

# Gas, Temperature and Pressure

Name \_\_\_\_\_

**Abstract:** The purpose of this experiment is to understand the relationship between temperature and pressure. One result of this experiment is that you will be able to calculate the value of absolute zero. The method that you will be using is very similar to the method that is actually used to calculate the official value of  $-273.15^{\circ}\text{C}$ .

**Data:**

Trial	Temperature in Degrees Celsius	Temperature in Degrees Kelvin	Air Pressure In Atmospheres
#1	_____	_____	_____
#2	_____	_____	_____
#3	_____	_____	_____
#4	_____	_____	_____

**Analysis of Data:**

1.) On your graph a small table will appear. What are the values on the table.

M = \_\_\_\_\_ B = \_\_\_\_\_ Cor = \_\_\_\_\_

M represents the slope of the line and B the y – intercept. Using this information write an equation for the line ( use the slope – intercept form of a line equation )

\_\_\_\_\_

2.) Now move your cursor along the line. You will notice that the values for the x and y will change. The x value represents the temperature and the y value represents the air pressure.

Remember that science must have the ability to predict what the values will be at other points in order to be useful. Complete the following table using your linear regression ( the values along the line )

<u>X – value</u>	<u>Y-value</u>
_____	1.00 Atm
400°	_____
_____	½ ATM
100°	_____
_____	1.5 ATM

3.) Should the graph go through the origin ( 0, 0 ). Why or why not? Explain.

4.) What should the air pressure be if the temperature is absolute zero? Why?

5.) Move your cursor until the air pressure reads zero. What temperature do you have? How close was your value to the accepted value of zero?

**Error Analysis:**

- 6.) What is the accepted value for absolute zero in the Celsius scale?
- 7.) Convert your value for absolute zero on the graph from Kelvin to Degrees Celsius.
- 8.) Compute your percentage error. ( show your work )

$$\text{Percentage Error} = \frac{\text{Your value} - \text{accepted value}}{\text{Accepted value}} \times 100$$

- 9.) What might have caused your errors ( list at least three reasons )?
- 10.) Write an equation to express the relationship between pressure and temperature. Use the symbols P, T, and k ( a constant ).
- 11.) The “Cor” value on the graph represent the level of correlation or standard deviation of the values to the regression line. The closer the value is to unity ( one ), the more accurate the line is. Calculate the average percentage error of your data to the line. (use the formula above)  
How accurate is your linear regression?
- 12.) How could you improve your correlation?