

Name:

The Adventures of Barbie Bungee and the Really Long Line

I. The quest for the n th rubber band

On the accompanying handout, you will find a scatter plot of the data collected from Barbie's jumps. Along with this data, we have provided you with a "line of best fit" - think of this line as a good estimator of the relationship between rubber bands and how far Barbie fell.

Recap Questions:

1. How did we figure out how far Barbie would fall given a number of rubber bands?
2. Could we use the same procedure if we used 20 rubber bands? What about a million rubber bands?
3. Is extending the line of best fit a practical approach?

II. Searching for clues

Now we need to determine a different way to figure out how many rubber bands to tie to Barbie to have her fall a very large distance. A good way to start a problem like this is to look for a pattern. In the table below, write down the y-coordinate (vertical part) of the points on the line of best fit with the given x-coordinate (horizontal part). We will help you with the first one.

x	y
1	
2	
3	
4	
5	
6	
7	
8	

Do you see a pattern? Write down any relationships that you see between the numbers in your table.

Using this pattern, we want to **Generalize** the relationship between the number of rubber bands and how far Barbie falls. Write down any useful arguments that may help us do that.

Equation for our line:

III. The Temple of slopes and intercepts

We have already seen the pattern between points whose x-coordinate differ by 1 (such as 1 and 2, 3 and 4, etc.). Now we want to consider the pattern between points who differ by more than 1. Try several different points and enter your findings in the table below.

$X_2 - X_1$	$Y_2 - Y_1$
1	
2	
3	
4	

There seems to be a pattern. What happens if you take the difference of the y's divided by the difference of the x's? (i.e. $\frac{y_2 - y_1}{x_2 - x_1}$) Is there a common solution, or does your answer depend on which points you choose?

We call this number the "slope." Just like mountains that you may have skied on before, slope indicates the steepness of a line. We'll use this idea in the weeks to follow. One last thing to notice: if you were to extend the line of best fit backwards, where does it intersect the y-axis. Notice that this is the same number as on the end of the equation we found above. We call this number the y-intercept, for obvious reasons. Write the slope and y-intercept for your equation below.

Slope:

y-intercept:

Congratulations! We can now find the equation of ANY line if we can find it's slope and y-intercept. What would that general formula be?

IV. The final conclusion

We have come a long way, but finally we have a way to find out how far Barbie fell given a number of rubber bands, as well as how many rubber bands to use to make Barbie fall a certain distance. Do the following problems with the help of a calculator to test your equation.

1. How many rubber bands must we tie to Barbie to have her fall as close to one million inches as possible?

2. How many inches will Barbie fall if we tie one million rubber bands to her feet?

3. Check to see if this point is on your line: (12543, 67834)