Superhero Bungee

Your task today is to design and construct a safe yet thrilling bungee cord for your favorite Superhero.

You will be given a Superhero figure (or an appropriate stand-in), a single meter stick, instructions, rubber bands to make the bungee cord, and a sheet of graph paper. Measure your Superhero’s bungee drop distance as a function of bungee cord length (number of rubber bands) using only the given items, your writing implements, and a calculator or computer (if you wish). You should also use a blank sheet of paper to record a data table. You will be given 20 minutes to complete this portion of your task.

After 20 minutes, your meter sticks will be taken away, and a drop height will be announced. The drop height will be a random height between 0.5 and 5.5 meters, chosen by your student teaching assistants. You will be given 10 minutes to calculate the bungee cord length (number of rubber bands) needed to deliver the most thrilling, yet safe, bungee drop. No dropping is allowed during this time.

At the end of the 10 minutes, all work will cease. You will hand this sheet, with your printed names on it, to a student teaching assistant.

Student teaching assistants will then bungee your Superhero and measure the minimum distance between the Superhero’s head and the floor towards which he/she/it bungees.

The team with the smallest minimum distance will “win.” The sound of a head impacting the floor will result in disqualification and multimillion dollar lawsuits filed by your Superhero’s next of kin.

Your names. (Print your names legibly. That means so we can read them!)

___________________________________   ___________________________________
___________________________________   ___________________________________

Did you remember to print your names legibly (check one)? ☐ yes ☐ no.

To be completed by student teaching assistant:

Observed distance between floor and head (metric units): __________
Superhero Bungee Detailed Procedure

This is a modification of “Barbie Bungee,” taken from http://www.themathlab.com. Here is what they say about using their material: “This material is intended for PERSONAL USE. Please feel free to print and pass on any of themathlab.com copyrighted material. Include our copyright and our web address, themathlab.com, on any material that you use or distribute.” All the pictures here, and text in quotes, are taken from the “Barbie on a Bungee Line” link on the Math Lab’s home page.

“We're going to create a bungee line for Barbie that will give her the most thrilling, yet safe, fall from a height” which will be announced shortly.

“Barbie is an adventure seeker to the max. She loves the thrill of death defying activities. She believes the adrenaline rush makes her hair more lustrous and her waistline thinner; so she will pay big bucks to the company which gives her the most thrilling ride. In the back of her mind though, she wants to be sure that she's really safe.”

“To design the best bungee line…connect two rubber bands with a slipknot.”

“Then wrap one end repeatedly around Barbie's ankles. Be sure the rubber band is on tight enough not to fall off when she is being dropped.”

Tape a meter stick to the wall or lab table. “If you have two or three people working together, one person can hold the meter stick, and the others can drop the doll, and take the measurements... Be sure that it is vertical, and that the zero is at the TOP.”

“Now you will need to get a "baseline" measurement. That means you record the height of your doll without rubber bands adding length. Be sure that she is stretched out completely with her hands at her sides.”

“Record this amount next to the zero rubber bands in the chart.” Note: by “chart” they mean data table, which you need to prepare and fill in for yourself.

“Next we drop her with one rubber band attached to her ankles.”

“Hold the band tight at the top of the yardstick, and simply let Barbie drop from the head-down position you see above.”

“She won't swing; she will just lightly bounce.” For the actual drop, your student teaching assistant will use a pencil instead of a finger as pictured.
“This is the tricky part. You need to observe the LOWEST spot her head reaches during the bounce. The final resting spot is NOT the lowest spot.”

“You will probably have to drop her two or three times to get an accurate lowest reading. It really helps to have another person watch too.”

“Now it’s time to start adding more bands. Once again use a slipknot to connect a second band to the bungee line. (Remember the band wrapped around her ankles does not count in the length of the line.)”

“Drop her with the two rubber bands attached to her ankles. Hold the band tight at the top of the yardstick, and simply let Barbie drop from the head-down position. She should bounce a bit more than she did with just one rubber band. The amount of bounce will get markedly larger as you add bands!”

“Remember, you may need to drop her several times to get an accurate reading of the LOWEST spot her head reaches.”

Repeat the steps above until you have enough data to accurately predict the final position of your Superhero’s head for any number of rubber bands.

Your student teaching assistant will announce the drop height for this lab. You are to bungee your Barbie (we’re using “Barbie” as the sample name for your Superhero) from the given height, using as many (or as few) rubber bands as you wish. But first, “consider the SAFETY issue vs. the THRILL issue.”

If you use one too many rubber bands, “her head will reach the floor, she will crack open her skull, and die. You will then be sued for negligence and will lose your business and owe her family millions of dollars that you don't have.

On the other hand, if you shorten the bungee line TOO MUCH, the ride may not be thrilling enough, and Barbie will pay her big bucks to your competitor. You will lose clients and your business will suffer.

So make a decision on how many bands you want to use, then attach that many bands to Barbie's line using slipknots like above.”

Remember, this event is called “Barbie Bungee,” not “Suicide Barbie.” The team whose Barbie comes the closest to the “ground” will “win.”

You will be given 20 minutes to collect data. Then your meter sticks will be will taken away and the drop height announced. You will have 10 minutes to determine and tie together the correct number of rubber bands needed to give Barbie the maximum safe bungee thrill. You will be given plenty of graph paper, or you may use the computers in the lab. After that, we will see if you can be trusted to design amusement park rides.