Name

Date

Physics Semester End Project

Engineering your own Rollercoaster

We are at the end of first semester and your project will be to construct a rollercoaster from whatever supplies you would like! Please think outside of the box! You may look up current rollercoasters or design your own.

**DUE DATE- FRIDAY, JANUARY 9th, 2015.**

Design:

I will supply each group of three people (minimum three people to get my supplies). If your group has less than three people you will need to supply your own construction materials. I will be providing masking tape and 6 feet of flexible foam tubing. You may use foam tubing, toilet paper rolls, wrapping paper rolls, pvc piping, boxes, a mix of materials, etc. (FYI- Home Depot has the 6 ft foam tubing for $1.39, then cut it in half and it gives you another 12 ft to work with.)

A glass marble will be your rollercoaster “cart”. The marble must stay on your track at all times and must come to an end safely.

You can make the track as simple or as complex as you’d like. You can add curves, loops, uphill/downhill sections. If you make a water ride you will have to supply a bowl or “pool” for the marble to safely land.

\*If your team can think of a way to “power” the marble up to your initial drop location, I will give each member a grade replacement or extra credit if all your assignments are already in.

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| --- | --- |
| Break down of Point Values:  90 degree turn 1 pt  180 degree turn 2 pts  270 degree turn 3 pts  Upside down loop 3 pts  Corkscrew 4 pts | Research rollercoaster design on the computer. List five things you have to be aware of (or take into account) when designing a rollercoaster:  1  2  3  4  5 |

Pre-Construction Questions: (this section is mandatory…not completed= no credit for entire project)

While analyzing a rollercoaster do you calculate velocity or speed? Why?

Define the Law of Conservation of Energy-

Briefly summarize Newton’s three Laws of Motion

1st-

2nd-

3rd

Explain how gravitational potential energy would differ if you had a roller coaster on Earth vs the Moon.

How is kinetic energy different than gravitational potential energy?

Suppose that a rollercoaster started off with a PEg of 15,000 N, how much KE would it have at anytime when the PEg turns to zero?

How is work different than power? Which one do you need to find out the other one?

What variables does the generic momentum formula use?

Could you use the inelastic or elastic momentum formula for a rollercoaster? Why or why not?

Hypothesize- If mass affects effects both KE and PEg- how does an empty rollercoaster still make it around the track?

What if the rollercoaster was completely full of large adults vs small kids- how would this affect the performance of the rollercoaster?

Calculations:

Calculate velocity (you will have to complete at least three trials to get an accurate average)

Measure your tubing (displacement) BEFORE you bend it into place!! Measure various distances of your track using tape to mark every 25 cm.

Measure the height of the starting point AFTER your rollercoaster is propped/taped up.

Measure the mass of the marble.

Calculate the gravitational potential energy of the marble at the starting point.