

Roller Coaster of Statistically Likely Doom (Part 1)

Your circus is making a ton of money. Crowds are lining up every night for a chance to see the launching clowns. Every child loses a great deal of money on your new penny-launching game (they come *so close* to winning each time, but not quite). The head clown approaches you for a new idea: design a roller coaster with a loop in it. Now, you won't be able to build a full track to experiment with. *Using just a section of roller coaster track, you have to figure out how high to make the track so the car will make it around the loop.*



Question:

What is the minimum height at which you can release the ball in order for the ball to *just make it* around the loop? Extra credit will be awarded to the group that comes up with the lowest height that actually makes it over.

This week will be devoted to data-taking.

- Brainstorm some ideas of what might affect the speed of the marble.
- Determine which factors are important enough to consider.
- Design an experiment to test the effects of these factors

Next week you will be able to test out your roller coaster prototype using the information your class has accumulated.

I. Introduction	5 min	Whole class
II. Brainstorm and plan	15 min	Groups of 4
III. Carry out the experiment	85 min	Groups of 4
IV. Evaluate your experiment	15 min	Groups of 4

Next week, you will apply your results to make a prediction about a real apparatus. Don't submit a lab report today.

MAJOR GOALS:

- *Be able to estimate the uncertainty in data that you are not actually taking, based on your experience with similar experiments. Use that knowledge to compare experimental methods without implementing them.*
- *Identify the kind of uncertainty that can be minimized with experimental design or technique, and minimize it.*
- *Determine the uncertainty in a calculated result based on the uncertainty in experimental data.*