

Activity 4

Graphing in the Laboratory Report

Name _____

The final report for this activity should include the Excel or Google graphs for each set of data with the trendline or “best-fit” line, equation of the line and the correlation coefficient. Each graph or plot should be appropriately titled, labeled and captioned. Complete the questions in the following document for each set of data.

Graph 1 – Relationship of mass and volume

1. Graph the data below, where Volume is on the x-axis and mass is on the y axis. Determine the “Best fit” line and answer the questions below.

Volume (cm ³)	Ball Bearing mass (g)
0.00	0.00
1.63	11.88
2.53	19.18
3.71	28.21
4.58	35.77
8.68	66.77

Variables:

X –axis _____

Y –axis _____

Equation of the best fit line:

Slope _____

Y-intercept _____

2. Create the x-y scatter plot of the above data and add the trendline, the equation of the trendline and the R² correlation coefficient on the graph. Label the axes and the graph.

3. Does the slope represent a known relationship between the variables of mass and volume? Explain your answer.

4. What units would you place on the slope of the line if slope = $\frac{\Delta y}{\Delta x}$

5. Graph 2 – Density of a salt solution.

% NaCl by mass	Density (g/mL)
0.00	0.998
5.00	1.034
10.00	1.071
15.00	1.108
20.00	1.148
25.00	1.189

Variables:

X –axis _____

Y –axis _____

Equation of the best fit line:

Slope _____

Y-intercept _____

6. Create the x-y scatter plot of the above data and add the trendline

7. Use the equation of the line determined from the graph to calculate the % mass of NaCl if the solution has a density of 1.095 g/mL.

8. Graph 3 – Beer's Law

Concentration (M)	Absorption (A)
0.030	0.149
0.060	0.341
0.090	0.510
0.120	0.670
0.150	0.800

Variables:

X –axis _____

Y –axis _____

Equation of the best fit line:

Slope _____

Y-intercept _____

9. Create the x-y scatter plot of the above data and add the trendline and the R^2 correlation coefficient on the graph.

10. When adding a trendline in Excel, the intercept can be set to any value. If the concentration of the solution is zero, we would expect the absorption to be zero. Create a second graph with the data above, but set the trendline to have an intercept of zero so that the line passes through the origin (0,0). You can copy and paste Graph 1 and then modify the options. In Google, create the second graph by adding the data point 0,0 to the graphed values. Note this changes the graph slightly but does not set the y-intercept equal to zero. You can use a function, to determine the equation of the line with an intercept of zero using the LINEST function.

11. How is the equation of the equation of the line from the first graph different from the equation of the line from the second graph when the intercept is set to be zero?

12. Graph 4 - Absorption Spectra

Wavelength (nm)	Absorption (A)
360	0.310
383	0.394
405	0.482
440	0.634
465	0.910
502	1.406
525	0.957
555	0.381
590	0.059
622	0.048
635	0.044
660	0.017
700	0.018
740	0.003

Variables:

X -axis _____

Y -axis _____

Equation of the best fit line:

Slope _____

Y-intercept _____

13. Create the x-y scatter plot of the above data and add the trendline.

14. Generally when a graph is created, the data should fill the complete field. In Excel, since this graph does not have data between 0 and 350, it is appropriate to create a second graph where the values are adjusted. Copy the graph above and adjust the x axis scale to show only the given wavelengths from 350 - 750 nm.. In Google, adjust the graph to show the x axis scale from 0 - 800 nm. Consider the x and y axis scale, is it appropriate to always begin a graph at the origin? Explain when the x and y axis should be adjusted.

15. Are the above graphs a straight line? Is it appropriate to represent all graphs with a trendline? Explain.

16. Graph 5 - Effective Nuclear Charge Periodic Trend

Atomic Number	Effective Nuclear charge
3	1.69
4	1.91
5	2.42
6	3.14
7	3.83
8	4.45
9	5.10
10	5.76
11	2.51
12	3.31
13	4.07
14	4.29
15	4.89
16	5.48
17	6.12
18	6.76
19	3.50
20	4.40

17. Create the scatter plot for the above data.

18. Would it be appropriate to place a best fit line on the graph? What is the best representation of the data points in the scatter plot?

19. Graph 6 for Charles' Law - Determination of volume dependence on temperature and an Estimation of Absolute Zero

Temperature (°C)	Volume (mL)
0.0	22.5
10.0	23.0
20.0	23.8
30.0	25.0
40.0	25.8
50.0	26.9
60.0	27.5
70.0	28.0
80.0	28.9
90.0	29.8
100.0	30.2

Variables:

X -axis _____

Y -axis _____

Equation of the best fit line:

Slope _____

Y-intercept _____

x-intercept _____

20. Create the x-y scatter plot of the above data and add the trendline.

21. Make a copy of the graph above and extrapolate (extend) the trendline to show the x-intercept value at volume = 0 ($y=0$).

22. What is the temperature value of x when $y = 0$?

23. Graph 7 Extrapolation of Density for Period 7 Transition Metals.

Period	Density Group 5	Density Group 6
4	6.11	
5	8.57	
6	16.65	
7		
4		7.14
5		10.28
6		19.25
7		

Variables:

X –axis _____

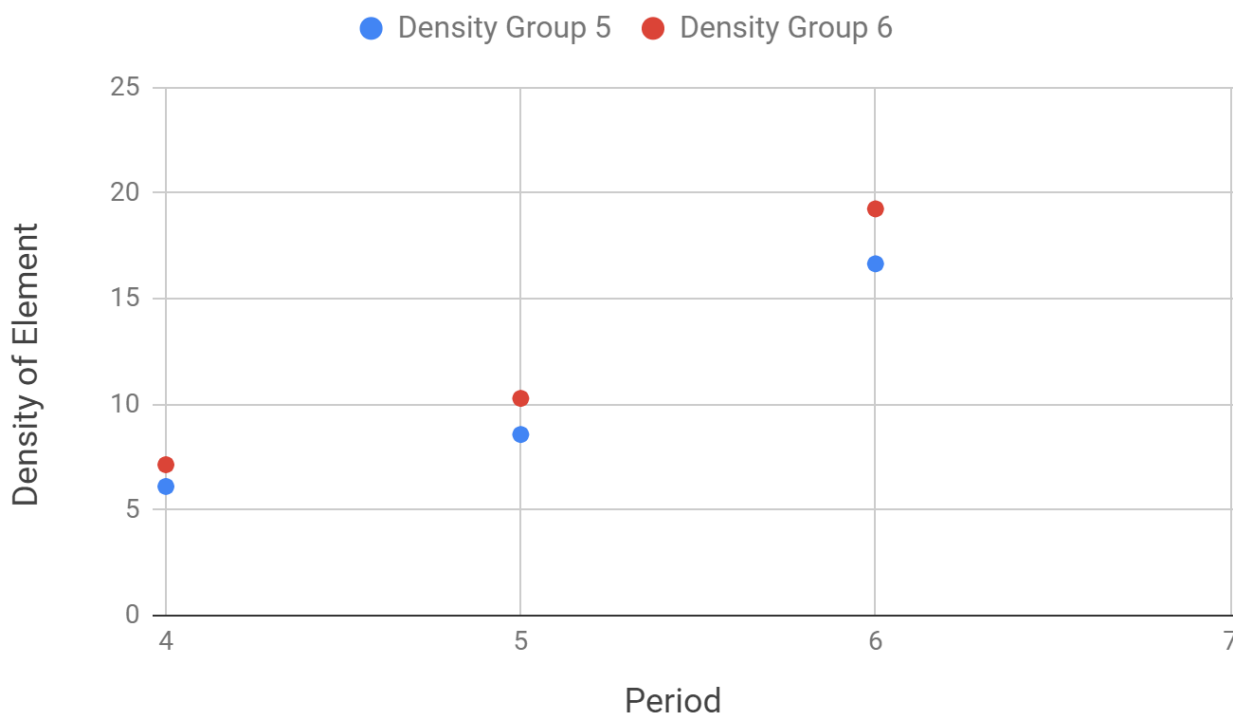
Y –axis _____

Equation of the best fit line for Group 5:

Equation of the best fit line for Group 6:

24. Separating the Density data for each Group, two separate lines are created on the same graph. Plot all three columns on the same scatter plot. Create the x-y scatter plot of the above data and add the trendlines. Adjust the maximum value on the y-axis.

Period and Density of Group 5 and Group 6



25. What is the estimated density of the element in group 5 and group 6, period 7?