Welcome to Physics Day at Elitch Gardens!

In this booklet, we provide a variety of materials for teachers and students to take advantage of some of the many educational opportunities at Elitch Gardens. Feel free to duplicate any of these materials. Please do not distribute information in the last section. It contains ride specifications — these often contain the actual values that students are asked to estimate or calculate. We have tried to provide materials that will give maximum flexibility for use in the classroom.

1. Suggestions for Making Measurements. In this section are some ideas on measuring time, distance, angles, and accelerations related to various rides, as well as some suggestions for equipment that can be built in the classroom loaded as an app, and brought to Physics Night. NOTE!!! Accelerometers involving hanging weights will not be allowed on any ride on which the rider is inverted. e.g. Mind Eraser, Sidewinder, Boomerang. There are suggested Smartphone apps that could be used on any ride to make measurements of height, speed, and acceleration. This section also includes definitions of physics quantities and information dealing with graphical interpretation.

2. Estimation Problems. This section invites students to make order of magnitude estimations concerning quantities at the park. Students will need to make some assumptions about quantities (e.g., number of hot dogs consumed per person, the number of people who visit the park etc.) to determine the magnitude of some of the quantities. Answers are not provided, but the quality of the assumptions made and the consideration of influencing factors should be reflected in the teacher-based grading.

3. Ride-related activities. The activities for each ride are divided into three parts.
Part 1 - These questions generally do not require any calculations or estimations. The questions ask for information about sensations and other observables. These questions should be appropriate for all students regardless of physics background.
Part 2 - These questions generally require the students to make estimates or timings. For estimates, students are asked to describe their method. The calculations generally involve substituting into provided equations. This section would be most appropriate for physical science students or students in a physics course that does not emphasize mathematics.
Part 3 - These questions generally provide minimal guidance for calculating quantities. They rely on a student's understanding of physics relationships and vectors including trigonometric relationships. This section would be most appropriate for physics students.
Data for Parts 1 and 2 needs to be collected during Physics Day; however, the calculations and descriptions could be completed later at school. Part 3 information often relies on data from Part 2 and often requires that some measurements using accelerometers or protractors be made at the park. Much of the analysis of the data could be done at a later time.

4. Physiology of Amusement Park Rides. Questions on this page invite students to be thoughtful about a variety of physiological responses to typical rides.

5. Specifications for Elitch Gardens Rides. Data for several rides at Elitch Gardens are presented in this section. These data are provided to assist teachers in designing studies for their students, including the use of the activities materials provided in this booklet. Because some of these data may be relevant to Physics Day Challenges, we request that teachers do not give these data sheets to students.

Many teachers who use these materials have their students work in teams to gather data and complete the activity sheets. No student should be forced to participate in any ride. Most activities can be completed without actually riding the ride. Estimates and measurements can be made from the ground. Safety is a concern of Elitch Gardens and it should be for your students as well.

This booklet is the result of significant work done by Steven Iona at the University of Denver, Department of Physics and Astronomy, 2112 E. Wesley Ave. Denver, CO 80208. It is built upon earlier drafts done by Rob Davies and activities drawn from similar manuals used at Kennywood, Wyandot Lake, Six Flags-St. Louis, Six Flags –Texas, Vancouver, Lagoon, Playland, and Riverside theme parks. Mark Siemens, University of Denver, provided content and editorial review.

The entire Physics Day program, including this booklet, is a work in progress.
Your comments and suggestions can improve the program. Please send your remarks to:

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Elitch Gardens Theme Park & Water Park

Tickets can be purchased online at ElitchGardens.com

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