



CENTER FOR THE URBAN ENVIRONMENT

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Instructor Lesson Plan
Multi Sessions
In School / Neighborhood
Grades 2-3

Power Up!

Transformative Energy Education



Captain Power Transforms!

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Captain Power Transforms!

SUMMARY:

Students learn to define energy and how it transforms in their environment. Students are introduced to the Law of Conservation and Energy, discover how electricity can be created through motion and create a sequential storyboard that shows how energy converts from one form to another.

PREPARATION

Location: Class Room

Duration: 1.5 hrs.

Materials:

Consumables

<u>ITEM</u>	<u>AMOUNT</u>
___ Graph Flip Chart	3-5 sheets
___ White Cardstock Paper	1 per student
___ Energy Converts Worksheet	1 per student
___ <i>My Experiment</i> Worksheet	1 per student
___ Balloons	10
___ Colored pencils	1 bag
___ Pencils	1 per student
___ Markers	2-3
___ Felt Pieces	1 per group
___ Tissue paper pieces	1 bag

Non-consumables

<u>ITEM</u>	<u>AMOUNT</u>
___ <i>Energy Makes Things Happen</i> book	1 copy
___ Captain Power Puppet	1 doll



OBJECTIVES:

- To understand the forms and function of energy
- To understand the law of conversion of energy
- To review sequential narrative and apply it to the principle of energy conversion
- To understand the basic principals of electricity using the scientific method

LESSON PLAN:

🌐 INTRODUCTION: Meet Captain Power!

TIME: 10 minutes

LOCATION: Rug Area

GROUP SIZE: Whole Class

MODE: Discussion

MATERIALS: Captain Power Puppet

SUMMARY: Instructor introduces him/herself and the program.

1. Introduce yourself and The Center. Tell students that they will be learning about energy and how we can help conserve energy at home and in school.
2. Introduce Captain Power to the students. "Captain Power is here to help us learn about energy and how we can work together to conserve energy and defeat the energy villains."
3. Captain Power Dialogue: Hello young energy converters of this great city. I am here to teach you about how energy is constantly changing forms all around us. We can see some examples of how energy converts from one form to another, but some forms of energy are invisible. Fear not... I will help reveal them all to you!
4. Be sure to define "convert" as it pertains to energy

🌐 ACTIVITY 1: Blowing Up!

TIME: 15 minutes

LOCATION: Rug Area

GROUP SIZE: Whole Class

MODE: Hands-on exploration

MATERIALS: Balloons



7. "For every action there is a reaction. When we move, cough or even have a thought, different types of energy are traveling and changing form."
8. Ask them if they think they know what energy is. How would they explain it to their little brother or sister? Tell them that energy is what makes things happen. Energy creates work and it powers everything that does work, from our bodies to airplanes, ants to elephants.
9. Collect the balloons and explain that they will be used for another activity later, but now they are going to read about how *Energy Makes Things Happen*.

🌐 ACTIVITY 2: Energy Makes Things Happen

TIME: 15 minutes

LOCATION: Reading Area

GROUP SIZE: Whole Class

MODE: Guided Reading and Inquiry

MATERIALS: *Energy Makes Things Happen*, flip chart

SUMMARY: Instructor will read the book *Energy Makes Things Happen* and elicit examples of energy transformation.

1. Gather students into a semi-circle and tell them that they are going to read a story about how energy works.
2. Read *Energy Makes Things Happen* aloud. Pause to ask questions about the illustrations to make sure that students are following along.
3. Ask students to identify examples of matter in the illustrations (baseball bat, grass, ball, people).
4. After reading the story, ask students where most of the energy on the Earth comes from (hint: it's Capt. Powers emblem).
5. Ask students to come up with examples of how energy works in their daily lives and explain the stages of change in each example.
For instance:
 - "I brush my teeth" (your body burns its food fuel, to create motion which brushes your teeth).
 - The subway car brings me to school (the subway runs on electricity generated from burning fuel which is transmitted along rails and becomes motion).
 - My mom makes soup on the stove. (the stove runs on gas which is ignited by a spark and transformed into heat. The heat warms the



soup so your stomach can digest it more easily and transform it into energy).

🌐 ACTIVITY 3: Energy Converts! Story Board

TIME: 20-25 minutes

LOCATION: Classroom

GROUP SIZE: Small Group

MODE: Artistic, Project-Based

MATERIALS: Energy Converts Worksheet (Legal-Sized), Colored Pencils, Markers

SUMMARY: Students will create story boards that demonstrate an example of energy conversion in sequence.

1. Inform students that they will be using a story-board, which is like a comic strip, to create an illustrated sequence depicting an activity where energy is being converted.
2. Begin by brainstorming a list of activities where energy is converted. Illustrate one of the strongest examples on the board so they have a model to work from.
3. Break the students into small groups and distribute the Story Board worksheet. Ask students to agree upon an example as a group. They can choose one of the examples from the board or choose their own. Refer back to *Energy Makes Things Happen* for examples.
4. Students should write out the stages in the action beneath the box in the space indicated, then draw the actions in pencil. Afterwards they can color their drawings in with markers or colored pencils.

🌐 ACTIVITY 4: Static Cling!

TIME: 15 minutes

LOCATION: Classroom

GROUP SIZE: Individual

MODE: Kinetic, exploratory

MATERIALS: Balloons, Felt, Tissue Paper, *My Experiment Worksheet*

SUMMARY: Students generate a static charge using a balloon and felt and observe how the charged balloon behaves through exploratory activities.



1. Ask students to generate a list of things in the class and at home that are powered by electricity. Write that list on the board.
2. Captain Power Dialogue: Electricity is a very useful and powerful form of energy that we have to be careful with. Electricity has many abilities. It can produce light through light bulbs or flashlights and it can produce heat in space heaters and irons. Electricity is the form of energy that powers most of the machines around us. It also runs through us. When we move our muscles a small spark of electricity tells the muscle to move. Now- the instructor is going to show you how we can produce an electric charge using a balloon and a piece of felt.
3. Ask them what they think might happen when they rub the felt on the balloon, and to write their hypothesis on the Static Cling worksheet.
4. Hand the balloons inflated in the previous activity out to the students. Distribute a piece of felt, a few pieces of tissue paper and a *My Experiment* worksheet to each group.
5. Direct them to rub the felt against the exterior of the balloon to create a static charge and then lower the balloon towards the pile of tissue paper.
6. Have them write a short description of what they see occurring on their worksheet and to explain what other kinds of energy might be involved in the experiment.
7. Ask students to share their observations and reassure them that the charge they generated is not enough to harm anyone and that they should always exercise caution around electrical appliances and outlets.
8. If students aren't finished with the worksheet, collect materials so students can finish.

🌐 WRAP-UP: Storyboard Presentation (Optional)

TIME: 10 minutes

LOCATION: Rug Area

GROUP SIZE: Whole Class

MODE: Inquiry and Discussion

MATERIALS: Storyboards



SUMMARY: Students present story boards and explain how energy is transformed in sequence.

1. Ask students to share their storyboards and to explain how their drawings represent the transformation of energy.
2. Captain Power Dialogue: Thank you for helping to unlock the secrets of the invisible world of energy. In the next class we are going to learn more about how our bodies transform energy and create our own Super Heroes.

🌐 Optional: Energy Charades

TIME: 10 minutes

LOCATION: Rug Area

GROUP SIZE: Whole Class

MODE: Kinetic

MATERIALS: Storyboards

SUMMARY: Students act out energy transformations while the class tries to guess and describe the transformation.

1. Organize the class into teams of four and assign each team a number (team #1, team #2, team #3, etc).
2. Give team one an energy transformation to act out (whisper it to one member of the team) and ask them to act it out in front of the class.
3. Whichever group guesses the transformative activity first earns a point and gets to go next. The winning group can earn an extra point by specifically naming the energies transformed in the charade. (ex: one point for identifying the action *an airplane lands* and an extra point for fuel becomes motion or motion becomes heat (friction).

VOCABULARY:

- **Electricity:** A form of energy that can produce light, energy or magnetism.
- **Energy:** The power that makes things happen.
- **Energy Conversion:** When energy changes from one form to another.
- **Fuel:** Material that contains energy.
- **Matter:** The material that everything in the universe is made of. It can be solid, liquid, or gas.
- **Universe:** everything that exists anywhere