

## Bungee Barbie: Worksheet answers

### Part 1 Scientific Questions

When scientists and engineers ask a scientific question, they make a prediction: ***If this thing is changed, then that is expected to happen.*** In testing that prediction, they try to keep all other factors unchanged.

Suggest a couple of scientific questions that you could ask using your experiment equipment and materials:

The amount of rubber bands and the drop height are related.

The amount of rubber bands and the drop height are not related.

Some scientific questions will be more suitable for investigation in a classroom setting. Your teacher will lead a discussion to decide which scientific question will be investigated. Your group will then decide how to investigate that question.

The scientific question that my group will investigate is:

The amount of rubber bands and the drop height are related.

Our hypothesis is:

I think that as the number of rubber bands increase the height the barbie dropped with be proportionally linear.

Our **Independent** variable is (What you changed):

Rubber bands.

Our **Dependant** variable is (what you measured):

Height the barbie dropped.

Our **controlled variables** are (what did you keep the same):

- Same type of rubber band: Different rubber bands stretch differently so using the same keeps data consistent.
- Method of attaching rubber band: Different methods could result in changing the bands ability to stretch.
- Same doll: If the doll was changed the weight pulling down would be different and results would change.
- Same method of measurement: Using the feet or the Barbie or the head or the top of the hair would all give different results, picking one and staying consistent will improve reliability of results.

Are there any **safety** issues to consider?

As we are throwing the barbie doll off the edge of something high, we must be careful.

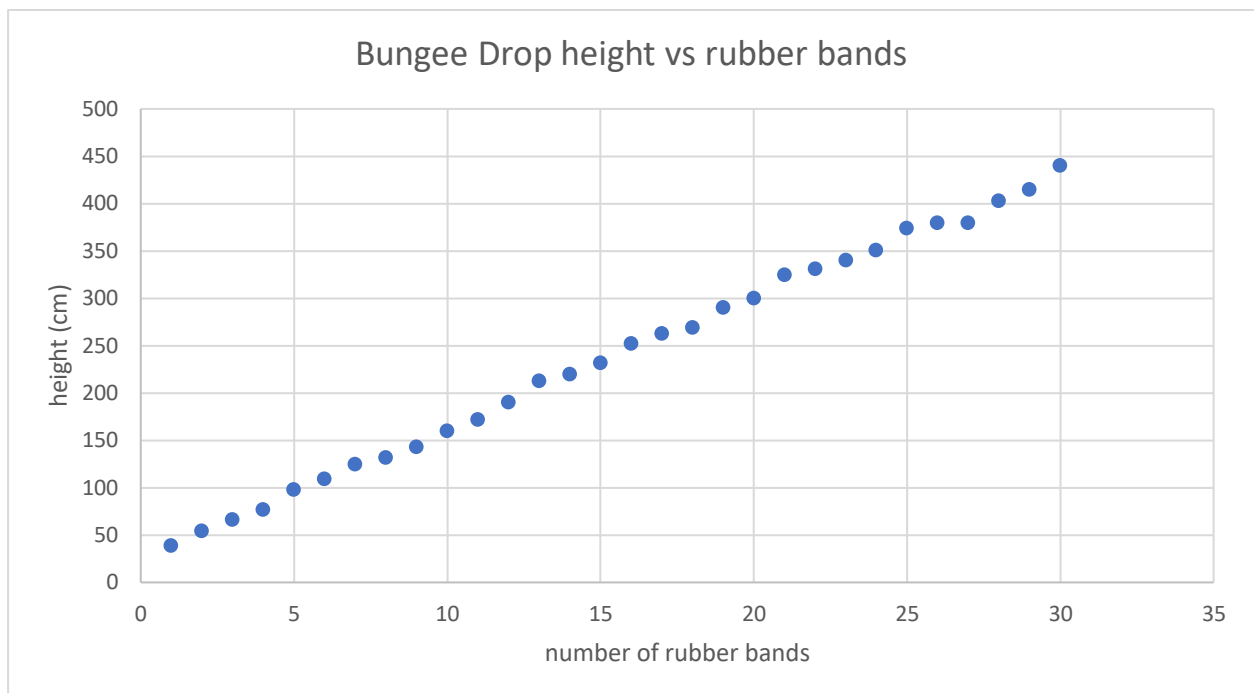
## Part 2 Testing our scientific question

Get approval from your teacher of your plans (Part 1) before starting Part 2.

Results:

No. of Elastics	Distance fallen (m)			
	1 <sup>st</sup> Trial	2 <sup>nd</sup> Trial	3 <sup>rd</sup> Trial	Average
1				39
2				54.3
3				66
4				77.2
5				98
6				109
7				125
8				132
9				143
10				160
11				172
12				190
13				213
14				220
15				232
16				252
17				263
18				268
19				290
20				300
21				325
22				331
23				340
24				351
25				374
26				380
27				380
28				403
29				415
30				440

**Graph: For this experiment a scatter plot would be best as you have an independent and dependant variable, include a trend line that goes through (0,0)**



### Part 3: Discussion

What does the trend in the graph mean?

The trend means that the amount of rubber bands is linearly proportional to the height the Barbie dropped. It was not exponential.

If the mass of the barbie was changed, how would the graph change?

If the mass of the Barbie changed the graph would shift upwards, the gradient would not change.

Why can't the results be directly applied to a real bungee jumper?

The ratio of Barbie to rubber band elasticity is not going to be the same of a human, therefore the results cannot be directly applied.

What improvements could be made to make the experiment more reliable?

- 1) Having a way of releasing the Barbie, unintentionally some of the Trials may have given the barbie a force and therefore not all the same
- 2) Having a way of measure the exact height the Barbie dropped would also improve accuracy of data rather than using the human eye.

## Part 4: Reflection

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Did your observations or measurements agree with your expectations and prediction? Can you explain why?

This will depend on what the expectations the students had, and what they had predicted.

Did you encounter any problems?

This will vary on how the student conducted the investigation. Some students may have problems depending on their knowledge, while others will have no problems.

What changes could you have made to this experiment?

This will vary on what recommendations that the students may offer.

What did you discover for this experiment?

This will vary depending on the student's prior knowledge.

## Conclusion:

The results support the hypothesis that the amount of rubber bands is linearly related to height of the Barbie, rather than being exponential.

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