Name _____ Period _____

College Prep Chemistry of the Earth

Assignment 7P – *Unit 7 Review* 20 Points

Complete the following problems based on the Combined Gas Law

Boyle's Law Forms	$P_1 = \frac{P_2V_2}{V_1}$	$V_1 = \frac{P_2V_2}{P_1}$	$P_2 = \frac{P_1V_1}{V_2}$	$V_2 = \frac{P_1V_1}{P_2}$

Charles' Law Forms	$V_1 = \frac{V_2T_1}{T_2}$	$T_1 = \frac{V_1T_2}{V_2}$	$V_2 = \frac{V_1T_2}{T_1}$	$T_2 = \frac{V_2T_1}{V_1}$
$V_1T_2 = V_2T_1$				

Gay-Lussac's Law Forms	$P_1 = \frac{P_2T_1}{T_2}$	$T_1 = \frac{P_1T_2}{P_2}$	$P_2 = \frac{P_1T_2}{T_1}$	$T_2 = \frac{P_2T_1}{P_1}$
$P_1T_2 = P_2T_1$				

Combined Gas Law Forms	$P_1 = \frac{P_2V_2T_1}{V_1T_2}$	$V_1 = \frac{P_2V_2T_1}{P_1T_2}$	$T_1 = \frac{P_1V_1T_2}{P_2V_2}$
$P_1V_1T_2 = P_2V_2T_1$	$P_2 = \frac{P_1V_1T_2}{V_2T_1}$	$V_2 = \frac{P_1V_1T_2}{P_2T_1}$	$T_2 = \frac{P_2V_2T_1}{P_1V_1}$

Ideal Gas Law Forms	$P = \frac{nRT}{V}$	$V = \frac{nRT}{P}$	$n = \frac{PV}{RT}$	$T = \frac{PV}{nR}$
$PV = nRT$				

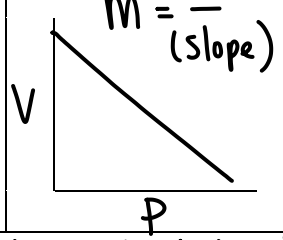
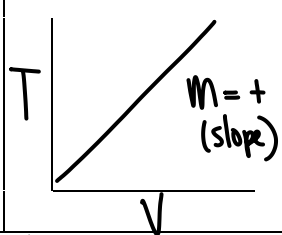
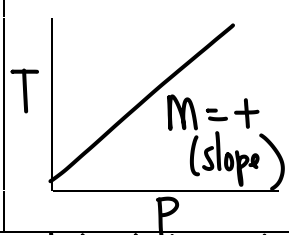
Ideal Gas Constant [*R*]	$R = 0.0821 \frac{L \cdot atm}{mol \cdot K}$	1atm = 760mmHg = 101.3kPa	1L = 1000mL

$K = {}^oC + 273.15$	${}^oC = K - 273.15$

Ideal Gas Constant [*R*]	$R = 0.0821 \frac{L \cdot atm}{mol \cdot K}$

Dalton Law	$P_{Total} = P_1 + P_2 + P_3$	$P_1 = P_{Total} - P_2 - P_3$

For each gas law, define the variables involved, determine the relationship between variables, and draw a line showing the relationship on the graph

Gas Law	Boyle's Law	Charles' Law	Gay-Lussac's Law
Variables	P and V	V and T	P and T
Relationship	Indirect | ↑↓	Direct | ↑↑	Direct | ↓↓
Graph			

What is Dalton's Law | kelvin +Abs. Zero | Ideal gas definition | What is "R" | How is P and n related? Direct ↑↑ | What are the fundamental units? atm L mol K

°C → K

K = °C + 273.15

Convert the following measurements to the new measurement given

1atm = 760 mmHg

1atm = 101.3 kPa

Convert 2.82atm to mmHg	
$2.82\ \text{atm} \cdot \frac{760\ \text{mmHg}}{1\ \text{atm}}$	
P =	214.32 mmHg

Convert 142.83°C to K	
T =	142.83 + 273.15
T =	415.98 K

Convert 410.19K to °C

K → °C: °C = K − 273.15 = 410.19 − 273.15 = 137.04°C

Solve the following equations based on the fundamental gas laws

$P_1V_1 = P_2V_2$

$P_1 = \frac{P_2V_1}{V_2}$

V_1 = ____L, T_1 = 421.29K V_2 = 0.92L, T_2 = 371.29K	
P_1 =	$\frac{0.92\ \text{L} \cdot 421.29\ \text{K}}{371.29\ \text{K}}$
P_1 =	1.04 L (1.04389… Round to 2 after)

V_1 = 1.42L, P_1 = 3.28atm T_1 = ____K V_2 = 3.74L, P_2 = 1.39atm T_2 = 372.41K	
T_1 =	$\frac{3.28\ \text{atm} \cdot 1.42\ \text{L} \cdot 372.41\ \text{K}}{(1.39\ \text{atm} \cdot 3.74\ \text{L})}$
T_1 =	333.41 K (333.4127…)

$P_1V_1T_2 = P_2V_2T_1$

$T_1 = \frac{P_1V_1T_2}{P_2V_2}$

Complete the following problems based on the ideal gas law

$n = \frac{PV}{RT}$

P = 2.37atm, V = 12.84L, n = ____mol, T = 284.23K	
n =	$\frac{2.37\ \text{atm} \cdot 12.84\ \text{L}}{(0.0821\ \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \cdot 284.23\ \text{K})}$
n =	1.30 mol (1.304068…)

$V = \frac{nRT}{P}$

P = 4.29atm, V = ____L, n = 1.74mol, T = 341.84K	
V =	$\frac{1.74\ \text{mol} \cdot 0.0821\ \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \cdot 341.84\ \text{K}}{4.29\ \text{atm}}$
V =	11.38 L (11.3830…)

Complete the following problem based on conversions with the ideal gas law

$n = \frac{PV}{RT}$

P = 4.71atm, V = 6.27L, n = ____mol HF, T = 294.39K	
n =	$\frac{4.71\ \text{atm} \cdot 6.27\ \text{K}}{(0.0821\ \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \cdot 294.39\ \text{K})}$
n =	1.22 molHF (1.22186…)

n = ____mol HF, mass = ____g HF Molar Mass HF = 20.01g/mol	
mass HF =	$\frac{1.22\ \text{mol} \cdot 20.01\ \text{g}}{1\ \text{mol}}$
Mass HF =	24.41 gHF

mol always 1