Barbie Bunji Group Name: Group Members:

In this activity, you will simulate a bungee jump using a Barbie® doll and rubber bands. Before you conduct the experiment, look at a single rubber band and formulate a conjecture:

I believe that _____ is the maximum number of rubber bands that will allow Barbie to safely jump from a height of 602 cm (the height of the landing next to the elevator).

Now, perform a linear analysis and conduct the experiment to test your conjecture.

PROCEDURE:

- Stick some masking tape to the wall from the floor to a height of about 2 metres. This will be used to mark and take measurements. DO NOT WRITE ON THE WALLS! Draw a line near the top of the tape to indicate the height from which Barbie will make each jump.
- 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 (picture 1).
- Wrap the open end of the double-loop tightly around Barbie's feet (picture 2).
- Attach a second rubber band to the first one, again using a slip knot (picture 3).

- With two rubber bands now attached, 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.
- Measure the jump distance in centimeters, and record the value in the data table below. You may wish to repeat this jump several times and take the average, to ensure accuracy.
- Accuracy is important—Barbie's life could depend on it!
- 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, create a graph on the other side of this page, then answer Questions 3-10.

1. Complete the data table below.

Number of Rubber Bands (x)	Jump Distance in Centimeters (y)
2	
4	
6	
8	
10	
12	

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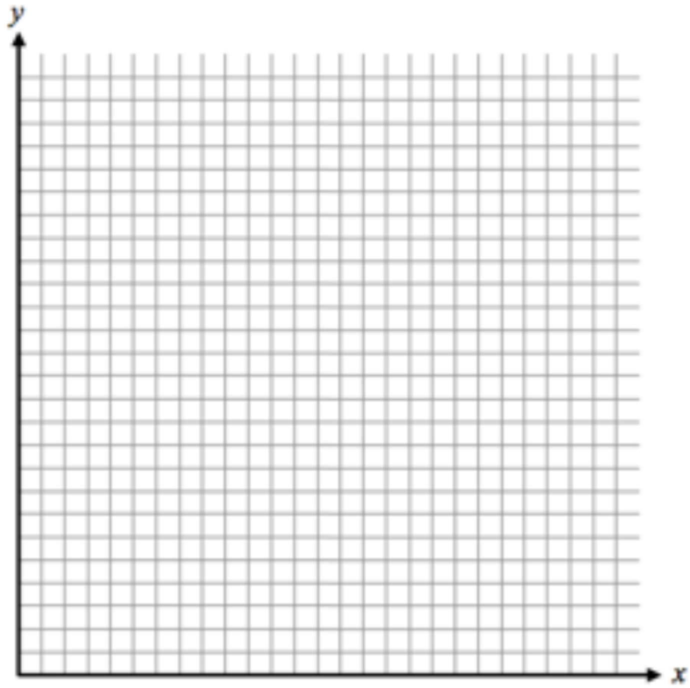
2. Make a scatterplot of your data. Indicate the scale on each axis.



3. On the graph above, sketch a line of best fit.

4. Pick two points on your line of best fit, calculate the gradient, then use $y-y_1=a(x-x_1)$ to find the equation of the line of best fit.

THE EQUATION IS:

6. What does the gradient represent in this context?

7. What is the *y*-intercept of your equation, and what does it represent in this context?

8. Based on your data, what would you predict is the maximum number of rubber bands so that Barbie could still safely jump from 602 cm?
   Using your Line of Best Fit (the graph): ________________________________
   Using your Equation: ____________________________

SHOW YOUR WORK ON THE PREDICTION USING THE EQUATION 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?