

Barbie Bungee Project

NAME _____

Group # _____

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

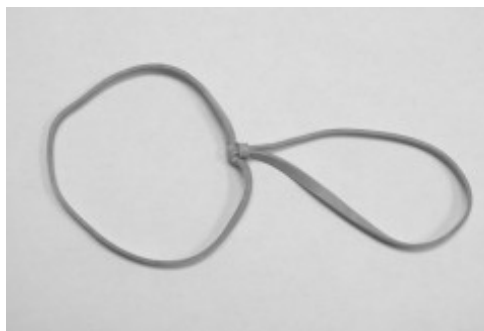
I believe that _____ is the maximum number of rubber bands that will allow Barbie to safely jump from a height of 250 cm.

Now, conduct the experiment to test your conjecture.

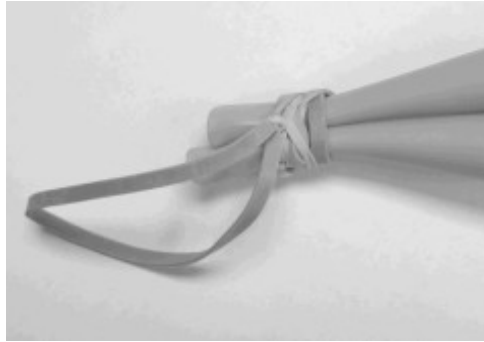
PROCEDURE:

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

- Tape a large piece of paper to the wall from the floor to a height of about six feet.
- Draw a line near the top 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, as shown (below).



- 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, as shown below.



- 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 in Question 1. Repeat the jump 5 times for each x -value and then circle the median. You will be using the median values for your scatter plot. Accuracy is important — Barbie, the doll's life, could depend on it!
- Repeatedly attach one additional rubber band 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 2–12.

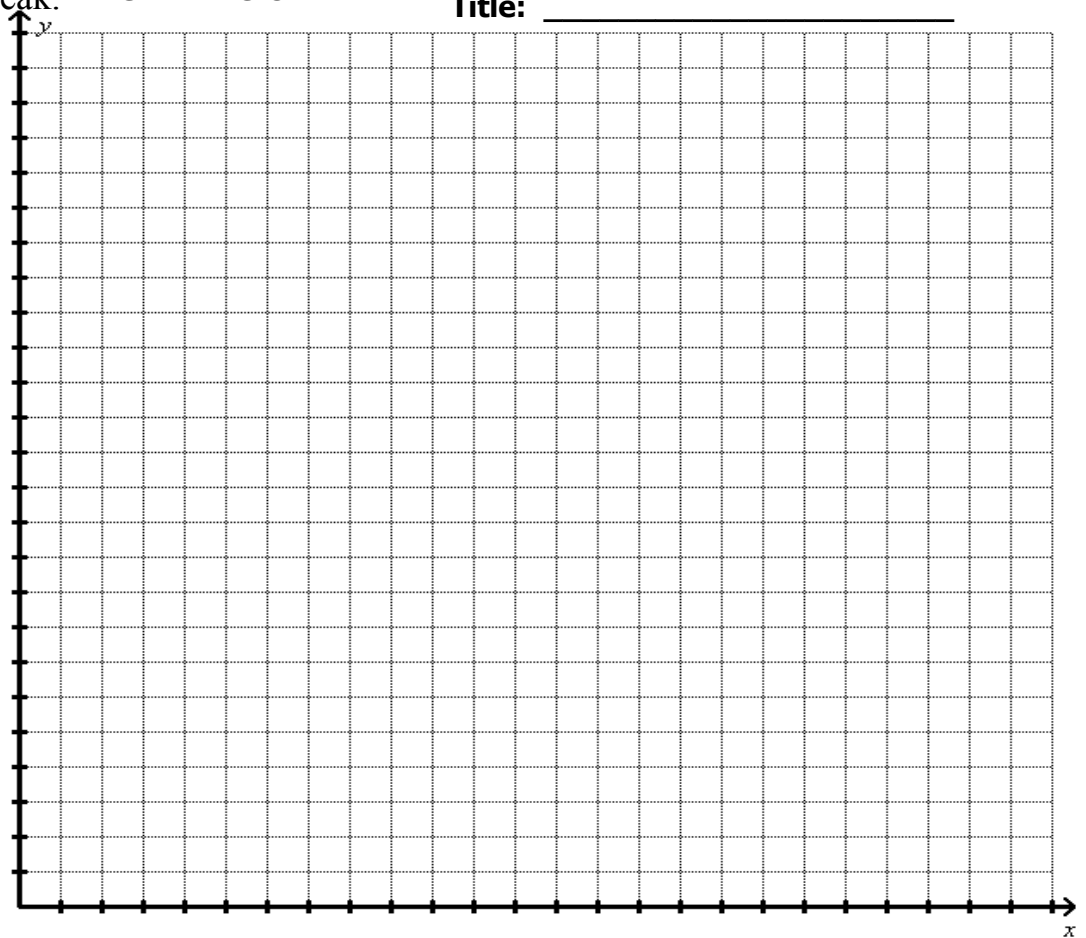
1. Complete the data table below.

# of Rubber Bands (x)	Jump Distance in cm					Median (y)
	Trial 1	Trial 2	Trial 3 (y)	Trial 4	Trial 5	
2						
3						
4						
5						
6						
7						

END OF DAY 1

2. Create a scatter plot of your data. Please have a title. For each axis, indicate the scale, label, and DO NOT have a break. **BEGINNING OF DAY 2** Title: _____

Label :



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

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

5. Create the equation for your line of best fit.

You will need to find the _____ and the _____ to write this equation.

Neatly show all of your work for finding the slope and the y -intercept of the line in the space below:

#5 Equation Answer: _____

6. What is the slope of your equation, and distinguish what it represents in this context?

$m =$

7. What is the y -intercept of your equation, and distinguish what it represents in this context?

$b =$

END OF DAY 2

This part should be completed independently. BEGINNING OF DAY 3

8. Based on your data, what would you predict is the maximum number of rubber bands so that Barbie could still safely jump from 250 cm?

Using your Line of Best Fit: _____

Using your Regression Equation (from #5): _____

Use & write the equation from #5:

(Be sure to show your work for this in the space below.)

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?

This part should be completed with your group.

11. At this point each member of your group has decided on the number of rubber bands your group should use for the final jump. Your group needs to compare these estimates and arrive at a consensus. Your Barbie may only jump once from your final height so your group must agree on one number of rubber bands.

How many rubber bands did your group decide to use? _____

In the space below, explain how your group chose your decision:

END OF DAY 3

12. Jump!! BEGINNING OF DAY 4

Successful Jumps:	10 points	the jump is within 10 cm
	8 points	the jump is within 15 cm
	6 points	the jump is within 20 cm
	4 points	the jump is more than 20 cm

Unsuccessful Jumps:	4 points	Barbie's head just perfectly touches the ground
	2 points	Barbie hits the ground with major impact

After Barbie's jump, **circle the point value that your group earned.**

Barbie Bungee Project – Grading Criteria	Rubric Score																			
Day 1	<ul style="list-style-type: none"> ○ The procedures checklist is complete. (2 points) ○ All group members work efficiently during the class period. (1 point) ○ The data table is accurate. (3 points) 	/6																		
Day 2	<ul style="list-style-type: none"> ○ The scatter plot includes a title, labels, scales, no breaks, and data points. (5 points) ○ The sketch of the line of best fit is reasonable. (1 points) ○ The relationship between the variables is clearly and accurately stated. (2 points) ○ The equation of the line of best fit is accurate, based on the data. (6 points) ○ The slope and y–intercept are explained in context. (6 points) 	/20																		
Day 3	<ul style="list-style-type: none"> ○ The predictions are made and their reliability is discussed. (3 points) ○ The predictions are compared to the original conjecture. (3 points) ○ The predictions are mathematically sound. (4 points) 	/10																		
Jump	<table border="0" style="width: 100%;"> <tr> <td style="width: 33%;">Successful Jumps:</td> <td style="width: 33%;">10 points</td> <td style="width: 33%;">the jump is within 10 cm</td> </tr> <tr> <td></td> <td>8 points</td> <td>the jump is within 15 cm</td> </tr> <tr> <td></td> <td>6 points</td> <td>the jump is within 20 cm</td> </tr> <tr> <td></td> <td>4 points</td> <td>the jump is more than 20 cm</td> </tr> <tr> <td>Unsuccessful Jumps:</td> <td>4 points</td> <td>Barbie’s head touches ground</td> </tr> <tr> <td></td> <td>2 points</td> <td>Major impact</td> </tr> </table>	Successful Jumps:	10 points	the jump is within 10 cm		8 points	the jump is within 15 cm		6 points	the jump is within 20 cm		4 points	the jump is more than 20 cm	Unsuccessful Jumps:	4 points	Barbie’s head touches ground		2 points	Major impact	/10
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Day 4	<ul style="list-style-type: none"> ○ Reflection questions are thoroughly and accurately addressed. 	/4																		

Total = _____/50