

Energy In Motion

Recommended grades level(s) 9-12

Time Duration: - 60 minutes

Objective(s):

The learner will be able to define potential and kinetic energy.
The learner will give examples of potential and kinetic energy.

Materials and/or Resources:

Stiff paper
5 yo-yos
pins
Thumbtacks or tape
Colored markers
Paper cups
Pencils
Pictures
Showing examples of potential and kinetic energy
Student sheets (included)

Background Information:

Energy is used when matter changes or is moved. The energy matter has when it is moving is called kinetic energy. A moving train has kinetic energy. A landslide has kinetic energy. Kinetic energy is called the energy of motion.

Not all energy is kinetic energy. Some matter is able to move or change something, but is not doing it at the moment. Matter that has stored energy is said to have potential energy. This means that piles of coal or wood have potential energy. (When they are burning, they have kinetic energy.) Likewise, something that is in a position from which it would be able to exert energy (for example, a ball held high in the air or water held behind a dam) has potential energy. Potential energy is called stored energy or the energy of position.

Procedures:

- I. Setting the stage
 - A. Introduce the concept of potential and kinetic energy by having the students do the following demonstration:
 1. Give each of five students a yo-yo. Have them yo-yo for the class.
 2. Tell the students that energy is the ability to do work. Ask if they see any evidence of energy. Many will cite the moving of the arms or the yo-yos. Tell the students that the movement of arms and yo-yos is called kinetic energy—the energy of motion.
 3. Have the students with the yo-yos stop and just hold them in their hands. Tell the students another kind of energy is being

demonstrated. Explain the concept of potential energy—stored energy.

- B. Have the student's think of other examples of kinetic and potential energy. List them on the board.

II. Activity

- A. Play a game to help the students recognize potential and kinetic energy.
1. Display a chart like the following:

Energy	
Kinetic	Potential

2. The chart can be drawn on a bulletin board or made on a large piece of poster board. If done on poster board, the chart can serve as a display when the game is completed.
 3. Show the students a stack of pictures (cut from magazines) showing kinetic and potential energy.
 4. Divide the class into two teams. Have each team choose a picture and place it correctly on the chart. (Supply the teams with thumbtacks or tape.)
 5. Award one point for each correctly placed picture. If a picture is placed incorrectly, award no points. When all the pictures have been placed, the team with the most points wins the game.
- B. Have the students construct and use a pinwheel to demonstrate kinetic and potential energy.
1. Have each student construct a pinwheel using the student sheet "ENERGY WHEEL," included. (These need to be reproduced on heavyweight paper.)
 2. Give each student a paper cup. Have them fill their cups with water.
 3. Review the definitions for kinetic and potential energy. Write them on the board.
 4. Have the student's state which kind of energy the pinwheels and the cups of water represent.
 5. Station the students at sinks or tubs, and have them pour the water over the pinwheels, stating which kind of energy the spinning pinwheels and the cups of pouring water represent. (If it is impractical to have the students do this, you may demonstrate it for them.)

- C. Have the students solve an energy production problem.

1. Divide the students into pairs and give them this problem: How much water will it take to produce 100 units of energy if each turn of the pinwheel represents units of energy?
2. Have the students use the pinwheel constructed in Activity B. One blade of the pinwheel should be colored a bright color (so that turns will be easier to count).
3. Provide each pair of students with a large cup of water.
4. Have the students develop a procedure that will allow them to solve the problem.

III. Follow-up

- A. Have the students complete the student sheet "ENERGY MATCH," Included. The answers are as follows: kinetic—moving bicycle, waterfall, burning coal, moving ball, running horse; potential—batteries, pile of wood, stretched rubber band, can of gasoline, still water.
- B. Give each of the students a copy of the student sheets "ENERGY MAZE # 1" and "ENERGY MAZE # 2," included. Have them complete the mazes. (The first maze spells "kinetic" and the second, "potential.")
- C. Have the students answer the following questions.
 1. What in your experiment represented potential energy? (still pinwheel, cup of water) kinetic energy? (turning pinwheel, pouring water)
 2. Can you think of any real-life situations, which are related to your experiment? (windmills, waterwheels, hydroelectric power)
 3. List some examples of kinetic and potential energy, which could be found in your community.

Development Resources:

Sund, R.B., D.K. Adams, J.K. Hacket, and R.H. Mayes. Accent on Science. Columbus, OH: Merrill, 1985.

Zinn, G.A. Steps in Science. New York: Standard, 1974.