

# BARBIE BUNGEE JUMP

## JUMP OFF COMPETITION

Group members: \_\_\_\_\_  
(no more than 4 per group)

**Instructions:** You may only consult your instructor, class tutor or your own group members on this activity.

### **Part 1** EXPERIMENT

**Objective:** To determine the number of rubber bands necessary to give Barbie the best bungee jump from any given height without getting injured.

1. Define the variables you will use to determine Barbie's best bungee jump. Classify each variable as independent or dependent.
2. Using rubber bands, Barbie, and tape measure or meter stick, collect data for at least 9 different jumps and display the data in a table. Label your columns first.

Jump Attempt #		
1		
2		
3		
4		
5		
6		
7		
8		
9		

3. Plot your data on graph paper. Use pen.
4. Draw a line on the graph that you feel best fits your raw data.
5. Determine the equation of your line.
6. Test the model (equation) you determined in part 5 for a couple of jumps to see if it is a good predictor of the bungee jump and modify the equation if needed. Tell in your report what you tested and how your model worked. If it does not work consider adjusting your equation and testing again. Explain what you did in your report.
7. Explain what the meaning of the slope of this line is.
8. Explain what the vertical intercept of your model represents in the situation.

## **Part 2 REPORT**

A full typed report should be prepared and turned in at the conclusion of the jump off competition. The report should include the following in a clear organized manner.

1. A brief description of the goal of the experiment.
2. Definitions of the variables used.
3. A description of how you collected your data, including the setup, location, and each team member's role in the experiment.
4. A table of data collected.
5. A graph of your data with your best fit line. This can be done by hand or on the computer.
6. The equation of the best fit line. Including all calculations for multiple attempts.
7. A description of how you tested your model and the results of that test, including any adjustments you made to your original model and the new calculations.
8. Explain what the slope of your model represents in this situation.
9. Tell what the vertical intercept of your model represents in regards to Barbie.
10. If after testing your model, Barbie consistently is over 1ft from the ground, how could you adjust the model to make better predictions and give Barbie a better bungee jump experience?
11. If after testing your model, Barbie consistently is hitting the ground, how could you adjust the model to make better predictions and give Barbie a better bungee jump experience?
12. Your handwritten work you did during your experiment including any notes and algebra you performed to find your model.
13. Your calculations you perform using your model on competition day. These may be on a separate piece of paper and done by hand as long as it is neat.
14. Your team's conclusion of the success or failure of your model and jump attempt. Mathematical reasoning must be used.

## **Part 3 JUMP OFF COMPETITION**

### **Rules and Regulations for the Annual Barbie Bungee Jump Invitational**

- You will be given the competition height 10 minutes prior to the start of competition
- After the announcement of the competition height, practice jumps are prohibited
- All decisions of the judges are final and not subject to rebuttal, appeal, or question
- Barbie is participating at her own risk. The organizers, sponsors, or judges are in no way shape or form liable for any injury she might incur as a result of participating in this event. On the other hand, if Barbie suffers injury as a result of mathematical errors or poor application of scientific practices on behalf of the bungee builders, then said builders are responsible for the consequences of any and all negligence or lack of due diligence in performing these task and maybe accountable for any loss of educational resources suffered by the organizers of this event.
- When you receive the competition height use your mathematical model to design and construct a bungee cord that will produce the best jump in the competition.