Exam II

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

____ 1. What is the distinguishing characteristic of crystals?
a. They are solids.
b. They have repeating geometrical structures.
c. They are bonded together by the electric forces between atoms.
d. They have low melting points.

____ 2. At which point in the swing of an ideal pendulum (ignoring friction) is the kinetic energy a maximum?
a. at either end
b. at the lowest point
c. It's always the same.

____ 3. How many different arrangements can you make with three different colored blocks?
a. 3
b. 6
c. 9
d. 12

____ 4. Which of the four states of matter occurs at the highest temperature?
a. plasma
b. liquid
c. solid
d. gas

____ 5. Which of the following does NOT determine the amount of internal energy an object has?
a. temperature
b. amount of material
c. type of material
d. shape of the object

____ 6. What is the gravitational potential energy of a ball with a weight of 50 N when it is sitting on a shelf 2 m above the floor?
a. 400 J
b. 200 J
c. 100 J
d. We cannot say without knowing the zero level.

____ 7. A 20-N block lifted straight upward by a hand applying a force of 20 N has an initial kinetic energy of 26 J. If the block is lifted 1 m, what is the block's final kinetic energy?
a. 6 J
b. 26 J
c. 46 J
d. There is not enough information to say.

____ 8. Sodium and chlorine form a
a. mixture
b. element
c. compound
d. dichotomy

____ 9. Nuclear power plants are less efficient than coal-fired plants because

a. nuclear power plants have lower exhaust temperatures.
b. safety regulations require nuclear plants to run at lower temperatures.
c. there is less energy in a ton of coal than a ton of uranium.
d. coal plants produce much more carbon dioxide.

____ 10. On a day when a water barometer reads 10 m, what is the pressure at the bottom of a 20-m deep tank of water?

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

____ 11. A ball dropped from a height of 10 m only bounces to a height of 5 m. Which of the following statements is valid for this situation?

a. Kinetic energy is conserved.
b. Mechanical energy is conserved.
c. Gravitational potential energy is conserved.
d. None of the above.

____ 12. Which of the following disagrees with the second law of thermodynamics?

a. Heat naturally flows from hot objects to cold objects.
b. No engine can transform all of its heat input into mechanical work.
c. The entropy of an isolated system can never decrease.
d. Perpetual motion machines are not possible.

____ 13. What input energy is required if an engine performs 50 kJ of work and exhausts 60 kJ of heat?

a. 10 kJ
b. 50 kJ
c. 60 kJ
d. 110 kJ

____ 14. An ideal heat engine has a theoretical efficiency of 60% and an exhaust temperature of 27° C. What is its input temperature?

a. 227° C
b. 477° C
c. 500° C
d. 750° C

____ 15. A block of wood loses 160 J of gravitational potential energy as it slides down a ramp. If it has 90 J of kinetic energy at the bottom of the ramp, we can conclude that

a. mechanical energy is conserved.
b. momentum is conserved.
c. 250 J of energy was lost.
d. 70 J of energy was transformed to another form.

____ 16. Heat is the

a. same as temperature.
b. thermal energy that is transferred from one object to another.
c. potential energy associated with temperature.
d. massless fluid generated by doing work on the system.

____ 17. How much work does a 55-kg person do against gravity in walking up a trail that gains 720 m in elevation?

a. 13.1 J
b. 39,600 J
c. 396,000 J

d. There is not enough information to say.

____ 18. Which of the following is NOT a potential energy?

a. elastic
b. friction
c. chemical
d. nuclear

____ 19. You have two cubes of the same size, one made of wood and the other of aluminum. Both cubes are placed in a water-filled aquarium. The wooden block floats, and the aluminum block sinks. Which cube, if either, experiences the greater buoyant force?

a. the wood cube
b. the aluminum cube
c. Both cubes experience the same buoyant force.
d. There is not enough information to say.

____ 20. We are currently experiencing a world-wide energy crisis because the

a. amount of energy in the world is decreasing rapidly.
b. entropy of the world is increasing rapidly.
c. entropy of the world is decreasing rapidly.
d. amount of energy in the world is not increasing.

____ 21. When the input to an engine is 1000 W at 800 K and the exhaust temperature is 400 K, what is the minimum theoretical rate the engine could exhaust heat?

a. 200 W
b. 400 W
c. 500 W
d. 600 W

____ 22. Which has the greater kinetic energy, a heavy truck at rest or a moving roller skate?

a. Cannot tell from the information given.
b. The heavy truck.
c. The roller skate.
d. They are equal.

____ 23. Given that 12 g of carbon combines completely with 16 g of oxygen to form carbon monoxide, how many grams of carbon monoxide can be made from 36 g of carbon and 90 g of oxygen?

a. 48 g
b. 84 g
c. 90 g
d. 126 g

____ 24. Two objects are in thermal equilibrium if

a. they have the same temperature.
b. they are each in thermal equilibrium with a third object.
c. they are in thermal contact and there is no net flow of thermal energy.
d. any of the above is true.

____ 25. What average power is required to accelerate a 1200-kg car from rest to 20 m/s in 10 s?

a. 240 W
b. 24,000 W
c. 36,000 W
d. 48,000 W

____ 26. If 200 g of water at 100° C are mixed with 300 g of water at 50° C in a completely insulated container, what is the final equilibrium temperature?

a. 50° C

b. 70° C
c. 80° C
d. 100° C

____ 27. If a 0.5-kg ball is dropped from a height of 6 m, what is its kinetic energy when it hits the ground?

a. 3 J
b. 9 J
c. 30 J
d. There is not enough information to say.

____ 28. An ice cube is floating in a glass of water. As the ice cube melts, the water level in the glass will

a. go up
b. go down
c. stay the same

____ 29. Why do climates near the coasts tend to be more moderate than near the middle of the continent?

a. Because water has a relatively high specific heat.
b. Because water has a high latent heat of vaporization.
c. Because the coasts have lower elevations.
d. Because it rains a lot on the coasts.

____ 30. Which of the following forces does the most work? A force of _____ acting through a distance of _____.

a. 1 N ... 5 m
b. 2 N ... 4 m
c. 3 N ... 3 m
d. 4 N ... 2 m

____ 31. A 4-kg toy car with a speed of 5 m/s collides head-on with a stationary 1-kg car. After the collision, the cars are locked together with a speed of 4 m/s. How much kinetic energy is lost in the collision?

a. 10 J
b. 40 J
c. 50 J
d. 90 J

____ 32. A typical jogger burns up food energy at the rate of about 40 kJ per minute. How long would it take to run off a piece of cake if it contains 400 Calories (about 1,700 kJ)?

a. 1 min
b. 4.25 min
c. 10 min
d. 42.5 min

____ 33. One mole of water molecules consists of 1 mole of oxygen (16 g) and 2 moles of hydrogen (1 g each). You combine 1 kg of oxygen with 1 kg of hydrogen to make water. What is the mass of the resulting water?

a. 1000 g
b. 1062.5 g
c. 1125 g
d. 2000 g

____ 34. Density is defined as

a. weight per unit volume
b. weight per unit area

c. mass per unit volume
d. mass per unit area

____ 35. If a CD player uses electricity at a rate of 15 W, how much energy does it use during an 8-h day?
a. 15 J
b. 120 J
c. 720 J
d. 432,000 J

____ 36. How much work is performed by the gravitational force F on a synchronous satellite during one day?
a. zero, because the satellite does not move.
b. zero, because the force is perpendicular to the velocity.
c. FC, where C is the circumference of the orbit.
d. Fr, where r is the radius of the orbit.

____ 37. A refrigerator extracts 1000 J of energy from a cold region and exhausts 1400 J of energy to a hot region. How much work was required?
a. 400 J
b. 1000 J
c. 1400 J
d. 2400 J

____ 38. A ham sandwich consists of one slice of ham (10 g) and two slices of bread (25 g each). You have 1 kg of ham and 1 kg of bread. You make as many sandwiches as you can. How many sandwiches did you make?
a. 20
b. 40
c. 100
d. 120

____ 39. A cold piece of metal is dropped into an insulated container of hot water. After the system has reach an equilibrium temperature, the
a. entropy of the metal has decreased.
b. entropy of the water has decreased.
c. net change in entropy of the system is zero.
d. entropy of the system has decreased.

____ 40. Iron has a density of 7860 kg/m^3. What is the density of iron in g/cm^3?
a. 7860
b. 786
c. 78.6
d. 7.86

____ 41. The second law of thermodynamics says that
a. the energy of an isolated system is conserved.
b. it is impossible to build a heat engine that can do mechanical work by extracting thermal energy that does not also exhaust heat to the surroundings.
c. it is impossible to reach the absolute zero of temperature.
d. it is impossible to build a heat engine that does more mechanical work than the thermal energy it consumes.

____ 42. Water and sugar form a
a. mixture
b. element
c. compound

d. molecule

____ 43. A Btu is defined to be the amount of heat required to raise the temperature of
a. 1 pound of water by 1° C
b. 1 gram of water by 1° C
c. 1 gram of water by 1° F
d. 1 pound of water by 1° F

____ 44. Which of the following has the largest viscosity?
a. honey
b. air
c. water
d. gasoline

____ 45. It takes 250 cal to raise the temperature of a metallic ring from 20° C to 30° C. If the ring has a mass of 90 g, what is the specific heat of the metal?
a. 0.14 cal/g° C
b. 0.28 cal/g° C
c. 1.4 cal/g° C
d. 2.8 cal/g° C

____ 46. If a system has no change in internal energy, we can say that
a. the system lost no heat.
b. no work was done on the system.
c. the amount of work done by the system was equal to the heat gained.
d. the change in heat energy produced a temperature change.

____ 47. Power is defined to be the energy
a. lost in a process.
b. lost in a process divided by the time it takes.
c. changed to other forms in a process.
d. changed to other forms divided by the time it takes.

____ 48. A solid ball with a volume of 0.4 m^3 is made of a material with a density of 2500 kg/m^3. What is the mass of the ball?
a. 1000 kg
b. 1500 kg
c. 2500 kg
d. 6250 kg

____ 49. How many calories are equivalent to 21 joules?
a. 5
b. 17
c. 25
d. 88

____ 50. What is the force that binds materials together?
a. gravitational
b. electric
c. strong nuclear
d. weak nuclear

Exam II
Answer Section

MULTIPLE CHOICE

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

42. ANS: A DIF: 1
43. ANS: D DIF: 1
44. ANS: A DIF: 1
45. ANS: B DIF: 1
46. ANS: C DIF: 1
47. ANS: D DIF: 1
48. ANS: A DIF: 1
49. ANS: A DIF: 1
50. ANS: B DIF: 1