Lesson Title	Roller Coaster Engineers
Length of Lesson	2 days
Created By	Hannah Box and David Wilson
Subject	8th Science
Grade Level	Eight
State Standards	2c
DOK Level	DOK 2
DOK Application	Construct, Predict, Modify, Make Observations
National Standards	5-8: B: Physical Science
Graduate Research Element	Newton's laws provides the foundation for quantum mechanics and laws of conservation of mass

Student Learning Goal:

State Standards Eighth Grade:
2c: Distinguish the motion of an object by its position, direction of motion, speed, and acceleration and represent resulting data in graphic form in order to make a prediction. (DOK 2)

National Standards 5-8: B: Physical Science
The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.

Materials Needed (supplies, hand-outs, resources):

3-4 half pieces of foam tubing (Lowes) per group, masking tape for each group, and marbles.

Lesson Performance Task/Assessment:

Students will use what they learn about motion and forces to design a roller coaster that meets specific requirements. The student will then measure the energies associated with their roller coaster and map it out on paper.

Lesson Relevance to Performance Task and Students:

Students will use what they learned on day one of this lesson and apply it to roller coasters.

Anticipatory Set/Capture Interest:

Foam roller coaster video from youtube (Teacher's Notes)

Guided Practice:

On the first day of this lesson, the teacher will cover the basics of motion and forces. The second day will begin with a short video showing an elaborate foam roller coaster to show the students how interesting their roller coasters could be. Then the students will be told their requirements. In groups of 3-4 the students will use trial and error to create a roller coaster that meets the requirements. Once completed, the students will map their roller coaster on paper and measure the energy associated with it.

Independent Practice:

Students will be given an entire class period to build and test their roller coaster. After the roller coaster is built to meet the requirements, the students will complete a worksheet.

Remediation and/or Enrichment:

Remediation:
Individual IEP. The students could work in larger groups and the roller coaster requirements could be easier.

Enrichment:
Students could test different size marble and marbles with different textures. This could introduce the concept of friction.

Check(s) for Understanding:

Where will you find the greatest amount of Potential Energy?

Where will you find the greatest amount of Kinetic Energy?

Did you do any research to inform your design? How did it help you?

If you had more time what would you add, change, or do differently?

Closure:

Students will be graded based on how their roller coaster meets the requirements.

Through trial and error, the students will gain a better understanding of the motion and forces involved in roller coasters.

Possible Alternate Subject Integrations:

Physics: Introduction to motion and forces.

Teacher Notes:

Roller coaster video: http://www.youtube.com/watch?v=wPYh-fPFvCM