Name: _____ Date: _____ Period: ____

Spaghetti Graph

20 Points

Background

In this lab you will be determining the relationship between the mass and length of spaghetti noodles. 1.2 Spaghetti You will do this by making a data table where you record the lengths and masses of small pieces of spaghetti. To make the best possible graph, use widely varying lengths of spaghetti. Record your data in a table on a sheet of graph paper. When you have measured the masses and lengths of 10 - 16 pieces of spaghetti, use your data table to make a line graph.

Materials

- Two dry spaghetti noodles (one for each partner)
- Electronic or triple beam balance

Procedure

1. Break your spaghetti noodles up into at **least ten different** sized pieces. The greater the range in your spaghetti sizes the easier you will find it to graph. Try to avoid same sized pieces!
2. Use a ruler to measure and record the length of a piece of spaghetti noodle. Record your value in centimeters but measure to the closest **millimeter**. (Example: 2.3 cm)
3. Mass the piece to the nearest **0.01 gram**.
4. Repeat the processes until all of pieces have been measured.

Data

Record the length and mass of your samples, minimum of 10 samples: *(5 pts)*

	Length (cm)	Mass (g)
1		
2		
3		
4		
5		
6		
7		
8		

	Length (cm)	Mass (g)
9		
10		
11		
12		
13		
14		
15		
16		

CALCULATIONS/GRAPH

1. Make a scatter plot graph from your data on graph paper and staple it to the lab. *(6 pts, see below)*
    a. The **x-axis** of the graph is the independent variable and the **y-axis** is the dependent variable. In other words, y changes when x changes and not the other way around. A good example would be a graph of age versus weight. Will your age change when your weight changes or will your weight change when you age? Since the second is true, age goes on the x-axis and weight goes on the y-axis. *(1 pt)*
    b. Create a **line-of-best-fit** or a **trend line**. Graphs should always be shown as smooth lines or curves. Never connect the dots with straight lines to form a saw blade pattern. The reason we can't connect the dots with simple straight lines is that we recognize the data we take isn't perfect. Besides that, the actual values in the regions between the dots almost never lie on a straight line. If we use our data points as a guide for drawing smooth lines or curves rather than as absolute truth, they are more useful for helping us identify the underlying trend that we are really interested in. *(1 pt)*
    c. The **title** of a graph should always be "The dependence of [dependent variable] on [independent variable]." Another way this is commonly written is "The effect of [independent variable] on [dependent variable]." *(1 pt)*
    d. **Units** should always be drawn on both axes of the graph. If you don't know what units are being used, the graph isn't very useful. *(1 pt)*
    e. The data in the graph should **fill the page**. If it doesn't, rescale the axes so it does. The larger the area covered by the data, the ·better the graph will be as a predictive tool. *(1 pt)*
    f. Use a **ruler**! It looks sloppy if the *x* and *y*-axes are drawn freehand, and linear trends drawn with freehand lines may harm the predictive ability of the graph. For these reasons, always use a ruler to draw the axes and make the best-fit lines. *(1 pt)*

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ANALYSIS

1. Does the graph show a direct or inverse relationship? How can you tell? *(2 pts)*

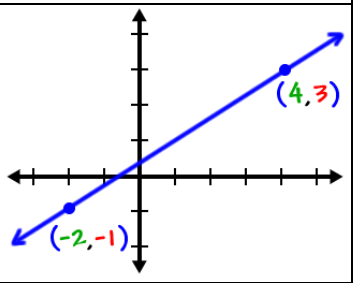
2. Determine the slope of the line for your graph. *Answer this question on the graph paper*. Show your work like the example below: **Label the two points** you will be using and plug those values into the **slope formula**. *(3 pts)*

SLOPE EXAMPLE

Example: Solving for slope example:

$$Slope = m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{3-(-1)}{4-(-2)} = \frac{4}{6} = \frac{2}{3}$$



3. Write the formula for the line of the graph. Formula for a line example: *(2 pts)*

$$y = mx + b$$

FORMULA FOR A LINE EXAMPLE

Substitute any point on your line for *x* and *y* and use your slope (answer from question 2) to solve for *b* (y intercept). Example below:

$$3 = (^2/_3)4 + b$$
$$3 = {}^8/_3 + b$$
$$3 - {}^8/_3 = b$$
$$b = {}^1/_3$$

Use your slope and *y*-intercept to write the formula for your line:

$$\boldsymbol{y = \frac{2}{3}x + \frac{1}{3}}$$

4. Based on *your* calculations, what would be the mass of a spaghetti noodle that has a length of zero, show your work. *(2 pts)*