

ROLLER COASTER!!

Master Teacher: Roni Wymore

Grade Level: 6-8

Time: Two 50-minute periods

Overview:

Every object has energy and it can be found in several forms. However, these energies are either at rest or in motion. The energy of rest, or position, is called potential energy. All objects that have the potential to move are stationary. Once objects are in motion, that potential energy is now kinetic energy. Therefore, potential energy is converted to kinetic energy. This lesson is designed to illustrate to students a simple, real world example of this conversion as they view a roller coaster. Students will also visit a website to design their own roller coaster.

Subject Matter: Science

Learning Objectives:

7.8 (a) illustrate examples of potential and kinetic energy in everyday life

Media Components:

Futures with Jaime Escalante, Architecture and Structural Design

Materials:

Internet access: <http://www.learner.org/exhibits/parkphysics/>

Per student:

Copies of Activity #1

Prep for Teachers:

Cue tape to visual of roller coaster just after Dr. Jameel Ahmad says, "...design high speed systems."

Introductory Activity:

The following activity will prepare the students to understand potential and kinetic energy by presenting a real world example. By working in cooperative groups, students will use a round table structure to list and then round robin, to discuss.

Step 1: Students will brainstorm and list rides that can be found at carnivals or theme parks for a few minutes.

Step 2: Ask students to then discuss which rides they felt were more exciting.

Learning Activities:

Step 1: Explain to students that they will be viewing a small segment of video that will help them understand that potential and kinetic energies are present in roller coasters and they will be able to identify at which points these energies are present.

Step 2: **Focus for Media Interaction:** Instruct them to listen as the narrator says when during the ride there is potential energy (going up the lift) and then what happens to that potential energy (converted to kinetic energy).

Step 3: Start tape. Stop when Dal Freeman says, "...maybe beyond the sky. Who knows?"

Step 4: Ask for responses to the previous instructions.

Step 5: Ask students to describe what occurs on a roller coaster ride during the moments of kinetic energy (car is going down)

Culminating Activity:

Step 1: Hand out copies of Activity #1.

Step 1: Using the recommended web site, students will complete Activity #1

Cross Curricular Extensions:

HISTORY:

Research the first roller coasters, wooden and steel.

ART:

Design a roller coaster model out of toothpicks or Popsicle sticks.

MATH:

Calculate Kinetic Energy

$$KE = 1/2Mv^2$$

M is mass in kilograms; *v* is velocity in meters per second measured in metric units
(joules)

Community Connections:

Call a theme park nearest you for information about their roller coasters. Some theme parks do offer classroom tours that are actually integrated math and physics lessons.

Activity #1

Roller Coaster: The "Scream Machine"

Web site: <http://www.learner.org/exhibits/parkphysics/>

Using information from the home page, answer the following questions:

1. Does a roller coaster have an engine?
2. What drives the roller coaster?
3. When is all of the kinetic energy needed present for the ride?
4. What keeps the ride smooth?
5. Explain the following:
 - a. running wheels:
 - b. friction wheels:
 - c. final set:
 - d. compressed air brakes:

6. Compare and contrast:

7. Click on "design your own roller coaster." Read all information as you move from screen to screen and follow all steps. Draw your finished coaster below. Label all parts.

8. What was your fun rating? Safety rating?