Name: Key Period: _____ Date: _____

Gas Laws Review Worksheet

Complete the following relationships.

a. As pressure increases, volume ↓.
b. As temperature increases, volume ↑.
c. As temperature decreases, pressure ↓.

For each of the following problems, write the formula and show all of your work, including units. Place a box around your final answer.

a. A weather balloon has a volume of 35 L at sea level (1.0 atm). After the balloon is released it rises to where the air pressure is .75 atm. What will the new volume of the weather balloon be?

$P_1V_1 = P_2V_2$ $\quad \frac{(35L)(1.0\ atm)}{.75\ atm} = \frac{(.75\ atm)(V_2)}{.75\ atm}$

$\boxed{47\ L = V_2}$

b. A gas system has an initial temperature of 443.0 K with the pressure unknown. When the temperature changes to 1390 K the pressure is found to be 7.77 atm. What was the initial pressure in atm?

$\frac{T_1}{P_1} = \frac{T_2}{P_2}$ $\quad \frac{443.0\ K}{P_1} = \frac{1390\ K}{7.77\ atm}$ $\quad \boxed{P_1 = 2.48\ atm}$

c. A gas system has initial pressure and temperature of 12.0 atm and 27.9°C If the pressure changes to 3.74 atm, what will the resultant temperature be in °C?

$\frac{T_1}{P_1} = \frac{T_2}{P_2}$ $\quad \frac{300.9\ K}{12.0\ atm} = \frac{T_2}{3.74\ atm}$

$T_2 = 93.8\ K$
-273.0
$= \boxed{-179.2\ °C}$

d. There are 135 L of gas in a container at a temperature of 260°C. If the gas was cooled until the volume decreased to 75 L, what would the temperature of the gas be (in °C)?

$\frac{T_1}{V_1} = \frac{T_2}{V_2}$ $\quad \frac{533\ K}{135L} = \frac{T_2}{75L}$

$T_2 = 300\ K$
$- 273$
$\boxed{=27°C}$

e. $CaCO_3$ decomposes at 1200 °C to form CO_2 gas and CaO. If 25 L of CO_2 are collected at 1200 °C, what will the volume of this gas be after it cools to 25°C?

$\frac{T_1}{V_1} = \frac{T_2}{V_2}$ $\quad \frac{1473\ K}{25L} = \frac{298K}{V_2}$ $\quad \boxed{V_2 = 5.1\ L}$

f. The initial volume of a gas at a pressure of 3.2 atm is 2.9 L. What will the volume be if the pressure is increased to 4.0 atm?

$P_1V_1 = P_2V_2$ $\quad \frac{(3.2\ atm)(2.9\ L)}{4.0\ atm} = \frac{(4.0\ atm)V_2}{4.0\ atm}$

$\boxed{2.3\ L = V_2}$

g. 6.0 L of gas in a piston at a pressure of 1.0 atm are compressed until the volume is 3.5 L. What is the new pressure inside the piston?

$P_1V_1 = P_2V_2$ $\quad \frac{(1.0\ atm)(6.0L)}{3.5\ L} = \frac{P_2(3.5\ L)}{3.5\ L}$ $\quad \boxed{P_2 = 1.7\ atm}$