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

AP Physics 2 - Chapters 11 and 12 Practice

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

____ 1. In an adiabatic free expansion
a. no heat is transferred between a system and its surroundings.
b. the pressure remains constant.
c. the temperature remains constant.
d. the volume remains constant.
e. the process is reversible.

____ 2. In which process will the internal energy of the system ***NOT*** change?
a. An adiabatic expansion of an ideal gas.
b. An isothermal compression of an ideal gas.
c. An isobaric expansion of an ideal gas.
d. The freezing of a quantity of liquid at its melting point.
e. The evaporation of a quantity of a liquid at its boiling point.

____ 3. How much heat, in joules, is required to convert 1.00 kg of ice at 0 °C into steam at 100°C?
(L_{ice} = 333,000 J/kg; $L_{steam} = 2.26 \times 10^6$ J/kg.)
a. 3.35×10^5 b. 4.19×10^5 c. 2.36×10^6 d. 2.69×10^6 e. 3.01×10^6

____ 4. Water at room temperature, 20°C, is pumped into a reactor core where it is converted to steam at 200 °C. How much heat (in J) is transferred to each kilogram of water in this process?
(c_{steam} = 2 010 J/kg·°C; $L_{steam} = 2.26 \times 10^6$ J/kg; 1 cal = 4.186 J.)
a. 3.35×10^5 b. 7.53×10^5 c. 2.67×10^6 d. 2.80×10^6 e. 3.01×10^6

____ 5. If 25 kg of ice at 0°C is combined with 4 kg of steam at 100°C, what will be the equilibrium temperature?
a. 40 °C b. 20 °C c. 60 °C d. 100 °C e. 8 °C

____ 6. In an isothermal process
a. P is constant. c. $\frac{P}{T}$ is constant. e. $\frac{V}{n}$ is constant.
b. V is constant. d. PV is constant.

____ 7. A company that produces pulsed gas heaters claims their efficiency is approximately 90%. If an engine operates between 250°C and 25°C, what is its maximum thermodynamic efficiency?
a. 83% b. 65% c. 43% d. 90% e. 56%

____ 8. By operating a reversible heat engine with an ideal gas as the working substance in a Carnot cycle and measuring the ratio Q_c/Q_h, we can calculate
a. n, the number of moles of the ideal gas.
b. the ratio V_c/V_h of the volumes of the ideal gas.
c. the ratio P_c/P_h of the pressures of the ideal gas.
d. the ratio P_cV_c/P_hV_h of the products of volumes and pressures of the ideal gas.
e. the value of Avogadro's number.

____ 9. The thermal efficiency of a heat engine is given by

a. $e = \dfrac{W_{eng}}{|Q_h|}$.

b. $e = \dfrac{|Q_h| - |Q_c|}{|Q_h|}$.

c. $e = 1 - \dfrac{T_h}{T_c}$.

d. all of the formulas above.

e. only (a) or (b) above.

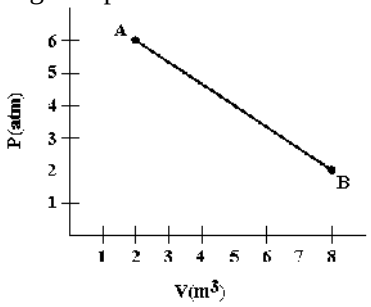
____ 10. A Carnot cycle, operating as a heat engine, consists, in the order given, of

a. an isothermal expansion, an isothermal compression, an adiabatic expansion and an adiabatic compression.
b. an adiabatic expansion, an adiabatic compression, an isothermal expansion and an isothermal compression.
c. an isothermal expansion, an adiabatic compression, an isothermal compression and an adiabatic expansion.
d. an isothermal expansion, an adiabatic expansion, an isothermal compression and an adiabatic compression.

____ 11. Which answer below is not a statement of the second law of thermodynamics?

a. Real processes proceed in a preferred direction.
b. Energy does not flow spontaneously by heat from a cold to a hot reservoir.
c. The entropy of the universe increases in all natural processes.
d. In theory, heat engines working in a cycle employ reversible processes.
e. You cannot construct a heat engine, operating in a cycle that does nothing but take heat from a reservoir and perform an equal amount of work.

____ 12. A gas expands from A to B as shown in the graph. Calculate the work (in joules) done by the gas.



a. 12 b. 24 c. 1.21×10^6 d. 2.42×10^6 e. 3.64×10^6

____ 13. A gas expands as shown in the graph. If the heat taken in during this process is 1.02×10^6 J, the change in internal energy of the gas (in J) is

a. -2.42×10^6 b. -1.40×10^6 c. -1.02×10^6 d. 1.02×10^6 e. 1.40×10^6

____ 14. Assume 3.0 moles of a monatomic gas has an internal kinetic energy of 10 kJ. Determine the temperature of the gas after it has reached equilibrium.

a. 270 K b. 160 K c. 800 K d. 96 K e. 400 K

____ 15. The internal energy of *n* moles of an ideal gas depends on

a. one state variable *T*.
b. two state variables *V* and *P*.
c. three state variables *T*, *P* and *V*.
d. four variables *R*, *T*, *P* and *V*.

AP Physics 2 - Chapters 11 and 12 Practice
Answer Section

MULTIPLE CHOICE

1. A
2. B
3. E
4. D
5. B
6. D
7. C
8. D
9. E
10. D
11. D
12. D
13. B
14. A
15. A