



Lesson Plan

Theme: Examples of potential and kinetic energy can be seen in human design, as well as in nature. Designs for products change many times, with the designer learning from past failures and making alterations accordingly.

Length of Lesson:

Introduction: 10 minutes

Field and Interpretive Center (IC) Activities: 100 minutes

Conclusion: 10 minutes

Minnesota Academic Science Standards/Benchmarks:

- (6.1.2.1.2) - Recognize that there is no perfect design and that new technologies have consequences that may increase some risks and decrease others.
- (6.1.2.1.4) - Explain the importance of learning from past failures, in order to inform future designs of similar products or systems.
- (6.2.3.2.1) - Differentiate between kinetic and potential energy and analyze situations where kinetic energy is converted to potential energy and vice versa.

Excellence in EE: Guidelines for Learning Standards:

- Grades (5-8) - Strand 1.1 Questioning, analysis and Interpretation Skills, F) Working with models and simulations

Objectives (Students will be able to...):

- Recognize that a skill can be acquired with practice, attention, and patience.
- Understand definitions for potential and kinetic energy.
- Recognize examples of potential and kinetic energy in nature and in human design.

Background Information :

An object can store energy as a result of its position. This kind of stored energy is called potential energy. Potential energy may be elastic, as in the example of a bowstring being pulled back and altered from its usual equilibrium position, or it may be gravitational, as in the case of a heavy bowling ball perched on top of a post; the ball possesses potential energy because of its vertical position or height, and the effect of gravity upon it. An object that is moving has kinetic energy. Potential energy can turn into kinetic energy once movement begins. Examples of both kinds of energy can be seen in nature and in the designs of man-made things.

*Helping people discover, enjoy,
understand, and preserve the incredible
natural world that surrounds us.*

Introduction

Goals: Welcome students to River Bend, introduce River Bend leaders, and introduce the program content.

Key Points:

- Welcome
- Demonstration of potential and kinetic energy
- Explain logistics of what is to come
- Set River Bend expectations

Activities:

1. Design Lab

Goal: Design, build, and test a machine that utilizes potential and kinetic energy.

Key Points:

- Each group will design a device capable of shooting a marshmallow across the room and hitting a target.

Assessment: Discuss changes made to the device, compare aesthetic versus function. Students will be asked to refer to different energy types while explaining how their device works.

Physics in Nature (active learning)

Goal: Find examples of both potential and kinetic energy in nature

Key Points:

- Students will use real examples found in nature to further understand types of energy.

Assessment: Ask for students to explain what type of energy is being presented in each example they find—further develop this assessment by asking whether the examples are due to gravity or elasticity.

Archery (active learning)

Goal: Students will take turns practicing archery and see real examples of energy in action

Key Points:

- Archery demonstration
- Archery practice

Assessment: Discuss student challenges and successes, emphasizing new skills, the importance of practice. Ask about examples of kinetic/potential energy in relation to the bows and arrows.