Quarter 2 Revision Topics:

Ch.7- Circular Motion and Gravitation
Ch.8- Fluid Mechanics
Ch.9-: Heat
Ch.10-: Thermodynamics
Ch.11-: Vibrations and waves
Ch.12-: Sound

PHys.12-Q2W7-Qs. Bank-Quarter Revision-

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

____ 1. What is the term for the net force directed toward the center of an object's circular path?
a. circular force
b. centrifugal force
c. centripetal force
d. orbital force

____ 2. Which of the following can be a centripetal force?
a. friction
b. gravity
c. tension
d. all of the above

____ 3. The centripetal force on an object in circular motion is
a. perpendicular to the plane of the object's motion.
b. in the plane of the object's motion and perpendicular to the tangential speed.
c. in the plane of the object's motion and in the same direction as the tangential speed.
d. in the plane of the object's motion and in the direction opposite the tangential speed.

____ 4. The centripetal force on an object in circular motion is
a. in the same direction as the tangential speed.
b. in the direction opposite the tangential speed.
c. in the same direction as the centripetal acceleration.
d. in the direction opposite the centripetal acceleration.

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.

____ 5. What is the magnitude of the centripetal force on the bicycle?
a. 4.0 N
b. 43 N
c. 86 N
d. 3.7 kN

____ 6. What kind of force provides the centripetal force on the bicycle?
a. gravitational force
b. friction
c. air resistance
d. normal force

____ 7. A ball is whirled on a string, then the string breaks. What causes the ball to move off in a straight line?
a. centripetal acceleration
b. centripetal force
c. centrifugal force
d. inertia

____ 8. Tides are caused by
a. differences in the gravitational force of the sun at different points on Earth.
b. differences in the gravitational force of the moon at different points on Earth.
c. differences in Earth's gravitational field strength at different points on Earth's surface.
d. fluctuations in the gravitational attraction between Earth and the moon.

____ 9. Why does an astronaut weigh less on the moon than on Earth?
a. The astronaut has less mass on the moon.
b. The astronaut is farther from Earth's center when he or she is on the moon.
c. The gravitational field strength is less on the moon's surface than on Earth's surface.
d. The astronaut is continually in free fall because the moon orbits Earth.

____ 10. If you lift an apple from the ground to some point above the ground, the gravitational potential energy in the system increases. This potential energy is stored in
a. the apple.
b. Earth.
c. both the apple and Earth.
d. the gravitational field between Earth and the apple.

____ 11. Which of the following confirms that gravitational mass and inertial mass are equivalent?
a. Free-fall acceleration is the same throughout the universe.
b. Free-fall acceleration is the same at all points where the gravitational field strength is the same.
c. Newton's second law is valid throughout the universe.
d. An object's weight can change with location, but the object's mass remains constant.

____ 12. In this text, which of the following symbols represents gravitational field strength?
a. F_g c. g
b. G d. F_c

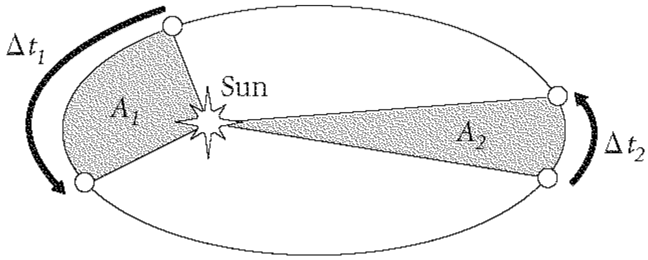
____ 13. In this text, which of the following symbols represents the constant of universal gravitation?
a. F_g c. g
b. G d. F_c

____ 14. Which of the following equations expresses Newton's law of universal gravitation?
a. $F_c = \frac{mv_t^2}{r}$ c. $g = G\frac{m_E}{r^2}$
b. $F_g = \frac{m_1 m_2}{r}$ d. $F_g = G\frac{m_1 m_2}{r^2}$

____ 15. The gravitational force between two masses is 36 N. What is the gravitational force if the distance between them is tripled? ($G = 6.673 \times 10^{-11}$ N•m^2/kg^2)
a. 4.0 N c. 18 N
b. 9.0 N d. 27 N

____ 16. 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 c. 20.0 N
b. 2.5 N d. 40.0 N

____ 17. Until the middle of the 16th century, most people believed ____ was at the center of the universe.
a. Earth c. the sun
b. the moon d. a black hole



____ 18. In the figure above, according to Kepler's laws of planetary motion,

a. $A_1 = A_2$.
b. $\Delta t_1 > \Delta t_2$.
c. if $\Delta t_1 = \Delta t_2$, then the orbit is circular.
d. if $\Delta t_1 = \Delta t_2$, then $A_1 = A_2$.

____ 19. Newton's law of universal gravitation

a. is equivalent to Kepler's first law of planetary motion.
b. can be used to derive Kepler's third law of planetary motion.
c. can be used to disprove Kepler's laws of planetary motion.
d. does not apply to Kepler's laws of planetary motion.

____ 20. 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 2.
b. It would increase by a factor of 4.
c. It would decrease by a factor of 2.
d. The speed would not change.

____ 21. When an astronaut in orbit experiences apparent weightlessness,

a. no forces act on the astronaut.
b. no gravitational forces act on the astronaut.
c. the net gravitational force on the astronaut is zero.
d. the net gravitational force on the astronaut is not balanced by a normal force.

____ 22. Where should a force be applied on a lever arm to produce the most torque?

a. closest to the axis of rotation
b. farthest from the axis of rotation
c. in the middle of the lever arm
d. It doesn't matter where the force is applied.

____ 23. If you want to open a swinging door with the least amount of force, where should you push on the door?

a. close to the hinges
b. in the middle
c. as far from the hinges as possible
d. It does not matter where you push.

____ 24. If you cannot exert enough force to loosen a bolt with a wrench, which of the following should you do?

a. Use a wrench with a longer handle.
b. Tie a rope to the end of the wrench and pull on the rope.
c. Use a wrench with a shorter handle.
d. You should exert a force on the wrench closer to the bolt.

____ 25. 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. two times as much
c. one-fourth as much
d. four times as much

____ 26. 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. 120 N•m
b. 240 N•m
c. 300 N•m
d. 360 N•m

____ 27. If the torque required to loosen a nut on a wheel has a magnitude of 40.0 N•m and the force exerted by a mechanic is 133 N, how far from the nut must the mechanic apply the force?

a. 1.20 m
b. 15.0 cm
c. 30.1 cm
d. 60.2 cm

____ 28. What kind of simple machine are you using if you pry a nail from a board with the back of a hammer?

a. a wedge
b. a pulley
c. a lever
d. a screw

____ 29. An iron bar is used to lift a slab of cement. The force applied to lift the slab is 4.0×10^{2} N. If the slab weighs 6400 N, what is the mechanical advantage of the bar?

a. 1.6
b. 16
c. 6000
d. 6.3%

____ 30. What is the efficiency of a machine that requires 1.00×10^{2} J of input energy to do 35 J of work?

a. 2.9%
b. 29%
c. 35%
d. 65%

____ 31. Which of the following statements is *not* correct?

a. A fluid flows.
b. A fluid has a definite shape.
c. Molecules of a fluid are free to move past each other.
d. A fluid changes its shape easily.

____ 32. How does a liquid differ from a gas?

a. A liquid has both definite shape and definite volume, whereas a gas has neither.
b. A liquid has definite volume, unlike a gas.
c. A liquid has definite shape, unlike a gas.
d. A liquid has definite shape, whereas a gas has definite volume.

____ 33. When a gas is poured out of one container into another container, which of the following does *not* occur?

a. The gas flows into the new container.
b. The gas changes shape to fit the new container.
c. The gas spreads out to fill the new container.
d. The gas keeps its original volume.

____ 34. For incompressible fluids, density changes little with changes in

a. depth.
b. temperature.
c. pressure.
d. free-fall acceleration.

____ 35. 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. 7.65×10^{3} N
b. 7.65 N
c. 6.40 N
d. 5.00 N

____ 36. According to legend, to determine whether the king's crown was made of pure gold, Archimedes measured the crown's volume by determining how much water it displaced. The density of gold is 19.3 g/cm^3. If the crown's mass was 6.00×10^{2} g, what volume of water would have been displaced if the crown was indeed made of pure gold?

a. 31.1 cm^3
b. 1.81×10^{3} cm^3
c. 22.8×10^{3} cm^3
d. 114×10^{3} cm^3

____ 37. 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 displaced volume of fluid is greater than the volume of the object.
d. The buoyant force equals the object's weight.

____ 38. 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 greater than the density of the object.
d. The density of the fluid is less than the density of the object.

____ 39. Which of the following is *not* an example of units for expressing pressure?
a. N/m^2
b. kg/m^2
c. atm
d. Pa

____ 40. Which of the following statements is always true?
a. Pressure always increases when force increases or the area acted on increases.
b. Pressure always increases when force increases or the area acted on decreases.
c. Pressure always increases when force decreases or the area acted on increases.
d. Pressure always increases when force decreases or the area acted on decreases.

____ 41. A water bed that is 1.5 m wide and 2.5 m long weighs 1055 N. Assuming the entire lower surface of the bed is in contact with the floor, what is the pressure the bed exerts on the floor?
a. 250 Pa
b. 260 Pa
c. 270 Pa
d. 280 Pa

____ 42. Each of four tires on an automobile has an area of 0.026 m^2 in contact with the ground. The weight of the automobile is 2.6×10^4 N. What is the pressure in the tires?
a. 3.1×10^6 Pa
b. 1.0×10^6 Pa
c. 2.5×10^5 Pa
d. 6.2×10^4 Pa

____ 43. What does the net force between two levels in a fluid equal?
a. the weight of the fluid above the top level
b. the weight of the fluid between the levels
c. the force applied to the fluid's surface
d. the force applied to the fluid's sides

____ 44. 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. 0.680 m
b. 1.47 m
c. 15.7 m
d. 27.2 m

____ 45. Which of the following properties is *not* characteristic of an ideal fluid?
a. laminar flow
b. turbulent flow
c. nonviscous
d. incompressible

____ 46. 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. water flowing evenly from a slightly opened faucet
d. smoke twisting as it moves upward from a fire

____ 47. 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. 9.0 m/s
b. 18 m/s
c. 27 m/s
d. 54 m/s

____ 48. 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 as the pipe diameter increases.
b. Pressure decreases as the pipe diameter increases.
c. Pressure remains constant as the pipe diameter increases.
d. Pressure increases, then decreases as the pipe diameter increases.

____ 49. Which of the following is a direct cause of a substance's temperature increase?
a. Energy is removed from the particles of the substance.
b. Kinetic energy is added to the particles of the substance.
c. The number of atoms and molecules in a substance changes.
d. The volume of the substance decreases.

____ 50. What happens to the internal energy of an ideal gas when it is heated from 0°C to 4°C?
a. It increases.
b. It decreases.
c. It remains constant.
d. It is impossible to determine.

____ 51. Which of the following is proportional to the kinetic energy of atoms and molecules?
a. elastic energy
b. temperature
c. potential energy
d. thermal equilibrium

____ 52. 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. rotational
c. vibrational
d. internal

____ 53. As the temperature of a substance increases, its volume tends to increase due to
a. thermal equilibrium.
b. thermal energy.
c. thermal expansion.
d. thermal contraction.

____ 54. 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. 273 K
c. 0 K
d. 100°C

____ 55. If two small beakers of water, one at 70°C and one at 80°C, are emptied into a large beaker, what is the final temperature of the water?
a. The final temperature is less than 70°C.
b. The final temperature is greater than 80°C.
c. The final temperature is between 70°C and 80°C.
d. The water temperature will fluctuate.

____ 56. Which of the following is *not* a widely used temperature scale?
a. Kelvin
b. Fahrenheit
c. Celsius
d. Joule

____ 57. What temperature has the same numerical value on both the Fahrenheit and the Celsius scales?
a. –40.0°
b. 0°
c. 40.0°
d. –72.0°

____ 58. Which of the following terms describes a transfer of energy?
a. heat
b. internal energy
c. temperature
d. kinetic energy

____ 59. 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

____ 60. How is energy transferred as heat always directed?
a. from an object at low temperature to an object at high temperature
b. from an object at high temperature to an object at low temperature
c. from an object at low kinetic energy to an object at high kinetic energy
d. from an object with higher mass to an object of lower mass

____ 61. 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.

____ 62. Energy transfer as heat between two objects depends on which of the following?
a. The difference in mass of the two objects.
b. The difference in volume of the two objects.
c. The difference in temperature of the two objects.
d. The difference in composition of the two objects.

____ 63. 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. 10°C and 15°C
b. 15°C and 25°C
c. 17°C and 32°C
d. 80°C and 90°C

____ 64. Why does sandpaper get hot when it is rubbed against rusty metal?
a. Energy is transferred from the sandpaper into the metal.
b. Energy is transferred from the metal to the sandpaper.
c. Friction between the sandpaper and metal increases the temperature of both.
d. Energy is transferred from a hand to the sandpaper.

____ 65. If there is no temperature difference between a substance and its surroundings, what has occurred on the microscopic level?
a. Energy has been transferred from lower-energy particles to higher-energy particles.
b. Energy has been transferred from higher-energy particles to lower-energy particles.
c. No energy has been transferred between the substance and its surroundings.
d. Heat has been flowing back and forth.

____ 66. In the presence of friction, not all of the work done on a system appears as mechanical energy. What happens to the rest of the energy provided by work?
a. The remaining energy is stored as mechanical energy within the system.
b. The remaining energy is dissipated as sound.
c. The remaining energy causes a decrease in the internal energy of the system.
d. The remaining energy causes an increase in the internal energy of the system.

____ 67. 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. 150 J
b. 75 J
c. 0 J
d. –150 J

____ 68. What three properties of a substance affect the amount of energy transferred as heat to or from the substance?
a. volume, temperature change, specific heat capacity
b. density, temperature change, specific heat capacity
c. mass, temperature change, specific heat capacity
d. mass, temperature change, latent heat

____ 69. 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?

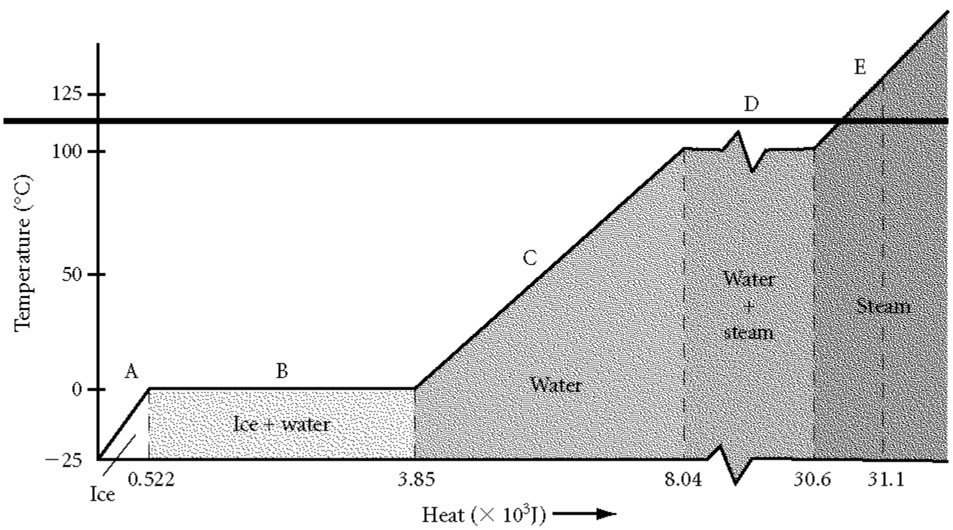
a. 2.25°C
b. 1.86°C
c. 1.43°C
d. 1.00°C

____ 70. Which of the following describes a substance in which the temperature and pressure remain constant while the substance experiences an inward transfer of energy?

a. gas
b. liquid
c. solid
d. substance undergoing a change of state

____ 71. Which of the following is true during a phase change?

a. Temperature increases.
b. Temperature remains constant.
c. Temperature decreases.
d. There is no transfer of energy as heat.



____ 72. The figure above shows how the temperature of 10.0 g of ice changes as energy is added. Which of the following statements is correct?

a. The water absorbed energy continuously, but the temperature increased only when all of the water was in one phase.
b. The water absorbed energy sporadically, and the temperature increased only when all of the water was in one phase.
c. The water absorbed energy continuously, and the temperature increased continuously.
d. The water did not absorb energy.

____ 73. At what point on the figure above does the substance undergo a phase change?

a. A
b. B
c. C
d. E

____ 74. 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. 22.6×10^3 J
c. 30.6×10^3 J
d. 31.1×10^3 J

____ 75. What accounts for an increase in the temperature of a gas that is kept at constant volume?
a. Energy has been removed as heat from the gas.
b. Energy has been added as heat to the gas.
c. Energy has been removed as work done by the gas.
d. Energy has been added as work done on the gas.

____ 76. When an ideal gas does positive work on its surroundings, which of the gas's quantities increases?
a. temperature
b. volume
c. pressure
d. internal energy

____ 77. 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. 5 J
c. 8 J
d. 30 J

____ 78. What thermodynamic process for an ideal gas system has an unchanging internal energy and a heat intake that corresponds to the value of the work done by the system?
a. isovolumetric
b. isobaric
c. adiabatic
d. isothermal

____ 79. 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. isovolumetric
b. isobaric
c. adiabatic
d. isothermal

____ 80. Which thermodynamic process takes place at a constant temperature so that the internal energy of a system remains unchanged?
a. isovolumetric
b. isobaric
c. adiabatic
d. isothermal

____ 81. Which thermodynamic process takes place at constant volume so that no work is done on or by the system?
a. isovolumetric
b. isobaric
c. adiabatic
d. isothermal

____ 82. During an isovolumetric process, which of the following does not change?
a. temperature
b. volume
c. pressure
d. internal energy

____ 83. 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. entropy change
b. internal energy change
c. volume change
d. pressure change

____ 84. How is conservation of internal energy expressed for a system during an adiabatic process?
a. $Q = W = 0$, so $\Delta U = 0$ and $U_i = U_f$
b. $Q = 0$, so $\Delta U = -W$
c. $\Delta T = 0$, so $\Delta U = 0$; therefore, $\Delta U = Q - W = 0$, or $Q = W$
d. $\Delta V = 0$, so $P\Delta V = 0$ and $W = 0$; therefore, $\Delta U = Q$

____ 85. How is conservation of internal energy expressed for a system during an isovolumetric process?
a. $Q = W = 0$, so $\Delta U = 0$ and $U_i = U_f$
b. $Q = 0$, so $\Delta U = -W$
c. $\Delta T = 0$, so $\Delta U = 0$; therefore, $\Delta U = Q - W = 0$, or $Q = W$
d. $\Delta V = 0$, so $P\Delta V = 0$ and $W = 0$; therefore, $\Delta U = Q$

____ 86. How is conservation of internal energy expressed for an isolated system?

a. $Q = W = 0$, so $\Delta U = 0$ and $U_i = U_f$

b. $Q = 0$, so $\Delta U = -W$

c. $\Delta T = 0$, so $\Delta U = 0$; therefore, $\Delta U = Q - W = 0$, or $Q = W$

d. $\Delta V = 0$, so $P\Delta V = 0$ and $W = 0$; therefore, $\Delta U = Q$

____ 87. 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. –5 J
c. 0 J
d. 20 J

____ 88. An ideal gas system undergoes an adiabatic process in which it expands and does 20 J of work on its environment. How much energy is transferred to the system as heat?

a. –20 J
b. 0 J
c. 5 J
d. 20 J

____ 89. 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 isothermal process
c. a cyclic process
d. an adiabatic process

____ 90. Which equation describes the net work done for a complete cycle of a heat engine?

a. $W_{net} = Q - \Delta U$
b. $W_{net} = Q_h - Q_c$
c. $W_{net} = Q_c - Q_h$
d. $W_{net} = P\Delta V$

____ 91. How does a real heat engine differ from an ideal cyclic heat engine?

a. A real heat engine is not cyclic.
b. An ideal heat engine converts all energy from heat to work.
c. A real heat engine is not isolated, so matter enters and leaves the engine.
d. An ideal heat engine is not isolated, so matter enters and leaves the engine.

____ 92. 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. first
b. second
c. third
d. No law of thermodynamics applies.

____ 93. According to the second law of thermodynamics, which of the following statements about a heat engine operating in a complete cycle must be true?

a. Heat from a high-temperature reservoir must be completely converted to work.
b. Heat from a high-temperature reservoir equals the entropy increase.
c. Heat from a high-temperature reservoir must be completely converted to internal energy.
d. Heat from a high-temperature reservoir cannot be completely converted to work.

____ 94. A heat engine has taken in energy as heat and used a portion of it to do work. What must happen next for the engine to complete the cycle and return to its initial conditions?

a. It must give up energy as heat to a lower temperature so work can be done on it.
b. It must give up energy as heat to a higher temperature so work can be done on it.
c. It must do work to transfer the remaining energy as heat to a lower temperature.
d. It must do work to transfer the remaining energy as heat to a higher temperature.

____ 95. What occurs when a system's disorder is increased?

a. No work is done.
b. No energy is available to do work.
c. Less energy is available to do work.
d. More energy is available to do work.

____ 96. 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 increased.
b. Its entropy decreased.
c. Its entropy remained constant.
d. Work was converted to energy.

____ 97. When a drop of ink mixes with water, what happens to the entropy of the system?
a. The system’s entropy increases, and the total entropy of the universe increases.
b. The system’s entropy decreases, and the total entropy of the universe increases.
c. The system’s entropy increases, and the total entropy of the universe decreases.
d. The system’s entropy decreases, and the total entropy of the universe decreases.

____ 98. 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 stays the same.
d. It could increase or decrease, depending on the process.

____ 99. Which of the following is *not* an example of approximate simple harmonic motion?
a. a ball bouncing on the floor
b. a child swinging on a swing
c. a piano wire that has been struck
d. a car’s radio antenna waving back and forth

____ 100. A mass attached to a spring vibrates back and forth. At the equilibrium position, the
a. acceleration reaches a maximum.
b. velocity reaches a maximum.
c. net force reaches a maximum.
d. velocity reaches zero.

____ 101. A mass attached to a spring vibrates back and forth. At maximum displacement, the spring force and the
a. velocity reach a maximum.
b. velocity reach zero.
c. acceleration reach a maximum.
d. acceleration reach zero.

____ 102. 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.

____ 103. A mass-spring system can oscillate with simple harmonic motion because a compressed or stretched spring has which kind of energy?
a. kinetic
b. mechanical
c. gravitational potential
d. elastic potential

____ 104. The angle between the string of a pendulum at its equilibrium position and at its maximum displacement is the pendulum’s
a. period.
b. frequency.
c. vibration.
d. amplitude.

____ 105. For a mass hanging from a spring, the maximum displacement the spring is stretched or compressed from its equilibrium position is the system’s
a. amplitude.
b. period.
c. frequency.
d. acceleration.

____ 106. For a system in simple harmonic motion, which of the following is the time required to complete a cycle of motion?
a. amplitude
b. period
c. frequency
d. revolution

____ 107. If a pendulum is adjusted so that its frequency changes from 10 Hz to 20 Hz, its period will change from n seconds to
a. $n/4$ seconds.
b. $n/2$ seconds.
c. $2n$ seconds.
d. $4n$ seconds.

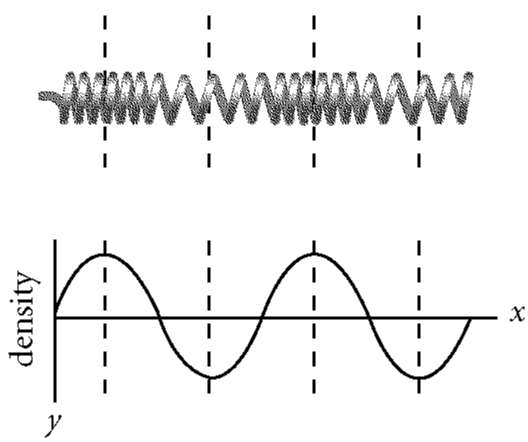
____ 108. By what factor should the length of a simple pendulum be changed in order to triple the period of vibration?
a. 3
b. 6
c. 9
d. 27

____ 109. Which of the following features of a given pendulum changes when the pendulum is moved from Earth’s surface to the moon?
a. the mass
b. the length
c. the equilibrium position
d. the restoring force

____ 110. 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. longitudinal.
b. a pulse.
c. electromagnetic.
d. transverse.

____ 111. Which of the following is a single nonperiodic disturbance?
a. pulse wave
b. periodic wave
c. sine wave
d. transverse wave

____ 112. 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. pulse wave
b. periodic wave
c. sine wave
d. longitudinal wave

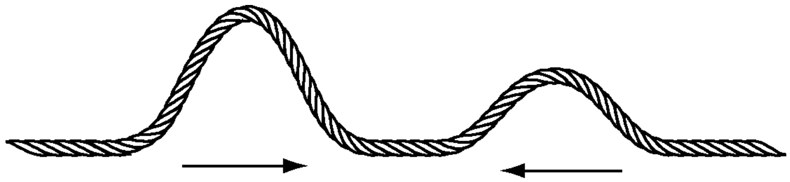


____ 113. Each compression in the waveform of the longitudinal wave shown above corresponds to what feature of the transverse wave below it?
a. wavelength
b. crests
c. troughs
d. amplitude

____ 114. Which of the following most affects the wavelength of a mechanical wave moving through a medium? Assume that the frequency of the wave remains constant.
a. the nature of the medium
b. the amplitude
c. the height of a crest
d. the energy carried by the wave

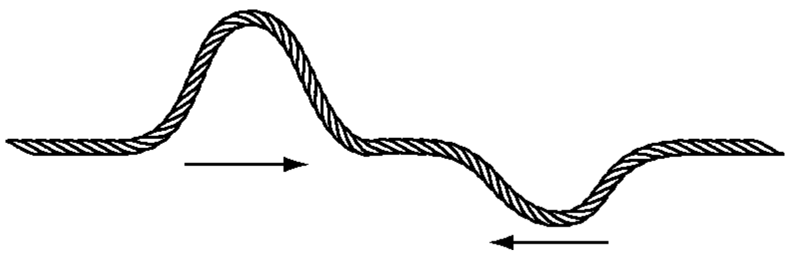
____ 115. Two mechanical waves that have positive displacements from the equilibrium position meet and coincide. What kind of interference occurs?
a. constructive
b. destructive
c. complete destructive
d. none

____ 116. Two mechanical waves meet and coincide. One wave has a positive displacement from the equilibrium position, and the other wave has a negative displacement. What kind of interference occurs?
a. constructive
b. destructive
c. complete constructive
d. none



____ 117. Which of the following types of interference will occur when the pulses in the figure above meet?

a. no interference
b. constructive interference
c. destructive interference
d. total interference



____ 118. Which of the following types of interference will occur when the pulses in the figure above meet?

a. no interference
b. constructive interference
c. destructive interference
d. total interference

____ 119. Consider two identical wave pulses on a rope having a fixed end. Suppose the first pulse reaches the end of the rope, is reflected back, and then meets the second pulse. When the two pulses overlap exactly, what will be the amplitude of the resultant pulse?

a. zero
b. same as the original pulses
c. double the amplitude of the original pulses
d. half the amplitude of the original pulses

____ 120. Waves arriving at a free boundary are

a. neither reflected nor inverted.
b. reflected but not inverted.
c. reflected and inverted.
d. inverted but not reflected.

____ 121. Standing waves are produced by periodic waves of

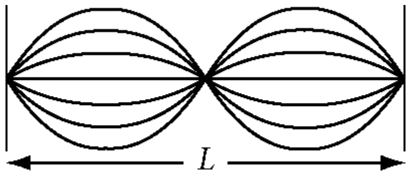
a. any amplitude and wavelength traveling in the same direction.
b. the same amplitude and wavelength traveling in the same direction.
c. any amplitude and wavelength traveling in opposite directions.
d. the same frequency, amplitude, and wavelength traveling in opposite directions.

____ 122. 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. 3.0 m
c. 4.0 m
d. 6.0 m

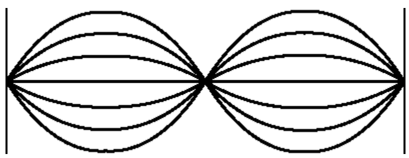
____ 123. Which of the following wavelengths would *not* produce standing waves on a rope whose length is 1 m?

a. 2/3 m
b. 1 m
c. 2 m
d. 2 1/4 m



_____ 124. The standing wave shown in the diagram above would be produced on a string of length *L* by a wave having wavelength

a. 1/2 *L*.
b. *L*.
c. 2 *L*.
d. 4 *L*.

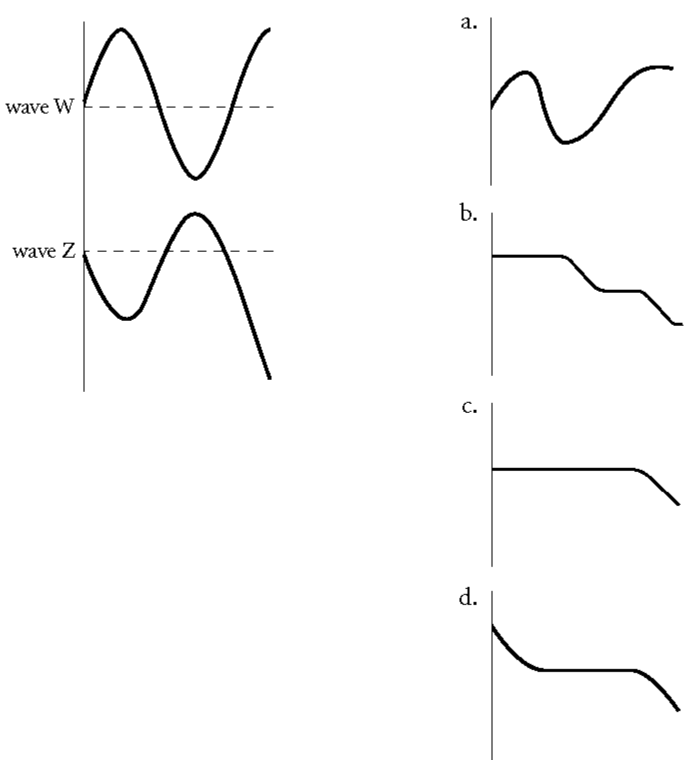


_____ 125. How many nodes and antinodes are shown in the standing wave above?

a. two nodes and three antinodes
b. one node and two antinodes
c. one-third node and one antinode
d. three nodes and two antinodes

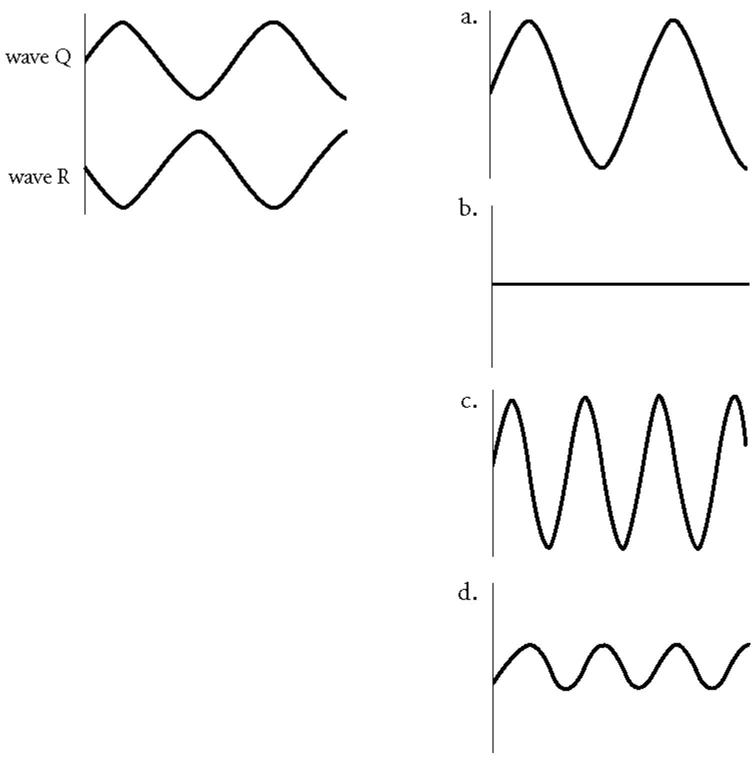
_____ 126. What is the fewest number of nodes a standing wave can have?

a. 1
b. 2
c. 3
d. 4



_____ 127. In the diagram above, use the superposition principle to find the resultant wave of waves W and Z.

a. a
b. b
c. c
d. d



_____ 128. In the diagram above, use the superposition principle to find the resultant wave of waves Q and R.

a. a
b. b
c. c
d. d

_____ 129. Sound waves

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

_____ 130. The trough of the sine curve used to represent a sound wave corresponds to

a. a compression.
b. the wavelength.
c. the amplitude.
d. a rarefaction.

_____ 131. Which of the following is the region of a sound wave in which the density and pressure are greater than normal?

a. rarefaction
b. compression
c. amplitude
d. wavelength

_____ 132. Pitch depends on the _____ of a sound wave.

a. frequency
b. amplitude
c. power
d. speed

_____ 133. The point at which a ray crosses a wave front corresponds to a _____ of a sound wave.

a. wavelength
b. compression
c. trough
d. source

____ 134. 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. the same as
b. a different timbre than
c. higher in pitch than
d. lower in pitch than

____ 135. The Doppler effect occurs with
a. only sound waves.
b. only transverse waves.
c. only water waves.
d. all waves.

____ 136. If you are on a train, how will the pitch of the train's whistle sound to you as the train moves?
a. The pitch will become steadily higher.
b. The pitch will become steadily lower.
c. The pitch will not change.
d. The pitch will become higher, then become lower.

____ 137. The property of sound called *intensity* is proportional to the rate at which energy flows through
a. an area perpendicular to the direction of propagation.
b. an area parallel to the direction of propagation.
c. a cylindrical tube.
d. a sound wave of a certain frequency.

____ 138. The intensity of a sound at any distance from the source is directly proportional to the sound's
a. wavelength.
b. pitch.
c. power.
d. frequency.

____ 139. If the intensity of a sound is increased by a factor of 100, the new decibel level will increase
a. by two units.
b. to twice the old one.
c. by a factor of 10.
d. by 20 units.

____ 140. Which of the following decibel levels is nearest to the value that you would expect for a running vacuum cleaner?
a. 10 dB
b. 30 dB
c. 70 dB
d. 120 dB

____ 141. For a standing wave in an air column in a pipe that is open at both ends, there must be at least
a. one node and one antinode.
b. two nodes and one antinode.
c. two antinodes and one node.
d. two nodes and two antinodes.

____ 142. When an air column vibrates in a pipe that is open at both ends,
a. all harmonics are present.
b. no harmonics are present.
c. only odd harmonics are present.
d. only even harmonics are present.

____ 143. When an air column vibrates in a pipe that is closed at one end,
a. all harmonics are present.
b. no harmonics are present.
c. only odd harmonics are present.
d. only even harmonics are present.

____ 144. If a guitar string has a fundamental frequency of 500 Hz, what is the frequency of its second harmonic?
a. 250 Hz
b. 750 Hz
c. 1000 Hz
d. 2000 Hz

____ 145. The wavelength of the fundamental frequency of a vibrating string of length L is
a. 1/2 L.
b. L.
c. $2L$.
d. $4L$.

____ 146. Musical instruments of different types playing the same note may often be identified by the ____ of their sounds.
a. pitch
b. intensity
c. fundamental frequency
d. timbre

____ 147. How many beats per second are heard when two vibrating tuning forks having frequencies of 342 Hz and 345 Hz are held side by side?

a. 687 Hz
b. 343.5 Hz
c. 5 Hz
d. 3 Hz

____ 148. 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. 2500 Hz
b. 1500 Hz
c. 605 Hz
d. 495 Hz

____ 149. 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. 418 Hz
b. 105 Hz
c. 416 Hz
d. 1680 Hz

____ 150. Audible beats are formed by the interference of two waves

a. of slightly different frequencies.
b. of greatly different frequencies.
c. with equal frequencies, but traveling in opposite directions.
d. from the same vibrating source.

PHys.12-Q2W7-Qs. Bank-Quarter Revision-
Answer Section

MULTIPLE CHOICE

1.	ANS: C	PTS: 1	DIF: I	OBJ: 7-1.2
2.	ANS: D	PTS: 1	DIF: I	OBJ: 7-1.2
3.	ANS: B	PTS: 1	DIF: I	OBJ: 7-1.2
4.	ANS: C	PTS: 1	DIF: I	OBJ: 7-1.2
5.	ANS: C			

Given

$m = 43\ \text{kg}$

$v_t = 2.0\ \text{m/s}$

$r = 2.0\ \text{m}$

Solution

$$F_c = \frac{m{v_t}^2}{r} = \frac{(43\ \text{kg})(2.0\ \text{m/s})^2}{2.0\ \text{m}} = 86\ \text{N}$$

PTS: 1 DIF: IIIA OBJ: 7-1.2

6.	ANS: B	PTS: 1	DIF: II	OBJ: 7-1.2
7.	ANS: D	PTS: 1	DIF: I	OBJ: 7-1.3
8.	ANS: B	PTS: 1	DIF: I	OBJ: 7-2.1
9.	ANS: C	PTS: 1	DIF: II	OBJ: 7-2.1
10.	ANS: D	PTS: 1	DIF: I	OBJ: 7-2.1
11.	ANS: B	PTS: 1	DIF: II	OBJ: 7-2.1
12.	ANS: C	PTS: 1	DIF: I	OBJ: 7-2.2
13.	ANS: B	PTS: 1	DIF: I	OBJ: 7-2.2
14.	ANS: D	PTS: 1	DIF: I	OBJ: 7-2.2
15.	ANS: A			

Given

$F_1 = 36\ \text{N}$

$r_2 = 3r_1$

$G = 6.673 \times 10^{-11}\ \text{N}\bullet\text{m}^2/\text{kg}^2$

Solution

$r_2 = 3r_1$

$$F_1 = G\frac{m_1 m_2}{r_1^{\,2}} = 36\ \text{N}$$

$$F_2 = G\frac{m_1 m_2}{r_2^{\,2}} = G\frac{m_1 m_2}{\left(3r_1\right)^2} = G\frac{m_1 m_2}{9r_1^{\,2}} = \frac{1}{9}G\frac{m_1 m_2}{r_1^{\,2}} = \frac{1}{9}F_1$$

$$F_2 = \frac{1}{9}(36\ \text{N}) = 4.0\ \text{N}$$

PTS: 1 DIF: II OBJ: 7-2.2

16. ANS: D

Given

$F_1 = 10.0\ \text{N}$

$r_1 = 10.0\ \text{cm}$

$r_2 = 5.0\ \text{cm}$

$G = 6.673 \times 10^{-11}\ \text{Nm}^2/\text{kg}^2$

Solution

$$\frac{r_2}{r_1} = \frac{(5.0\ \text{cm})}{(10.0\ \text{cm})} = \frac{1}{2}$$

$$r_2 = \tfrac{1}{2}r_1$$

$$F_1 = G\frac{m_1 m_2}{r_1^{\,2}} = 10.0\ \text{N}$$

$$F_2 = G\frac{m_1 m_2}{\left(r_2\right)^2} = G\frac{m_1 m_2}{\left(\frac{1}{2}r_1\right)^2} = G\frac{m_1 m_2}{\frac{1}{4}r_1^{\,2}} = 4G\frac{m_1 m_2}{r_1^{\,2}} = 4F_1$$

$$F_2 = (4)(10.0\ \text{N}) = 40.0\ \text{N}$$

PTS: 1 DIF: II OBJ: 7-2.2

17. ANS: A PTS: 1 DIF: I OBJ: 7-3.1
18. ANS: D PTS: 1 DIF: I OBJ: 7-3.1
19. ANS: B PTS: 1 DIF: I OBJ: 7-3.2
20. ANS: A

Given

$m_2 = 4m_E$

Solution

$$v_{t_1} = \sqrt{G\frac{m_E}{r_1}}$$

$$v_{t_2} = \sqrt{G\frac{4m_E}{r_1}}$$

$$\frac{v_{t_2}}{v_{t_1}} = \frac{\sqrt{G\frac{(4m_E)}{r_1}}}{\sqrt{G\frac{m_E}{r_1}}} = \sqrt{4} = 2$$

$v_{t_2} = 2v_{t_1}$, i.e., speed would increase by a factor of 2

	PTS: 1	DIF: II	OBJ: 7-3.3	
21.	ANS: D	PTS: 1	DIF: II	OBJ: 7-3.3
22.	ANS: B	PTS: 1	DIF: I	OBJ: 7-4.1
23.	ANS: C	PTS: 1	DIF: I	OBJ: 7-4.1
24.	ANS: A	PTS: 1	DIF: II	OBJ: 7-4.1
25.	ANS: B	PTS: 1	DIF: II	OBJ: 7-4.2
26.	ANS: B			

Given

$F = 3.0 \times 10^2$ N

$d = 0.80$ m

Solution

$$\tau = Fd = \left(3.0 \times 10^2 \text{ N}\right)(0.80 \text{ m}) = 2.4 \times 10^2 \text{ Nm}$$

	PTS: 1	DIF: IIIA	OBJ: 7-4.2	
27.	ANS: C			

Given

$\tau = 40.0$ Nm

$F = 133$ N

Solution

$\tau = Fd$

$$d = \frac{\tau}{F} = \frac{40.0 \text{ Nm}}{133 \text{ N}} = 3.01 \times 10^{-1} \text{ m} = 30.1 \text{ cm}$$

	PTS: 1	DIF: IIIA	OBJ: 7-4.2	
28.	ANS: C	PTS: 1	DIF: I	OBJ: 7-4.3
29.	ANS: B			

Given

$F_{in} = 4.0 \times 10^2$ N

$F_{out} = 6.4 \times 10^3$ N

Solution

$$MA = \frac{F_{out}}{F_{in}} = \frac{6.4 \times 10^3 \text{ N}}{4.0 \times 10^2 \text{ N}} = 16$$

PTS: 1 DIF: IIIA OBJ: 7-4.4

30. ANS: C

Given

$W_{in} = 1.00 \times 10^2$ J

$W_{out} = 35$ J

Solution

$$eff = \frac{W_{out}}{W_{in}} = \frac{35 \text{ J}}{1.00 \times 10^2 \text{ J}} = 0.35 = 35\%$$

PTS: 1 DIF: IIIA OBJ: 7-4.4

31. ANS: B PTS: 1 DIF: I OBJ: 8-1.1
32. ANS: B PTS: 1 DIF: I OBJ: 8-1.2
33. ANS: D PTS: 1 DIF: I OBJ: 8-1.2
34. ANS: C PTS: 1 DIF: I OBJ: 8-1.3
35. ANS: B

Given

$\rho = 0.780$ g/cm^3

$\ell = 10.0$ cm

$g = 9.81$ m/s^2

Solution

For a floating object,

$$F_B = F_g = mg = \rho V g = \rho \ell^3 g$$

$$F_B = (0.780 \text{ g/cm}^3)(10.0 \text{ cm})^3(9.81 \text{ m/s}^2) \times \left(\frac{1 \text{ kg}}{1000 \text{ g}}\right) = 7.65 \text{ N}$$

PTS: 1 DIF: IIIA OBJ: 8-1.3

36. ANS: A

Given

$\rho_{Au} = 19.3$ g/cm^3

$m_c = 6.00 \times 10^2$ g

Solution
For a submerged object, the volume of the displaced fluid equals the volume of the object.

$$V_w = V_c = \frac{m_c}{\rho_{Au}} = \frac{6.00 \times 10^2\ \text{g}}{19.3\ \text{g/cm}^3} = 31.1\ \text{cm}^3$$

PTS: 1 DIF: IIIA OBJ: 8-1.3

37. ANS: D PTS: 1 DIF: I OBJ: 8-1.4
38. ANS: C PTS: 1 DIF: I OBJ: 8-1.4
39. ANS: B PTS: 1 DIF: I OBJ: 8-2.1
40. ANS: B PTS: 1 DIF: I OBJ: 8-2.1
41. ANS: D

Given
x = 2.5 m
y = 1.5 m
F = 1055 N

Solution

$$P = \frac{F}{A} = \frac{(1055\ \text{N})}{(1.5\ \text{m})(2.5\ \text{m})} = 280\ \text{Pa}$$

PTS: 1 DIF: IIIA OBJ: 8-2.1

42. ANS: C

Given
A_{tire} = 0.026 m^2
$F = 2.6 \times 10^4$ N
number of tires = 4

Solution
The pressure is distributed over the total area provided by 4 tires.

$$P = \frac{F}{A} = \frac{(2.6 \times 10^4\ \text{N})}{(4)(0.026\ \text{m}^2)} = 2.5 \times 10^5\ \text{Pa}$$

PTS: 1 DIF: IIIB OBJ: 8-2.1

43. ANS: B PTS: 1 DIF: I OBJ: 8-2.2
44. ANS: B

Given
$h_w = 20.0\ \text{m}$

$\rho_w = 1.00\ \text{g/cm}^3$

$\rho_{Hg} = 13.6\ \text{g/cm}^3$

Solution

$$P = P_0 + \rho g h$$

$$P - P_0 = \rho_w g h_w = \rho_{Hg} g h_{Hg}$$

$$h_{Hg} = \frac{\rho_w h_w}{\rho_{Hg}} = \frac{(1.00\ \text{g/cm}^3)(20.0\ \text{m})}{(13.6\ \text{g/cm}^3)} = 1.47\ \text{m}$$

	PTS: 1	DIF: IIIA	OBJ: 8-2.2	
45.	ANS: B	PTS: 1	DIF: I	OBJ: 8-3.1
46.	ANS: D	PTS: 1	DIF: II	OBJ: 8-3.1

47. ANS: C

Given
diameter$_1$ = 3.6 m
diameter$_2$ = 1.2 m
v_1 = 3.0 m/s

Solution
$$A_1 v_1 = A_2 v_2$$

$$\pi\left(\frac{diameter_1}{2}\right)^2 v_1 = \pi\left(\frac{diameter_2}{2}\right)^2 v_2$$

$$v_2 = v_1\left(\frac{diameter_1}{diameter_2}\right)^2 = (3.0\ \text{m/s})\left(\frac{3.6\ \text{m}}{1.2\ \text{m}}\right)^2 = 27\ \text{m/s}$$

	PTS: 1	DIF: IIIA	OBJ: 8-3.1	
48.	ANS: A	PTS: 1	DIF: II	OBJ: 8-3.2
49.	ANS: B	PTS: 1	DIF: I	OBJ: 9-1.1
50.	ANS: A	PTS: 1	DIF: I	OBJ: 9-1.1
51.	ANS: B	PTS: 1	DIF: I	OBJ: 9-1.1
52.	ANS: C	PTS: 1	DIF: I	OBJ: 9-1.1
53.	ANS: C	PTS: 1	DIF: I	OBJ: 9-1.2
54.	ANS: D	PTS: 1	DIF: I	OBJ: 9-1.2
55.	ANS: C	PTS: 1	DIF: I	OBJ: 9-1.2
56.	ANS: D	PTS: 1	DIF: I	OBJ: 9-1.3

57. ANS: A

Given
$T_F = T_C$

Solution
$$T_F = T_C = \tfrac{9}{5} T_C + 32.0$$

$$\left(\tfrac{9}{5} - 1\right) T_C = -32.0$$

$$T_F = T_C = \tfrac{5}{4}(-32.0)^\circ = -40.0^\circ$$

	PTS:	1	DIF:	IIIB	OBJ:	9-1.3		
58.	ANS:	A	PTS:	1	DIF:	I	OBJ:	9-2.1
59.	ANS:	A	PTS:	1	DIF:	I	OBJ:	9-2.1
60.	ANS:	B	PTS:	1	DIF:	I	OBJ:	9-2.1
61.	ANS:	B	PTS:	1	DIF:	II	OBJ:	9-2.1
62.	ANS:	C	PTS:	1	DIF:	I	OBJ:	9-2.2
63.	ANS:	C	PTS:	1	DIF:	II	OBJ:	9-2.2
64.	ANS:	C	PTS:	1	DIF:	II	OBJ:	9-2.2
65.	ANS:	B	PTS:	1	DIF:	II	OBJ:	9-2.2
66.	ANS:	D	PTS:	1	DIF:	I	OBJ:	9-2.3

67. ANS: A

Given
KE_i = 150 J
KE_f = 0 J
ΔPE = 0 J

Solution
The nail comes to rest in the board, so the final kinetic energy equals zero. Thus the change in kinetic energy is 150 J. From the conservation of energy,

$$\Delta PE + \Delta KE + \Delta U = 0$$

$$0 + KE_f - KE_i + \Delta U = 0$$

$$\Delta U = KE_i = 150 \text{ J}$$

	PTS:	1	DIF:	IIIA	OBJ:	9-2.3		
68.	ANS:	C	PTS:	1	DIF:	I	OBJ:	9-3.1

69. ANS: C

Given
Q_{bread} = 4.19 × 10^5 J
$c_{p,person}$ = 4.19 × 10^3 J/kg•°C
m_{person} = 70.0 kg

Solution

$$Q_{bread} = c_{p,person} m_{person} \Delta T_{person}$$

$$\Delta T_{person} = \frac{Q_{bread}}{c_{p,person} m_{person}} = \frac{4.19 \times 10^5 \text{ J}}{(4.19 \times 10^3 \text{ J/kg°C})(70.0 \text{ kg})} = 1.43\text{°C}$$

	PTS:	1	DIF:	IIIA	OBJ:	9-3.1		
70.	ANS:	D	PTS:	1	DIF:	I	OBJ:	9-3.2
71.	ANS:	B	PTS:	1	DIF:	I	OBJ:	9-3.2
72.	ANS:	A	PTS:	1	DIF:	II	OBJ:	9-3.2
73.	ANS:	B	PTS:	1	DIF:	II	OBJ:	9-3.2

74.	ANS:	B	PTS:	1	DIF:	II	OBJ:	9-3.2
75.	ANS:	B	PTS:	1	DIF:	I	OBJ:	10-1.1
76.	ANS:	B	PTS:	1	DIF:	I	OBJ:	10-1.1
77.	ANS:	A	PTS:	1	DIF:	II	OBJ:	10-1.2
78.	ANS:	D	PTS:	1	DIF:	I	OBJ:	10-1.3
79.	ANS:	C	PTS:	1	DIF:	I	OBJ:	10-1.3
80.	ANS:	D	PTS:	1	DIF:	I	OBJ:	10-1.3
81.	ANS:	A	PTS:	1	DIF:	I	OBJ:	10-1.3
82.	ANS:	B	PTS:	1	DIF:	I	OBJ:	10-1.3
83.	ANS:	B	PTS:	1	DIF:	I	OBJ:	10-2.1
84.	ANS:	B	PTS:	1	DIF:	I	OBJ:	10-2.1
85.	ANS:	D	PTS:	1	DIF:	I	OBJ:	10-2.1
86.	ANS:	A	PTS:	1	DIF:	I	OBJ:	10-2.1
87.	ANS:	A	PTS:	1	DIF:	II	OBJ:	10-2.2
88.	ANS:	B	PTS:	1	DIF:	II	OBJ:	10-2.2
89.	ANS:	C	PTS:	1	DIF:	I	OBJ:	10-2.3
90.	ANS:	B	PTS:	1	DIF:	I	OBJ:	10-2.3
91.	ANS:	C	PTS:	1	DIF:	I	OBJ:	10-2.3
92.	ANS:	B	PTS:	1	DIF:	I	OBJ:	10-3.1
93.	ANS:	D	PTS:	1	DIF:	I	OBJ:	10-3.1
94.	ANS:	A	PTS:	1	DIF:	II	OBJ:	10-3.1
95.	ANS:	C	PTS:	1	DIF:	I	OBJ:	10-3.3
96.	ANS:	A	PTS:	1	DIF:	I	OBJ:	10-3.3
97.	ANS:	A	PTS:	1	DIF:	II	OBJ:	10-3.3
98.	ANS:	B	PTS:	1	DIF:	II	OBJ:	10-3.3
99.	ANS:	A	PTS:	1	DIF:	I	OBJ:	11-1.1
100.	ANS:	B	PTS:	1	DIF:	I	OBJ:	11-1.2
101.	ANS:	C	PTS:	1	DIF:	I	OBJ:	11-1.2
102.	ANS:	A	PTS:	1	DIF:	I	OBJ:	11-1.2
103.	ANS:	D	PTS:	1	DIF:	II	OBJ:	11-1.2
104.	ANS:	D	PTS:	1	DIF:	I	OBJ:	11-2.1
105.	ANS:	A	PTS:	1	DIF:	I	OBJ:	11-2.1
106.	ANS:	B	PTS:	1	DIF:	I	OBJ:	11-2.2
107.	ANS:	B	PTS:	1	DIF:	II	OBJ:	11-2.2
108.	ANS:	C	PTS:	1	DIF:	IIIB	OBJ:	11-2.3
109.	ANS:	D	PTS:	1	DIF:	IIIA	OBJ:	11-2.3
110.	ANS:	D	PTS:	1	DIF:	I	OBJ:	11-3.1
111.	ANS:	A	PTS:	1	DIF:	I	OBJ:	11-3.2
112.	ANS:	A	PTS:	1	DIF:	I	OBJ:	11-3.2
113.	ANS:	B	PTS:	1	DIF:	I	OBJ:	11-3.3
114.	ANS:	A	PTS:	1	DIF:	II	OBJ:	11-3.4
115.	ANS:	A	PTS:	1	DIF:	I	OBJ:	11-4.2
116.	ANS:	B	PTS:	1	DIF:	I	OBJ:	11-4.2
117.	ANS:	B	PTS:	1	DIF:	I	OBJ:	11-4.2
118.	ANS:	C	PTS:	1	DIF:	I	OBJ:	11-4.2
119.	ANS:	A	PTS:	1	DIF:	IIIA	OBJ:	11-4.3
120.	ANS:	B	PTS:	1	DIF:	I	OBJ:	11-4.3

121.	ANS:	D	PTS:	1	DIF:	I	OBJ:	11-4.4
122.	ANS:	B	PTS:	1	DIF:	IIIA	OBJ:	11-4.4
123.	ANS:	D	PTS:	1	DIF:	I	OBJ:	11-4.4
124.	ANS:	B	PTS:	1	DIF:	II	OBJ:	11-4.4
125.	ANS:	D	PTS:	1	DIF:	I	OBJ:	11-4.5
126.	ANS:	B	PTS:	1	DIF:	I	OBJ:	11-4.5
127.	ANS:	B	PTS:	1	DIF:	II	OBJ:	11-4.1
128.	ANS:	B	PTS:	1	DIF:	II	OBJ:	11-4.1
129.	ANS:	C	PTS:	1	DIF:	I	OBJ:	12-1.1
130.	ANS:	D	PTS:	1	DIF:	I	OBJ:	12-1.1
131.	ANS:	B	PTS:	1	DIF:	I	OBJ:	12-1.1
132.	ANS:	A	PTS:	1	DIF:	I	OBJ:	12-1.2
133.	ANS:	B	PTS:	1	DIF:	II	OBJ:	12-1.4
134.	ANS:	C	PTS:	1	DIF:	I	OBJ:	12-1.5
135.	ANS:	D	PTS:	1	DIF:	I	OBJ:	12-1.5
136.	ANS:	C	PTS:	1	DIF:	II	OBJ:	12-1.5
137.	ANS:	A	PTS:	1	DIF:	I	OBJ:	12-2.1
138.	ANS:	C	PTS:	1	DIF:	II	OBJ:	12-2.1
139.	ANS:	D	PTS:	1	DIF:	IIIB	OBJ:	12-2.2
140.	ANS:	C	PTS:	1	DIF:	II	OBJ:	12-2.2
141.	ANS:	C	PTS:	1	DIF:	II	OBJ:	12-3.1
142.	ANS:	A	PTS:	1	DIF:	I	OBJ:	12-3.1
143.	ANS:	C	PTS:	1	DIF:	I	OBJ:	12-3.1
144.	ANS:	C	PTS:	1	DIF:	IIIA	OBJ:	12-3.2
145.	ANS:	C	PTS:	1	DIF:	I	OBJ:	12-3.2
146.	ANS:	D	PTS:	1	DIF:	II	OBJ:	12-3.3
147.	ANS:	D	PTS:	1	DIF:	IIIA	OBJ:	12-3.4
148.	ANS:	D	PTS:	1	DIF:	IIIA	OBJ:	12-3.4
149.	ANS:	C	PTS:	1	DIF:	IIIA	OBJ:	12-3.4
150.	ANS:	A	PTS:	1	DIF:	I	OBJ:	12-3.4