

Graph Matching Activity – Teacher’s Notes

In preparation for your participation in Physics Day at Six Flags, you may find it helpful to orient students to the rides and data they will be analyzing. In this activity, students view videos of the rides and attempt to match each video to its corresponding graphs.

On the CD you will find a set of QuickTime videos for the following rides: Batman, Highland Fling, The Joker, Mr. Freeze, Riverview Racer, and Rush Street Flyer. These video clips can be played on any computer with Apple Computer’s free Quicktime Player. Quicktime Player can be downloaded from <http://www.apple.com/quicktime>.

SetofNumberedGraphs.pdf shows two or three Force Factor graphs and one altimeter graph for each of the six rides. Force Factor vs. time graphs show the ratio of the normal force in the direction of measurement to the magnitude of the gravitational force. That ratio, the Force Factor, is a multiplier that can be used to find the normal force on an object. For example, a Force Factor of 2 in the head-to-toe direction means that the normal force is twice as big as the gravitational force and you would feel twice as heavy as usual. A Force Factor of 0.5 in the front-to-back direction means the seat’s force on your back is equal to half of the gravitational force on you. *See a detailed explanation for interpreting Force Factor data in the Measurement document in the Introduction folder of this CD.*

Before beginning the activity, provide students with an introduction to the Force Factor concept. Once the students understand Force Factor, provide each student with a copy of GraphMatchingActivity-student.pdf and provide each group of students with the set of graphs in SetofNumberedGraphs.pdf. If you have a computer for each lab group, copy the Quicktime videos to each computer. If only one computer is available, connect a digital projector to show the videos for the class. As students work to determine which graph corresponds to each video, ask each group to justify their choices.

When a group has matched all the graphs with the rides, assign the group one set of graphs and have them prepare to justify their match for the class. This presentation could use a transparency of the data on the overhead projector, and, if a digital projector is available, the students can show the video clip along with their presentation. Ask students to provide evidence for their match by including force diagrams (free-body diagrams) for critical points on the graph. Students should be encouraged to correlate the motion or position they observe on the video with the features on the graphs that are consistent with the particular motion or position. Note that the altitude vs. time graph has the same time scale as the Force Factor graphs. This is extremely helpful in determining whether hunches about what is being shown on the Force Factor graphs are correct since the altitude graph helps students locate the specific position on the ride at a particular time.

This activity is very helpful in preparing students to know how to analyze the graphs they will encounter when they attend Physics Day at Six Flags. It also provides an excellent review of much of the mechanics that students have studied in their introductory physics class.

Answer Key

Graph 1: Batman
Graph 2: Mr. Freeze
Graph 3: Highland Fling
Graph 4: Riverview Racer
Graph 5: The Joker
Graph 6: Rush Street Flyer