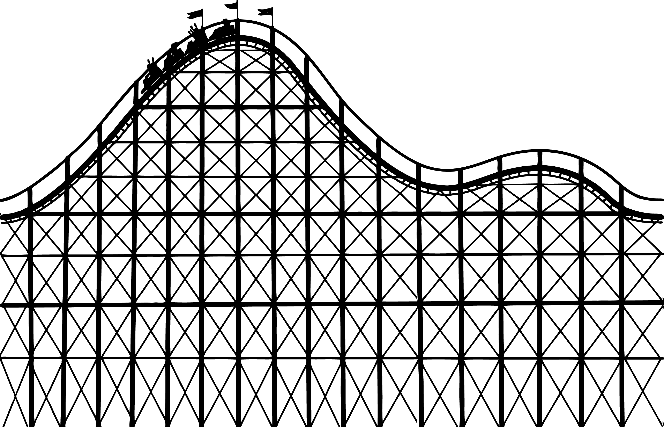
Newton’s Revenge & UK’s

Basketball Players

*How Can I Use Data to Solve a Problem?*

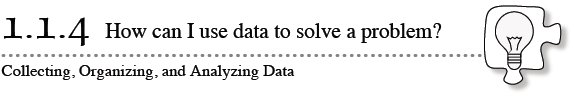
**



Pam Argabrite

CPM Teacher Leader & Coach

[*pamargabrite@gmail.com*](mailto:pamargabrite@gmail.com)



Computing batting averages, performing scientific experiments, and polling people during elections are just a few examples of how data can provide useful information when it is collected and analyzed.  In this lesson, you will be collecting and organizing data to determine the potential danger of riding a roller coaster.



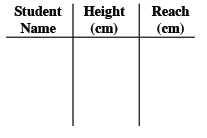
**1-24.** NEWTON’S REVENGE

**Your Task:**Consider how you could determine whether the tunnel is actually safe for any rider, no matter how tall. Discuss the questions below with your team. Be ready to share your responses with the rest of the class.

http://textbooks.cpm.org/images/cc3/common/DiscussionPoints.png

* What is this problem about?  What is it asking you to do?
* What information can help you answer this question?
* How can you get the information you need?

**1-25.** One way to determine if the roller coaster is safe is to collect and analyze data.

* 1. Collect data from each member of your team. 

Each member of the team needs to be measured twice.  First, have one team member stand and have another team member measure his or her height.  Second, have the same student sit in a chair or desk, raise his or her arms so that they are stretched as far as possible above his or her head, and measure the distance from the seat of the chair to his or her fingertips (called “the reach”).  All measurements should be in centimeters.

Each person should record the team’s data in a table like the one above.

* 1. Send one person up to record your team’s data on the class table.  Then add the rest of the class data to your own table. You may want to save your data using [Newton's Revenge Student eTool](https://www.desmos.com/calculator/lltn8qraov) (Desmos).
  2. Each person should put his or her initials on a sticky dot, then graph his or her own *height vs. reach* point on the class graph.
* **1-26.** Use the class graph to answer the questions below.
  1. Are there any dots that you think show *human error*?  That is, are there any dots that appear to be graphed incorrectly or that someone may have measured incorrectly?  Explain why or why not.
  2. Is a person’s reach related to his or her height?  That is, what seems to be true about the reach of taller people?  Explain.
  3. Since a person’s reach depends on his or her height, the reach is called the **dependent** quantity (or variable) and the height the **independent** quantity (or variable).  Examine the class graph of the data from problem 1-25.  On which axis was the independent data represented?  On which axis was the dependent data represented?
  4. Is there a trend in the data?  How can you generalize the trend?

**1-27.**  Everyone is complaining about how the teacher made the class graph. 

* 1. Jorge is confused about how the teacher decided to set up the graph.  *“Why is it a 1st-quadrant graph instead of a 4-quadrant graph?”*  Answer Jorge’s question.  In general, how should you decide what kind of graph to use?
  2. Lauren is annoyed with the *x*-axis. “*Why didn’t the teacher just use the numbers from the table*?” she whined.  “*Why count by twenties*?”  What do you think?
  3. Hosai thinks that the graph is TOO BIG.  “*The dots are all mashed together!  Why did the teacher begin both the x- and y-axes at zero?  Anyone that short would never be allowed on the roller coaster.  Why not just start closer to the smallest numbers on the table?*” she asked.  What do you think?
  4. Sunita says the graph is TOO SMALL!  “*If we’re supposed to be using this data to check if the coaster is safe for really tall people, the graph has to have room to graph tall people’s dots too.*”  Do you agree?  If so, how much room do you think is needed?

**1-28.** Using all of your ideas from problem 1-27, make your own graph that will help you determine whether the ride is safe for very tall people. An example of a “very tall” person is Yao Ming, who retired from the NBA in 2011. He was one of the tallest NBA players in history, measuring 7 feet 6 inches (about 228.6 cm) tall. Is the roller coaster safe for him? Explain.

**1-29.**   Is the roller coaster safe for all riders?  Prepare a poster that shows and justifies your team’s answer to this question.  Every team poster should include:

* 1. A large, clear graph.
  2. A complete, clear, and convincing explanation of why your team thinks the ride is or is not safe for all riders.