PHys.12-Q2W7-H.W.-Quarter Revision-

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

____ 1. If the intensity of a sound is increased by a factor of 100, the new decibel level will increase
a. by two units.
b. by a factor of 10.
c. to twice the old one.
d. by 20 units.

____ 2. A thermodynamic process occurs, and the entropy of a system decreases. What can be concluded about the entropy change of the environment?
a. It decreases.
b. It increases.
c. It could increase or decrease, depending on the process.
d. It stays the same.

____ 3. The centripetal force on an object in circular motion is
a. in the same direction as the tangential speed.
b. in the same direction as the centripetal acceleration.
c. in the direction opposite the centripetal acceleration.
d. in the direction opposite the tangential speed.

____ 4. A nail is driven into a board with an initial kinetic energy of 150 J. If the potential energy before and after the event is the same, what is the change in the internal energy of the board and nail?
a. 0 J
b. –150 J
c. 75 J
d. 150 J

____ 5. Which thermodynamic process takes place when work is done on or by the system but no energy is transferred to or from the system as heat?
a. isothermal
b. adiabatic
c. isobaric
d. isovolumetric

____ 6. Which of the following statements is *not* correct?
a. Molecules of a fluid are free to move past each other.
b. A fluid flows.
c. A fluid has a definite shape.
d. A fluid changes its shape easily.

____ 7. In the diagram above, use the superposition principle to find the resultant wave of waves W and Z.
a. a
b. c
c. b
d. d

____ 8. Which of the following is a single nonperiodic disturbance?
a. sine wave
b. pulse wave
c. periodic wave
d. transverse wave

____ 9. Which of the following statements is always true?
a. Pressure always increases when force decreases or the area acted on increases.
b. Pressure always increases when force increases or the area acted on increases.
c. Pressure always increases when force increases or the area acted on decreases.
d. Pressure always increases when force decreases or the area acted on decreases.

____ 10. What three properties of a substance affect the amount of energy transferred as heat to or from the substance?
a. mass, temperature change, specific heat capacity
b. volume, temperature change, specific heat capacity
c. mass, temperature change, latent heat
d. density, temperature change, specific heat capacity

____ 11. Which of the following is *not* a widely used temperature scale?
a. Kelvin
b. Fahrenheit
c. Joule
d. Celsius

____ 12. The use of fiberglass insulation in the outer walls of a building is intended to minimize heat transfer through what process?
a. vaporization
b. convection
c. radiation
d. conduction

A child rides a bicycle in a circular path with a radius of 2.0 m. The tangential speed of the bicycle is 2.0 m/s. The combined mass of the bicycle and the child is 43 kg.

____ 13. What kind of force provides the centripetal force on the bicycle?
a. air resistance
b. friction
c. normal force
d. gravitational force

____ 14. What is the temperature of a system in thermal equilibrium with another system made up of water and steam at 1 atm of pressure?
a. 0°F
b. 0 K
c. 100°C
d. 273 K

____ 15. Using the figure above, determine which value equals the latent heat required to change the liquid water into steam.
a. 8.04×10^3 J
b. 31.1×10^3 J
c. 30.6×10^3 J
d. 22.6×10^3 J

____ 16. What does the net force between two levels in a fluid equal?
a. the force applied to the fluid's sides
b. the weight of the fluid above the top level
c. the weight of the fluid between the levels
d. the force applied to the fluid's surface

____ 17. A chunk of ice with a mass of 1 kg at 0°C melts and absorbs 3.33×10^5 J of heat in the process. Which best describes what happened to this system?
a. Its entropy decreased.
b. Its entropy increased.
c. Its entropy remained constant.
d. Work was converted to energy.

____ 18. According to the first law of thermodynamics, the difference between energy transferred to or from a system as heat and energy transferred to or from a system by work is equivalent to which of the following?
a. volume change
b. internal energy change
c. entropy change
d. pressure change

____ 19. Energy is transferred as heat between two objects, one with a temperature of 5°C and the other with a temperature of 20°C. If two other objects are to have the same amount of energy transferred between them, what might their temperatures be?
a. 17°C and 32°C
b. 15°C and 25°C
c. 10°C and 15°C
d. 80°C and 90°C

____ 20. Which of the following confirms that gravitational mass and inertial mass are equivalent?
a. Newton's second law is valid throughout the universe.
b. An object's weight can change with location, but the object's mass remains constant.
c. Free-fall acceleration is the same at all points where the gravitational field strength is the same.
d. Free-fall acceleration is the same throughout the universe.

____ 21. Which of the following is a form of kinetic energy that occurs within a molecule when the bonds are stretched or bent?
a. translational
b. internal
c. rotational
d. vibrational

____ 22. When an ideal gas does positive work on its surroundings, which of the gas's quantities increases?
a. internal energy
b. pressure
c. volume
d. temperature

____ 23. A slice of bread contains about 4.19×10^5 J of energy. If the specific heat capacity 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. 1.43°C
b. 2.25°C
c. 1.86°C
d. 1.00°C

____ 24. Until the middle of the 16th century, most people believed ____ was at the center of the universe.
a. the sun
b. the moon
c. Earth
d. a black hole

____ 25. Where should a force be applied on a lever arm to produce the most torque?
a. in the middle of the lever arm
b. closest to the axis of rotation
c. It doesn't matter where the force is applied.
d. farthest from the axis of rotation

____ 26. What is the term for the net force directed toward the center of an object's circular path?
a. circular force
b. centripetal force
c. centrifugal force
d. orbital force

____ 27. What temperature has the same numerical value on both the Fahrenheit and the Celsius scales?
a. –40.0°
b. –72.0°
c. 0°
d. 40.0°

____ 28. As the temperature of a substance increases, its volume tends to increase due to
a. thermal expansion.
b. thermal contraction.
c. thermal energy.
d. thermal equilibrium.

____ 29. Which of the following is proportional to the kinetic energy of atoms and molecules?
a. thermal equilibrium
b. temperature
c. potential energy
d. elastic energy

____ 30. If you cannot exert enough force to loosen a bolt with a wrench, which of the following should you do?
a. Tie a rope to the end of the wrench and pull on the rope.
b. Use a wrench with a shorter handle.
c. Use a wrench with a longer handle.
d. You should exert a force on the wrench closer to the bolt.

____ 31. Which of the following is *not* an example of units for expressing pressure?
a. kg/m^2
b. atm
c. Pa
d. N/m^2

____ 32. In this text, which of the following symbols represents the constant of universal gravitation?
a. F_c
b. g
c. G
d. F_g

____ 33. What is the efficiency of a machine that requires 1.00×10^2 J of input energy to do 35 J of work?
a. 65%
b. 35%
c. 2.9%
d. 29%

____ 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 ice is cooler than the table.
b. The ice is no longer 0°C.
c. Energy is being transferred from the ice to the table.
d. The table and the ice are at thermal equilibrium.

____ 35. When a gas is poured out of one container into another container, which of the following does *not* occur?
a. The gas keeps its original volume.
b. The gas changes shape to fit the new container.
c. The gas spreads out to fill the new container.
d. The gas flows into the new container.

____ 36. A mass-spring system can oscillate with simple harmonic motion because a compressed or stretched spring has which kind of energy?
a. gravitational potential
b. kinetic
c. elastic potential
d. mechanical

____ 37. If a guitar string has a fundamental frequency of 500 Hz, what is the frequency of its second harmonic?
a. 1000 Hz
b. 2000 Hz
c. 750 Hz
d. 250 Hz

____ 38. The requirement that a heat engine must give up some energy at a lower temperature in order to do work corresponds to which law of thermodynamics?
a. second
b. No law of thermodynamics applies.
c. third
d. first

____ 39. A train moves down the track toward an observer. The sound from the train, as heard by the observer, is ____ the sound heard by a passenger on the train.
a. a different timbre than
b. higher in pitch than
c. the same as
d. lower in pitch than

____ 40. Which of the following wavelengths would *not* produce standing waves on a rope whose length is 1 m?
a. 2/3 m
b. 2 1/4 m
c. 1 m
d. 2 m

____ 41. A cube of wood with a density of 0.780 g/cm^3 is 10.0 cm on each side. When the cube is placed in water, what buoyant force acts on the wood? (ρ_w = 1.00 g/cm^3)
a. 6.40 N
b. 5.00 N
c. 7.65×10^3 N
d. 7.65 N

____ 42. If an object is only partially submerged in a fluid, which of the following is true?
a. The volume of the displaced fluid equals the volume of the object.
b. The density of the fluid equals the density of the object.
c. The density of the fluid is less than the density of the object.
d. The density of the fluid is greater than the density of the object.

____ 43. An ideal gas system is maintained at a constant volume of 4 L. If the pressure is constant, how much work is done by the system?
a. 0 J
b. 8 J
c. 5 J
d. 30 J

____ 44. A water tunnel has a circular cross section where the diameter diminishes from 3.6 m to 1.2 m. If the velocity of water is 3.0 m/s in the larger part of the tunnel, what is the velocity of water in the smaller part of the tunnel?
a. 18 m/s
b. 27 m/s
c. 54 m/s
d. 9.0 m/s

____ 45. During an isovolumetric process, which of the following does not change?
a. temperature
b. internal energy
c. pressure
d. volume

____ 46. How would the speed of Earth's orbit around the sun change if Earth's mass increased by 4 times?
a. It would increase by a factor of 4.
b. The speed would not change.
c. It would decrease by a factor of 2.
d. It would increase by a factor of 2.

____ 47. Which of the following is a thermodynamic process in which a system returns to the same conditions under which it started?
a. an isovolumetric process
b. an adiabatic process
c. an isothermal process
d. a cyclic process

____ 48. Four beats per second are heard when two notes are sounded. The frequency of one note is 420 Hz. Which of the following is a possible frequency of the other note?
a. 1680 Hz
b. 418 Hz
c. 416 Hz
d. 105 Hz

____ 49. Which of the following terms describes a transfer of energy?
a. heat
b. temperature
c. internal energy
d. kinetic energy

____ 50. What occurs when a system's disorder is increased?
a. No work is done.
b. Less energy is available to do work.
c. More energy is available to do work.
d. No energy is available to do work.

____ 51. What kind of simple machine are you using if you pry a nail from a board with the back of a hammer?
a. a screw
b. a wedge
c. a lever
d. a pulley

____ 52. Which equation describes the net work done for a complete cycle of a heat engine?
a. $W_{net} = Q_c - Q_h$
b. $W_{net} = Q - \Delta U$
c. $W_{net} = P\Delta V$
d. $W_{net} = Q_h - Q_c$

____ 53. For an ideal fluid flowing through a horizontal pipe, Bernoulli's principle and the continuity equation state that the pressure within the pipe does which of the following? (Assume measurements are taken along the pipe in the direction of fluid flow.)
a. Pressure increases, then decreases as the pipe diameter increases.
b. Pressure remains constant as the pipe diameter increases.
c. Pressure decreases as the pipe diameter increases.
d. Pressure increases as the pipe diameter increases.

____ 54. When an astronaut in orbit experiences apparent weightlessness,
a. the net gravitational force on the astronaut is zero.
b. the net gravitational force on the astronaut is not balanced by a normal force.
c. no forces act on the astronaut.
d. no gravitational forces act on the astronaut.

____ 55. Which of the following statements about floating objects is correct?
a. The object's density is greater than the density of the fluid on which it floats.
b. The object's density is equal to the density of the fluid on which it floats.
c. The buoyant force equals the object's weight.
d. The displaced volume of fluid is greater than the volume of the object.

____ 56. Why does sandpaper get hot when it is rubbed against rusty metal?
a. Friction between the sandpaper and metal increases the temperature of both.
b. Energy is transferred from the sandpaper into the metal.
c. Energy is transferred from the metal to the sandpaper.
d. Energy is transferred from a hand to the sandpaper.

____ 57. Suppose a doorknob is placed at the center of a door. Compared with a door whose knob is located at the edge, what amount of force must be applied to this door to produce the torque exerted on the other door?
a. one-half as much
b. four times as much
c. one-fourth as much
d. two times as much

____ 58. A ball is whirled on a string, then the string breaks. What causes the ball to move off in a straight line?
a. inertia
b. centrifugal force
c. centripetal force
d. centripetal acceleration

____ 59. One end of a taut rope is fixed to a post. What type of wave is produced if the free end is quickly raised and lowered one time?
a. periodic wave
b. sine wave
c. pulse wave
d. longitudinal wave

____ 60. A heavy bank-vault door is opened by the application of a force of 3.0×10^{2} N directed perpendicular to the plane of the door at a distance of 0.80 m from the hinges. What is the torque?
a. 300 N•m
b. 240 N•m
c. 360 N•m
d. 120 N•m

____ 61. Which of the following is *not* an example of laminar flow?
a. a river moving slowly in a straight line
b. smoke rising upward in a smooth column through air
c. smoke twisting as it moves upward from a fire
d. water flowing evenly from a slightly opened faucet

____ 62. Musical instruments of different types playing the same note may often be identified by the ____ of their sounds.
a. intensity
b. timbre
c. pitch
d. fundamental frequency

____ 63. The angle between the string of a pendulum at its equilibrium position and at its maximum displacement is the pendulum's
a. vibration.
b. amplitude.
c. period.
d. frequency.

____ 64. Two small masses that are 10.0 cm apart attract each other with a force of 10.0 N. When they are 5.0 cm apart, these masses will attract each other with what force? ($G = 6.673 \times 10^{-11}$ N•m^2/kg^2)
a. 5.0 N
b. 2.5 N
c. 40.0 N
d. 20.0 N

____ 65. Which of the following properties is *not* characteristic of an ideal fluid?
a. nonviscous
b. laminar flow
c. incompressible
d. turbulent flow

____ 66. A simple pendulum swings in simple harmonic motion. At maximum displacement,
a. the acceleration reaches a maximum.
b. the velocity reaches a maximum.
c. the acceleration reaches zero.
d. the restoring force reaches zero.

____ 67. Pitch depends on the ____ of a sound wave.
a. speed
b. power
c. amplitude
d. frequency

____ 68. A vibrating guitar string emits a tone just as a 5.00×10^{2} Hz tuning fork is struck. If five beats per second are heard, which of the following is a possible frequency of vibration of the string?
a. 495 Hz
b. 2500 Hz
c. 1500 Hz
d. 605 Hz

____ 69. Tides are caused by
a. differences in Earth's gravitational field strength at different points on Earth's surface.
b. fluctuations in the gravitational attraction between Earth and the moon.
c. differences in the gravitational force of the sun at different points on Earth.
d. differences in the gravitational force of the moon at different points on Earth.

____ 70. Two mechanical waves that have positive displacements from the equilibrium position meet and coincide. What kind of interference occurs?
a. destructive
b. complete destructive
c. constructive
d. none

____ 71. What happens to the internal energy of an ideal gas when it is heated from 0°C to 4°C?
a. It decreases.
b. It is impossible to determine.
c. It remains constant.
d. It increases.

____ 72. An ideal gas system undergoes an adiabatic process in which it expands and does 20 J of work on its environment. What is the change in the system's internal energy?
a. 20 J
b. –20 J
c. 0 J
d. –5 J

____ 73. For a system in simple harmonic motion, which of the following is the time required to complete a cycle of motion?
a. frequency
b. amplitude
c. revolution
d. period

____ 74. A wave travels through a medium. As the wave passes, the particles of the medium vibrate in a direction perpendicular to the direction of the wave's motion. The wave is
a. transverse.
b. electromagnetic.
c. longitudinal.
d. a pulse.

____ 75. Sound waves
a. are longitudinal waves.
b. are a part of the electromagnetic spectrum.
c. are transverse waves.
d. do not require a medium for transmission.

____ 76. A closed vessel can sink to a depth of 20.0 m in water (ρ_w = 1.00 g/cm^3) before the external pressure crushes it. To what depth could this same container be immersed in a deep vat of mercury (ρ_{Hg} = 13.6 g/cm^3) without it being crushed?
a. 15.7 m
b. 1.47 m
c. 27.2 m
d. 0.680 m

____ 77. The standing wave shown in the diagram above would be produced on a string of length *L* by a wave having wavelength
a. 2 *L*.
b. 4 *L*.
c. *L*.
d. 1/2 *L*.

____ 78. A 2.0 m long stretched rope is fixed at both ends. Which wavelength would *not* produce standing waves on this rope?
a. 2.0 m
b. 6.0 m
c. 4.0 m
d. 3.0 m

____ 79. In the diagram above, use the superposition principle to find the resultant wave of waves Q and R.
a. a
b. b
c. d
d. c

____ 80. When an air column vibrates in a pipe that is open at both ends,
a. no harmonics are present.
b. only even harmonics are present.
c. all harmonics are present.
d. only odd harmonics are present.

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