

SYSTEMS & SCALE

ELEMENTARY SCHOOL

STUDENT PAGES

(Embedded Assessments)



Environmental Literacy Project

Lindsey Mohan and Hui Jin

With help from Jonathon Schramm, Li Zhan, Valencia Moses, Jim Ratcliffe, Dante Cisterna, and Andy Anderson

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Embedded Assessments:

Please make copies of these student worksheets for your focus students and mail to environmental literacy project.

- Visible and Invisible
- Needs of Living Organisms
- My Observations of Air
- My Ideas about Energy
- How Can Machines Work?
- Burning a Candle
- How Is Air Changed

ACTIVITY 1. VISIBLE AND INVISIBLE

Name: _____ Date: _____

Visible and Invisible

When thinking about different scales, we can generally group systems and parts of systems into one of three groups: 1) microscopic/cellular (we cannot see with our eyes, but can use a microscope to see), 2) macroscopic (things we can see with our eyes), and 3) landscape scale (things that are too large to see with our eyes).

With your classmates, try to think of all the things that may be too small or too large to see with the human eye, and things you can see with the human eye. List the things in the Table below.

TOO SMALL TO SEE WITH HUMAN EYE (microscopic and smaller)	CAN SEE WITH OUR EYES (macroscopic, visible)	TOO LARGE TO SEE WITH HUMAN EYE (Landscape scale)

Questions:

1. How are *really* small things part of the visible things we see with our eyes?

2. How are *really* large things connected to the visible things we see with our eyes?

ACTIVITY 4. MATERIALS AND NEEDS

Name: _____ Date: _____

Needs of Living Organisms

Living organisms include plants, and animals some of which are decomposers. In order to stay alive, organisms must meet their daily needs. Think about what living things need, and then answer the questions below.

PLANTS

1. What things do plants need to live and grow? List all the things that plants need.

Look at your list above. Decide whether each thing you listed is matter or is non-matter and then place it where it belongs in the table below.

<i>Matter</i>			<i>Not Matter</i>
<i>Solid</i>	<i>Liquid</i>	<i>Gas</i>	

ANIMALS

2. What things do animals (including people) need to live and grow? List all the things that animals need.

Look at your list above. Decide whether each thing is matter or is not matter and then place it where it belongs in the table below.

Matter			Not Matter
<i>Solid</i>	<i>Liquid</i>	<i>Gas</i>	

DECOMPOSERS

3. What things do decomposers need to live and grow? List all the things that decomposers need.

Look at your list above. Decide whether each thing is matter or is not matter and then place it where it belongs in the table below.

<i>Matter</i>			<i>Not Matter</i>
<i>Solid</i>	<i>Liquid</i>	<i>Gas</i>	

ACTIVITY 5. INVESTIGATING AIR AS FORM OF MATTER

Name: _____ Date: _____

My Observations of Air

In the table below, write down what you observe during each investigation. Describe as much as possible, what you see happening in the investigation.

Investigation #1 and #2	Investigation #3
Investigation #4	Investigation #5
Investigation #6	Investigation #7

Questions:

1. Is air matter? Why or why not?

2. Do you think air can cause something to gain weight? Why or why not?

3. Do you think air can cause something to lose weight? Why or why not?

ACTIVITY 6. WHAT IS ENERGY?

Name: _____ Date: _____

My Ideas about Energy

PART 1

1. We use the word “energy” all the time. But what does this word mean? Think about what the word “energy” means to you. Use the space below to write about your ideas.

2. You have just read about different forms of energy. How have your ideas about energy changed? Did you learn something new or different from what you wrote above?

3. Do you have any questions about energy or forms of energy?

Question 1: _____

Question 2: _____

PART 2

Examples of Forms of Energy

MOTION	LIGHT	CHEMICAL	ELECTRICAL	HEAT

ACTIVITY 7. HOW DOES ENERGY CHANGE?

Name: _____ Hour: _____

How can machines work?

In this activity, you will use the *Process Tool* to analyze energy transformation in various events. The incoming wavy arrow represents the energy input into the machines. The outgoing wavy arrow represents the energy output from the machines. Please note that the Energy Process Tool follows the two principles of energy:

- Energy conservation – Energy can transform from one energy form to other energy forms, but the total amount of energy conserves. (Energy cannot be converted into or from matter).
- Energy degradation – You cannot use all of the energy, because whenever energy transforms, heat is always released and released into the environment.

As you look at each machine, decide what FORM of energy flows into the machines and what FORM of energy flows out of the machines. Choose from among the four forms:

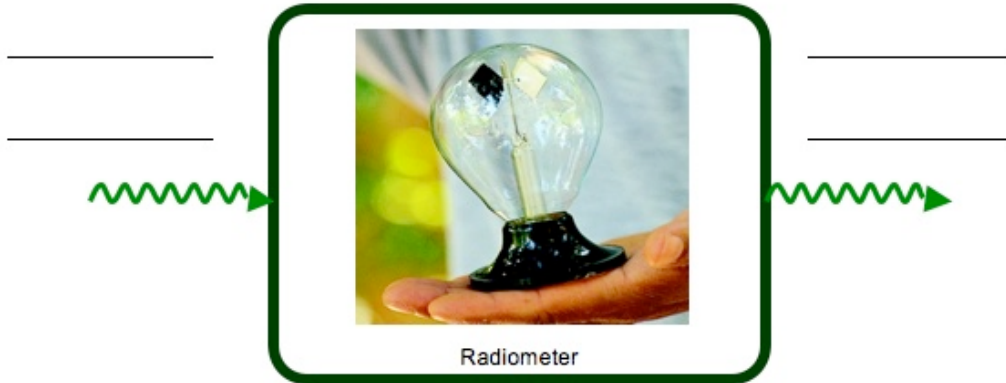
Light

Motion

Electrical

Heat

Radiometer: The radiometer is a light-bulb shaped device with a small weather vane in the middle of it. Place the radiometer under a lamp or sunlight and observe what happens when the light shines on it. Think about what happens inside the radiometer. Please use the process tool to analyze how energy transforms. Fill out the energy input and energy output in the blanks below. You may not need all the blanks.



1. **Solar Car #1:** The solar car has a switch at the bottom. It can either run on battery or use solar cells. Put the switch on “solar”. Observe what happens when the car runs on solar cells. Please fill out the energy input and energy output in the blanks below. You may not need all the blanks.



2. **Solar car #2:** Put the switch on “battery”. Observe what happens when the car uses the battery. What is the energy input? What is the energy output? Fill out the energy input and energy output in the blanks below. You may not need all the blanks.



3. **The Flashlight:** In order to make the flashlight work, you will need to squeeze the handle back-and-forth. Observe what happens when you squeeze and release the handle. What is the energy input? What is the energy output? Fill out the energy input and energy output in the blanks below. You may not need all the blanks.



5. The four events are all show energy changing from one form to another. What patterns do you see in your four diagrams?

ACTIVITY 8. ENERGY AND FUELS

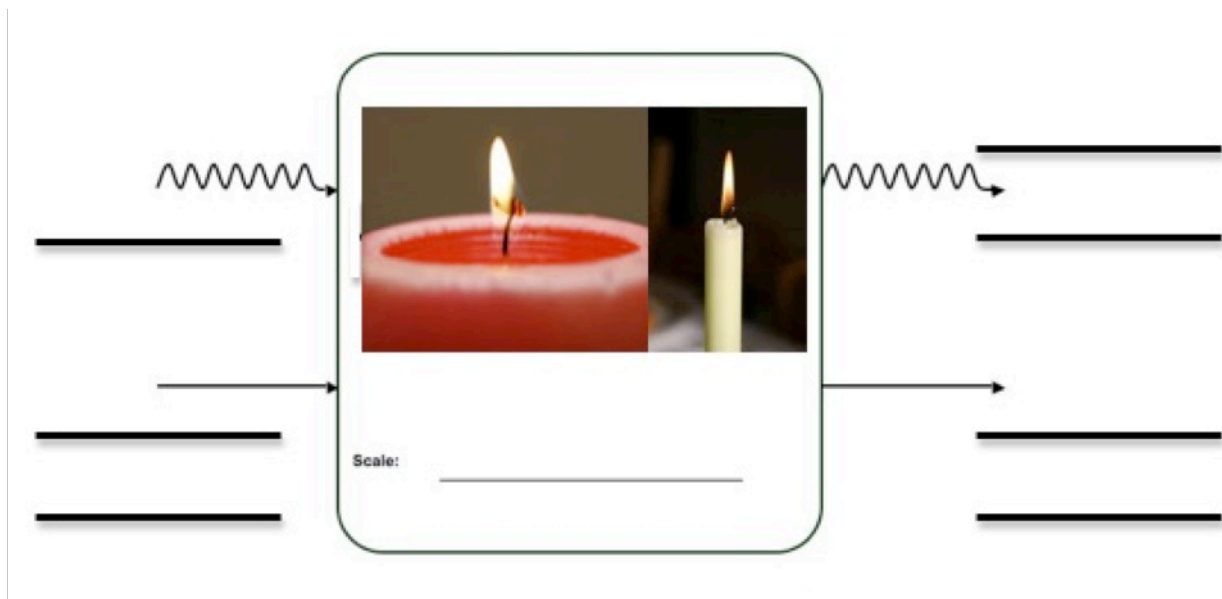
Name: _____ Date: _____

Burning a Candle

Record your observations of the candle in the table below.

What happens to materials as the candle burns? (3 Questions)	What happens to the energy as the candle burns? (2 Questions)
<p><i>1. What does the flame need in order to keep burning?</i></p> <p><i>2. What happens to the weight of the wax and wick of the candle?</i></p> <p><i>3. What is produced when the flame burns?</i></p>	<p><i>1. What form of energy do you identify before the candle burns?</i></p> <p><i>2. What forms of energy is released when the candle burns?</i></p>

Fill out the matter and energy inputs and outputs in the blanks below.



Questions

1. When you use digital scale to measure the weight of the candle, what did find? Does it lose weight? If yes, where does the lost material go?

2. Wood and wax can burn, but water, sand, and stone cannot burn. Some materials are called fuels. Fuels can burn, which means energy must come from fuels. What type of energy do fuels have?

3. How does the energy change as the fuel burns?

ACTIVITY 9. AIR IS A MIXTURE

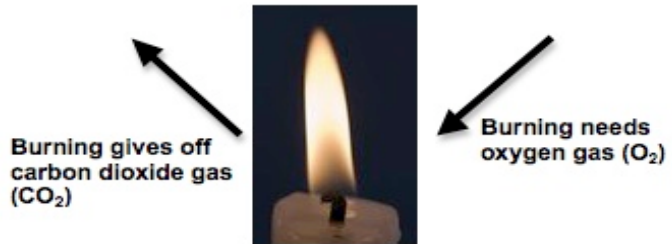
Name: _____ Date: _____

How Is Air Changed?

Now that you know air is a mixture of gases, think about how plants, animals, decomposers, and flames change this mixture. Write down your ideas below.

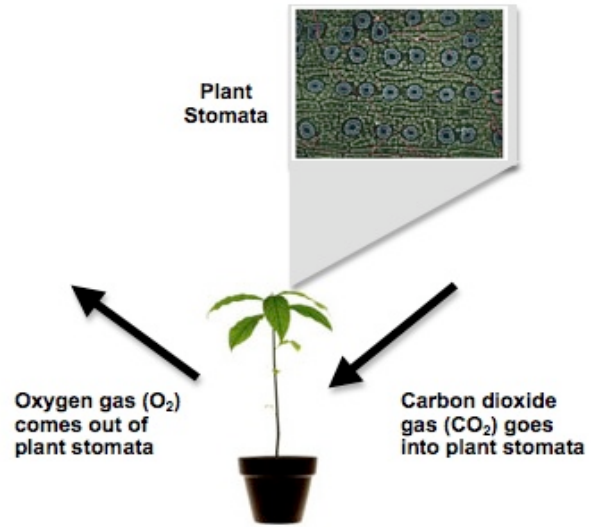
Burning Fuels & Flame

1. Look at the arrows going into and out of the flame. Oxygen is needed to burn things and carbon dioxide is given off. How does a flame change the mixture of air around it?



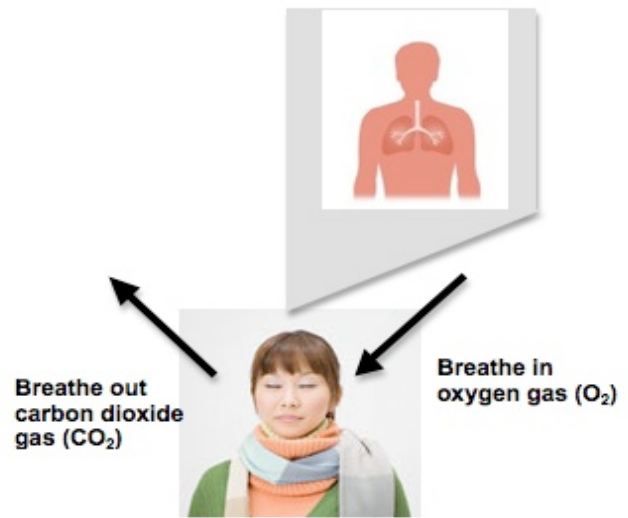
Plants

2. Look at the arrows going into and out of the plant. You may have heard that plants take in carbon dioxide and give off oxygen. How does the plant change the mixture of air around it?



Animals

3. Look at the arrows going into and out of the person. You may have heard that people and other animals breathe in oxygen and breathe out carbon dioxide. How does a person change the mixture of air around them?



Decomposers

6. Look at the arrows going into and out of decomposers in the compost pile.

Decomposers need oxygen to decompose dead plants and animals. They give off carbon dioxide. How do decomposers change the mixture of air around them?

