

## Beam Strength

How strong do the beams in a ceiling have to be? How do bridge engineers select beams to support traffic? In this investigation you will collect data and find a linear model to determine the strength of various "beams" made of spaghetti.

- Step 1: Make two stacks of books of equal height. Punch holes on opposite sides of the cup and tie string through the holes.
- Step 2: Hang your cup at the center of your spaghetti beam.  
Support the beam between the stacks of books so that it overlaps each stack by about 1 inch. Put another book on each stack to hold the beam in place.  
Put pennies in the cup, one at a time, until the beam breaks.
- Step 3: Record the maximum load (the number of pennies) that this beam will support.
- Step 4: Repeat steps 2 and 3 for beams made with two, three, four five, and six strands of spaghetti.

Number of strands of spaghetti	1	2	3	4	5	6	
Maximum load (pennies)							

- Step 5: Plot your data on graph paper or in your calculator. Let  $x$  represent the number of strands of spaghetti and let  $y$  represent the maximum load.
- Step 6: Draw the best line through the data.
- Step 7: Choose two points that best fit your data to determine the slope of the line.  
Slope = \_\_\_\_\_
- Step 8: Estimate your  $y$ -intercept on your line. .  
Write your equation.  
If you used a calculator, enter your equation in your calculator.
- Step 9: What is the real world meaning of the slope of your line?
- Step 10: Use your linear model to predict the number of spaghetti strands needed to support \$5.00 worth of pennies.
- Step 11: Use your linear model to predict the maximum loads for beams made of 10 and 28 strands of spaghetti.