Carbon Cycle Game

In this activity, we will model the natural cycle of carbon through all its stages in the environment. We will also try to understand how the burning of fossil fuels has increased the amount of carbon now present in the carbon cycle, upsetting the balance. In the activity you will be a carbon atom moving through the seven carbon cycle reservoirs: atmosphere, land plants, soils, surface oceans, marine life, deep oceans, and the deep earth.

1. Record your start location in the space below.

2. a) If you started in the deep earth station skip to (b). If not, continue with (a). Roll the die and read the corresponding instructions to find out where you will go next. Be sure to note how you traveled. Complete Table 1 by recording where you went and how you got there. If you need more space, use a separate piece of paper. Move to the next station. Go to step 3.
b) For millions of years you were underground in fossil fuels. Now, you have been released into the atmosphere as humans burn fuels in vehicles and factories. While in the atmosphere, you will be stuck to two atoms of oxygen in a greenhouse gas called carbon dioxide. Only a small amount (0.04%) of the atmosphere is made of carbon dioxide. Because of burning fossil fuels the amount has increased about 30% in the past 150 years. More carbon dioxide in our atmosphere makes our planet warmer. From deep earth, go to the atmosphere station and follow the instructions in (a).

3. When you have completed all eight trips, return to your seat.

Your Travel Record

Starting Location: _____

Table 1 Record of carbon atom location and method of travel

Trip	How I traveled	Where I went
1		
2		
3		
4		
5		
6		
7		
8		

Questions

1. Most cycles we think about are drawn as circles.

a) Did you travel in a circle in this activity? If not, describe your path.

b) What does this tell us about the path of carbon atoms in the carbon cycle? (The path does not follow a circular pattern.)

2. No carbon atoms in this activity made it to the deep earth location. What does this tell about the result of releasing carbon atoms from the deep earth by burning fossil fuels?

3. What effect is human activity having on the carbon cycle?

4. What is the connection between the greenhouse effect, global warming and the carbon cycle?

5. The approximate residence time of a carbon atom in each reservoir is shown in Table 2.

Table 2 Residence time for carbon atoms in different reservoirs

Reservoir	Residence time (years)
Atmosphere	4
Biosphere	11
Surface Ocean	385
Deep Ocean	100 000
Crust and Sedimentary Rock	324 million

Why do you think carbon atoms stay in some reservoirs longer than others?

6. Lots of marine organisms rely on carbon in the ocean but as carbon dioxide in the ocean increases, the ocean becomes more acidic. Water that is too acidic prevents marine organisms such as clams, snails, and corals from growing their shells. Based on what you know about carbon dioxide and ocean acidity, explain the how an increase in atmospheric carbon dioxide might affect human food chains.