

Activity #13 (Part 1 of 2)

Spaghetti Bridges

Introduction:

Engineers test the materials used in construction of buildings, roads, bridges, etc, for durability, strength, and safety. Testing models gives them the information in a manageable, cost efficient manner. The following activity is similar to a procedure used in testing the strength of bridge beams.

Objectives:

In this lesson, students will:

- Increase conceptual understanding
- Practice data collection
- Graph data
- Be introduced to linear equations
- Interpret data

Session time: 40-50 minutes

Materials:

Each pair of students needs:

- 1 paper cup with 2 holes punched on opposite sides
- 1 cupful of pennies (about 100)
- Uncooked spaghetti (about 25 pieces)

Methods: Teacher demonstration, cooperative learning, interactive participation, guided discussion

Procedure:

1. Thread a piece of spaghetti through the holes in the cup.
2. One person will suspend the cup by placing each index finger approximately one inch in from the ends of the spaghetti.
3. Another student will carefully add pennies to the cup, one at a time, until the spaghetti breaks.
4. Record results below.
5. Repeat the above procedure with 2, 3, 4, and 5 pieces of spaghetti until one or more pieces of spaghetti breaks.

Activity #13 (Part 2 of 2)

(x) (Independent Variable) # of spaghetti	(y) (Dependent Variable) # of pennies
1	
2	
3	
4	
5	

6. **GRAPH THE RESULTS:** Plot the data from your table on a coordinate plane as ordered pairs (x, y) .

7. **READ THE RESULTS:** Looking at your graphed points, do they seem to lie along a straight line or curve?

Use the **graph** to answer the following:

A. Find the number of pennies needed to break “bridges” of 6 pieces: _____ pennies, 7 pieces: _____ pennies, 8 pieces: _____ pennies.

B. About how many more pennies are required to break a “bridge” each time another piece of spaghetti was added? How can you tell this from your graph?

C. Extend the line or curve you have drawn so that it crosses the y-axis. Identify the ordered pair where this occurs: $(0, \quad)$. It sounds crazy, but the graph may suggest that a bridge of no spaghetti would crumple with a _____ weight of pennies.

8. Describe **in words** how to determine the number of pennies needed to break a bridge if you know the number of pieces of spaghetti.

9. Use your description to predict how many pennies would be needed before a bridge of 20 pieces of spaghetti would break. Show your work!

10. Translate your words above to an equation that could be used to determine the number of pennies (y) needed if you know the number of pieces of spaghetti (x) .

$$y =$$

11. Use your **equation** to predict the number of pennies needed to break a bridge of 50 pieces of spaghetti.