

Building Bridges

Name:

Most bridges are built with beams. Steel is very strong, but enough weight on any beam, it break. The amount of weight a support is related to its design. To design a bridge, to understand these thoroughly. Engineers often use to test the strength of their

You are going to work with your group to determine the least amount of beams needed to support 500 units of weight. Collect data for bridge strength using thickness ranging from 1 to 10 beams.



frames of steel if you put will bend or beam can thickness and engineers need relationships scale models bridge designs.

Testing Paper Bridges

In this problem, you will do an experiment to test some of the principles involved in building bridges and their carrying capacity.

Equipment: several 11- inch by 6 - inch strips of paper (beams), two books of the same thickness, a small paper cup, a ruler, and about 50 pennies (units of weight).

Group Roles:

- recorder and detail check
- Material handler (in charge of paper and pennies) - cannot lose a penny!
- Communicator and fact checker (only person that can ask Mr. Lanners a question)

Directions:

- Make a paper "bridge" by folding up 1 inch on each long side of one of the paper strips.
- Suspend the bridge between the two books. The bridge should span the books by 7 inches. Place the paper cup in the center of the bridge.
- Put pennies into the cup, one at a time, until the bridge crumples. Record the number of pennies you added to the cup. This number is *the breaking weight* of the bridge.
- Put two strips together to make a bridge of double thickness. Find the breaking weight for this bridge. Repeat this experiment to find the breaking weights for bridges made of up to 8 beams. Need to collect data on a minimum of five beams.

Problems **(Questions that are related to graphing or a table go on graph paper. All others can be done in space provided)**

1. Record your data in the following table

X (beams)	Y (units of measure)	Ratio $\frac{y}{x}$	k

Graph your data. Title the graph, Bridge Strength. X-axis is "Beams" and y-axis "Units of Weight"

Mean for k (show work)

Describe the pattern of change in the data.

Is there a proportional relationship? How do you know (use graph and ratios within you response)

Where would you expect your data to cross the y-axis?

Develop an equation that best fits the data:

Using your equation to predict how many units of weight we can expect 20 beams to hold? 52? (show all work)

According to your results, how many beams are needed to suspend 500 units of weight? If each beam costs 1 million dollars, what is the total expense of your design and experiment?