COASTER KINGDOM

Extra Credit in Exactly 10.0 Seconds

For Standard and Honors physics

Purpose:

To build a roller coaster to allow a sphere to travel a student designed and student built course in **exactly** 10.0 seconds.

Rules/Procedures:

1) Entries may be designed and built by a either an individual or a team of 2 students.

2) You are limited to materials on the materials list. Multiple mediums for the track are encouraged with extra points.

3) You must **try** to include at least vertical **one loop** on the track. Massive points will be given for successfully completing a loop. More loops, more points. a ball travels around and around along the same track piece, then it still only counts as one loop. If you are not able to build with a loop, at least build the track! (You just won't get the maximum amount of points)

4) Track must have at least **1 hill** for the marble to go **up**. Massive points will be given for this hill. More hills, more points.
Hills must have a height difference of at least of 10 cm below previous hill's maximum height.

5) You must be able to see the marble on the track for AT LEAST **1/2 of the total trip**. Looking through clear tubing does not count.

6) You must name your roller coaster and have a theme. Tunnels and scenery are a must--you will get points for decorations such as small signs, mountains, trees, random people, miniature models etc..... Think about the Matterhorn or Thunder Mountain, or the Pirates of Caribbean at Disneyland.

7) The roller coaster's height is only limited by the ceiling in the class room and the vehicle you are using to get it here. **Hint**: The taller it is, the more energy you have to start out with and more speed at the bottom!

8) A marble may be obtained from the teacher. Or the student may supply a ball of any size.

9) The roller coaster is to have a base no larger than (1.0 x 10^2 cm) x (5.0 x 10 cm). It cannot be higher than 2.0 x 10^2 meters.

10) The roller coaster MUST be stable. It must stand up on its own without any help from singent beings.

11) The marble must go through the roller coaster and be done by ***exactly*** 10.0 seconds. +/- 0.10second increments will cause deduction in points.

10) Timing will be done by stopwatch by the teacher

13) Timing will start when the student releases the ball.

14) Timing will stop when the ball reaches the end of the track at the **diagonally opposite** corner and light is turned light it turned on at the end of the track.

15) If the ball flips off of the track, the timing will stop.

16) **You may not touch the device at any time**, once the ball is let loose and is going down the track or you will lose 2 points each time.

17) The roller coaster's track length may be as long as you wish in length.

18) You must have **at least 2 curved turns**. Other turns are ok:
- Drops (through a funnel)
- zig zag sections
- 90 degree angle turns
- Spirals

19) The marble must only go through the track via the force of gravity.

20) You will get 2 tries to make it work. The best score of 2 will be used.

21) The roller coaster's track **MUST** end at the diagonally opposite corner from where it began.

Due Date:

Wednesday, November 9th and 10th, during your class. You not have any class time to build on the coaster.

Points and Grading:

Grade: 50 point test grade

The entry with the maximum number of points wins the contest.

1. Building a feasible marble track on the board that takes a marble a minimum of **6 seconds** to go through.....15 points

2. Decorations, scenery, painted/colorful, with trees etc..... 4 points
(subjective score--judged by the teacher**-Impress the teacher.**)

3. 1 loop **with success**..... 4 points.
(extra loops with success.....2 points each)

4. 1 hill **with success** (Minimum of 10.0cm tall).....4 points
(extra hills with success.....2 points each)

5. Time for completion---10.0sec (when light is lit or ball stops).....15 points
*minus 1 point for every 0.10.0sec above or below 10.0sec.

8. Minimum of two curved turns.....4 points
(Unlike hills and loops, extra curves do not add extra points.)

9. Track ends at the diagonally opposite corner to the starting point..... 4 points

10. Not being able to see the marble for 1/2 of the total time
(example: marble is inside of PVC pipe the whole trip)..... **-** 8 points
Clear tygon flex tubing doesn't count for seeing the marble.

With multiple hills and loops, an entry can earn up to 6 more points above the 50 listed above. The maximum number of points is 56.

3 Bonus points for winning.

3 Bonus points for having built a coaster that can fit in the smallest rectangular volume.

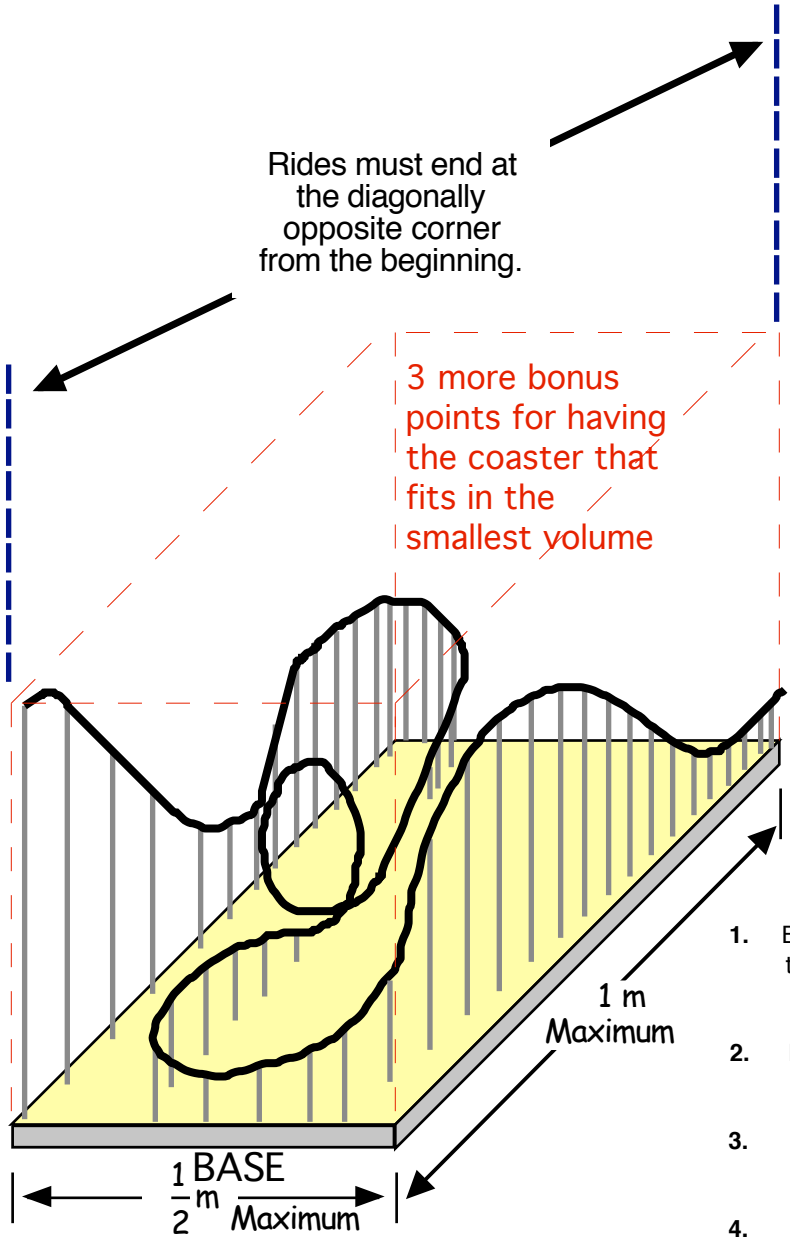
Materials List

HotWheels™ type of car
Marbles
10.0ft pieces of PVc Pipe. (You may cut it as needed. But if you make a mistake you are not allowed any more than what was originally supplied.)
90° PVC elbow joints
“tee” PVC connections
6 volt lantern battery
Magnet
Light bulb
Plastic “Solo” Cups
meters of string
meters of duct tape
Used manila folders
Film canisters
CD-Rom
vinyl tubing from Lowes
Stiff wire

Crayons for decorating only

Tools at Your Disposal

PVC Pipe cutter
Scissors
Pliers
Wire snips -for cutting wire
Tin Snips ...for cutting the cd-rom: to cut the cd-rom is must be heated in hot water first. Not heating it up sufficiently will result inthe cd-rom shattering when cut.



This coaster's grade.

1.	Building a feasible marble track on the board that takes a marble a minimum of **6 secs** to go through..... ✓	15	pts
2.	Decorations, scenary, painted/colorful, with trees ect.....	4	pts
3.	1 loop **with success**..... ✓ (extra loops with success.....2 pts each)	4	pts.
4.	each hilll **with success** (Minimum of 10cm tall)..... ✓✓✓	2	pts
5.	Time for completion---12 sec ..... 11 sec *minus 1 point for every 0.5 sec above or below 12 sec. 1 second away from "12": 13 points	15	pts
8.	Minimum of <u>two</u> curved turns..... ✓ (<u>Unlike</u> hills and loops, extra curves do not add extra points.)	4	pts
9.	Track ends at the diagonally opposite corner to the starting pount..... ✓	4	pts
10.	Not being able to see the marble for <u>1/2 of the total time</u>.....	- 8	pts

Score = 15 + 4 + (2 x 3) + 13 + 4 + 4 = 46/50