Short Answer

12.1 Zeroth Law of Thermodynamics: Thermal Equilibrium 47.

What does *green* energy development entail?

a. Green energy involves finding new ways to harness clean and renewable alternative energy sources.
b. Green energy involves finding new ways to conserve alternative energy sources.
c. Green energy involves decreasing the efficiency of nonrenewable energy resources.
d. Green energy involves finding new ways to harness nonrenewable energy resources.

48.

Why are the sun and Earth not in thermal equilibrium?

a. The mass of the sun is much greater than the mass of Earth.
b. There is a vast amount of empty space between the sun and Earth.
c. The diameter of the sun is much greater than the diameter of Earth.
d. The sun is in thermal contact with Earth.

12.2 First law of Thermodynamics: Thermal Energy and Work 49.

If a fixed quantity of an ideal gas is held at a constant volume, which variable relates to pressure, and what is that relation?

a. Temperature; inverse proportionality $\left(P \propto \frac{1}{T}\right)$
b. Temperature, direct proportionality to square root $\left(P \propto \sqrt{T}\right)$
c. Temperature; direct proportionality $(P \propto T)$
d. Temperature; direct proportionality to square $\left(P \propto T^2\right)$

50.

When is volume directly proportional to temperature?

a. when the pressure of the gas is variable
b. when the pressure of the gas is constant
c. when the mass of the gas is variable
d. when the mass of the gas is constant

51.

For fluids, what can work be defined as?

a. pressure acting over the change in depth
b. pressure acting over the change in temperature
c. temperature acting over the change in volume
d. pressure acting over the change in volume

52.

In the equation \Delta U = Q - P\Delta V, what does P\Delta V indicate?

a. the work done on the system
b. the work done by the system
c. the heat into the system
d. the heat out of the system

53.

By convention, if Q is positive, what is the direction in which heat transfers energy with regard to the system?

a. The direction of the heat transfer of energy depends on the changes in W, regardless of the sign of Q.
b. The direction of Q cannot be determined from just the sign of Q.
c. The direction of net heat transfer of energy will be out of the system.
d. The direction of net heat transfer of energy will be into the system.

54.

What is net transfer of energy by heat?

a. It is the sum of all energy transfers by heat into the system.
b. It is the product of all energy transfers by heat into the system.
c. It is the sum of all energy transfers by heat into and out of the system.
d. It is the product of all energy transfers by heat into and out of the system.

55.

Three hundred ten joules of heat enter a system, after which the system does 120\,\text{J} of work. What is the change in its internal energy? Would this amount change if the energy transferred by heat were added after the work was done instead of before?

a. {-190}\,\text{J} ; this would change if heat added energy after the work was done
b. 190\,\text{J}; this would change if heat added energy after the work was done
c. {-190}\,\text{J}; this would not change even if heat added energy after the work was done
d. 190\,\text{J}; this would not change even if heat added energy after the work was done

56.

Ten joules are transferred by heat into a system, followed by another 20\,\text{J}. What is the change in the system's internal energy? What would be the difference in this change if 30\,\text{J} of energy were added by heat to the system at once?

a. 10\,\text{J}; the change in internal energy would be same even if the heat added the energy at once
b. 30\,\text{J}; the change in internal energy would be same even if the heat added the energy at once
c. 10\,\text{J}; the change in internal energy would be more if the heat added the energy at once
d. 30\,\text{J}; the change in internal energy would be more if the heat added the energy at once

12.3 Second Law of Thermodynamics: Entropy 57.

How does the entropy of a system depend on how the system reaches a given state?

a. Entropy depends on the change of phase of a system, but not on any other state conditions.
b. Entropy does not depend on how the final state is reached from the initial state.
c. Entropy is least when the path between the initial state and the final state is the shortest.
d. Entropy is least when the path between the initial state and the final state is the longest.

58.

Which sort of thermal energy do molecules in a solid possess?

a. electric potential energy
b. gravitational potential energy
c. translational kinetic energy
d. vibrational kinetic energy

59.

A cold object in contact with a hot one never spontaneously transfers energy by heat to the hot object. Which law describes this phenomenon?

a. the first law of thermodynamics
b. the second law of thermodynamics
c. the third law of thermodynamics
d. the zeroth law of thermodynamics

60.

How is it possible for us to transfer energy by heat from cold objects to hot ones?

a. by doing work on the system
b. by having work done by the system
c. by increasing the specific heat of the cold body
d. by increasing the specific heat of the hot body

61.

What is the change in entropy caused by melting 5.00 kg of ice at 0 °C ?

a. 0 J/K
b. 6.11×10^{3} J/K
c. 6.11×10^{4} J/K
d. ∞J/K

62.

What is the amount of heat required to cause a change of 35\,\text{J/K} in the entropy of a system at 400\,\text{K}?

a. 1.1 \times 10^{1}\,\text{J}
b. 1.1 \times 10^{2}\,\text{J}
c. 1.4 \times 10^{3}\,\text{J}
d. 1.4 \times 10^{4}\,\text{J}

12.4 Applications of Thermodynamics: Heat Engines, Heat Pumps, and Refrigerators 63.

In a refrigerator, what is the function of an evaporator?

a. The evaporator converts gaseous refrigerant into liquid.
b. The evaporator converts solid refrigerant into liquid.
c. The evaporator converts solid refrigerant into gas.
d. The evaporator converts liquid refrigerant into gas.

64.

Which component of an air conditioner converts gas into liquid?

a. the condenser
b. the compressor
c. the evaporator
d. the thermostat

65.

What is one example for which calculating thermal efficiency is of interest?

a. A wind turbine
b. An electric pump
c. A bicycle
d. A car engine

66.

How is the efficiency of a refrigerator or heat pump expressed?

a. $Eff = W\sqrt{Q_{\text{c}}}$
b. $Eff = \frac{W}{Q_{\text{c}}}$

c. $Eff = Q_{\mathrm{c}} \times W$
d. $Eff = \frac{Q_{\mathrm{c}}}{W}$

67.

How can you express the proportion of thermal energy lost by a heat engine?

a. \frac{Q_{h} - Q_{c}}{Q_{h}}
b. 1 - \frac{Q_{h} - Q_{c}}{Q_{h}}
c. \frac{W - Q_{c}}{Q_{h}}
d. 1 + \frac{W - Q_{c}}{Q_{h}}

68.

How can you calculate percentage efficiency?

a. percentage efficiency = \left(Eff + 100\right)\%
b. percentage efficiency = \frac{Eff}{100}\%
c. percentage efficiency = \left(Eff - 100\right)\%
d. percentage efficiency = Eff \times 100\,\%