NATIONAL MATH + SCIENCE INITIATIVE

Barbie® Doll Bungee Jumping

Graphing and Extrapolating Data

MATERIALS

computer with graphing software

meter stick

Barbie® doll

rubber bands

Team members have been hired to work for the company, No More Scaredy-cat Imposters. NMSI provides rock climbing, skydiving, extreme skateboarding, and hang gliding adventures to the public. The current market research indicates that NMSI should add bungee jumping to its list of entertainment services.

As part of the preliminary research, the management has assigned you the task of working out the details of a bungee jump that will ensure a safe yet thrilling adventure. Your team needs to determine what factors are relevant in predicting the correct bungee length for our first customer. The company has located the perfect site for bungee jumping and will provide the jump height to your team once you have completed the preliminary research.

PURPOSE

To ensure a safe and thrilling jump, you will determine the relationship between the jump height and the number of rubber bands used to make the bungee cord. Remember that safety comes first—however, we want your doll to come as close to the floor as possible without sustaining any "injuries."

SAFETY ALERT!

- Use extreme caution during the "jumps."
- Wear safety goggles throughout this activity.

PROCEDURE

1. Secure the doll's ankles together with one rubber band. This will serve as a point of attachment for the bungee cord. Tie back the doll's hair with a small rubber band if it is not already in a ponytail.
2. Construct a bungee cord composed of 2 rubber bands and attach it to the band on the doll's ankles. The doll should fall freely from a standing position, plunging headfirst.
3. Drop the doll several times to perfect the technique of taking readings and recording data.
4. Create a data table to record the trials, the number of rubber bands in the bungee cord, and the drop distance. Remember that you will be adding up to a total of 6 rubber bands, and that you will need to record an average maximum drop distance for each.
5. Drop your doll three times using 2 rubber bands, and record the data.
6. Add a rubber band to your attached bungee cord. Drop your doll three times using the new cord, and record the data.
7. Repeat Step 6 until you have used a total of 6 rubber bands. Additional trials may be performed if time permits. You may have to devise a way to take measurements greater than 1.0 m.
8. Calculate the averages of each drop distance and record these values in your data table.
9. Construct a graph of the average drop distance versus the number of rubber bands using a graphing program.
10. Perform a linear fit on the data using the program's curve-fitting function. Be sure to display the equation for the best-fit line in $y = mx + b$ format. Record this equation in your data sheet.
11. Using your equation, predict the number of rubber bands needed to provide a safe yet thrilling jump from the height that your teacher specifies. Your teacher will set the boundaries for both the doll's safety and her "thrill factor."
12. Create and attach a bungee cord to the doll based on the number of rubber bands you predicted in Step 11. When directed by your teacher, proceed to the drop zone and test your prediction.