LESSON #2 - How Strong is Spaghetti?

Objective: To find a linear function that fits a set of real world data.

Procedure:

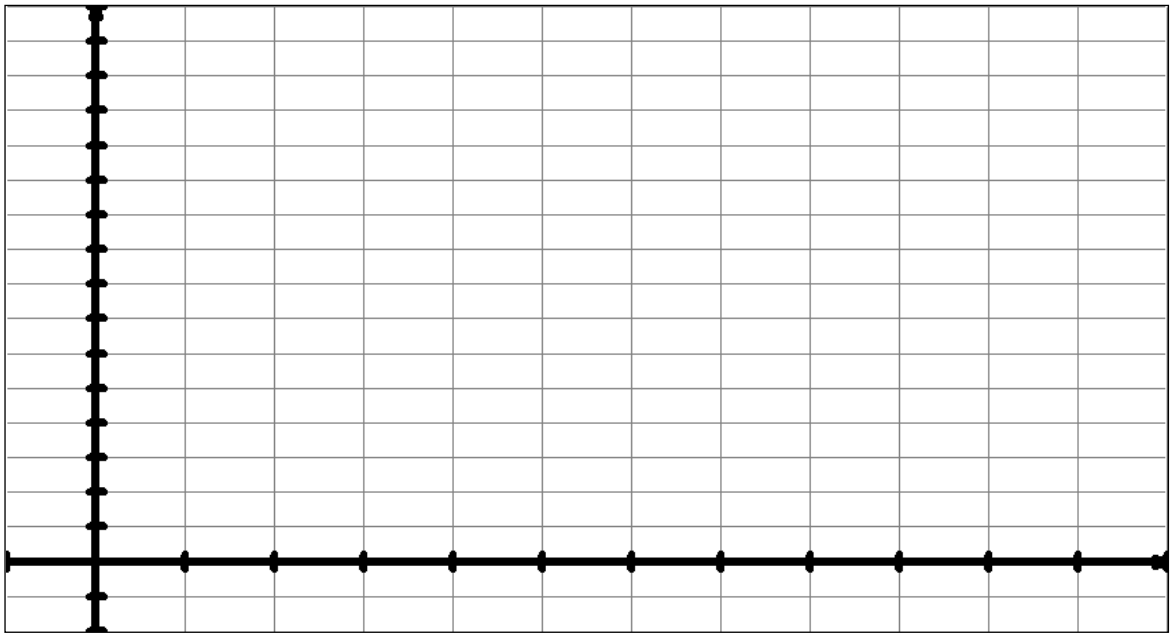
- Puncture two holes in the top of the cup and thread a string through the holes. Tie the ends of the string together so that the string acts like a handle.
- Place one piece of spaghetti under the string so that the cup hangs from the middle of the piece of spaghetti. One person should hold both ends of the spaghetti.
- Another person should begin to add weights to the cup. When the spaghetti breaks, record the number of weights needed to break the spaghetti.
- After you have broken one piece of spaghetti, use two new pieces and again place weights in the cup until the spaghetti breaks. Repeat the experiment until the table below is completed.

Data Table and Exploration:

1. Complete the table below based upon your experiments.

Pieces of Spaghetti	Number of Weights Needed
1	
2	
3	
4	
5	
6	

2. Create a graphical display for your data, with appropriate labels and indicate the independent and dependent variables. **A2,C2**



3. Is your data linear? Justify your response in at least two ways. **K2**

4. Suppose the data does have a linear relationship (*regardless of your answer in question 2).*

   a. Determine the equation of the line for this data. **K1**

   b. What is the slope of this line? Comment on what this value means realistically. **K1,A1**

   c. What is the y-intercept of this line? Comment on what this value means realistically. **A2**

   d. Using your linear model, how many weights could you add for 10 pieces of spaghetti? Confirm your response using the equation and the graph. **K2,A1**

   e. Using your linear model, how many pieces of spaghetti would hold 50 weights? Confirm your response using the equation and the graph. **K2, A1**

5. If your group had decided to use spaghettini instead of spaghetti, describe how you think the linear model would change. **T2,C1**

6. Alexa's group also conducted this experiment of the strength of spaghetti, using a tin tray and dice as weights. Alexa's group drew this graph from their investigation.

   a. How would this graph differ if your group had used a heavy plastic tray instead of a tin tray? Sketch the graph that would result from your experiment. Alexa's original graph using a tin tray is drawn as a dotted line in the reference graph. Explain your reasoning. **T2, C2**

   b. How would the graph differ if her group had still used a tin tray, but M&Ms instead of dice? Sketch the graph that would result. Again, Alexa's original graph using a tin tray is draw in as a dotted line as a reference graph. Explain your reasoning. **T2, C2**