Name:_____ Date:____ Block:____ **Pair-Solo-Teacher√ : Gas Laws**

1. If I have an unknown quantity of gas at a pressure of 0.5 atm, a volume of 25 liters, and a temperature of 300 K, how many moles of gas do I have and what law is this? **(pair)**

$P = 0.5$ atm
$V = 25$ L
$T = 300$ K
$n = ?$ mol

$PV = nRT$

$(0.5 \text{ atm})(25 \text{ L}) = (n)(0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}})(300 \text{ K})$

$n = 0.5075 \text{ mol} = \boxed{0.5 \text{ mol}}$ Ideal Gas Law

2. If 6.12 grams of nitrogen gas is held at a pressure of 5.0 atm and in a container with a volume of 50.0 liters, what is the temperature of the gas? What law did you use to solve? **(SOLO-Teacher√)**

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3. Maybelline Cousteau's backup oxygen tank reads 900. mmHg while on her boat, where the temperature is 27.0°C. When she dives down to the bottom of an unexplored methane lake on a recently-discovered moon of Neptune, the temperature will drop down to –183.0°C. What will the pressure in her backup tank be at that temperature? What law did you use to solve? **(pair)**

$P_1 = 900.$ mmHg
$T_1 = 27.0°C + 273 = 300$ K
$T_2 = -183.0°C + 273 = 90$ K
$P_2 = ?$ mmHg

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$ Lussac's Law

$\frac{900 \text{ mm Hg}}{300 \text{ K}} = \frac{P_2}{90 \text{ K}}$

$\boxed{P_2 = 270. \text{ mmHg}}$

4. The gas in a sealed can is at a pressure of 3.00 atm at 25.0°C. A warning on the can tells the user not to store the can in a place where the temperature will exceed 52.0°C. What would the gas pressure in the can be at 52.0°C? What law did you use to solve? **(SOLO-Teacher√)**

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5. 5.36 liters of nitrogen gas are at -25.0°C and 733 mm Hg. What would be the volume at 128.0°C and 1.5atm? What law did you use to solve? **(pair)**

COMBINED GAS LAW

$V_1 = 5.36$ L
$T_1 = -25.0°C + 273 = 248$ K
$P_1 = 733$ mm Hg
$V_2 = ?$ L
$T_2 = 128.0°C + 273 = 401$ K
$P_2 = 1.5 \text{ atm} \mid 760 \text{ mm Hg} = 1140 \text{ mm Hg}$

change to same unit

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$\frac{(733 \text{ mm Hg})(5.36 \text{ L})}{248 \text{ K}} = \frac{(1140 \text{ mm Hg})(P_2)}{401 \text{ K}}$

$P_2 = 5.57258$ L
$= \boxed{5.6 \text{ L}}$

6. My car has an internal volume of 2.60 x10^3 liters. If the sun heats my car from a temperature of 20.0° C to a temperature of 55.0° C, what will the pressure inside my car be? Assume the pressure was initially 760.0 mm Hg. What law did you use to solve? **(SOLO-Teacher√)**

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7. Ral3ph had a helium balloon with a volume of 4.88 liters at 150. kPa of pressure. If the volume is changed to 3.15 liters, what would be the new pressure in atm and what law did you use to solve? **(pair)**

$V_1 = 4.88$ L

$P_1 = 150.\ kPa \left| \frac{1\ atm}{101.3\ kPa} \right. = 1.48075\ atm$

$V_2 = 3.15$ L

$P_2 = ?$ atm

Must be same unit

$P_1V_1 = P_2V_2$

$(1.48075\ atm)(4.88\ L) = (P_2)(3.15\ L)$

$P_2 = 2.29$ atm

Boyle's Law

8. Divers get "the bends" if they come up too fast because gas in their blood expands, forming bubbles in their blood. If a diver has 0.050L of gas in his blood under a pressure of 250 atm, then rises instantaneously to a depth where his blood has a pressure of 50.0 atm, what will the volume of gas in his blood be? What law did you use to solve? **(SOLO-Teacher√)**

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9. On hot days, you may have noticed that potato chip bags seem to "inflate", even though they have not been opened. If I have a 250. mL bag at a temperature of 19.0 °C, and I leave it in my car which has a temperature of 60.0° C, what will the new volume of the bag be? What law did you use to solve? **(pair)**

$V_1 = 250.$ mL

$T_1 = 19.0°C + 273 = 292$ K

$T_2 = 60.0°C + 273 = 333$ K

$V_2 = ?$ mL

Must be same unit

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$ Charles' Law

$\frac{250\ mL}{292\ K} = \frac{V_2}{333\ K}$

$V_2 = 285$ mL

10. At a constant pressure, a sample of neon gas occupies a volume of 752 mL at 25.0°C. What volume will the gas occupy at standard temperature? What law did you use to solve? **(SOLO-Teacher√)**

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