



## PHYSICS ACTIVITY SHEET

**Note:** *These questions are designed to engage students in some qualitative and quantitative analysis of the application of physics concepts at an amusement park. Since each question requires them to essentially design a methodology for developing a solution to the question, students may approach any particular question differently. As a result, there may be several different solutions to the same question and there may be more than one right answer.*

### **What if?**

Tidal Force is a 100-foot tall splashdown ride that creates massive waves that soak our guests, as well as those standing in the designated "Splash Zone" in the midway!

- What factors determine the size of the splash?
- What happens if the boat is half full versus completely full?
- How does the capacity of the boat affect how far the water makes it into the "Splash Zone"?

Watch a few boats as they go around the ride and record any observations you notice.



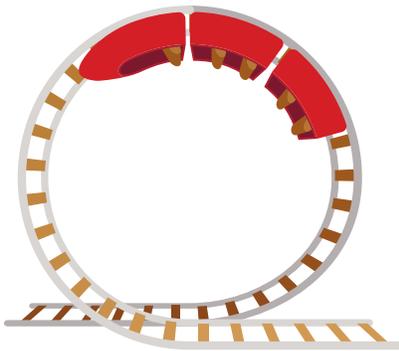
### **Why do they do that?**

Some of our roller coasters have multiple inversions, which are elements where the train goes upside down. One of these coasters is Fahrenheit, which has 6 inversions. Observe each of the inversions on Fahrenheit.

*What factors determine the size of each of the inversions, as well as their location along the ride?*

Vertical loops are a common element on many roller coasters. The loop on sooperdooperLooper is circular in shape, while the loop on Great Bear is an oval-shape, more commonly known as clothoid.

*Why do you think most loops are clothoid-shaped? Why do you think circular loops are not very common?*



Our faster, more intense roller coasters have steeper banked turns than those that are slower and gentler.

*What is the purpose of banked turns on the faster roller coasters? Think about the energy and distribution of forces.*

### **How do they do that?**

Gravitational potential energy is a major factor in determining how much energy a roller coaster train will have in order for it to make it all the way through its course.

*What factors contribute to a greater gravitational potential energy? What formulas would you use to calculate this data? Which of the roller coasters at Hersheypark do you think has the greatest gravitational potential energy?*

The Claw is a pendulum-style ride that swings its riders up to 65 feet in the air.

*What kinds of systems do you think are necessary to get the pendulum to swing so high? What do you think would happen if gravity was the only way to slow it down? Would it take a short amount of time to stop, or a long amount of time? Think about the forces and energies involved.*

