Graph Basics and the BFL

<table>
<thead>
<tr>
<th>Group</th>
<th>Mass (g)</th>
<th>Volume (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>120.95</td>
<td>50.65</td>
</tr>
<tr>
<td>B</td>
<td>41.7</td>
<td>21.5</td>
</tr>
<tr>
<td>C</td>
<td>46.5</td>
<td>23.5</td>
</tr>
<tr>
<td>D</td>
<td>33.82</td>
<td>16.98</td>
</tr>
<tr>
<td>E</td>
<td>25.83</td>
<td>12.8</td>
</tr>
<tr>
<td>F</td>
<td>18.53</td>
<td>9.2</td>
</tr>
<tr>
<td>G</td>
<td>151.73</td>
<td>73.5</td>
</tr>
</tbody>
</table>

Best Fit Line (BFL)

- A best fit line is an approximation of the average value through all the points.
- Roughly an equal number of points on an equal distance from the line should be present on either side of the line.

\[
\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}
\]

In the long form of the slope equation, the subscripts (green) refer to the data point \((x_1, y_1)\) and \((x_2, y_2)\).

To determine slope of line, you will need to choose two points on the line. **THREE DO NOT NECESSARILY HAVE TO BE DATA POINTS.**

Point 1 = (35, 75)
Point 2 = (60, 130)

Why did I choose these two points?
- The BFL crosses through these points clearly so made it more accurate and less work for me!

Slope = \(\frac{y_2 - y_1}{x_2 - x_1} = \frac{130 - 75}{60 - 35} = \frac{55}{25} = 2.2\)

This is a unitless #

Show all your work – ALL the time

Who cares?

\[
\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{mass}}{\text{volume}} = \text{Density}
\]

Density: amount of matter packed into a given amount of space

Unchanging characteristic of a given substance

FUNDAMENTAL PROPERTY

\(R^2\) Value
- Statistical # that indicates the likelihood of a BFL and its relationship to the data

All graphs at minimum should have:
1. Axis titles with units
2. Clear concise title
3. Appropriate unit divisions on both axes
4. Neatly and properly plotted points (with labels if appropriate)

Some graphs will have:
1. Legend – color coded and keyed to the data
2. BFL
3. 

Graphing Page 1
An R² value can range from:

- **1**
  - Perfect relationship—
    - All data directly on the line

- **0**
  - No relationship

- **-1**
  - Perfect relationship
    - But with a negative slope