Carbon Cycle Game

Included:
- Game directions (pages 2-3)
- 6 station labels (pages 4-9)
- 6 game cubes (pages 10-15)
- Station tokens (page 16)
- Student lab worksheet (pages 17-18)

Not Included:
- Paper cups (one per student and one at each station)

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Teacher Set Up:

1. Print out the game cubes. Fold and tape together. (Cardstock works best)

2. Print multiple copies of the station tokens page. (Depending on how many rounds you do, you will probably need at least 10-15 copies of this page). Cut and place station tokens in 6 different cups.

3. Set up stations around the room. Each station gets a station label, a game cube, and a cup full of station tokens.
How to Play:

1. Each student gets a cup to carry around with them.
2. Randomly assign students to their first station. Try to keep it even—about 5 students per station to begin with.
3. The first thing students do each round is pick up a station token and put it in their cup. This will help them keep track of what stations they have been to.
4. I play about 15 rounds with my students. Each student gets to roll the cube per round. The cube will tell them where to go for the following round. For middle school—I would announce when they are allowed to rotate. For high school you can let the students go at their own pace.
5. Remind the students to pick up a station token every round, **even if the cube tells them to stay**. Once students have completed 15 rounds they can go back to their seats and tally up their tokens.
6. When students finish answering the follow-up questions, ask them to return the tokens to the correct station.
ATMOSPHERE

Pick up the following token:  ⛅️
PLANTS

Pick up the following token:
OCEANS

Pick up the following token:
ANIMALS

Pick up the following token:
SOIL

Pick up the following token:

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Atmosphere
Oceans absorb atmospheric carbon dioxide.
GO TO OCEAN

Atmosphere
Oceans absorb atmospheric carbon dioxide.
GO TO OCEAN

Atmosphere
Plants take in carbon from the atmosphere during photosynthesis.
GO TO PLANTS

Atmosphere
Plants take in carbon from the atmosphere during photosynthesis.
GO TO PLANTS

Atmosphere
Some carbon dioxide remains in the atmosphere.
STAY

GO TO OCEAN

GO TO PLANTS

STAY
Plants

Animals eat the carbon in plants for nutrition.

GO TO ANIMALS

Plants

Plants release carbon dioxide as they complete cellular respiration.

GO TO ATMOSPHERE

Plants

As plants die carbon is broken down into the soil.

GO TO SOIL

Plants

Carbon is stored in plants as they grow.

STAY

Plants

Carbon is stored in plants as they grow.

STAY
Ocean
Carbon is stored deep in the ocean.
STAY

Ocean
Photoplankton release carbon as they complete cellular respiration.
GO TO ATMOSPHERE

Ocean
Carbon is stored deep in the ocean.
STAY

Ocean
Aquatic plants and animals die and sink to the bottom of the ocean.
GO TO SOIL

Ocean
Carbon is stored deep in the ocean.
STAY

Ocean
Carbon is stored deep in the ocean.
STAY
Carbon dioxide is released as animals complete cellular respiration.

As animals die, carbon is broken down and released into the soil.

Carbon is stored in our bodies as we grow and develop.

STAY
Soil
Organisms living in the soil respire and release carbon dioxide.
GO TO ATMOSPHERE

Soil
Over millions of years, dead plants and animals turn into coal.
GO TO FOSSIL FUELS

Soil
Carbon is stored in the soil as decomposers break down dead plants and animals.
STAY

Soil
Over millions of years, dead plants and animals turn into coal.
GO TO FOSSIL FUELS

Soil
Carbon is stored in the soil as decomposers break down dead plants and animals.
STAY

Soil
Carbon is stored in the soil as decomposers break down dead plants and animals.
STAY
Station Tokens: Print 10-15 copies of this page and cut into squares. Put in cups and place at the associated station.
Carbon Cycle Game

Before Playing: Use the word bank to label the diagram below.

Word bank: photosynthesis, burning fossil fuels, decomposition, feeding, animal respiration, deposition, ocean gas exchange

1. ___________________________________
2. ___________________________________
3. ___________________________________
4. ___________________________________
5. ___________________________________
6. ___________________________________
7. ___________________________________

Game Directions:
1. Get a small cup from your teacher.
2. You will be rotating around the room, traveling through the carbon cycle.
3. There will be 15 rounds. At each round, pick up a station token so you can track where you have been and put it in your cup.
4. At the end of the 15 rounds, go back to your seat and tally up your tokens in the data table below.
5. Compile class data and add it to your data table.
Follow-up Questions:
1. Where did the class spend the most amount of time? ____________________
2. Where did the class spend the least amount of time? ____________________
3. What processes release carbon dioxide into the atmosphere?
   a. ________________________________
   b. ________________________________
   c. ________________________________
4. What processes take in carbon dioxide from the atmosphere?
   a. ________________________________
   b. ________________________________
5. Does the carbon cycle function the same during the night as it does during the day? Explain.
   ___________________________________________________________________________
   ___________________________________________________________________________
   ___________________________________________________________________________
6. Carbon dioxide is a greenhouse gas, meaning it traps heat into our atmosphere. The long term effects of this process is called global warming. What are some alternative methods we can pursue to cut back on carbon emissions?
   ___________________________________________________________________________
   ___________________________________________________________________________
   ___________________________________________________________________________

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Before Playing: Use the word bank to label the diagram below.

Word bank: photosynthesis, burning fossil fuels, decomposition, feeding, animal respiration, deposition, ocean gas exchange

1. PHOTOSYNTHESIS
2. ANIMAL RESPIRATION
3. FEEDING
4. DECOMPOSITION
5. DEPOSITION
6. OCEAN GAS EXCHANGE
7. BURNING FOSSIL FUELS

Game Directions:
1. Get a small cup from your teacher.
2. You will be rotating around the room, traveling through the carbon cycle.
3. There will be 15 rounds. At each round, pick up a station token so you can track where you have been and put it in your cup.
4. At the end of the 15 rounds, go back to your seat and tally up your tokens in the data table below.
5. Compile class data and add it to your data table.
Data:

<table>
<thead>
<tr>
<th>Station</th>
<th>Personal Tally</th>
<th>Class Tally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmosphere</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fossil Fuels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Follow-up Questions:

1. Where did the class spend the most amount of time? ANSWERS WILL VARY, BUT LIKELY ATMOSPHERE OR OCEAN.

2. Where did the class spend the least amount of time? ANSWERS WILL VARY, BUT LIKELY ANIMAL OR SOIL.

3. What processes release carbon dioxide into the atmosphere?
   a. RESPIRATION
   b. OCEAN GAS EXCHANGE
   c. BURNING FOSSIL FUELS

4. What processes take in carbon dioxide from the atmosphere?
   a. PHOTOSYNTHESIS
   b. OCEAN GAS EXCHANGE

5. Does the carbon cycle function the same during the night as it does during the day? Explain. NO. AT NIGHT WHEN THE SUN IS DOWN, PLANTS CANNOT DO PHOTOSYNTHESIS. DURING THE NIGHT LESS CARBON IS TAKEN IN FROM THE ATMOSPHERE.

6. Carbon dioxide is a greenhouse gas, meaning it traps heat into our atmosphere. The long term effects of this process is called global warming. What are some alternative methods we can pursue to cut back on carbon emissions? SWITCH TO ALTERNATIVE METHODS OF RENEWABLE ENERGY INCLUDING SOLAR, WIND, OR HYDROELECTRIC.
Address misconceptions:

While this activity is great for students to learn how carbon moves through the carbon cycle, it doesn’t show the process perfectly. Please discuss the following with your students following the activity:

• As you can see from the diagram on the next slide, the majority of carbon is stored in the ocean. Depending on what the students roll, this activity might not reflect that.

• It is good to discuss how long each of the steps actually takes. For example- photosynthesis and respiration are relatively quick processes, but formation of fossil fuels takes millions of years.

• Students need to realize that this cycle can get out of balance. Over time, human activities are adding more carbon dioxide to the atmosphere. This is a great time to bring up the term “carbon footprint” and have students figure out their personal carbon footprint.
Use this image for reference—Students can see where most carbon is stored in the biosphere.