
a. It increases by a factor of two.
b. It increases by a factor of four.
c. It decreases by a factor of two.
d. It decreases by a factor of four.

____ 51. Which of the following is the interference that results when individual displacements on opposite sides of the equilibrium position are added together to form the resultant wave?
a. constructive
b. destructive
c. complete constructive
d. complete destructive



____ 52. How many nodes and antinodes are shown in the standing wave above?
a. four nodes and four antinodes
b. four nodes and three antinodes
c. four nodes and five antinodes
d. five nodes and four antinodes

____ 53. Which portion of the electromagnetic spectrum is used in a television?
a. infrared waves
b. microwaves
c. radio waves
d. gamma waves

____ 54. Which portion of the electromagnetic spectrum is used to sterilize medical instruments?
a. infrared waves
b. microwaves
c. X rays
d. ultraviolet light

____ 55. What is the frequency of an electromagnetic wave with a wavelength of 1.0×10^5 m?
a. 1.0×10^{13} Hz
b. 3.0×10^3 Hz
c. 3.0×10^{13} Hz
d. 1.0×10^3 Hz

____ 56. When red light is compared with violet light,
a. both have the same frequency.
b. both have the same wavelength.
c. both travel at the same speed.
d. red light travels faster than violet light.

____ 57. The relationship between frequency, wavelength, and speed holds for light waves because
a. light travels slower in a vacuum than in air.
b. all forms of electromagnetic radiation travel at a single speed in a vacuum.
c. light travels in straight lines.
d. different forms of electromagnetic radiation travel at different speeds.

____ 58. The farther light is from a source,
a. the more spread out light becomes.
b. the more condensed light becomes.
c. the more bright light becomes.
d. the more light is available per unit area.

____ 59. If a light ray strikes a flat mirror at an angle of 29° from the normal, the reflected ray will be
a. 29° from the normal.
b. 27° from the normal.
c. 90° from the mirror's surface.
d. 36° from the normal.

____ 60. If a light ray strikes a flat mirror at an angle of 52° from the normal, the reflected ray will be
a. 52° from the normal.
b. 25° from the normal.
c. 90° from the mirror's surface.
d. 18° from the normal.

____ 61. If you stand 3.0 m in front of a flat mirror, how far away from you would your image be in the mirror?
a. 1.5 m
b. 3.0 m
c. 6.0 m
d. 12.0 m

____ 62. When the reflection of an object is seen in a flat mirror, the distance from the mirror to the image depends on
a. the wavelength of light used for viewing.
b. the distance from the object to the mirror.
c. the distance of both the observer and the object to the mirror.
d. the size of the object.

____ 63. A concave mirror forms a real image at 42 cm from the mirror surface along the principal axis. If the corresponding object is at a 88 cm distance, what is the mirror's focal length?
a. 28 cm
b. 17 cm
c. 12 cm
d. 9 cm

____ 64. Which of the following is NOT a primary subtractive color?
a. yellow
b. cyan
c. magenta
d. blue

____ 65. When the transmission axis is perpendicular to the plane of polarization for light,
a. all the light passes through.
b. most of the light passes through.
c. little of the light passes through.
d. no light passes through.