**Lesson 2 – Little Data to Big Data**

**\*\*Instructions:** Please change the text color of your responses to red text. Please organize the endings to each page.

**ACTIVITY 3.1.1 Data Visualization: What’s the “Point”?**

**GOALS:**

* Visualize a data set as a graph.
* Use a spreadsheet program to organize data, filter data, and visualize data.
* Extract information from data.
* Identify the challenges associated with processing data.

You will be using Google Sheets for this assignment. You will need to download the Unknown Substance 1 and upload it to Google Sheets. Complete the following:

Sometimes sorting the data in different ways will allow different patterns to emerge.

1. How did the sorting change affect the other columns in the sheet?

| Sorting the time column caused the other two columns related to it to also be sorted in the same order, based on how they were lined up before. |
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1. How did the sorting order affect the graph and the data trend?

| The sorting order caused the graph to flip horizontally, reversing the data trend. |
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1. If you actually ran this experiment in reverse and heated up the unknown substance from a solid, what would the pattern indicate?

| The pattern would indicate at which temperatures the unknown substance would be a solid, liquid, or a gas. |
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Using visualizations, statistical analysis, and what you know about freezing and melting points, what is your observed melting/freezing point of the unknown substance?

| The melting/freezing point of the unknown substance is around 15.9 degrees celsius. |
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Summarize how you used visualizations and statistical analysis to derive meaning from the experimental data. *Include your use of charts, filters, and sorting in your summary*. Record any formulas you used to analyze your data.

| First of all, to find out which trials corresponded to which data sets, I used a line graph to graph all of the data sets in their own graph, which made it easy to assign the data sets to the trials based on the trials’ descriptions. This let me find out that data set 4 corresponded to trial 5, which was the only trial that was completed successfully. I then used a filter to decrease the amount of data points in data set 4, which made the jumps in the graph more drastic and made it easier to pinpoint where the freezing point was. I then used the average formula to find the average temperature across the range 100 to 140 seconds, which was around where the freezing point was, allowing me to figure out that the freezing point was around 15.9 degrees celsius. |
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Why it is important to use properly collected and clean data. How can you help keep bias out of your data collection, cleaning, and reporting processes?

| Bias can be kept out of data collection through blinding and the use of controls. Using a control makes sure that the data collection equipment is working properly, which could have helped to prevent much of the erroneous data from being generated. Using blinding stops the recorder from intentionally recording numbers closer to the theoretical value, as if they are unaware of the theoretical value, they cannot bias the data to trend towards it. |
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Information is the collection of facts and patterns extracted from data. What kind of information were you able to get from the provided data?

| I was able to get the observed freezing/melting point of the substance, as well as see the correlation between time in the cold water and temperature. I was also able to extract the graphs from the data. |
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A correlation is an association between two or more things. Were there any correlations between the unknown substance and the water temperatures?

| The water temperature and unknown substance had a slight negative correlation, as the water temperature slightly increased as the unknown substance’s temperature decreased, due to the water absorbing heat from the unknown substance while cooling it down. |
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Consider the variation between your observed melting/freezing point and the theoretical value. What are some of the data points you could share with someone to support how you got your specific temperature?

| The data points at 100 seconds and 140 seconds can be used to show how the temperature stayed at a relatively constant value for a period of time, which would show that that is the melting/freezing point of the substance. |
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