

Teacher Notes- Roller Coasters Lab

Beforehand:

1. For starters, go to [this link](#) to see for yourself what this project is all about.
2. The following are decisions you'll need to make beforehand to make everything go smoother:
 - a. **Materials-** decide what materials you'll make available for students to build with, and how much of each thing. (More on what those materials are further down.)
 - b. **How to group students-** I had mine in 3's, and it worked well. If your classes are overly-social, you'll want to decide who's in each group and not let them decide.
 - c. **Where** each group will work in your classroom.
 - d. If you have multiple classes, decide **how you'll juggle** all those tracks in one classroom.
3. Prepare and set out materials that you can make available (the same listed on Student Handout #1- track , masking tape, meter stick, and marble). You can buy [pipe insulation](#) from your local home center. Before buying, calculate how many total pieces you'll need. Remember- you'll cut each 6-foot piece of foam insulation in half and get 2 out of each section; so, if you think you need 30 6-foot sections, you'll only need to buy 15, right? I decided to give each group in my class two 6-foot sections and one other 3-foot section (they weren't required to use it all).
4. Look over the handouts. Make any changes you like to the editable Word versions, or just go with the easy-to-print PDF versions. Good idea- build your own track beforehand and fill the worksheets out like your students will, and you'll be surprised how much clearer your instructions will be during the lesson, which = better experience for everyone.
5. Get yourself ready for each day of class so that you're very clear on what your students need to get done that day. If you're expectations are not very clear, things will get "off-track" fast! (Sorry; couldn't resist.)

Day 1

1. Give each student Handout 1, which introduces the project. Go through and briefly explain it. Set a firm tone during this time that sends the message that this is constructive learning time and not play time.
2. When you get to the part of the handout that describes the 6 different types of things they can do with their track to earn points (hump, loop, corkscrew), pick up a piece of insulation and bend it to *show* them what you're talking about. You'll also want to show them how just a little masking tape is needed to get the track to stay put somewhere; if you forget to do this, students will be overly-wasteful.
3. Assign groups and give them the rest of the period to work while you circulate the room, constantly observing, answering questions, handing out extra tape, but mostly staying back and out of the way. Answer their questions with questions back at them; they'll usually figure out their own solutions most of the time this way. Limit your "needy" students to 2 questions per day.
4. At the end of the class period leave the tracks standing, if possible, since most will be set up with just enough precision to keep the marble on the track, and re-doing it tomorrow will cost time.

Day 2

1. Have a short 'how did things go yesterday?' discussion.
2. Today's expectations: they MUST finish building their coaster and get 4 time trials of the marble going through the track recorded at the bottom of Handout 1.
3. If students complete Handout 1, give them Handouts 2a and 2b to begin working on, which is self-guided and has them graph their coaster and write notes (2b explains how to do 2a).
4. At the end of the class period leave the tracks standing.

Day 3

1. If they don't have them yet, give students Handouts 2a and 2b. Today, student groups will fill out Handout 2a, which has them:
 - graph their coaster
 - take/copy notes on potential, kinetic, and mechanical energy
 - calculate speed, velocity, and gravitational potential energy (don't worry- you're not doing any of the leading; it's all on 2b- the instruction sheet).
2. Near the end of class have students disassemble their coaster track and put everything back where they originally found it. Make sure they pull off all masking tape!