Model Roller Coaster Contest 2019

California's Great America is proud to offer you and your group, entry into this year's Model Roller Coaster Contest. To find out how you and your school can enter this exciting contest, read the rules and suggestions that follow.

Roller coasters are called "gravity rides" for a good reason: once the coaster has been dragged to the top of the first hill and released, it is the force of gravity that keeps the coaster going all the way back to the station platform at the end of the ride. As the coaster goes through its twists, turns, rolls, and loops, it gains and loses its initial potential energy (supplied by dragging it up the first hill). Energy changes from potential into kinetic energy and back into potential energy. Since some of this initial energy is lost due to friction, the roller coaster can never rise as high as the first hill. The roller coaster you will design is also a "gravity ride".

We are encouraging schools to build and enter roller coaster models built by teams of students in either of the two grade categories: Grades 5-8 or Grades 9-12. Materials that seem logical include wood, wire, string, twine, doweling, toothpicks, cardboard, construction paper, glue, tape or other low cost items. Commercially available roller coaster kits are discouraged although ideas obtained while building them might be incorporated in the final design. In the "Spirit of the Competition," the key ingredients are creativity and application of science principles. Doing a great job is encouraged over spending lots of money to complete the project. See attached section on etiquette.

Awards:

The Model Roller Coaster Contest Awards will be divided into two (2) basic categories: Technical/Performance and Additional. The description of each follows:

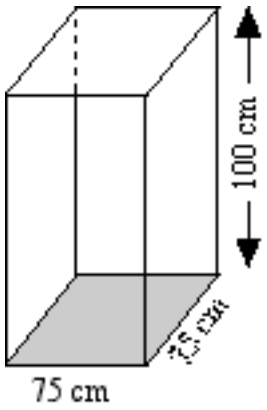
Awards

Based on the rulings of the judges, additional models will be recognized in a variety of categories. Some examples might include but not be limited to:

* Judges' Choice
* Most Enjoyable
* Most Technical
* Most Likely to be Built
* Most Creative Theming
* Best Use of Space

Rules:

1. Size restrictions - at least 75 cm x 75 cm x 100cm



In practice, the team will place their model in a 3-sided form such as shown on the right. If any portion sticks outside the form, the model must be modified until all portions are inside or it will be disqualified. **You should check to make sure you can successfully carry your model in the bus or vehicle you are taking to PSM Day.**

2. The model should be designed for a steel ball or glass marble. This means that the steel ball or glass marble when released from the top of the first hill by the judge will travel through the entire ride and arrive at the bottom loading platform. (Note: for this contest, you will raise the steel ball or glass marble by hand from the loading platform to the top of the first hill to start the "ride".)

3. A ball must be provided by the team so that it can be tested on judging day. The ball must be either a glass marble of regular size or greater (shooter), or a steel ball that is 1 cm (1/2") diameter or greater.

4. The ball must remain in contact with the track at all times. The following are prohibited: free-fall of the marble, uncontrolled movement through a funnel, Frisbee disc or similar. If there is a question about legality of a design, questions may be posed to the PhysicsDay.org webmaster: webmaster@physicsday.org

5. Magnets, electricity, springs and other forms of energy may not be used - this is a "gravity ride" only. These other sources of energy can be used for aesthetics (e.g., background lighting). No access to 100-volt ac electricity is provided in the contest area.

6. The starting position at the top of the first hill should be clearly marked. The steel ball or glass marble must end in a designated area or container.

7. Each competing team can have a maximum of 4 students. The maximum number of teams from a school is 4.

8. **The decision of the judges is final. Any coaster that violates the rules above or the spirit of the competition will be subject to disqualification.**

Daily Procedures

Location – Great America Pavilion

9:00am-11:30am - Students bring model to Great America Pavilion. Check in with contest official and have size checked as above. (Rule 1) Team may make adjustments to the model. Only team members allowed in contest area at this time. Check in with the judges and tell them about the special characteristics of your coaster.

11:30am-12:30pm – Judges will test the models by themselves. Teams are welcome to participate in activities inside the park during this time.

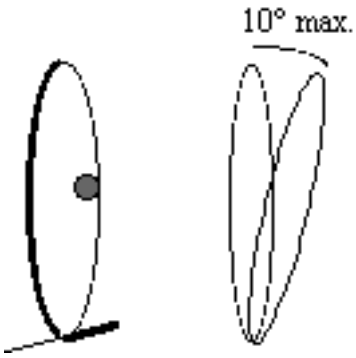
1:00pm - Prizes awarded. Open to the public and teams to see results of the contest. Judges will be present to answer contest questions.

Technical Score (25 pts)

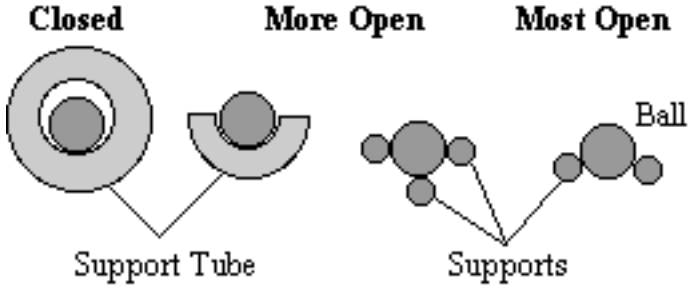
Each model will be entitled to three runs. Based on the total time, points will be awarded according to the rubric. (25 pts maximum) (See Rubric)

Bonus points for technical merit will be awarded for the following: (See Rubric)

5 points per vertical loop. Vertical loop is defined as any time the "rider" is upside down on a loop of track that is within 10° of vertical (see illustration below). If the vertical loop is a portion of a corkscrew (helix), it counts as a vertical loop. Horizontal loops do not add bonus points.



0-15 points may be awarded for degree of openness of track.



0-10 points may be awarded for novel engineering, including use of unusual materials, quality of workmanship, etc.

Theme (creativity & marketability) Score (25 pts)

The model roller coaster will be judged for its merits as a possible ride to be purchased by an amusement park. Theming is an essential element of a new ride. A park marketing manager will judge this category. A score out of 25 will be awarded to each entry. (See Rubric)

Rider Enjoyment (25 pts)

Members of the American Coaster Enthusiasts will judge each entry for rider enjoyment. These folks have ridden most of the biggest, scariest rides in the world. A score out of 25 will be awarded to each entry. (See Rubric)

Rubric

Calculation of points for Time

Time	1-3.9 sec	4-7.9 sec	8-11.9 sec	12-14.9 sec	>15 sec
Points	5 pts	10 pts	15 pts	20 pts	25 pts

Calculation of Bonus Points

Bonus Points for technical merit will be awarded based on a rubric similar to that below. The actual categories used and point distribution will be developed more fully between now and the actual event.

Vertical Loops	1 = 5 pts	2 = 10 pts	3 = 15 pts	4 = 20 pts
Track Openness	Mostly closed = 0	~25% open = 5 pts	~50% open = 10 pts	>80% open = 15 pts
Engineering	Nothing unusual = 0	Some novel materials = 3 pts	Several novel parts = 6 pts	Great deal of novel design = 10 pts

Calculation of Theme points

Theme points will be awarded based on a rubric similar to the one below. The actual rubric and point distribution will be developed more fully between now and the actual event.

Definite Theme	No theme = 0	Theme but little follow through = 3 pts	Theme throughout ride = 6 pts	Theme well done throughout = 10 pts
Would attract visitors	Wouldn't attract = 0	Minimally attractive = 3 pts	Moderately attractive = 6 pts	Strongly attractive = 10 pts
Park would be able to build	Very difficult to build = 0	Building would be possible, but would be challenging = 3 pts		Very reasonable to build = 5 pts

Calculation of Rider Enjoyment points

Rider Enjoyment points will be awarded based on a rubric similar to the one below. The actual rubric and point distribution will be developed more fully between now and the actual event.

"Realistic" Ride	Unrealistic for people = 0	Would be harsh for people = 1 pt	Would be generally reasonable = 3 pts	People would ride safely = 5 pts
High g-forces	Blah ride = 0	Very minor g-forces = 1 pt	1 good area = 3 pts	>1 area = 5 pts
Unexpected thrills	None = 0	Very minor thrills= 1 pt	1 good thrill = 3 pts	>1 good thrill = 5 pts
Would you want to ride it?	Definitely not = 0	Most likely not = 3 pts	Most likely yes = 6 pts	Definitely yes = 10 pts

The rubrics above will be used by the judges during the contest. They should be used by teachers as they work with their classes. Check back here as you get closer to Physics, Science & Math Days to see if any changes have been made that will affect your model. Thank you for your interest in our Roller Coaster Model Contest for 2018.

Documentation

(1) Each team must attach a 3" x 5" index card to the ride. The front of the card should include:

Name of the Roller Coaster
Official Entry Number (supplied by Great America)
Grade Level (5-8 or 9-12)

The back of the card (not showing) should include:

School Name
Members of the Team with grade level
Teacher Name
Teacher's contact phone number
Teacher's contact email

(2) Each team should download and complete the Entry/Scoring Form. Fax the completed form to Great America following the instructions on the form. Deadline: Two weeks prior to visit date. If unable to get form faxed in time, registration can still be done at the park, but please try to let us know in advance that we should be expecting an entry from you so we can make sure they are enough tables to place all the models on.

Location: Great America Pavilion

Time: 9:00am-11:30am – Drop-off

11:30am-12:30pm – Judges test the rides

1:00pm – Prizes awarded. Open forum to ask judges questions

California's Great America

Roller Coaster Model Contest 2019
Entry Form

Print out and complete this entry form prior to the contest date at California's Great America. It will serve as your contest entry form as well as the scorekeeping form for the contest officials. Please make sure the names can be read easily. Fax the completed form to **408.986.5855**, **ATTN: PSM/Roller Coaster Contest**. You will receive your entry number on the date of the event. **Deadline: Two weeks prior to your visit date.**

Name of Roller Coaster: _____

Date of Visit: _____

School Name: _____

Grade Level (circle one): Grade 8 and below 9-12

School Address:

_____

Teacher Name: _____ **Phone:** (____) _____

Contact E-mail: _____

Team Members (name/grade)

_____/____ _____ /____

_____/____ _____ /____

JUDGING

Times: _____ sec _____ sec _____ sec

Bonus Points: _____ **Points**

Theme Score: _____ **Points**

Rider Enjoyment: _____ **Points**

Grand Total: _____ **Points**