

**Indiana Education Standards**  
**Correlation with the 2010 Arbor Day National Poster Contest for 5<sup>th</sup> Grade**  
***Trees Are Terrific...and Energy-wise***

**SCIENCE EDUCATION STANDARDS**

**BASIC ACTIVITY: *Design an Energy Wise Community Using Trees***

**SUMMARY** - Activities included in “*Design an Energy Wise Community Using Trees*” will let students apply scientific understanding of environmental issues. Planting trees for shade and to create windbreaks can protect the soil and water...and conserve use of fossil fuels. Based on information learned, students will “*Design an Energy-Wise Community Using Trees*” in various landscaping applications and recognize how human activity of properly placing and planting trees can produce positive benefits for the environment. They will also investigate and describe that changes in speed or direction of motion of an object (wind) that can mitigated by stationary object (trees) and how that the change in speed, motion and direction can impact energy use.

This activity meets the following Science Standards:

**Scientific Thinking**

- 5.2 Students use a variety of skills and techniques when attempting to answer questions and solve problems. Students describe their observations accurately and clearly using numbers, words, and sketches, and are able to communicate their thinking to others. They compare, contrast, explain, and justify both information and numerical functions.

**The Physical Setting**

- 5.3 Students continue to investigate changes of Earth and the sky. They explore, describe, and classify materials, motion, and energy
  - 5.3.8 Investigate, observe, and describe that heating and cooling cause changes in the properties of materials, such as water turning into steam by boiling and water turning into ice by freezing. Notice that many kinds of changes occur faster at higher temperatures. (Core Standard)

**The Living Environment**

- 5.4 Students learn about an increasing variety of organisms - familiar, exotic, fossil, and microscopic. They use appropriate tools in identifying similarities and differences among these organisms. Students explore how organisms satisfy their needs in their environments.
    - 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.
    - 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful. (Core Standard)
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## **The Mathematical World**

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- 5.5 Students apply mathematics in scientific contexts. They make more precise and varied measurements in gathering data. Their geometric descriptions of objects are comprehensive, and their graphing demonstrates specific connections. They identify questions that can be answered by data distribution, i.e. "Where is the middle?" and their support of claims or answers with reasons and analogies becomes important.
    - 5.5.1 Make precise and varied measurements and specify the appropriate units. (Core Standard)
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## **Common Themes**

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- 5.6 Students work with an increasing variety of systems and begin to modify parts in systems and models and notice the changes that result.
    - 5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other.
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## **EXTENSION ACTIVITY #1: *Conduct temperature and transpiration experiments to show how trees shade and cool their surroundings***

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**SUMMARY** - In the classroom Extension Activity #1 activity, "*Conduct temperature and transpiration experiments to show how trees shade and cool their surroundings*," students will have an opportunity to make a hypothesis and determine experiment constants and variables as they set up experiments related to temperature and transpiration. They will use microscopes to look at individual cells and understand that different cells have different functions. They will take and compare temperatures in different settings.

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This activity meets the following Science Standards:

### **The Nature of Science and Technology**

- 5.1 Students work collaboratively to carry out investigations. They observe and make accurate measurements, increase their use of tools and instruments, record data in journals, and communicate results through chart, graph, written, and verbal forms. Students repeat investigations, explain inconsistencies, and design projects.
  - 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. (Core Standard)

### **Scientific Thinking**

- 5.2 Students use a variety of skills and techniques when attempting to answer questions and solve problems. Students describe their observations accurately and clearly using numbers, words, and sketches, and are able to communicate their thinking to others. They compare, contrast, explain, and justify both information and numerical functions.

### **The Physical Setting**

- 5.3 Students continue to investigate changes of Earth and the sky. They explore, describe, and classify materials, motion, and energy.
  - 5.3.8 Investigate, observe, and describe that heating and cooling cause changes in the properties of materials, such as water turning into steam by boiling and water turning into ice by freezing. Notice that many kinds of changes occur faster at higher temperatures. (Core Standard)

### **The Living Environment**

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- 5.4 Students learn about an increasing variety of organisms - familiar, exotic, fossil, and microscopic. They use appropriate tools in identifying similarities and differences among these organisms. Students explore how organisms satisfy their needs in their environments.
  - 5.4.3 Observe and explain that some organisms are made of a collection of similar cells that benefit from cooperating. Explain that some organisms' cells, such as human nerve and muscle cells, vary greatly in appearance and perform very different roles in the organism. (Core Standard)

### **The Mathematical World**

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- 5.5 Students apply mathematics in scientific contexts. They make more precise and varied measurements in gathering data. Their geometric descriptions of objects are comprehensive, and their graphing demonstrates specific connections. They identify questions that can be answered by data distribution, i.e. "Where is the middle?" and their support of claims or answers with reasons and analogies becomes important.
  - 5.5.1 Make precise and varied measurements and specify the appropriate units. (Core Standard)

### **EXTENSION ACTIVITY #2: Discover How Trees Produce Energy**

**SUMMARY:** Activities in Extension Activity #2 inform students about the transfer of energy through food chains and food webs. They connect the process of photosynthesis to energy conversion and transfer. Students will explore the benefit of planting diverse species of plants (especially trees of high food value to wildlife) and the impact that has on diversity of wildlife species within an ecosystem. Activities and assessments also center on the role trees play in both production of biomass energy and conservation of energy resources through various planting applications. Students will draw an energy flow chain.

This activity meets the following Science Standards:

### **The Physical Setting**

- 5.3 Students continue to investigate changes of Earth and the sky. They explore, describe, and classify materials, motion, and energy.
  - 5.3.8 Investigate, observe, and describe that heating and cooling cause changes in the properties of materials, such as water turning into steam by boiling and water turning into ice by freezing. Notice that many kinds of changes occur faster at higher temperatures. (Core Standard)

- 5.3.11 Investigate and describe that changes in speed or direction of motion of an object are caused by forces. Understand that the greater the force, the greater the change in motion and the more massive an object, the less effect a given force will have. (Core Standard)

### **The Living Environment**

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- 5.4 Students learn about an increasing variety of organisms - familiar, exotic, fossil, and microscopic. They use appropriate tools in identifying similarities and differences among these organisms. Students explore how organisms satisfy their needs in their environments.
    - 5.4.3 Observe and explain that some organisms are made of a collection of similar cells that benefit from cooperating. Explain that some organisms' cells, such as human nerve and muscle cells, vary greatly in appearance and perform very different roles in the organism. (Core Standard)
    - 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.
    - 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful. (Core Standard)
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