7 Moving Through the Carbon Cycle [Modeling]

1 – 2 class sessions

TEACHER'S NOTE:
Necessary changes have been made in the student book. Use the replacement pages for Activity 7, not the pages in the bound student book. If you do not have a copy of the replacement pages, they can be accessed online at http://www.sepuplhs.org/teachers/sgi/ under "Ecology Unit," "Activity 7, Student Book Replacement Pages."

SPECIAL QUESTION:
Did the use of Student Sheet 7.3, "Keeping Track of Carbon" help the carbon scientists work through the walking model? Did your students come up with a better way to keep track of the carbon? Is so, what did they use?

OVERVIEW

Students walk through a simulation that models the movement of carbon through the global carbon cycle, and summarize the affect of human activities on the cycle.

Key Concepts and Process Skills

(with correlation to NSE 5-8 Content Standards)

1. The earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different chemical reservoirs. Each element on earth moves among reservoirs in the solid earth, oceans, atmosphere, and organisms as part of geochemical cycles. *(Earth Sci: 2)*
2. Human beings live within the world's ecosystems. Human destruction of habitats through harvesting, pollution, and other ways is threatening current global stability and if not addressed, ecosystems will be irreversibly affected. (*Life Sci: 4)*

Key Vocabulary

Carbon cycle

Nitrogen cycle

reservoir

sustainability

Materials and Advance Preparation

For the teacher

	1	Transparency 7.1, "Carbon Cycle Model Key"
	1	Transparency 7.2, "Total Carbon in the System"
	1	transparency of Sample Student Answers to Student Sheet 7.2, "Carbon Cycle Diagram"
	1	marker
*	5	sheets of white paper
*	3	sheets of cardstock for the Carbon Cycle Cards
	1	UNDERSTANDING CONTENT (UC) Scoring Guide

For the class

	5	9 oz. plastic cups (filled with the number of carbon chips shown in the chart on the next page)
	5	Carbon Cycle Model Key Cards
	1	bag of plastic carbon chips (containing purple, yellow, white, green, blue, red, black, and yellow chips)
	5	copies of Student Sheet 7.3, "Keeping Track of Carbon"
	1	set of 15 Carbon Cycle Cards
*	1	set of 5 reservoir nametags (Atmosphere, Organisms, Water, Rocks and Soil, Fossil Fuels)
*	5	calculators
*		scrap paper

For each pair of students

The Giant Kelp and Sea Urchin cards from Activity 6

For each group of four students

1 set of 3 Human Impact Cards

For each student

1	Student Sheet 7.1, "Moving Carbon Through the Carbon Cycle"
1	Student Sheet 7.2, "Carbon Cycle Diagram"
1	UNDERSTANDING CONTENT (UC) Scoring Guide (optional)

**Not supplied in kit*

You will need to assign students to a starting reservoir for the walking model. Decide how you will do this before class begins. Teaching Step 2 provides suggestions for where to assign students and the roles they will fulfill during the activity.

To set up for the walking model:

- Make the reservoir signs. Write the name of each carbon reservoir (Atmosphere, Organisms, Water, Rocks and soil, Fossil fuels) on a sheet of 8 ½" x 11" sheet of paper. Hang the reservoir signs around the perimeter of the classroom, spacing them as far apart as possible.
- Photocopy and cut out five Carbon Cycle Model Key Cards. On the back of each card, record the number of each color of chips contained in the reservoir to start. Place the card next to the corresponding reservoir cup.
- Photocopy and cut out the Carbon Cycle Cards on cardstock. Sort them by reservoir name and place each stack of three next to the corresponding reservoir cup.
- Fill each of the five reservoir cups with the number of chips shown in the chart below. Place each cup under the corresponding sign.
- Photocopy and cut out a set of Human Impact Cards for each group.
- Make 5 photocopies of Student Sheet 7.3, "Keeping Track of Carbon" and place one by each reservoir cup.

Reservoir Cup	**Starting amount of Carbon (Giga tons)**	**Fill cup with**
Rocks and Soils	80 million	7 White chips (70,000,000) 9 Purple chips (9,000,000) 9 Blue chips (900,000) 9 Green chips (90,000) 9 Orange chips (9,000) 8 Red chips (800) 18 Yellow chips (180) 20 Black chips (20)
Water	39 thousand	3 Green chips (30,000) 8 Orange chips (8,000) 7 Red chips (700) 28 Yellow chips (280) 20 Black chips (20)

Fossil Fuels	4 thousand	3 Orange chips (3,000) 7 Red chips (700) 6 Yellow chips (60) 40 Black chips (40)
Organisms	2 thousand	1 Orange chip (1,000) 8 Red chips (800) 20 Yellow chips (200)
Atmosphere	750	5 Red chips (500) 23 Yellow chips (230) 20 Black chips (20)

Teaching Summary

Getting Started

1. Review the movement of carbon-containing molecules between organisms in the Kelp Forest.

Doing the Activity

2. The class models the movement of carbon between reservoirs in the carbon cycle.

Follow-Up

3. (UC ASSESSMENT) Students analyze the affect of human actions on the Carbon Cycle.

TEACHING SUGGESTIONS

Getting Started

1. **Review the movement of carbon-containing molecules between organisms in the Kelp Forest.**

Pass out the Giant Kelp and sea urchin cards to each pair of students. Ask students to arrange the cards to show the flow of carbon-containing compounds between them. Once the cards are arranged ask student pairs to discuss, ***How would you describe the flow of carbon between these two organisms?*** Based on the information provided on the cards, and an understanding that the sea urchin consumes the Giant Kelp, students should respond that the sea urchin ingests carbon-containing molecules contained in the kelp. Carbon dioxide will also be released from the sea urchin and Giant

Kelp into the surrounding environments when they respire. Do not expect students to name or describe this process this process at this point in the unit. They will learn this in depth later in the Unit. . Students should be able to deduce that the carbon dioxide is released into the environment based on the information provided on the cards.

Ask the class, ***Where do the carbon containing molecules in the Giant Kelp come from? Go to?*** Based on the information provided on the card, students are likely to say the carbon dioxide comes from the environment, goes into the plant, and then is incorporated into a carbon-containing molecule. It is then released as waste or as carbon dioxide into the environment. A more detailed answer would explain that the carbon enters the organisms as carbon dioxide. The carbon dioxide is taken into the plant and incorporated into sugar molecules during the process of photosynthesis. The carbon in the sugar molecule is either used during the process of cellular respiration---and the carbon is released into the water as carbon dioxide---or incorporated into the kelp itself. It is not expected that students would be able to answer with this amount of detail until later in the Ecology unit when they learn about photosynthesis and cellular respiration.

Explain that the cycling of carbon between the Giant Kelp and the sea urchin is one process in a series of process that cycle carbon among biotic and abiotic factors in ecosystems. In this activity students will conduct a walking model demonstrating the cycling of carbon through these processes in the Global Carbon Cycle.

Doing the Activity

2. The class models the movement of carbon between reservoirs in the carbon cycle.

Ask students to read the Introduction in the Student Book and complete Procedure Step 1.With the class, make a list of carbon-containing molecules found on Earth. A sample list is shown below. Use both the common name and chemical formula so students are familiar with both ways of referring to carbon-containing molecules.

Carbon-containing molecules

Common name	Chemical formula
carbon dioxide	CO_2
methane	CH_4
carbon monoxide	CO
glucose	$C_6H_{12}O_6$

The most common carbon-containing molecules in the carbon cycle that students may be familiar with are carbon dioxide (CO_2) and methane (CH_4).

Explain that students will model the movement of carbon in the Global **Carbon Cycle**. The Carbon Cycle is name given to the processes that transfer carbon from one place or reservoir on earth to another. These processes include photosynthesis, respiration, and decomposition. It is not necessary for students to learn the names of these processes at this point, as they will be treated in depth in subsequent activities.

Project Transparency 7.1, "Total Carbon in the System." Show students the plastic chips they will work with. Explain that 1 black chip represents 1 giga ton of carbon. As appropriate, review the concept of giga ton (Gt). 1 giga ton is equivalent to 10^9 tons or 1,000,000,000 tons. Show students Transparency 7.1, "Carbon Cycle Model Key," and explain that the chips represent from one giga ton (1 black chip) to one million giga tons (1 white chip). These chips represent the relatively large amounts of carbon-containing molecules that cycle through the global carbon cycle.

Display Transparency 7.2, "Total Carbon in the System." Explain that each reservoir contains the amount of carbon atoms shown in the "Start" column. These numbers are based on estimates of the amount of carbon contained in each reservoir on Earth between the years 2000 and 2008.

Ask students, ***Which reservoir contains the most carbon? The least?*** Rocks and soil contain the most carbon (approximately 80 million Gt), followed by the earth's oceans, rivers, and lakes (approximately 39,000 Gt). The least amount of carbon is contained in the earth's atmosphere (approximately 750 Gt).

Assign students a role and a starting reservoir. The roles needed are as follows:

- **Carbon scientists** (1-2 per reservoir) - This student stays at the same reservoir throughout the activity and keeps track of how much carbon is in his or her assigned reservoir using Student Sheet 7.3, "Keeping Track of Carbon." See the last page of this Activity's Teacher's Guide for example student work on Student Sheet 7.3.
- **Carbon movers** (at least one per reservoir) - The remaining students will move carbon from one reservoir to the next as directed by the cards placed at each of the five reservoirs. Place at least one student at each reservoir to begin.
- Place as many students as possible at the fossil fuels reservoir.

Teacher's note: Students will only move carbon into, not out of, the "Fossil Fuels" reservoir during the walking model. For this reason assign as many students as possible to begin at this reservoir.

Pass out Student Sheet 7.1, "Moving Carbon Through the Carbon Cycle." Explain that students will record each move on this sheet as shown below.

Sample Student Answers, Student Sheet 7.1, "Moving Carbon Through the Carbon Cycle"

Reservoir			
Moves from	**Moves to**	**Giga tons of carbon moved**	**Color and number of chips moved**
Atmosphere	Water	95	9 yellow chips 5 black chips
Water	Rocks and soil	1	1 black chip
Rocks and soil	Atmosphere	1	1 black chip
Atmosphere	Atmosphere	none	none

Let each student know which reservoir he or she will begin at. If there are multiple students at a reservoir they should stand in a line. When you indicate it is time to start, the first student at each reservoir will select a Carbon Cycle Card located next to the reservoir cup. On Student Sheet 7.1 they will record the name of the new reservoir, the number of colored chips they will move, and the total amount of carbon they will move. They should collect the correct number of chips from the carbon scientist at the reservoir, return the card to the bottom of the deck, walk to the next reservoir and drop the carbon chips into the next reservoir cup, and join the back of the line at the new reservoir.

When the first group of students have completed this move, signal the next set of students to select the next card and repeat the movement. Repeat one more time and then signal the class to stop. Ask each carbon scientist to report the total giga tons of carbon contained at his or her reservoir as recorded on Student Sheet 7.3, "Keeping Track of Carbon." Record this number on Transparency 7.2 under "Subtotal 1." Resume student movement through the walking model. After another three turns or so, repeat the process. Stop and record the amount of carbon in each reservoir on

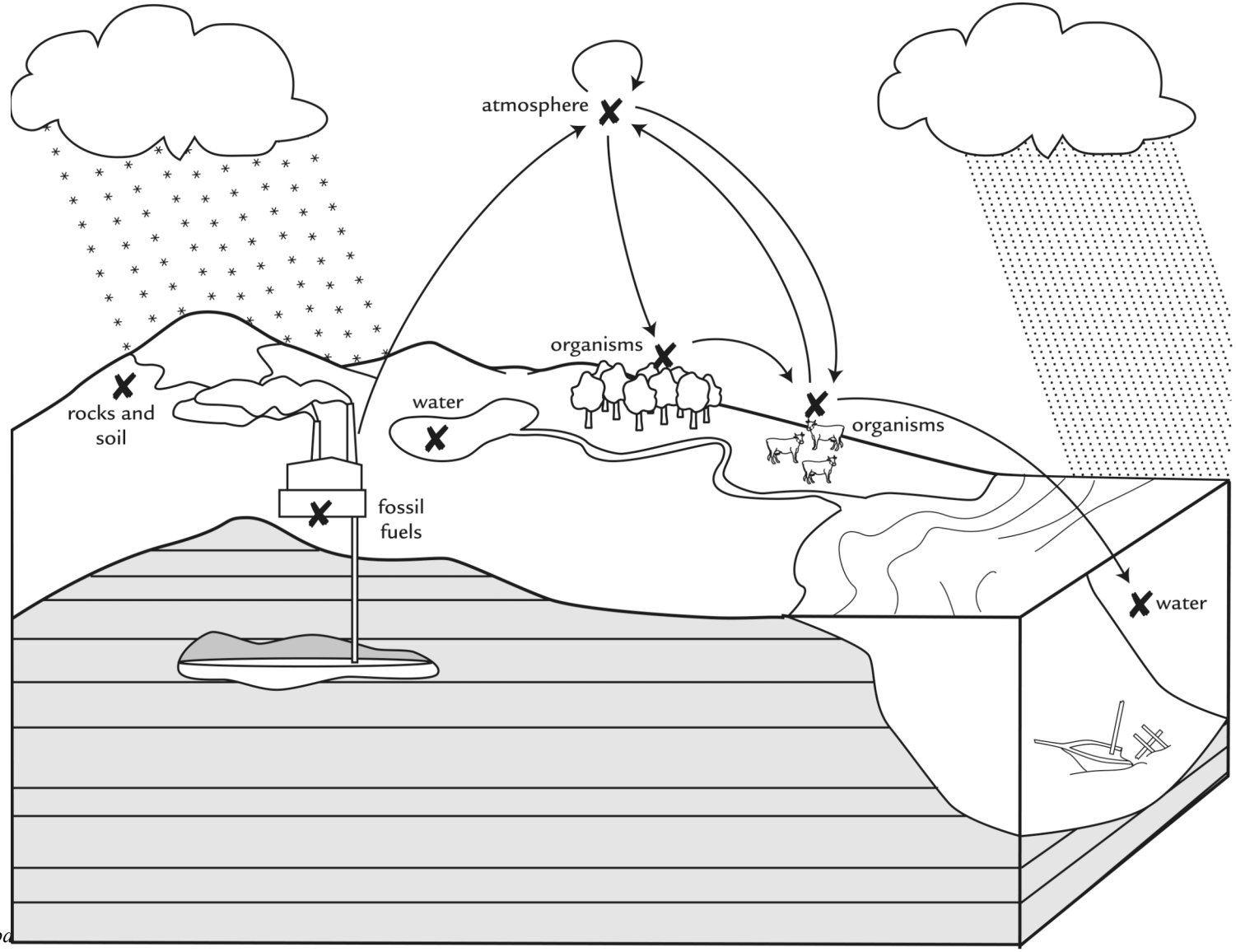
Transparency 7.1 under "Subtotal 2." Continue for three more turns. Instruct students to return to their seats.

Pass out Student Sheet 7.2, "Carbon Cycle Diagram." As a class, label each X on Student Sheet 7.2 with the name of the reservoirs as shown on the, "Sample Student Answers for Student Sheet 7.2," found on the next page. Assist students as necessary in drawing arrows on Student Sheet 7.2 to represent the moves made during the activity. If students repeated a pathway more than once, they only need to record one arrow as shown on the next page. Project a transparency of "Sample Student Answers for Student Sheet 7.2," and ask the class to***, Compare the pathway you recorded on Student Sheet 7.2 with the movement recorded on the transparency. Are there similarities?*** No two students will have recorded the exact same pattern of movement, unless they moved together through the model. Ask students to ***Imagine you were a carbon-containing molecule moving through the carbon cycle. What can you say about how you moved, as shown on Student Sheet 7.2, compared to another student? Compared to the class?*** Each student's work will show a different order of pathways from one reservoir to the next. Also, one student may have made it to all of the reservoirs, while another may have only visited two. This is representative of the Global Carbon Cycle. Carbon moves from one reservoir to the next, but at different rates and along different pathways.

As a class analyze the information presented on Transparency 7.2, "Total Carbon in the System." Ask the question, ***What does this data tell you about the movement of carbon through the carbon cycle?*** Student answers should indicate that the carbon was in flux from reservoir to reservoir and the amount of carbon in each changed each round. What did not change was the total amount of carbon in the system, which remained constant. Ask, ***What patterns can you see in the data on Transparency 7.2?*** Make the following points:

- Giga tons of carbon are removed from the Fossil Fuels reservoir, but are not put back in.
- The flux of giga tons of carbon in and out of water, rocks and soils, and organisms is small relative to the gain in the Atmosphere.
- The atmosphere gains the most giga tons of carbon over time.

Sample Student Work, Student Sheet 7.2, "The Carbon Cycle"



Follow-Up

3. **(UC ASSESSMENT) Students analyze the affect of human actions on the Carbon Cycle.**

Hand out one set of Human Impact cards to each group of four students. As students groups complete Procedure Steps 8 through 10, assist then as necessary in examining Student Sheet 7.2 and describing the short- and long-term affect of the human actions detailed on each card. Sample student answers to Procedure Steps 9 and 10 are shown below.

Sample student responses for Procedure Steps 9 and 10,

"Human Impacts on the Carbon Cycle"

Description of Human Event	**Short-term Impacts on Carbon Flow**	**Long-term Impacts on Carbon Flow**
A: Forest cut down and replaced with corn crops	Corn photosynthesizes at a rate slower than the trees, so less carbon dioxide is removed from the atmosphere.	This may lead to an overall buildup of carbon dioxide in the atmosphere.
B: Burning coal in a factory	Carbon dioxide is added to the atmosphere.	Build up of carbon dioxide in the atmosphere.
C: Hybrid cars used	Less carbon dioxide is released into the atmosphere compared with standard gasoline burning vehicles.	Less carbon dioxide is added to the atmosphere in the long-term compared to standard gasoline burning vehicles.

Analysis Question 2 is a UC ASSESSMENT question. Use the SEPUP scoring guide to formally score students work. A sample level three response is shown below.

Analysis Question 4 introduces the **Nitrogen Cycle** and prompts students to compare and contrast the nitrogen cycle shown in the student book and the carbon cycle they constructed on Student Sheet 7.2.

SUGGESTED RESPONSES TO ANALYSIS QUESTIONS

1. ***[Class]*** *Based on the information on Transparency 7.2, what can you say about the total amount of carbon in the carbon cycle?*
   The total amount of carbon atoms in the system remained the same even through carbon was moving from reservoir to reservoir.

2. ***[1 student](UC ASSESSMENT)*** *Describe how the carbon contained in a catfish can end up in a blade of grass.*
   The carbon is a part of a molecule in the body of the fish. A larger fish eats the fish, and the carbon is in a molecule that is digested. The carbon is incorporated into the body of the larger fish. The large fish respires and releases carbon dioxide. The carbon dioxide is released into the ocean water. The carbon dioxide is transferred from the lake water into the atmosphere. A plant takes in the carbon dioxide from the atmosphere and uses it during the process of photosynthesis to create a carbon-containing molecule. This carbon-containing molecule is incorporated into the body of the plant.

3. *[**4 Students**] Below is a diagram of the nitrogen cycle. Use the diagram to help you answer the following questions:*

a. *What forms of nitrogen do you see in the diagram?*

b. *Which organisms take in nitrogen-containing compounds?*

c. *Which organisms give off nitrogen-containing compounds?*

d. *Compare and contrast the carbon and nitrogen cycles.*
   a. The nitrogen-containing compounds shown in the diagram include nitrogen (N_2), ammonium (NH^{4+}), nitrates (NO^{3-}), nitrites (NO^{2-}), and ammonia (NH_3).
   b. The rabbit, algae, fish, bacteria, fungi, and other decomposers in the soil all take in nitrogen-containing compounds.
   c. The same organisms give off nitrogen-containing compounds.
   d. They both cycle an element through the air, soil, and water on earth. They are both affected by human activity. They are different in the type of element they are cycling, and the exact ways they pass from one reservoir to another.

4. *How can human activity affect the flow of carbon through the carbon cycle? Include an example from this activity to support your answer.*
   Humans can affect a part of the carbon cycle by doing things such as cutting down a forest. When the forest is removed, the trees will no longer remove carbon from the atmosphere. This means that more carbon dioxide may build up in the atmosphere reservoir over time if it is not removed in some

other way. In this way, humans can create imbalances in the natural cycle of carbon on Earth.

5. *How has human use of fossil fuels impacted the global carbon cycle?*
   Humans' use of fossil fuels releases a lot of carbon into the atmosphere. While there is already carbon cycling through the atmosphere, humans are releasing carbon into the atmosphere at levels that are higher than natural levels. The natural system is not able to cycle the carbon out of the atmosphere at the same rate.

6. *An algal bloom is an event in a marine ecosystem that can occur when the level of nutrients in an ocean ecosystem rises. The increase in nutrient levels increases the carrying capacity of the ecosystem for algae and the algae population increases dramatically. Describe how a change in the algae population might affect the local carbon cycle in that ecosystem.*
   Algae are producers, which means that they take in carbon dioxide and create carbon-containing compounds from the carbon dioxide. If the algae populations increase dramatically, it might be able to remove carbon dioxide from the atmosphere at a fast rate, since the population is larger.

7. *Explain how a person's carbon footprint relates to the carbon cycle.*
   As explored in the Sustainability Unit, a person's carbon footprint is the amount of land (in acres) needed to absorb the amount of carbon the person's activities will release into the atmosphere over the course of a year. This means that a person's carbon footprint is a measure of how much carbon the person's lifestyle releases into the atmosphere, and the amount of land covered by plants conducting photosynthesis, would be needed to remove the carbon from the atmosphere.

Carbon Cycle Cards

Directions: Photocopy and cut out one set of the cards that follow. Place them next to the corresponding reservoir cup.

Atmosphere Gaseous carbon dioxide in the atmosphere doesn't encounter anything to react with and remains in the atmosphere. Record this on your Student Sheet and move to the back of the line.	**Organisms** A consumer eats an organism whose body is composed of carbon-containing molecules. The molecule is incorporated into the cells of the producer (another organism). Record this on your Student Sheet and move to the back of the line.
Atmosphere Carbon dioxide moves into the leaves of a tree during the process of photosynthesis. Move 110 Gt of carbon to organisms.	**Organisms** The carbon-containing molecules in the cells of an organism are used during cellular respiration and produce carbon dioxide. This gas leaves the organism and is transfer to the atmosphere. Move 50 Gt of carbon to the atmosphere.
Atmosphere Carbon dioxide combines with water vapor in a cloud to form carbonic acid. In an acid rain storm, the carbonic acid falls into water. Move 95 Gt of carbon to water.	**Organisms** An organism dies and is decomposed. The decomposers convert the carbon molecules in the body of the organism into carbon dioxide that is released into the atmosphere. Move 110 Gt of carbon to the atmosphere.

(The Carbon Cycle Cards continue on the next page)

Water Carbon diffuses out of water as carbon dioxide, into the atmosphere. Move 95 Gt of carbon to the atmosphere.	**Rocks and Soil** Acid rain falls on rock, reacting chemically and releasing carbon dioxide. Move 62 Gt of carbon to the atmosphere.
Water Carbon-containing compounds on the surface of the ocean circulates to the deep ocean and then back again. Record this on your Student Sheet and move to the back of the line.	**Rocks and Soil** A rock in the earth's lower lithosphere is subducted into even lower layers in the earth and melts. Record this on your Student Sheet and move to the back of the line.
Water Carbon dioxide dissolved in seawater is used by organisms to make a rigid, protective shell. When the coral dies, and the protective shell is eroded, the carbon-containing molecules become a part of the sediment on the sea floor. Move 1 Gt of carbon to Rocks and soil.	**Rocks and Soil** A volcano erupts from tectonic movement and releases carbon dioxide into the atmosphere. Move 1 Gt of carbon to the atmosphere.
Fossil Fuels The oil is refined into gasoline and the gasoline is used to power standard gas vehicles. The vehicles release carbon dioxide into the atmosphere. Move 2 Gt of carbon to the atmosphere.	**Fossil Fuels** A factory that burns coal releases gaseous carbon dioxide. Move 2 Gt of carbon into the atmosphere.

(The Carbon Cycle Cards continue on the next page)

Fossil Fuels Oil is refined to make jet fuel. Jet fuel is used to power commercial airlines. When aircrafts burn jet fuel, they release carbon into the atmosphere. Move 2 Gt of carbon into the atmosphere.	

Carbon Cycle Model Key Cards

Carbon Cycle Model Key

White Chip	10,000,000 Giga tons of carbon
PurpleChip	1,000,000 Giga tons of carbon
Blue Chip	100,000 Giga tons of carbon
Green chip	10,000 Giga tons of carbon
Orange chip	1,000 Giga tons of carbon
Red chip	100 Giga tons of carbon
Yellow chip	10 Giga tons of carbon
Black chip	1 Giga ton of carbon

Carbon Cycle Model Key

White Chip	10,000,000 Giga tons of carbon
PurpleChip	1,000,000 Giga tons of carbon
Blue Chip	100,000 Giga tons of carbon
Green chip	10,000 Giga tons of carbon
Orange chip	1,000 Giga tons of carbon
Red chip	100 Giga tons of carbon
Yellow chip	10 Giga tons of carbon
Black chip	1 Giga ton of carbon

Carbon Cycle Model Key

White Chip	10,000,000 Giga tons of carbon
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Black chip	1 Giga ton of carbon

Carbon Cycle Model Key

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Orange chip	1,000 Giga tons of carbon
Red chip	100 Giga tons of carbon
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Black chip	1 Giga ton of carbon

Carbon Cycle Model Key

White Chip	10,000,000 Giga tons of carbon
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Blue Chip	100,000 Giga tons of carbon
Green chip	10,000 Giga tons of carbon
Orange chip	1,000 Giga tons of carbon
Red chip	100 Giga tons of carbon
Yellow chip	10 Giga tons of carbon
Black chip	1 Giga ton of carbon

Human Impact Cards

A landowner cuts down five acres of forest and replaces it with five acres of corn. The corn will photosynthesize at a rate that takes in 20% less carbon dioxide than the forest. A
A coal-powered factory is built. Coal is burned to power the machinery used in the factory. Carbon dioxide is released into the atmosphere when the coal is burned. B
A major city enacts legislation requiring motorists to drive fuel-efficient cars only. Fuel-efficient cars release less carbon dioxide into the atmosphere relative to standard gasoline powered vehicles. C

Carbon Cycle Model Key

White Chip	10,000,000 Giga tons of carbon
Purple Chip	1,000,000 Giga tons of carbon
Blue Chip	100,000 Giga tons of carbon
Green chip	10,000 Giga tons of carbon
Orange chip	1,000 Giga tons of carbon
Red chip	100 Giga tons of carbon
Yellow chip	10 Giga tons of carbon
Black chip	1 Giga ton of carbon

Ecology Transparency 7.1

Total Carbon in the System

	Amount of Carbon in Reservoir			
Reservoir	**Start (Gt of Carbon)**	**Round 1 (Gt of Carbon)**	**Round 2 (Gt of Carbon)**	**Round 3 (Gt of Carbon)**
Atmosphere	750			
Water (oceans, lakes, rivers)	39,000			
Rocks and soil	80,000,000			
Organisms (plants, animals, humans)	2,000			
Fossil Fuels	4,000			
Total carbon in the system	80,045,750			

Ecology Transparency 7.2

Name _____ Date _____

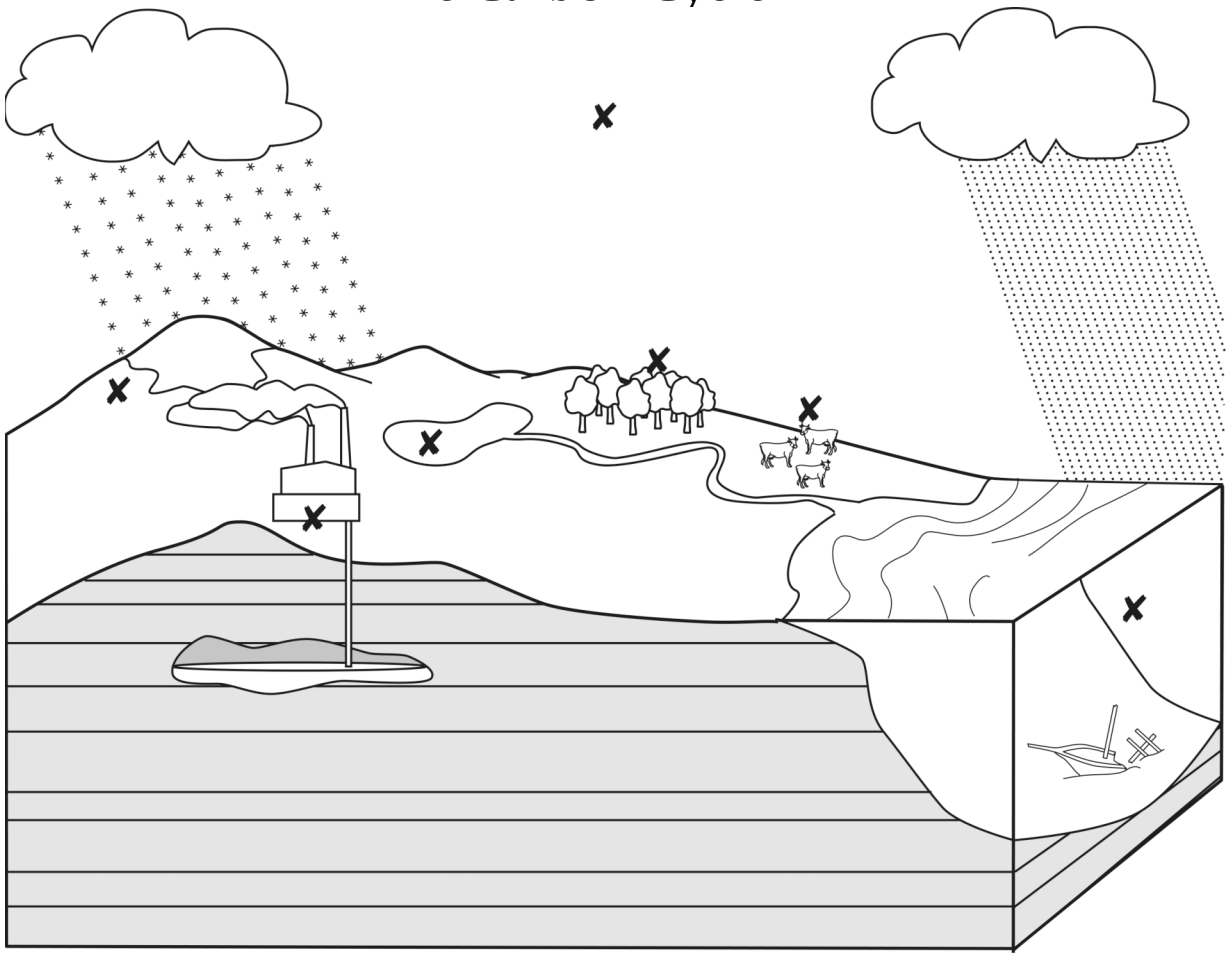
Moving Carbon Through The Carbon Cycle

Reservoir			
Moves <u>from</u>	**Moves <u>to</u>**	**Giga tons of carbon moved**	**Color and number of chips moved**

Ecology Student Sheet 7.1

Name _____ Date _____

The Carbon Cycle



Ecology Student Sheet 7.2

Reservoir _____

Keeping Track of Carbon

		Start		Round 1 Subtotal		Round 2 Subtotal		Round 3 Subtotal	
Color of Chip	**Carbon/ chip**	**Number of Chips**	**Carbon**	**Number of Chips**	**Carbon**	**Number of Chips**	**Carbon**	**Number of Chips**	**Carbon**
White chip	10 million								
Purple chip	1 million								
Blue chip	100,000								
Green chip	10,000								
Orange chip	1,000								
Red chip	100								
Yellow chip	10								
Black chip	1								
		Total Carbon Start		Total Carbon Round 1		Total Carbon Round 2		Total Carbon Round 3	

Ecology Student Sheet 7.3

Sample Student Work, Student Sheet 7.3, "Keeping Track of Carbon"

Reservoir _____*Atmosphere*_____

Keeping Track of Carbon

		Start		Round 1 Subtotal		Round 2 Subtotal		Round 3 Subtotal	
Color of Chip	**Carbon/ chip**	**Number of Chips**	**Carbon**	**Number of Chips**	**Carbon**	**Number of Chips**	**Carbon**	**Number of Chips**	**Carbon**
White chip	10 million								
Purple chip	1 million								
Blue chip	100,000								
Green chip	10,000								
Orange chip	1,000								
Red chip	100	*5*	*500*	*5*	*500*	*5*	*500*	*5*	*500*
Yellow chip	10	*23*	*230*	*23*	*230*	*24*	*240*	*24*	*240*
Black chip	1	*20*	*20*	*26*	*26*	*30*	*30*	*32*	*32*
		Total Carbon Start	*750*	Total Carbon Round 1	*756*	Total Carbon Round 2	*770*	Total Carbon Round 3	*772*