**Situation:**

You are an amusement park ride engineer. Your team’s first project on the job is to build a free-fall ride. This ride can incorporate any type of 1D motion (horizontal, vertical, or both), and should incorporate at least one instance of ‘free-fall’. It is important that this ride is both FUN and SAFE. Your ride should not only have a theme, but it should also provide excitement for riders – one easy way to do this is to have the riders experience free-fall! The presentation that your team is going to give of your ride is going to be given to the board of directors, which includes both thrill-seekers who only care about the fun-factor, as well as ride safety specialists, who will be much more interested in how your ride keeps passengers safe. See below for the items that the board of directors is going to be looking for:

**Deliverables**

1. Written proposal of your ride – remember, this is being given to the board of directors – make it convincing! It should include the following things:
   1. Why your ride is fun and exciting
   2. How your ride is unique from other free-fall rides
   3. Safety considerations for your ride
2. Scaled drawing of your ride (neat & in color) with all calculations labeled (work for the calculations can be shown separately)
3. Calculations / measurements for the following:
   1. Maximum height of the ride
   2. Maximum velocity of the ride
   3. Height at which ride begins braking
   4. Distance used for braking
   5. Maximum g-force riders experience
4. Scaled physical model of your ride – this can be made out of any material, but should accurately reflect the structure and movement of your ride as best you can (these models do NOT have to be completely functioning).

**Grading**

Your group’s project will be graded with two separate rubrics –

1. The school-wide problem solving rubric will be used to assess how well you gathered and analyzed data and used critical thinking skills to build your ride and solve the many problems you encountered.

2. A separate rubric will be used for determining your grade on the project. It will include criteria for all of the deliverables outlined above, as well as a grade for participation and presentation.

**Schedule**

***NOTE: On Wednesday & Thursday, we will not be spending the entire class on these projects!***

Monday: Intro to free-fall rides

Tuesday: Articles on safety & g-force, select groups, begin brainstorming and designing

*What should be done: Background research, initial designs & calculations*

Wednesday: Designing, writing, constructing

*What should be done: Written proposal, poster design w/ calculations*

Thursday: Designing, writing, constructing

*What should be done: Construction of prototype*

Monday: Presentations of rides – aka, everything should be done!

**Calculations**

Guide for thinking about calculations:

* What is the connection between how tall your ride is, how long it falls, and how fast it is going?
* Where would you be concerned about a large amount of acceleration (top or bottom)?
* A person can only experience 5g before losing consciousness. How can you make sure this doesn’t happen?
* Is there other movement besides the free-fall? What are the velocities / accelerations?
* Make sure you show ALL listed calculations as well as ALL of the calculations you had to do to get to those answers. These can be on a separate sheet.