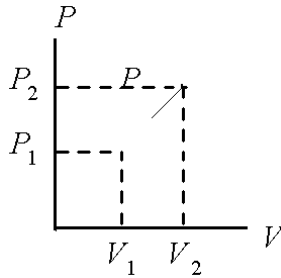


**Webreview AP B ch 12 thermodynamics****Multiple Choice**

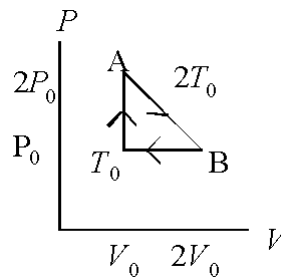
*Identify the choice that best completes the statement or answers the question.*

- \_\_\_\_\_ 1. A 2.0-mol ideal gas system is maintained at a constant volume of 4.0 L. If 100 J of heat is added, what is the work done on the system?
- zero
  - 5.0 J
  - 6.7 J
  - 20 J
  - 10 J
- \_\_\_\_\_ 2. A closed 2.0-L container holds 3.0 mol of an ideal gas. If 200 J of heat is added, what is the change in internal energy of the system?
- zero
  - 100 J
  - 150 J
  - 200 J
  - 250 J
- \_\_\_\_\_ 3. A 4-mol ideal gas system undergoes an adiabatic process where it expands and does 20 J of work on its environment. How much heat is received by the system?
- 20 J
  - 5 J
  - zero
  - +5 J
  - +20 J
- \_\_\_\_\_ 4. A 5-mol ideal gas system undergoes an adiabatic free expansion (a rapid expansion into a vacuum), going from an initial volume of 10 L to a final volume of 20 L. How much work is done on the system during this adiabatic free expansion?
- 50 J
  - 10 J
  - zero
  - +10 J
  - +50 J
- \_\_\_\_\_ 5. Which of the following increases the internal energy of a solid metal rod?
- raising it to a greater height
  - throwing it through the air
  - having the rod conduct heat
  - having the rod absorb heat
  - both choices B and D are valid.

- \_\_\_\_\_ 6. As the ideal gas expands from pressure  $P_1$  and volume  $V_1$  to pressure  $P_2$  and volume  $V_2$  along the indicated straight line, it is possible that:



- a. the temperature stays constant.  
 b. the internal energy decreases.  
 c. the gas is changing state.  
 d. all of the above are impossible for this particular graph.  
 e. both choices B and C are valid.
- \_\_\_\_\_ 7. Heat is applied to an ice-water mixture to melt some of the ice. In this process:
- a. work is done by the ice-water mixture.  
 b. the temperature increases.  
 c. the internal energy increases.  
 d. all of the above are correct.  
 e. the internal energy decreases.
- \_\_\_\_\_ 8. An ideal gas at pressure, volume, and temperature,  $P_0$ ,  $V_0$ , and  $T_0$ , respectively, is heated to point A, allowed to expand to point B also at A's temperature  $2T_0$ , and then returned to the original condition. The internal energy increases by  $3P_0V_0/2$  going from point  $T_0$  to point A. How much heat entered the gas from point  $T_0$  to point A?



- a. 0  
 b.  $P_0V_0/2$   
 c.  $3 P_0V_0/2$   
 d.  $5 P_0V_0/2$   
 e.  $3 P_0V_0$

- \_\_\_\_\_ 9. According to the second law of thermodynamics, which of the following applies to the heat received from a high temperature reservoir by a heat engine operating in a complete cycle?
- must be completely converted to work
  - equals the entropy increase
  - converted completely into internal energy
  - cannot be completely converted to work
  - equals the entropy decrease
- \_\_\_\_\_ 10. A heat engine receives 6 000 J of heat from its combustion process and loses 4 000 J through the exhaust and friction. What is its efficiency?
- 33%
  - 40%
  - 67%
  - 73%
  - 78%
- \_\_\_\_\_ 11. If a heat engine has an efficiency of 30% and its power output is 600 W, what is the rate of heat input from the combustion phase?
- 1 800 W
  - 2 400 W
  - 2 000 W
  - 3 000 W
  - 3 500W
- \_\_\_\_\_ 12. A turbine takes in 1000-K steam and exhausts the steam at a temperature of 500 K. What is the maximum theoretical efficiency of this system?
- 24%
  - 33%
  - 50%
  - 67%
  - 73%
- \_\_\_\_\_ 13. An electrical generating plant operates at a boiler temperature of 220°C and exhausts the unused heat into a nearby river at 18°C. What is the maximum theoretical efficiency of the plant? ( $0^{\circ}\text{C} = 273\text{ K}$ )
- 61%
  - 32%
  - 21%
  - 41%
  - 52%
- \_\_\_\_\_ 14. Which of the following choices is an appropriate unit for measuring entropy changes?
- J·K
  - N·K
  - J/s
  - J/K
  - N/K

## Webreview AP B ch 12 thermodynamics

### Answer Section

#### MULTIPLE CHOICE

1. ANS: A           PTS: 1           DIF: 1  
TOP: 12.2 The First Law of Thermodynamics
2. ANS: D           PTS: 1           DIF: 1  
TOP: 12.2 The First Law of Thermodynamics
3. ANS: C           PTS: 1           DIF: 1  
TOP: 12.2 The First Law of Thermodynamics
4. ANS: C           PTS: 1           DIF: 2  
TOP: 12.2 The First Law of Thermodynamics
5. ANS: D           PTS: 1           DIF: 1  
TOP: 12.2 The First Law of Thermodynamics
6. ANS: D           PTS: 1           DIF: 2  
TOP: 12.2 The First Law of Thermodynamics
7. ANS: C           PTS: 1           DIF: 2  
TOP: 12.2 The First Law of Thermodynamics
8. ANS: C           PTS: 1           DIF: 3  
TOP: 12.2 The First Law of Thermodynamics
9. ANS: D           PTS: 1           DIF: 1  
TOP: 12.3 Heat Engines and the Second Law of Thermodynamics
10. ANS: A           PTS: 1           DIF: 2  
TOP: 12.3 Heat Engines and the Second Law of Thermodynamics
11. ANS: C           PTS: 1           DIF: 2  
TOP: 12.3 Heat Engines and the Second Law of Thermodynamics
12. ANS: C           PTS: 1           DIF: 2  
TOP: 12.3 Heat Engines and the Second Law of Thermodynamics
13. ANS: D           PTS: 1           DIF: 2  
TOP: 12.3 Heat Engines and the Second Law of Thermodynamics
14. ANS: D           PTS: 1           DIF: 1           TOP: 12.4 Entropy