

## AP Physics 2 - Chapter 10 Practice

## Multiple Choice

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

- \_\_\_\_\_ 1. A pressure of 10.0 mm Hg is measured at the triple-point of water using a constant-volume gas thermometer. What will the pressure be (in mm Hg) at 50.0°C?  
a. 68.3                      b. 1.80                      c. 31.8                      d. 11.8                      e. 8.50
- \_\_\_\_\_ 2. A thermometer registers a change in temperature of 100°F. What change in temperature does this correspond to on the Kelvin Scale?  
a. 453                      b. 328                      c. 180                      d. 55.6                      e. 24.5
- \_\_\_\_\_ 3. Two thermometers are calibrated, one in degrees Celsius and the other in degrees Fahrenheit. At what temperature (in kelvins) do their readings measure the same temperature?  
a. 218.15                      b. 233.15                      c. 273.15                      d. 40.15                      e. 0
- \_\_\_\_\_ 4. A bridge is made with segments of concrete 50 m long. If the linear expansion coefficient is  $12 \times 10^{-6} (\text{°C})^{-1}$ , how much spacing (in cm) is needed to allow for expansion during an extreme temperature change of 150° F?  
a. 10                      b. 2.5                      c. 7.5                      d. 5.0                      e. 9.5
- \_\_\_\_\_ 5. An auditorium has dimensions 10 m  $\times$  10 m  $\times$  60 m. How many moles of air fill this volume at one atmosphere and 0°C?  
a.  $2.7 \times 10^2$                       b.  $2.7 \times 10^4$                       c.  $2.7 \times 10^3$                       d.  $2.7 \times 10^5$                       e.  $2.7 \times 10^6$
- \_\_\_\_\_ 6. One mole of an ideal gas has a temperature of 25°C. If the volume is held constant and the pressure is doubled, the final temperature (in °C) will be  
a. 174                      b. 596                      c. 50                      d. 323                      e. 25
- \_\_\_\_\_ 7. Two identical containers, A and B, hold equal amounts of the same ideal gas at the same  $P_o$ ,  $V_o$  and  $T_o$ . The pressure of A then decreases by a half while its volume doubles; the pressure of B doubles while its volume decreases by a half. Which statement correctly describes the temperatures of the gases after the changes?  
a.  $T_A = 0.5T_B = T_o$ .                      c.  $T_B = T_A = T_o$ .                      e.  $T_B = 2T_A = T_o$ .  
b.  $T_B = 0.5T_A = T_o$ .                      d.  $T_A = 2T_B = T_o$ .

- \_\_\_\_\_ 8. A square plate has an area of  $29.00 \text{ cm}^2$  at  $20.0^\circ\text{C}$ . It will be used in a low temperature experiment at  $T = 10.0\text{K}$  where it must have an area of  $28.00 \text{ cm}^2$ . What area must be removed from the plate at  $20.0^\circ\text{C}$  for it to have the correct area at  $10.0 \text{ K}$ ? (The coefficient of linear expansion is  $10 \times 10^{-6} (\text{C}^\circ)^{-1}$ .)  
a.  $0.0793 \text{ cm}^2$    b.  $0.159 \text{ cm}^2$    c.  $0.238 \text{ cm}^2$    d.  $0.841 \text{ cm}^2$    e.  $0.921 \text{ cm}^2$
- \_\_\_\_\_ 9. A container having a volume of  $1.0 \text{ m}^3$  holds  $5.0$  moles of helium gas at  $50^\circ\text{C}$ . If the helium behaves like an ideal gas, the total energy of the system is  
a.  $2.0 \times 10^4 \text{ J}$ .   b.  $2.5 \times 10^4 \text{ J}$ .   c.  $1.7 \times 10^3 \text{ J}$ .   d.  $1.5 \times 10^3 \text{ J}$ .   e.  $4.0 \times 10^4 \text{ J}$ .
- \_\_\_\_\_ 10. The average kinetic energy of a nitrogen molecule at room temperature ( $20^\circ\text{C}$ ) is  
a.  $2 \times 10^{-21} \text{ J}$ .   b.  $4 \times 10^{-21} \text{ J}$ .   c.  $6 \times 10^{-21} \text{ J}$ .   d.  $8 \times 10^{-21} \text{ J}$ .   e.  $1 \times 10^{-20} \text{ J}$ .
- \_\_\_\_\_ 11. The average translational speed of a nitrogen molecule at room temperature ( $20^\circ\text{C}$ ) is approximately (in m/s)  
a. 100.   b. 500.   c. 300.   d. 700.   e. 200.
- \_\_\_\_\_ 12. The internal energy of  $n$  moles of an ideal gas depends on  
a. one state variable  $T$ .   d. three state variables  $T$ ,  $P$  and  $V$ .  
b. two state variables  $T$  and  $V$ .   e. four variables  $R$ ,  $T$ ,  $P$  and  $V$ .  
c. two state variables  $T$  and  $P$ .
- \_\_\_\_\_ 13. The average molecular translational kinetic energy of a molecule in an ideal gas is  
a.  $\frac{3}{2}k_B T$ .   b.  $\frac{3}{2}RT$ .   c.  $\frac{5}{2}k_B T$ .   d.  $\frac{5}{2}RT$ .
- \_\_\_\_\_ 14. Which statement below is **NOT** an assumption made in the molecular model of an ideal gas?  
a. The separation between molecules is large compared with the size of the molecules.  
b. The molecules undergo inelastic collisions with one another.  
c. The forces between molecules are short range.  
d. The molecules obey Newton's laws of motion.  
e. Any molecule can move in any direction with equal probability.
- \_\_\_\_\_ 15. The temperature of a quantity of an ideal gas is  
a. one measure of its ability to transfer thermal energy to another body.  
b. proportional to the average molecular kinetic energy of the molecules.  
c. proportional to the internal energy of the gas.  
d. correctly described by all the statements above.  
e. correctly described only by (a) and (b) above.

**AP Physics 2 - Chapter 10 Practice  
Answer Section**

**MULTIPLE CHOICE**

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