# Roller Coasters and Energy

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8th Grade Science

## Learning Activity Summary

1. Lesson will examine the effects of kinetic and potential energy on the roller coaster.
2. Specifically, we will explore how energy conversions between kinetic and potential energy allow a roller coaster to operate.
3. The topic of Kinetic and Potential Energy will be introduced using a video clip titled, *Roller Coasters: Potential Energy Becomes Kinetic Energy* from United Streaming
4. The assessment of students learning will be the creation of a Venn diagram to compare kinetic and potential energy.

**This learning activity was developed as part of the requirements for the Aurora University / District U-46 graduate credit course *Online Resources to Enhance Learning: OEDP-5029,* Fall 2005, under the guidance of instructor Richard Levine**

## Goals and Curriculum Fit

The Illinois Science Learning Standards that are connected with this lesson are:

**12.C.3a** Explain interactions of energy with matter including changes of state and conservation of mass and energy.

**12.D.3a** Explain and demonstrate how forces affect motion (e.g., action/reaction, equilibrium conditions, free-falling objects).

**12.D.3b** Explain the factors that affect the gravitational forces on objects (e.g., changes in mass, distance).

## Project Level- Bloom's Taxonomy

The higher level of Bloom's Taxonomy that is addressed by the lesson is analysis and synthesis. After examining the topics of kinetic and potential energy, students must organize data and information they collected into a Venn diagram. The Venn diagram allows students to identify similar details that exist between kinetic and potential energy. Moreover, it allows students to separate information that is specific to kinetic and potential energy. Also, at the beginning of the lesson students are brainstorming or hypothesizing three reasons why a roller coaster works based on their prior classroom or outside experience.

**Engaged Learning Indicators**

Students are grouped heterogeneously during this activity. Students are also engaged and involved in the lesson by creating a Venn diagram of their own design. Also, students are creating a diagram of a certain section of the K'nex roller coaster they built to label kinetic and potential energy. From the United Streaming video, students gather information about the workings of a roller coaster they have just produced. This information helps them go back and analyze their brainstorming about why a roller coaster works. As stated before, the Venn diagram and the diagram of the roller coaster will be the assessment of students learning and involvement in this lesson.

**Learning Activity**

1. Review the topics kinetic and potential energy through a demonstration using a K'nex roller coaster that was created in a prior class session.
2. Ask students to brainstorm or hypothesize what they think is the *engine* in the roller coaster that was just built. Student specifically can write down three ideas of why they think a roller coaster works after it reached the top of the first hill.
3. Before discussing students' thoughts on the *engine* of a roller coaster, show a section from **The Physics of Motion**, found in United Streaming, called *Roller Coasters: Potential Energy Becomes Kinetic Energy*.
4. After the video (4:26 minutes), lead a discussion centered on the original questions of what students feel is the engine of a roller coaster. Have students evaluate their three answers to the questions and ask them if they would change any of their comments after viewing the video clip.
5. Discuss how kinetic and potential energy relate to the movement of a roller coaster. Demonstrate how kinetic and potential energy changes as a car moves along the K'nex roller coaster.
6. Explain the use of a Venn diagram to aid students in examining kinetic and potential energy.
7. Next, explain how students will create a diagram of a section of the roller coaster that describes the changes in kinetic and potential energy.
8. Guide students as they produce a Venn diagram and the diagram of the roller coaster.
9. Conclude lesson and review the objectives.