DATE: NAME: CLASS:

ANSWER KEY	Chapter 3 Test Answer Key	BLM 3.4.1A

Answers to Multiple-Choice Questions

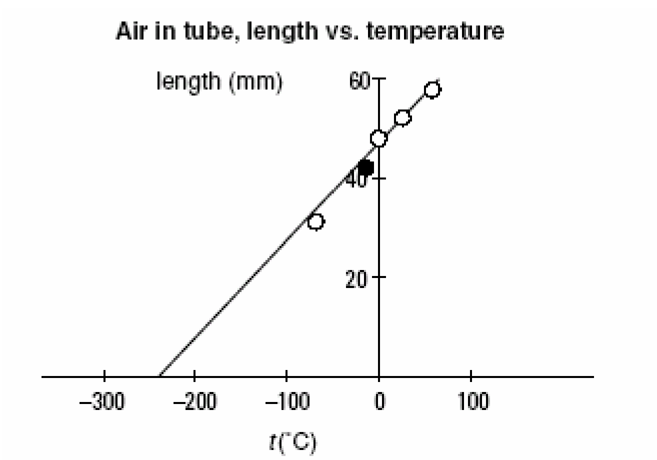
1. c
2. d
3. a
4. c
5. b
6. b
7. d
8. a
9. a
10. c
11. b
12. b
13. d
14. d
15. c

Answers to Numerical Response Questions

16.	Lower by 23.6 ^{o}C
17.	1.09×10^3 mmHg
18.	21.3 cm^3
19.	1.23 L
20.	152 kPa

Answers to Written Response Questions

21. a) Graph of the column length as a function of the temperature



b) Absolute zero is the *x*-intercept. It will be near –273 ºC. The graph extrapolates to about –267 °C.

c) Helium behaves more nearly like an ideal gas than does air because helium is spherical and has only two electrons and thus extremely small London (dispersion) forces. If helium was in the tube instead of air, the graph would probably extrapolate to a point closer to the expected value of –273 °C than does the graph shown above.

22 a) The balloon will expand as air is pumped out of the jar. Since no air escapes from the balloon, the pressure inside the balloon remains at 1.0 atm. The difference in the pressure between the inside and outside of the balloon causes the balloon to expand.

b) This is an application of Boyle's law. The temperature remained constant and the volume varied inversely with pressure.

23. When the stopcocks are both open, the molecules will distribute themselves evenly throughout the three containers. The total number of molecules is $1.0 \times 10^{22} + 2.0 \times 10^{22} = 3.0 \times 10^{22}$. Each container will have ⅓ of the total number of molecules, or 1.0×10^{22} molecules. This number of molecules will give a pressure in container B (and also in A and C) of 100.0 kPa

24.

V	***T***
$V_1 = 5.0$ L	$T_1 = 273.15 + 20.0 = 293.15$ K
$V_2 = ?$	$T_2 = 273.15 + 90.0 = 363.15$ K

$$V_2 = V_1 \times \frac{T_2}{T_1} = 5.0 \text{ L} \times \frac{293.15 \text{ K}}{363.15 \text{ K}} = 4.036 \text{ L} = 4.0 \text{ L}$$

V	***P***
$V_1 = 5.0$ L	P_1
$V_2 = 4.0$ L	P_2

$$V_1P_1 = V_2P_2$$

$$P_2 = \frac{V_1}{V_2} \times P_1 \qquad P_2 = \frac{5.0}{4.036} P_1 \approx 1.25\, P_1$$

Also acceptable is $P_2 = \dfrac{363.15 \text{ K}}{293.15 \text{ K}} \times P_1 \approx 1.25\, P_1$

25. As the temperature decreases, the molecules lose kinetic energy and slow down. The collisions with the walls of the tire will be less frequent and have less force. This decreases the inside pressure and the tire becomes slightly flat.

Chapter 3 Test Answer Key

26.

V	***P***
$V_1 = 20.0\text{ L}$	$P_1 = 1600\text{ kPa}$
$V_2 = ?$	$P_2 = 100\text{ kPa}$

$$V_1P_1 = V_2P_2$$

$$V_2 = V_1 \times \frac{P_1}{P_2} \qquad V_2 = 20.0\text{ L} \times \frac{1600\text{ kPa}}{100\text{ kPa}} = 320\text{ L}$$

When the cylinder is "empty," there is still 20.0 L inside. Therefore, the volume of gas that can be obtained is 300.0 L.