

Gr. 5 – Understanding Earth and Space Systems

Conservation of Energy and Resources

Windmill

Specific Expectations:

1.1 Analyse the long-term impacts on society and the environment of human uses of energy and natural resources, and suggest ways to reduce these impacts.

2.1 Follow established safety procedures for using tools and materials.

2.2 Use scientific inquiry/research skills to investigate issues related to energy and resource conservation.

2.3 Use technological problem-solving skills to design, build, and test a device that transforms one form of energy into another and examine ways in which energy is being “lost” in the device.

3.2 Identify renewable and non-renewable sources of energy.

3.3 Describe how energy is stored and transformed in a given device or system.

Big Idea (for lesson):

Students investigate wind power as a renewable source of energy, and how it acts as a force to power a windmill. Students design and test different models to see which catches the wind best to produce movement.

Accommodations:

- Increase time
- Visual Aids
- Manipulatives
- Chunking
- Step-by-Step
- Scaffolding
- Copy of Notes
- Student Grouping

Differentiated Instruction:

- Content: Use demo to show the content as you offer verbal descriptions.
- Process: Have students work in pairs and support each other if physical impediments exist.
- Product: Students may show their final product in pairs, and communicate their findings either verbally, visually, or through written means.
- Other: _____

Bloom’s Taxonomy:

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

Multiple Intelligence:

- Verbal/Linguistic
- Logical/Mathematical
- Visual/Spatial
- Bodily/Kinesthetic
- Naturalist
- Musical/Rhythmic
- Interpersonal
- Intrapersonal

Gr. 5 – Understanding Earth and Space Systems

Conservation of Energy and Resources

Delivering The Lesson:

Portion & Timing	Grouping:			Introduction:	Materials
Minds On: 10 mins	W <input checked="" type="checkbox"/>	S <input type="checkbox"/>	I <input type="checkbox"/>	<p>Teacher can do a demonstration to introduce how movement of water can do work by changing one type of energy to another. Follow the instructions here to build an easy water wheel: http://howto.wired.com/wiki/Build_a_Plastic_Cup_Waterwheel</p> <p>Ask students where the energy that lifts the pulley comes from? (<i>Answer: The force of the water turning the wheel.</i>)</p> <p>Ask students if they can think of any other sources of energy that are captured by turning wheels? (<i>Answer: Windmills!</i>).</p>	4 Styrofoam plates Pencil Stiff straw 9 small plastic cups Masking tape String Water container/hose
Action: 15 mins	W <input checked="" type="checkbox"/>	S <input checked="" type="checkbox"/>	I <input checked="" type="checkbox"/>	<p>Have students build their own windmills according to the instructions on the handout.</p> <p>Teacher can circulate and ask questions of the different groups:</p> <ul style="list-style-type: none"> -Besides wind and water, can you think of other places that energy comes from? (<i>Answers listed on handout.</i>) -What type of things do we use energy to do? -Is the energy from our windmill doing any real work? (<i>Answer: No, but we can make it do work with some adjustments.</i>) 	Windmill Handout (Materials listed)
Consolidate: 15 mins	W <input checked="" type="checkbox"/>	S <input type="checkbox"/>	I <input type="checkbox"/>	<p>With a little bit of preparation, you can have an electrical set-up that can be connected to the windmill. The instructions are found at the following website: http://www.hometrainingtools.com/a/wind-energy-science-newsletter</p> <p>-Explain to students that the addition of the motor makes it into a generator. Show students that electricity flows through and lights the bulb.</p> <p>Ask students what type of energy the spinning mechanical energy changes into? (<i>Answer: electrical energy, then light.</i>)</p> <p>-How is this set-up similar to real windmills?</p>	Pinwheel windmill (from handout) Small electric motor Alligator clip leads 1.5 V bulb Strong fan

Gr. 5 – Understanding Earth and Space Systems

Conservation of Energy and Resources

			<p><i>(Answer: they have large-scale generators that also convert mechanical energy into electrical, and potentially light!)</i></p> <p><i>-Are wind and water renewable sources?</i> <i>(Answer: Yes, they do not run out.)</i></p> <p><i>-How could energy stored be stored in a windmill? (Answer: The wind energy itself can't be stored, but the electrical energy is. We use large instruments called "flywheels" to help lessen the waste of electricity during "off-peak" hours.)</i></p>	
--	--	--	---	--