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

AP REVIEW 2

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

____ 1. How would you convert an angle in degrees to an angle in radians?
a. multiply the angle measured in degrees by $2\pi/180°$
b. multiply the angle measured in degrees by $2\pi/360°$
c. multiply the angle measured in degrees by $\pi/360°$
d. multiply the angle measured in degrees by $2\pi r°$

____ 2. A cave dweller rotates a pebble in a sling with a radius of 0.30 m counterclockwise through an arc length of 0.96 m. What is the angular displacement of the pebble?
a. 1.6 rad
b. –1.6 rad
c. 3.2 rad
d. –3.2 rad

____ 3. What is the approximate angular speed of a wheel rotating at the rate of 5.0 rev/s?
a. 3.2 rad/s
b. 1.6 rad/s
c. 16 rad/s
d. 31 rad/s

____ 4. An automobile tire with a radius of 0.30 m starts at rest and accelerates at a constant angular acceleration of 2.0 rad/s^2 for 5.0 s. What is the angular displacement of the tire?
a. 12 rad
b. 25 rad
c. 2.0 rad
d. 0.50 rad

____ 5. A cylinder with a diameter of 0.150 m rotates in a lathe at a constant angular speed of 35.6 rad/s. What is the tangential speed of the surface of the cylinder?
a. 2.67 m/s
b. 5.34 m/s
c. 2.37×10^2 m/s
d. 4.75×10^2 m/s

____ 6. A wheel with a radius of 1.2 m rotates at a constant angular speed of 10.5 rad/s. What is the tangential speed of a point 0.55 m from the wheel's axis?
a. 19 m/s
b. 5.8 m/s
c. 13 m/s
d. 8.7 m/s

____ 7. An automobile tire with a radius of 0.3 m accelerates from rest at a constant 2 rad/s^2 over a 5 s interval. What is the tangential component of acceleration for a point on the outer edge of the tire?
a. 30 m/s^2
b. 7 m/s^2
c. 0.6 m/s^2
d. 0.3 m/s^2

____ 8. A contestant in a game show spins a stationary wheel with a radius of 0.50 m so that it has a constant angular acceleration of 0.40 rad/s^2. What is the tangential acceleration of a point on the edge of the wheel?
a. 0.20 m/s^2
b. 0.60 m/s^2
c. 1.3 m/s^2
d. 0.73 m/s^2

____ 9. A roller coaster loaded with passengers has a mass of 2.0×10^3 kg; the radius of curvature of the track at the lowest point of the track is 24 m. If the vehicle has a tangential speed of 18 m/s at this point, what force is exerted on the vehicle by the track?
a. 2.3×10^4 N
b. 4.7×10^4 N
c. 3.0×10^4 N
d. 2.7×10^4 N

____ 10. To warm up before a game, a baseball pitcher tosses a 0.15 kg ball by rotating his forearm, which is 0.32 m in length, to accelerate the ball. The ball starts at rest and is thrown at a speed of 12 m/s in 0.40 s. While the ball is in the pitcher's hand, what torque is applied to the ball to produce the angular acceleration?
a. 1.1 N•m
b. 11 N•m
c. 7.2 N•m
d. 1.4 N•m

____ 11. A force of 4.0 N is applied to a door at an angle of 60.0° and a distance of 0.30 m from the hinge. What is the torque produced?
a. 1.0 N•m
b. 0.75 N•m
c. 0.87 N•m
d. 0.22 N•m

____ 12. 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

____ 13. Which of the following is NOT an intrinsic property of an object?
a. mass
b. moment of inertia
c. center of mass
d. center of gravity

____ 14. The dependence of equilibrium on the absence of net torque is
a. the first condition of equilibrium.
b. the second condition of equilibrium.
c. rotational equilibrium.
d. translational equilibrium.

____ 15. A child with a weight of 4.50×10^2 N sits on a seesaw 0.60 m from the axis of rotation. How far from the axis of rotation on the other side should a child with a weight of 6.00×10^2 N sit so the seesaw will remain balanced?
a. 0.30 m
b. 0.40 m
c. 0.45 m
d. 0.50 m

____ 16. A bowling ball has a mass of 7.0 kg, a moment of inertia of 2.8×10^{-2} kg•m^2, and a radius of 0.10 m. If it rolls down the lane without slipping at an angular speed of 4.0×10^1 rad/s, what is its angular momentum?
a. 0.80 kg•m^2/s
b. 1.4 kg•m^2/s
c. 11 kg•m^2/s
d. 1.1 kg•m^2/s

____ 17. A figure skater with arms drawn in spins on the ice at a rate of 5.0 rad/s and has a moment of inertia of 1.875 kg•m^2. What is the angular momentum of the skater?
a. 2.5 kg•m^2/s
b. 3.8 kg•m^2/s
c. 9.4 kg•m^2/s
d. 12 kg•m^2/s

____ 18. A table-tennis ball has an average density of 0.084 g/cm^3 and a diameter of 3.8 cm. What force can submerge the ball in water? (ρ_w = 1.00 g/cm^3)
a. 1.0 N
b. 0.79 N
c. 0.52 N
d. 0.26 N

____ 19. Because a buoyant force acts in the opposite direction of gravity,
a. objects submerged in water have a net force smaller than their weight.
b. objects submerged in water have a net force larger than their weight.
c. objects submerged in water have a net force equal to their weight.
d. objects submerged in water appear to weigh more than they do in air.

____ 20. The temperature in a container of fluid is
a. a measure of the potential energy of the particles of the fluid.
b. the total mass of the particles in the container.
c. a measure of the average kinetic energy of the particles of the fluid.
d. the number of particles in the container.

____ 21. Increasing the temperature of a fluid
a. increases the speed of the particles.
b. decreases the speed of the particles.
c. decreases the number of particle collisions.
d. decreases the pressure.

____ 22. 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 flow is 3.0 m/s in the larger part of the tunnel, what is the velocity of flow in the smaller part of the tunnel?
a. 9.0 m/s
b. 18 m/s
c. 27 m/s
d. 54 m/s

____ 23. For an ideal fluid flowing through a horizontal pipe, Bernoulli's equation states that the sum of the pressure and energy per unit volume along the pipe does which of the following? (Assume measurements are taken along the pipe in the direction of fluid flow.)
a. increases as the pipe diameter increases
b. decreases as the pipe diameter increases
c. remains constant as the pipe diameter increases
d. increases, then decreases as the pipe diameter increases

____ 24. At a constant pressure, 6.00 m^3 of an ideal gas at 348 K is cooled until its volume is halved. What is the new temperature of the gas?
a. 174 K
b. 696 K
c. 19.3 K
d. 116 K

____ 25. A substance's temperature increases as a direct result of
a. energy being removed from the particles of the substance.
b. kinetic energy being added to the particles of the substance.
c. a change in the number of atoms and molecules in a substance.
d. a decrease in the volume of the substance.

____ 26. 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

____ 27. 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. less than 70°C
b. greater than 80°C
c. between 70°C and 80°C
d. The water temperature will fluctuate.

____ 28. A 5.00×10^2 kg object is attached by a rope through a pulley to a paddle-wheel shaft that is placed in a well-insulated tank holding 25.0 kg of water. The object is allowed to fall, causing the paddle wheel to rotate, churning the water. If the object falls a vertical distance of 1.00×10^2 m at constant speed, what is the temperature change of the water? (c_p = 4186 J/kg•°C and g = 9.81 m/s^2)
a. 1.96×10^4°C
b. 4.69×10^3°C
c. 4.69°C
d. 0.800°C

____ 29. What is the temperature increase of 4.0 kg of water when it is heated by an 8.0×10^2 W immersion heater for exactly 10.0 min? (c_p = 4186 J/kg•°C)
a. 57°C
b. 51°C
c. 29°C
d. 14°C

____ 30. 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

____ 31. Which of the following is a thermodynamic process that takes place at constant volume so that no work is done on or by the system?
a. adiabatic process
b. isothermal process
c. isovolumetric process
d. isobaric process

____ 32. 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, $\Delta U = Q$

____ 33. The internal energy of a system is initially 63 J. A total of 71 J of energy is added to the system as heat while the system does 59 J of work. What is the system's final internal energy?
a. 51 J
b. 75 J
c. 67 J
d. 190 J

____ 34. Over several cycles, a refrigerator does 1.73×10^4 J of work on the refrigerant. The refrigerant removes 8.11×10^4 J as heat from the air inside the refrigerator. How much energy is delivered to the outside air?
a. 3.19×10^4 J
b. 4.92×10^4 J
c. 6.38×10^4 J
d. 9.84×10^4 J

____ 35. Over several cycles, a refrigerator does 5.13×10^4 J of work on the refrigerant. The refrigerant, in turn, removes 9.63×10^4 J as heat from the air inside the refrigerator. What is the net change in the internal energy of the refrigerant?
a. 0.00 J
b. 4.92×10^4 J
c. 6.38×10^4 J
d. 9.84×10^4 J

____ 36. An engine absorbs 2150 J as heat from a hot reservoir and gives off 750 J as heat to a cold reservoir during each cycle. How much work is done during each cycle?
a. 750 J
b. 1400 J
c. 2150 J
d. 2900 J

____ 37. According to the second law of thermodynamics, the heat received by a heat engine operating in a complete cycle from a high-temperature reservoir
a. must be completely converted to work.
b. equals the entropy increase.
c. can be completely converted to internal energy.
d. cannot be completely converted to work.

____ 38. A turbine exhausts 69 400 J of energy added as heat when it puts out 21 300 J of net work. What is the efficiency of the turbine?
a. 3.26
b. 0.307
c. 0.693
d. 0.235

____ 39. A ball is thrown against a brick wall. After the collision,
a. the kinetic energy increases, and the ball is capable of doing more work.
b. the kinetic energy decreases, and the ball is capable of doing less work.
c. the kinetic energy increases, and the ball is capable of doing less work.
d. the kinetic energy decreases, and the ball is capable of doing more work.

____ 40. When a system's disorder is increased,
a. less energy is available to do work.
b. more energy is available do work.
c. no energy is available to do work.
d. no work is done.

AP REVIEW 2
Answer Section

MULTIPLE CHOICE

1. B
2. C
3. D
4. B
5. A
6. B
7. C
8. A
9. D
10. D
11. A
12. B
13. B
14. B
15. C
16. D
17. C
18. D
19. A
20. C
21. A
22. C
23. C
24. A
25. B
26. B
27. C
28. C
29. C
30. A
31. C
32. A
33. B
34. D
35. A
36. B
37. D
38. D
39. B

40. A