LAYERS, LENGTH, and STRENGTH

1. Start with a bridge that is **8 inches long**. Place pennies in the center of the bridge, one at a time, until the bridge collapses. Record the number of pennies it took. This is the breaking weight of the bridge.

2. Repeat Question 1, this time using bridges of **different lengths**.
   - **a.** What is the breaking weight of a 7 inch bridge? A 6 inch bridge? A 4 inch bridge?
   - **b.** Create a table, graph, and (+) rule of your results.
   - **c.** What do you predict the breaking weight of a 5 inch bridge would be? Why?
   - **d.** What do you predict the breaking weight of an 11 inch bridge would be? Why?
   - **e.** What do you predict the breaking weight of a 25 inch bridge would be? Why?

3. (+) Next, investigate how the number of layers affects the breaking weight of a bridge. Start with a bridge that is 8 units long, but make the bridge out of **two pieces of paper** this time. Again, place pennies in the center of the bridge, one at a time, until the bridge collapses. Record the number of pennies it took.

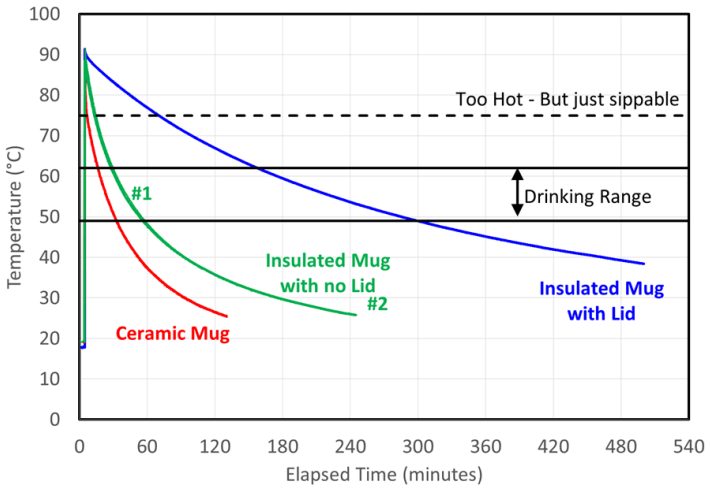
4. (+) Repeat Question 2, this time using a **different number of layers**.
   - **a.** What is the breaking weight of the 8-inch bridge with 3 layers? 4 layers?
   - **b.** Create a table, graph, and (+) rule of your results.
   - **c.** What do you predict the breaking weight of a 6 layer bridge would be? Why?
   - **d.** What do you predict the breaking weight of a 2.5 layer bridge would be? Why?
   - **e.** What do you predict the breaking weight of a 50 layer bridge would be? Why?

ON YOUR OWN

Layers, Length, and Strength

Can I describe functional relationships using words and symbols?

1. The graph on the right shows the temperature of a hot drink over time. Use the graph to help you answer the following questions.



a. Complete the statement by filling each blank with either **increases** or **decreases**: *"As the elapsed time _____, the temperature of the drink _____ ."*

b. If you are using an insulated mug with a lid, how long should you wait before taking a sip of your drink?

c. Does the temperature of the drink change more quickly during the first hour (60 min) or the second hour (60-120 min)? How do you know?

2. Can you determine (*this*), if you know (*that*)? For each question below, answer 'yes' or 'no' and explain your reasoning.

a. Can you determine a person's height in inches, if you know they are 5.5 feet tall?

b. Can you determine a person's shoe size, if you know they are 5.5 feet tall?

c. Can you determine the side length of a square, if you know the area is 16 units^2?

d. Can you determine the side length of a rectangle, if you know the area is 16 units^2?

e. Can you determine if a number is even or odd, if you are given the number?

f. Can you determine the number, if you know that it is even or odd?

3. Look back on your responses to Question 2.

a. If you said 'yes' then the relationship being described **is** a function. If you said 'no,' then the relationship **is not** a function. In your own words, how do you know if a relationship is a function or not?

b. For the statements you said yes to, write a statement like, "The height a rubber ball bounces depends on the height it was dropped from" or "Bounce height is a function of drop height."

c. For each statement you said yes to, identify the independent and dependent variable in each relationship.

4. Below are tables of Inputs and Outputs from two different machines. Use the tables to help you answer the questions that follow.

Table from **Blue Machine**

Input	Output
hello	P
hen	O
clear	S
happy	Z

Table from **Green Machine**

Input	Output
G	Gavin
A	Aki
A	Anand

a. What rule does the Blue Machine seem to be using? In other words, what is it doing with the input in order to get the output?

b. Can you determine the output for the Blue Machine, if you know the input?

c. What rule does the Green Machine seem to be using? In other words, what is it doing with the input in order to get the output?

d. Can you determine the output for the Green Machine, if you know the input?