Name: _____ Date: _____

Student Exploration: Carbon Cycle

Vocabulary: atmosphere, biomass, biosphere, carbon reservoir, carbon sink, fossil fuel, geosphere, greenhouse gas, hydrosphere, lithosphere, photosynthesis

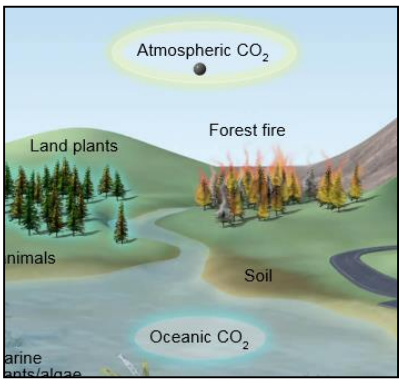
Prior Knowledge Questions (Do these BEFORE using the Gizmo.)
In the process of **photosynthesis**, plants take in carbon dioxide (CO_2) from the atmosphere and water (H_2O) from the soil. Using the energy of sunlight, plants build molecules of glucose ($C_6H_{12}O_6$) and oxygen (O_2).

1. How do plants on Earth affect the amount of carbon in Earth's atmosphere? _____

   _____

2. Animals eat plants and produce carbon dioxide and water. How do animals affect the amount of carbon in Earth's atmosphere? _____

Gizmo Warm-up
The *Carbon Cycle* Gizmo allows you to follow the many paths an atom of carbon can take through Earth's systems. To begin, notice the black carbon atom in the **Atmospheric CO_2** area, highlighted in yellow. The glowing blue areas represent possible locations the carbon atom could go next.



1. From Earth's atmosphere, where can the carbon atom go next? _____

2. Click on **Land plants** and read the description. How did the carbon atom get from the atmosphere to a plant? _____

3. Select **Land animals**. How did the carbon atom get from land plants into the animal?

   _____

4. Select **Atmospheric CO_2**. How did the carbon atom get from land animals back to the atmosphere? _____

Activity A: **Carbon pathways**	Get the Gizmo ready: • Click **Reset**.	

Introduction: Earth can be divided into four systems. The **atmosphere** is the air above Earth's surface. The **hydrosphere** is composed of all of Earth's water. The **geosphere** is the rocky, non-living part of Earth. The **biosphere** consists of all living things, including people. Some scientists use the term "anthroposphere" to describe everything made or modified by humans.

Question: How does carbon move between the atmosphere, hydrosphere, biosphere, and geosphere?

1. Explore: Use the Gizmo to create a path for carbon that begins and ends in the atmosphere. Fill in the steps in the path below. Then, label each location with the system it represents. Finally, summarize very briefly how the carbon atom got to that location.

Carbon path	System	How it got there
Atmospheric CO_2 ↓	Atmosphere	Atmospheric CO_2 comes from volcanoes, burning fossil fuels, and other sources.

2. Create: Click **Reset**. Use the Gizmo to create a path in which the carbon atom goes from the atmosphere to the hydrosphere, biosphere and geosphere. Describe each transition briefly.

Atmosphere	Hydrosphere	Biosphere	Geosphere
Atmospheric CO_2 →	→	→	
Volcanoes, burning fossil fuels, and other sources.			

(Activity A continued on next page)

Activity A (continued from previous page)

3. Explore: Use the Gizmo to create three more carbon paths, each starting and ending in the atmosphere. Label each location with A for atmosphere, B for biosphere, G for geosphere, or H for hydrosphere. (You can also use P for anthroposphere if you like, or just include it in the biosphere.)

   Path 1:

   Path 2:

   Path 3:

4. Explain: Based on the Gizmo, explain how the following transitions might take place:

   A. Describe at least two ways that carbon can get from a land plant to the atmosphere.

   _____

   _____

   B. Describe at least two ways that carbon can get from the atmosphere to the hydrosphere. _____

   _____

   C. Can you find two ways that carbon can get from the ocean to the **lithosphere**? (The lithosphere is the rigid layer of the Earth, including the crust and part of the mantle.)

   _____

   _____

   _____

   D. Describe at least two ways that carbon can get from seashells to the atmosphere.

   _____

   _____

   _____