**In-Class Activity**

Columns of various kinds are built to support different types of loads. Thick pillars help support buildings and bridges, whereas thinner columns suspend flags, wires and cables, and lights. If the vertical “point” load on a thin column is large enough, it can cause the column to “buckle,” or bend sideways (see figure). If such a load is not removed, the column will fail.



* Measure the length of a stand of spaghetti. Position it vertically using one finger on a small scale. If you increase the downward force slightly, the spaghetti will buckle; that is, it will bend slightly to the side.

* Record the force required to buckle the spaghetti. Repeat three times for each length to reduce the measurement error. Compute the average force.
* Complete the table below by snapping off shorter pieces of spaghetti and observing the forces required to buckle them.

|  |  |  |
| --- | --- | --- |
| **Length (cm)** | **Force (grams)** | **Average Force (grams)** |
| **Trial 1** | **Trial 2** | **Trial 3** |
| **25** |  |  |  |  |
| **20** |  |  |  |  |
| **15** |  |  |  |  |
| **10** |  |  |  |  |
| **8** |  |  |  |  |
| **6** |  |  |  |  |

1. Define the independent and dependent variables.
2. Make a scatterplot of the data. Be sure to label the axes.

1. As the independent variable increases, what happens to the dependent variable?
2. As the independent variable decreases, what happens to the dependent variable?
3. Would it be reasonable to consider a measurement of 0 for the independent variable?
4. Would it be reasonable to consider a measurement of 0 for the dependent variable?
5. What is a reasonable domain and range for this relationship?
6. To which family of functions would this situation belong? Provide 3 examples from your spreadsheets to verify this belief.
7. Find the regression model for the buckling of column lab. When necessary, round to 3 decimals.

Write the letter of a graph that matches each of the following types of graphs. You may only use a letter once.

\_\_\_\_\_\_1. An even power function with a positive power

\_\_\_\_\_\_2. An odd power function with a negative power

\_\_\_\_\_\_3. An even power function with a negative power

\_\_\_\_\_\_4. An odd power function with a positive power

\_\_\_\_\_\_5. Exponential growth

\_\_\_\_\_\_6. Exponential decay

\_\_\_\_\_\_7. Logarithmic function

\_\_\_\_\_\_8. A function that is symmetric to the y-axis

\_\_\_\_\_\_9. A function that is symmetric around the origin

\_\_\_\_\_\_10. A function that has two asymptotes