



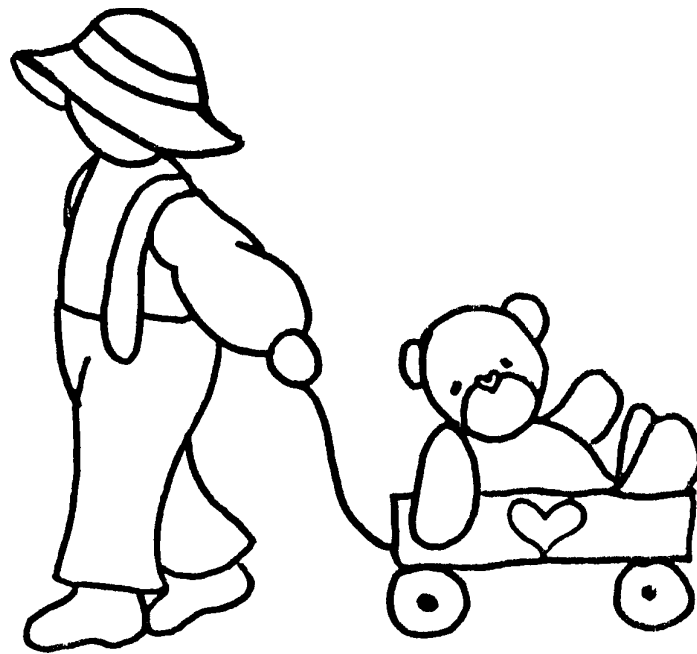
**Applied Science**

*Our Technological World*



# **SECOND GRADE**

# **BUILT ENVIRONMENT**



3 WEEKS  
LESSON PLANS AND  
ACTIVITIES

## **APPLIED SCIENCE OVERVIEW OF SECOND GRADE**

### **SCIENCE AND MATH**

#### **WEEK 1.**

PRE: *Exploring perception.*

LAB: *Experimenting and predicting volume, weight, and length.*

POST: *Estimating and gathering data.*

#### **WEEK 2.**

PRE: *Comparing and contrasting two and three dimensional objects.*

LAB: *Recognizing and comparing shapes.*

POST: *Exploring unit cells to create patterns.*

#### **WEEK 3.**

PRE: *Investigating symmetry.*

LAB: *Comparing symmetry in nature.*

POST: *Discovering tessellations.*



### **PHYSICS**

#### **WEEK 4.**

PRE: *Describing the physical world.*

LAB: *Exploring the physics behind toys.*

POST: *Investigating how things work.*

#### **WEEK 5.**

PRE: *Comparing different forms of energy.*

LAB: *Investigating different forms of energy.*

POST: *Exploring nuclear, heat, and chemical energy.*

### **TECHNOLOGY**

#### **WEEK 6.**

PRE: *Investigating everyday simple machines.*

LAB: *Investigating machines that produce work.*

POST: *Comparing machines that produce energy.*

#### **WEEK 7.**

PRE: *Exploring technology.*

LAB: *Investigating computer technology.*

POST: *Comparing technologies used in the entertainment industry.*

### **BUILT ENVIRONMENT**

#### **WEEK 8.**

PRE: *Comparing different energy machines.*

LAB: *Investigating how solar energy produces power.*

POST: *Contrasting different forms of energy.*

## APPLIED SCIENCE - BUILT ENVIRONMENT (2)

### PRE LAB

Students use a worksheet to explore different sources of energy.

### OBJECTIVES:

1. Investigating technology and energy that is produced.
2. Comparing different "energy" machines.

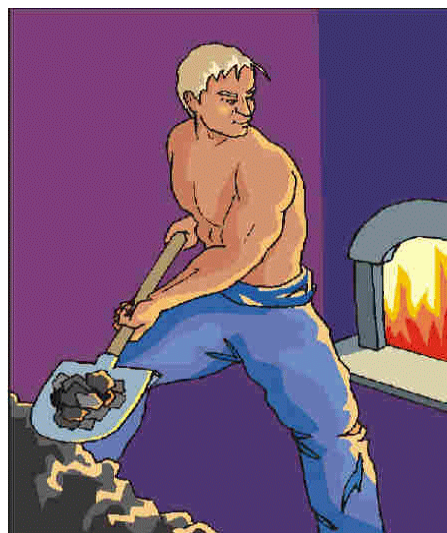
### VOCABULARY:

energy  
hydroelectric  
solar

### MATERIALS:

worksheet  
pictures of different types of energy

### BACKGROUND:



Our built environment captures what nature has given us and tries to use it for the good of the human society. Students should be aware how human society sometimes affects other "societies," from ants, elephants, atmosphere and oceans. Humans are only one of the millions of species on this planet. The following units in Built Environment focuses on how we use nature's gifts, whether good or bad. Students as adults, should learn to research a problem or potential problem and then make decisions based on solid evidence.

There are many ways to get energy from nature. Some methods like wind, water, and solar do little to affect the environment. Other methods like petroleum, gas, coal, and nuclear may someday pose a threat to future humans.

Water is very powerful. In the past, falling water turned a flour mill which ground wheat into flour. Today steam from water or falling water causes a turbine to spin. This generates electricity. A turbine can do without steam when it is located at the base of a waterfall or a dam and made to spin by the falling water alone. This is power produced by hydroelectric energy. It generates about 16 -20% of all electricity in the United States.

Windmills have been used for centuries. Holland, a small country in Europe, is noted for their use of windmills. Many people do not realize that a windmill produces energy. Wind turns turbines which change the wind power to electrical energy.

Solar power captures energy from the light rays of the sun. Students may have seen solar powered hot water tanks. This example is easy for them to understand. However, there are many solar operated machines such as calculators, that can help make this understandable for a second grader. Point out that solar energy is becoming more

and more advanced. Coal, gas, petroleum (oil and other derivatives), and nuclear energy are all used to create electricity by fueling turbines to create movement, similar to hydroelectric. The advantage over many of these forms of energy is that the energy can be created anywhere. Water, wind, and solar all require specialized conditions to work, and sometimes the conditions prevent energy from being made. For example, no wind, no energy.

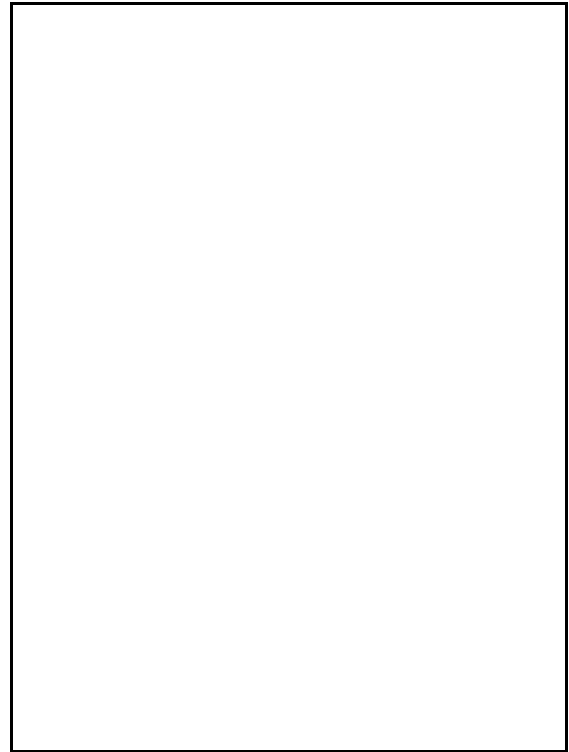
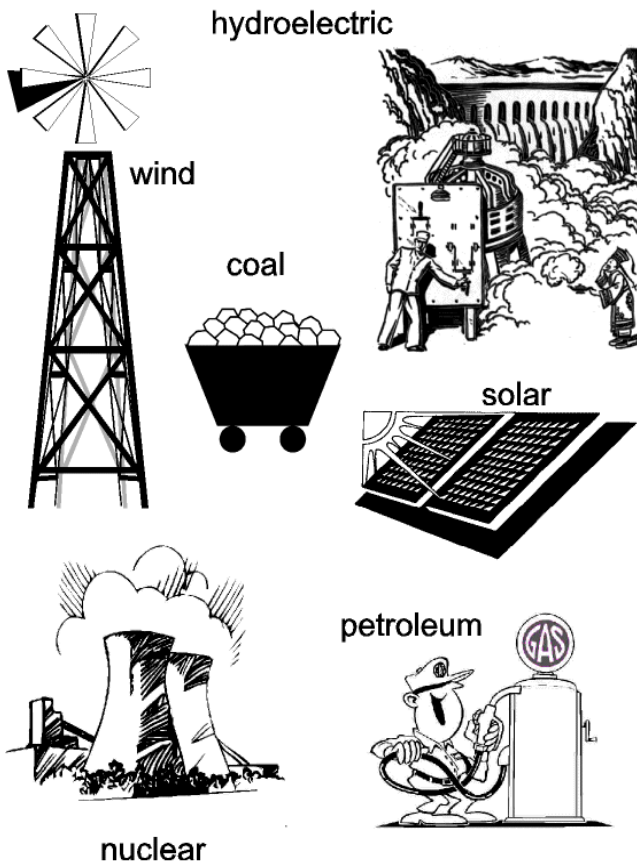
### **PROCEDURE:**

1. In this activity, students start learning the different ways to derive energy. Go over the worksheet to discuss the different types of energy sources.

2. Have students select one of the words: hydroelectric, wind, coal, gas, petroleum, nuclear, or solar and have them draw a picture of the energy that is produced from that source. For example, if they choose wind, they may want to draw a picture of a windmill.

3. Instruct students to write 2 sentences on the energy source. For example, "I like wind energy. Wind energy is clean, but you need wind."

## APPLIED SCIENCE - BUILT ENVIRONMENT (2) PRE



Draw your favorite energy source.


## APPLIED SCIENCE - BUILT ENVIRONMENT (2)

### LAB

Students create heat from light.

### OBJECTIVES:

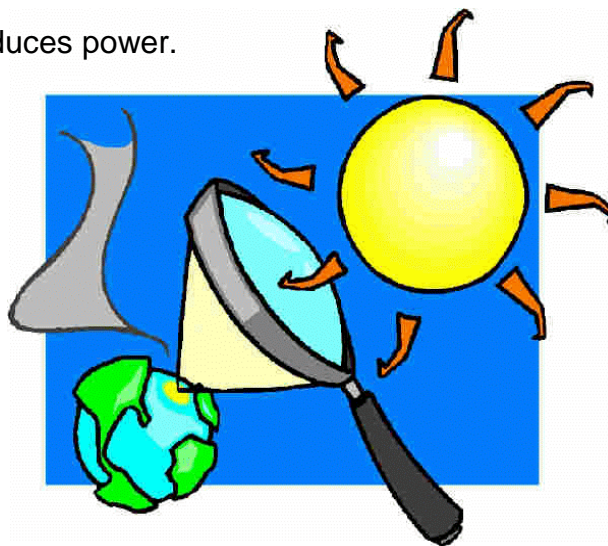
1. Experimenting with solar energy.
2. Investigating how solar energy produces power.

### VOCABULARY:

coal  
energy  
power  
solar

### MATERIALS:

3 types of hand lenses  
fickle foam  
leaves  
aluminum foil  
can of water (in case a leaf burns out of control)



### BACKGROUND:

Solar energy is an environmentally good source of energy because it is non-polluting. However, it isn't always practical everywhere around the world. Weather conditions sometimes prevent full use of solar energy. Solar energy, however, is very powerful.

Concentrating light causes sunlight to create energy, making some items work. For example, a solar calculator or solar heater. In this activity, students will learn how to capture these light rays to make heat energy. Most children learn sooner or later that a magnifying lens will make paper burn. Students will learn how light is concentrated and then discover they can create a fire if not careful.

### PROCEDURE:

1. This lab is designed to teach children safety and the power of solar energy.
2. On a sunny day, go outside and give each student a hand lens, 3 dry leaves and a piece of aluminum foil. (You can always use a piece of paper instead of leaves, but leaves are safer). Put the leaves on the aluminum foil over a cement or asphalt area. These areas help concentrate the heat, but are also much safer when burning any items.

Students should see if one, two, or three loupes makes the leaf easier to burn. Time how long it takes. (If a watch is available and your students can tell time).

3. The 3 lens together will produce the most concentrated energy, so it will burn the fastest. Students have to be sure to focus the light before it will burn.

4. Students are sometimes confused between heat energy and light energy. After they finish burning the leaves, have students rub their hands and then put them on the fickle foam. If the hand is warm enough, the fickle foam will turn colors (blue is warmest, reddish is coolest). This is because of heat energy. Shining light on the fickle foam will produce no change unless the light is derived from solar light which will also create heat. Heat energy and light energy are not always the same. However light, if concentrated, can create heat energy. Remember light can come from more sources than the Sun. Energy is a complicated subject.

## APPLIED SCIENCE - BUILT ENVIRONMENT (2)

**PROBLEM:** Does more magnification increase solar energy?

**PREDICTION:** \_\_\_\_\_

**PROCEDURE:** Put a leaf on aluminum foil. Try and burn the leaf using 1, 2 and 3 lenses. (If you burn a leaf put it out immediately.) Your teacher will give you instructions how to perform this experiment outside. Describe how long it takes for the leaf to begin to burn. (Count: 1 thousand 1, 1 thousand 2).

	DESCRIBE WHAT HAPPENS TO YOUR LEAF
1 LENS	
2 LENS	
3 LENS	

Put your finger on the Fickle Foam and describe what happens.

\_\_\_\_\_

**CONCLUSION:** Can you control the use of solar energy?

\_\_\_\_\_

\_\_\_\_\_



## APPLIED SCIENCE - BUILT ENVIRONMENT (2)

### POST LAB

Students create a collage of items that use energy.

### OBJECTIVES:

1. Contrasting different forms of energy.
2. Exploring which forms of energy are more efficient.

### VOCABULARY

energy  
fuel  
hydroelectric  
nuclear  
solar  
wind



### MATERIALS:

butcher paper  
pictures of items that use energy

### BACKGROUND:

Energy is a difficult concept for students to understand. The term is used in advertisement that are selling candy to shoes. It has several meanings depending on the context of the conversation. The term "energy" is used in a general way in American society. It sometimes refers to a specific energy such as solar energy (work created by the Sun) or can be expressed as a generality (you are full of energy).

Energy is the ability to do work, from a scientist's point of view. It can turn on a light or television. It can melt ice or make ice. It can make a car move. Energy is not something you can pick up and hold.

### PROCEDURE:

1. This activity acts as a review of many different forms of energy. Review the use of different fuels to create energy. Moving water can be used to create hydroelectric. Dams and reservoirs are created for this purpose. Nuclear material such as plutonium and uranium are used to generate electricity in nuclear power plants. The Sun's light can be converted into heat or electrical energy. Wind can move windmills which is converted to electrical energy.

2. As a homework assignment, ask students to look through magazines and find pictures of different forms of energy such as a windmill, solar calculator, nuclear plant, or other items you have discussed.

3. In class classify the different types of energy that they have found. Group them into electrical, solar, petroleum, coal, wind, hydroelectric, or nuclear. Paste them on a collage and put it outside the classroom for other students in the school to see.