Name _____ Hr _____ Date _____

Barbie Bungee

Barbie and her friends are adventure seekers to the max. They all love the thrill of death defying activities. Barbie even believes the adrenaline rush makes her hair more lustrous and her waistline thinner. Barbie and friends want your help to find the most thrilling, while *safe*, bungee jump. In this activity, you will simulate a bungee jump using a Barbie® doll (or other action figure) and rubber bands.

Before you conduct the experiment, formulate a conjecture:

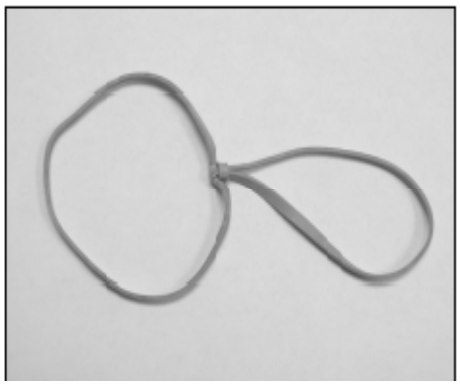
> *I believe that _____ is the **maximum** number of rubber bands that will allow Barbie to safely jump from a height of 1000 cm.*

Now, conduct the experiment to test your conjecture.

PROCEDURE:

Complete each step below. As you complete each step, put a check mark in the box to the left.

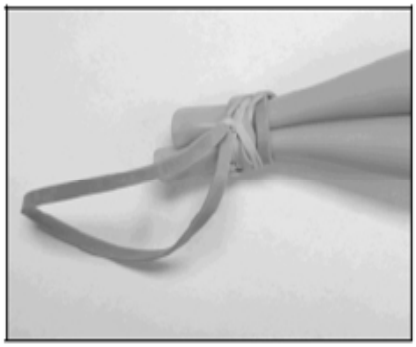
- ❑ Tape a yardstick (use the centimeter side) to the wall at a height of at least six feet, with zero at the top.
- ❑ Create a double-loop to wrap around Barbie's feet. A double-loop is made by securing one rubber band to another with a slip knot, as shown (below left).



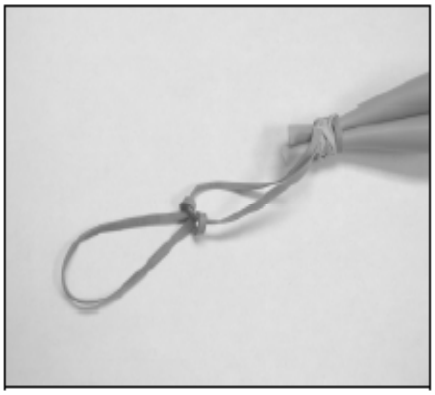
Our action figure is:

_____

- ❑ Wrap the open end of the double-loop tightly around Barbie's feet, as shown below.



- Attach a second rubber band to the first one, again using a slip knot.



- Before sending Barbie on her jump, you will need to take an initial measurement. This means you record the height of the doll without any rubber bands (see picture at the right). Record the amount next to zero rubber bands in the data table on the following page.

- With two rubber bands attached and your initial measurements taken, hold the end of the rubber bands at the jump line with one hand, and drop Barbie from the line with the other hand. Have a partner make a mark to the **lowest** point that Barbie reaches on this jump. This is the tricky part. ***You may want to repeat this jump several times and take the average, to ensure accuracy.*** Accuracy is important—**Barbie's life could depend on it**!

- Measure the jump distance in *centimeters*, and record the value in the data table in Question 1.

- Repeatedly attach ***two additional rubber bands*** for each new jump, measure the jump distance, and record the results in the data table.

- When you've completed the data table, answer Questions 2-13.

1. Complete the data table below.

NUMBER OF RUBBER BANDS (x)	JUMP DISTANCE IN CENTIMETERS (y)
0	
2	
4	
6	
8	
10	

2. Make a scatter plot of your data on a piece of graph paper. Indicate the scale on each axis, and be sure to include a title!

3. On the graph you created, sketch a line of best fit (a.k.a. trend line).

4. What is the relationship between the number of rubber bands and jump distance?

5. What is the equation for the line of best fit? (You can choose to find this by hand, or you may want to use a graphing calculator to ensure greater accuracy.)

6. In your equation, what is the coefficient (number in front) of x, and what does it appear to represent in this activity? (If using the graphing calculators, remember to go to the **y =** screen to find the equation and round the values to the nearest tenth.)

7. What is the last number of your equation, and what do you think it represents?

8. Based on your data, what would you predict is the desired number of rubber bands so that Barbie could safely jump from 1000 cm?

Using your Graph's Trend Line: _____

Using the Graphing Calculator's Equation: _____
(show the math here)

9. Are your predictions reliable? Justify your answer. Be sure to consider your methods of collecting, recording, and plotting data.

10. How do your predictions from Question 8 compare to the conjecture you made before doing the experiment? What prior knowledge did you have (or not have) that helped (or hindered) your ability to make a good conjecture?

11. In what ways did you contribute to the group while working on this project?

12. How many rubber bands would you need if Barbie were to bungee jump from the top of the door frame in this room? Explain your answer and how you found it.

13. Barbie is going to test your predictions by jumping from the armrest of the stairway leading up to the 7th grade hallway. How many rubber bands will you use to give her the most thrilling (but safe!) jump from this height of 450 centimeters?