

Kindergarten Ramps- Lesson #1

Materials:

Age-appropriate book on forces and motion. It needs to introduce the concepts of gravity, how objects move and friction.

Ramps from Toys-R-Us (one ramp per group). You can find them in the section with the matchbox cars. They are .99.

Blocks

Matchbox cars (one for each student)

Patterns for building four different ramp and block configurations, printed out on cards and laminated (see attachment)

After reading and discussing a book on pushes and pulls, students, working in pairs, build four different ramps and test how far a matchbox car travels on each ramp. Students will build the ramp according to the pattern that they are given. Once built properly, students let a car roll down each ramp (no pushes!) and place a little card where their car comes to a stop. After the first ramp, they are asked to predict where they think the car will stop when the car rolls down each subsequent ramp. At the end of the lesson, the students record which ramp made their car go the furthest.

Skills: spatial, engineering, cooperative learning, predicting

Kindergarten Ramps-Lesson #2

Materials per pair:

Ramps (three to start)

Sponges (4 to start)

1 marble

This is a constructivist/inquiry-based lesson in which the students are given materials and a brief demonstration and discussion on what it takes for a marble to roll down a ramp. After the demo, the materials are passed out and students are issued challenges. Some students will pick it up immediately without much help, and some will require more assistance, at which point I use the guided-inquiry approach to provide the scaffolding that those students require.

As students explore and successfully create ramps that meet the requirements of each challenge, I pass out more ramps and sponges so they can expand on their ideas and create more complicated designs.

Challenge one: Can you make the marble go down a hill, up a hill and then down a hill?

Challenge two: Can you make the marble turn a corner?

Challenge three: Can you make the marble drop down from one ramp to another?

Skills: spatial, cooperative learning, scientific inquiry

Fourth grade: Roller Coasters

Materials:

Foam Pipe Insulation from Home Depot/Lowes, cut in half
Tape
Shooter marble

4 websites that created high interest amongst the students, give students good background about roller coasters and a chance to explore building them:

<http://pbskids.org/fetch/games/coaster/index.html>
<http://www.learner.org/interactives/parkphysics/coaster.html>
http://www.sci-quest.org/home/just_for_kids/coaster.phtml
<http://www.funderstanding.com/coaster>

After an introduction to roller coasters and the concepts of potential and kinetic energy, students complete a brief Webquest on roller coasters in which they learn the basics about the engineering of coasters (see attachment). Students are then placed into groups and given materials and time for free exploration with the roller coasters. After about 10 minutes, we stop and come back together. I ask them to build a steep hill and a low hill. I have them notice the difference in how fast their marble travels down the track with each of those types of hills. We then come back together and discuss potential and kinetic energy and what design had more/less potential energy. Also we discuss friction and Newton's Three Laws of Motion.

After our discussion, I start issuing challenges such as:

Challenge one: Build a coaster with one hill
Challenge two: Build a coaster with two hills
Challenge three: Build a coaster with a loop
Challenge four: Build a coaster with a loop and a hill

Once the students complete all of the challenges, I have them pair up with another group and connect their two tracks to create longer ramps. At this point, I may issue challenges, or allow them time for free exploration, as long as I see it is productive.

Skills: engineering, cooperative learning, spatial, scientific inquiry