Bungee Jumping With a Toy Doll

Name(s) _____

You want to create a bungee cord for your doll that will give it the most thrilling, yet safe fall from a height of 10 meters. Before you start the experiment, guess the maximum number of rubber bands you can use: _____

Step 1: Link two rubber bands with a figure-8 knot. Then tie one end securely around the doll's ankles. Be sure it is tight enough not to fall off when the doll is dropped.

Step 2: Use masking tape or a sticky dot to mark a spot on the wall about as high as you can reach. Hold the free end of the bungee cord on the dot, drop the doll and measure the distance from the drop point to the lowest point that its head reaches. Record your data in the table below. [**NOTE:** You need to observe the LOWEST spot that the head reaches during the bounce. The final resting spot is NOT the lowest spot. You will probably have to drop the doll two or three times to get an accurate reading.]

Step 3: Add another rubber band to the bungee cord, drop the doll, and measure the lowest point, as you did in step 2. Repeat step 3 several times, adding a rubber band each time.

Number of rubber bands in the cord	**Lowest point the doll's head reaches (cm below the drop point)**
2	
3	
4	
5	
6	
7	

Step 4: Make a scatter plot of your data, plotting the number of rubber bands on the *x*-axis and the lowest point that the doll's head reaches on the *y*-axis. Label the axes correctly. Then draw a line of best fit for these data.

Step 5: Determine the slope and *y*-intercept of your line of best fit, and write its equation in slope-intercept form:

$y =$ _____

Step 6 (optional)**:** Use the regression menu on a graphing calculator or a "Line of Best Fit" applet to find an equation for these data.

$y =$ _____

Answer the following questions using the equation you determined in either Step 5 or Step 6. **Show your work for questions 4, 5, and 6.**

1. What does the independent variable (x) represent?

2. What does the dependent variable (y) represent?

3. What does the slope of your line represent?

4. Determine how low the doll's head would reach if the bungee cord were made of:
   a. 20 rubber bands
   b. 100 rubber bands

5. How many rubber bands would you need to use so the doll's head would fall:
   a. 5 meters below the drop point?
   b. 10 meters below the drop point?

6. Test your model by dropping the doll from a high location, such as a second story window. Can you make it fall as low as possible without hitting the ground?

7. Do you think your results would be the same for a heavier doll? Explain your reasoning. If you have time, add some additional weight to the doll and repeat the experiment.