Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_

**Noodle Bridges**

***Introduction:*** How much weight can a noodle bridge support?

You will be making a model of a beam bridge in class out of spaghetti noodles and testing to see what weight (how many pennies) it takes to break the bridge. You will make 5 bridges, from one to five spaghetti noodles lined up side by side, to see how the bridge size affects the weight (number of pennies) it takes to break it.

*Make a predicti*on about the relationship between the number of noodles in the bridge and the weight (number of pennies) it takes to break it: (If-then-because) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Materials:***

* Small Dixie cup
* 1 Paper clip
* Spaghetti (Angel Hair)
* Pennies
* Ruler
* Tape
* Graph paper

***Procedure:***

1. Bend a paper-clip to make a hanger for the cup.
2. Pierce the cup with the paper-clip and hang it from the clip.
3. Spread your two tables to create a space for the spaghetti “bridge.”
4. Use your ruler to measure length of this gap in centimeters. Note this measurement: \_\_\_\_\_\_\_\_\_\_\_\_\_ Keep it this length the WHOLE TIME!
5. Place ONE spaghetti noodle over this gap with one end on each of the tables.
6. Tape down each end of the noodle to the table.
7. Hook the clip over that piece of noodle.
8. Put the pennies into the cup one by one until the noodle breaks. Record this number of pennies.
9. Collect the pennies.

Repeat the same process with TWO, THREE, FOUR, and FIVE strips of spaghetti. KEEP THE DISTANCE BETWEEN YOUR TWO TABLES THE SAME.

***Data:***

|  |  |
| --- | --- |
| ***Table 1:* Number of Noodles and Number of Pennies it Takes to Break Them (at noodle bridge length of \_\_\_\_\_\_\_\_\_\_\_ cm)** | |
| **Number of spaghetti noodles** | **Number of pennies to break noodle** |
| **1** |  |
| **2** |  |
| **3** |  |
| **4** |  |
| **5** |  |

***Analysis:*** Some definitions: A *variable* is a factor that you can change in an experiment. The *manipulated variable (independent)* is the variable that you change to see its effect on another. The *responding variable (dependent)* is the variable that changes in reaction to changes in the manipulated variable.

1. In your noodle bridge experiment, which variable, number of pennies, or number of noodles, is the manipulated variable?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Which variable, number of pennies, or number of noodles, is the responding variable?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. In a line graph, the manipulated variable goes on the horizontal, or x-axis. The responding variable goes on the vertical, or y-axis. Use the graph paper provided to draw a line graph showing the relationship between the number of noodles and the corresponding number of pennies it takes to break them. (Your graph needs to include a title, and have labeled axes).
4. Explain the relationship that you observe in the graph in a complete sentence.
5. Apart from number of spaghetti noodles, make a list of other variables that might affect the weight (number of pennies) it takes to break the noodle bridge.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_

**Noodle Bridges - Extension**

1. Pick a variable that is different from the number of spaghetti noodles that might affect the number of pennies it takes to break the noodle bridge. The variable I will test is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. What is your manipulated variable?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. What is your responding variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What is your new hypothesis?

3. What new materials will you need?

4. How will your procedure change?

5. In the space below, create a new data table for your observations (include titles):

6. On a separate graph paper, draw a line graph showing your results (include title, label axes including units).

7. In full sentences, explain the relationship that you observe in the graph.