

## Data Table and Box Plot Formatting

### Data Tables (Data & Observation Section of Paper)

**REMEMBER:**

Do not begin with a table or figure. There should always be at least one introductory sentence.

**NOTES:**

- Data tables should be properly numbered, anchored and titled.
- A row including averages for all values should be at the bottom of the table.
- Row headings should include units and units should not appear in data cells.
- Data should be right justified trials should be centered.
- Trials numbers and the word 'Average' in the final row should be centered justified.
- A one or two sentence third person description of the table is given without analysis.
- There should be a separate data table with one detailed comment for each trials observation.
- Final answer (density, specific heat, alpha) should be reported with three (3) significance figures after the decimal place; all other columns should reflect significance of the tool used.

Table 1

#### Density Data

<u>Trial</u>	<u>Rod</u>	<u>Mass</u> <u>(g)</u>	<u>Radius</u> <u>(mm)</u>	<u>Length</u> <u>(mm)</u>	<u>Volume</u> <u>(mm<sup>3</sup>)</u>	<u>Density</u> <u>(g/mm<sup>3</sup>)</u>
1	A	67.9623	3.200	128.01	4115.982	0.0170
2	B	67.8645	3.185	127.88	4073.345	0.0170

The above table shows density data, results and averages.

Table 2

#### Thermal Expansion Data

<u>Trial</u>	<u>Rod</u>	<u><math>\Delta L</math></u> <u>(mm)</u>	<u>Initial</u> <u>Length</u> <u>(mm)</u>	<u>Initial</u> <u>Temp.</u> <u>(C°)</u>	<u>Final</u> <u>Temp.</u> <u>(C°)</u>	<u>Alpha</u> <u>Coefficient</u> <u>(°C<sup>-1</sup> x 10<sup>-6</sup>)</u>
1	A	0.0508	128.01	99.7	23.0	5.174
2	B	0.0381	127.88	99.8	24.5	3.957

Table 3

#### Specific Heat Data

<u>Trial</u>	<u>Initial Temp.</u> <u>(C°)</u>		<u>Equilibrium</u> <u>Temp.</u> <u>(C°)</u>	<u>Change in</u> <u>Temp. (C°)</u>		<u>Mass</u> <u>(g)</u>		<u>Specific</u> <u>Heat</u> <u>(J/g x C°)</u>
	<u>Water</u>	<u>Metal</u>		<u>Water</u>	<u>Metal</u>	<u>Metal</u>	<u>Water</u>	
1	23.7	99.8	25.3	1.6	-74.5	67.96	100	0.132
2	24.3	98.6	26.1	1.8	-72.5	67.86	100	0.153

## Box Plots (Data Analysis & Interpretation Section of Paper)

### NOTES:

- Create the box plot using your TI-Nspire Software. Make sure to name the data column in the spreadsheet with the property being measured.
- Add in a moveable line to represent the published value\* of your metal. Label.
- Use text boxes/arrows to label experimental median, Q1, Q3, minimum, maximum, and any outliers.
- Use text boxes to label the x-axis units.
- Figures should be properly numbered, anchored, labeled, and titled. Reader MUST be able to READ the font size!
- Make sure the box plot(s) are discussed in full detail. What is the standard deviation, mean, median, percent error, and distribution of data? What is the relevance of all of this information? [Determine the 1-variable statistics of the data to help answer these questions in addition to using the box plot.]
- Text should not wrap around figures.

\*Published value is the scientific accepted value of your identified metal for that property (density, specific heat or linear thermal expansion).

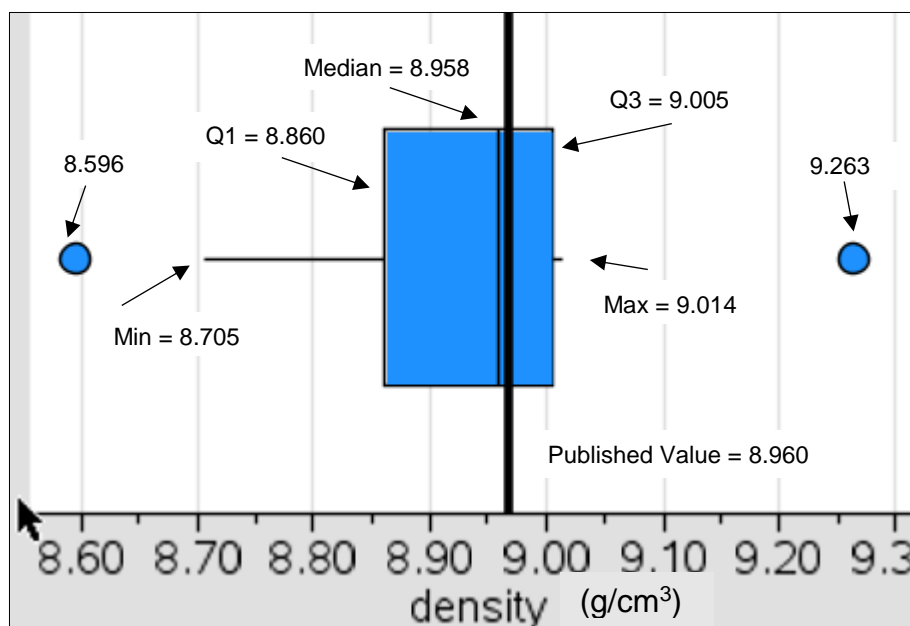


Figure 5. Box Plot of Density Values

Figure 5 shows a box plot of the densities calculated for each trial. The data fell between  $8.705 \text{ g/cm}^3$  and  $9.014 \text{ g/cm}^3$  giving the data set a range of  $0.309 \text{ g/cm}^3$ . The mean of the data set is  $8.935 \text{ g/cm}^3$ . Since the mean is less than the median, the data appears to be slightly left skewed. There are two outliers that are  $0.305 \text{ g/cm}^3$  and  $0.362 \text{ g/cm}^3$  away from the median, which is only slightly larger than twice the interquartile range ( $0.290 \text{ g/cm}^3$ ). Despite the skew and outliers, the plot shows that the median experimental density,  $8.958 \text{ g/cm}^3$ , is very close to the published density value of copper,  $8.960 \text{ g/cm}^3$ .