



# Carbon Cycles!

In an active game, students follow the path of carbon through the carbon cycle to learn where it is stored and how it circulates. In the first round of the game, students move from one component of the earth to the next, discovering there are short and long term carbon cycles. Round Two highlights how human actions, through the use of fossil fuels and clearing of the world's forests, results in an increase in the amount of carbon dioxide in the atmosphere.

## Activity Time

- Warm-up & Introduction: 10 - 20 minutes
- Activity: 20 minutes
- Wrap up: 10 - 30 minutes

**Note:** times are dependent upon the familiarity of the students with the background information

## Setting

- Gymnasium or outdoor playing area

## Materials

- Station Signs (see Black Line Masters (BLM))
- Activity Cards for each station (see BLM)
- Coloured paper; red, orange, grey (or white), green, blue and yellow (or brown) for Station Signs and Activity Cards
- Coloured markers that match the colour of Station Signs and Activity Cards; 2 – 3 markers per colour
- Popsicle sticks or index cards, one per student (use as “travel logs” to record path of carbon)
- 6 – 10 Skipping ropes
- Optional: Cones to mark stations
- Optional: Tape to attach station sign to cone or wall

## Subject Areas

Science, Social Studies, Language Arts, Physical Education

## Keywords

carbon, carbon cycle, carbon dioxide, carbohydrate, ecosystem, greenhouse gas, greenhouse effect

## Prescribed Learning Outcomes (PLO) – Science Life Science

- Analyse simple food chains
- Determine how personal choices and actions have environmental consequences

## Process of Science

- Make predictions, supported by reasons and relevant to the content

## IRP Curriculum Organizers:

### Language Arts

- Oral Language
- Reading and Viewing
- Writing and Representing

### Social Studies

- Human and Physical Environment

## Introduction and Background

Like water in the water cycle, carbon in the carbon cycle moves between various components of the earth by different processes. Carbon dioxide, a form of carbon found in the air of our atmosphere, is a greenhouse gas, and as such plays a critical role in regulating the earth's temperature. Understanding where carbon is stored and how it is captured and released – naturally and by human activity – is essential in understanding human-induced climate change.

**Note:** See the Primer for more detailed information on greenhouse gases, the greenhouse effect and the carbon cycle.



# Carbon Cycles!

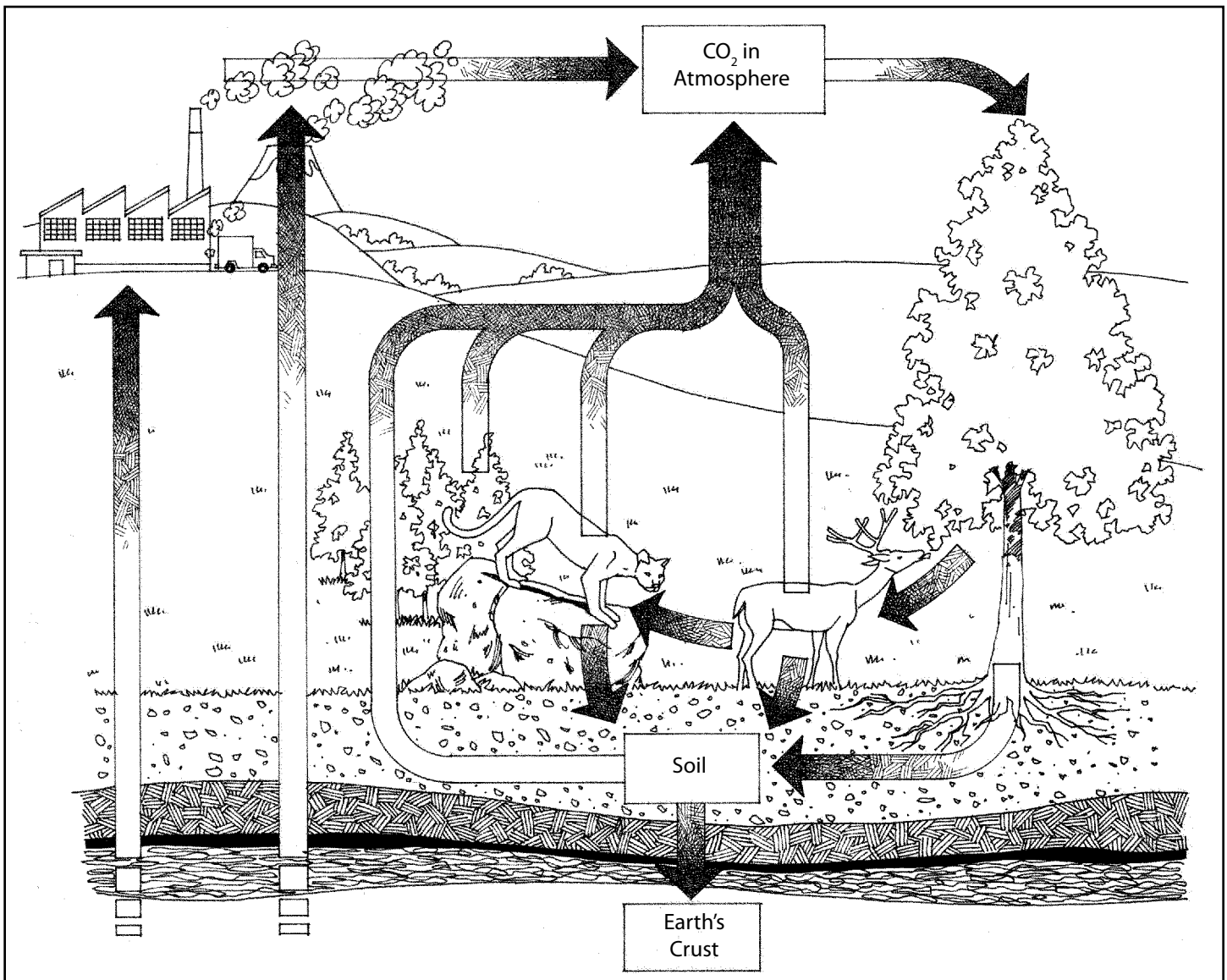
Carbon is one of the basic elements on Earth and is found and stored in a variety of the Earth's major components. In each component, carbon can be in different forms (chemical compounds), for example, in:

- the **Atmosphere** as the gas, carbon dioxide;
- **living things** (biotic component of ecosystems) mainly as sugars, starches, and cellulose (carbohydrates) in plants; as carbon molecules, including proteins, nucleic acids and

carbohydrates in animals; also as hard structures such as bone, coral and shell (calcium carbonate);

- **soil** as the remains of once living things (dead organic matter) and in bacteria, fungi and other micro-organisms (decomposers);
- the **ocean** as dissolved carbon dioxide;
- the **earth's crust** as sediments and rock originating from parts of living things (e.g., chalk and limestone) and fossil fuels (e.g., crude oil, coal, and natural gas).

## Carbon Cycle Diagram





# Carbon Cycles!

Carbon is found all around us: it is in everything living or once living, in the air we breathe, the ground we walk on, and even carbonated drinks! Not only do we burn fossil fuels as a source of energy (e.g., coal, oil, natural gas), we also use them as the raw material for many chemical products, including pharmaceuticals, solvents, fertilizers, pesticides, and plastics. Plastics are used to make everything from clothes to skateboards to computers. The only place carbon is not found is in things that are composed of pure mineral (e.g., quartz) or metal (e.g., gold) or simple compounds such as salt.

In the “**short carbon cycle**”, carbon moves from the **atmosphere** to plants then to animals (**living things**), to the **soil**, and back to the atmosphere. The time it takes to complete this short cycle can be a few hours to several weeks or hundreds of years if the carbon becomes incorporated into a structural component of an organism (e.g., the trunk of a cedar tree or the bones of a whale). In the “**long carbon cycle**”, carbon in living things can become trapped in sediments or fossil fuels in the **earth’s crust**. Once in the earth’s crust, the carbon is stored for extremely long periods of time – for thousands to millions of years – and rarely released, except through erosion of sediments and volcanic activity.

The living things in the **ocean** are part of the short carbon cycle. Similar to the short cycle on land, carbon dioxide moves from the ocean waters to marine algae (plant-like organisms) to marine animals, to biologically active ocean sediments, then back to the ocean water. Due to its size, a large amount of carbon is stored in the ocean; there is a balanced exchange of carbon dioxide between the atmosphere and the water in the ocean. Of all the carbon on Earth, most of it is stored in the earth’s crust as sediments from the ocean and land.

The carbon cycle is directly linked to **energy** use by all life on earth – including humans. Some of the energy from the **sun** (visible light) is captured and transformed by plants during the process of **photosynthesis** and then **stored** in the chemical bonds of carbon based molecules called **carbohydrates**, mainly glucose (sugar). Carbohydrates are “food” made by plants; they are essential for all life on earth. The stored energy in these carbon molecules is passed through the **food chain**,

much of it being used by organisms at each level. This movement of energy through ecosystems is called **energy flow**; eventually all energy leaves the earth’s systems as heat and enters space. The energy in fossil fuels is energy from the sun transformed by plants and algae approximately 300 million years ago. Contrary to popular belief, fossil fuels are not made of dinosaurs; oil is derived from mostly tiny marine organisms that become buried in ocean sediments, slowly changing over time into fossil fuels.

Carbon dioxide is released from living things when they use the energy in the carbohydrates to move, grow and reproduce (i.e., the process of respiration). It is also released through the burning of these same carbohydrates found in things that were once living such as wood, charcoal, and fossil fuels (i.e., the process of combustion), or in volcanic eruptions. The current balance of carbon in each of the earth’s components supports the vast array of life on earth. Human activity is tipping this balance by releasing the carbon stored in fossil fuels to the atmosphere, leading to climate change.

**Note:** See the Primer for more information on the role of carbon dioxide and the greenhouse effect.

## Procedure

### Setup

**1** Prepare five Station Signs and corresponding Activity Cards by copying the Blackline Masters (BLM) onto coloured paper as follows:

- Living Things – Green
- Soil – Yellow (or brown)
- Ocean – Blue
- Air, Round One and Round Two – grey (or white)
- Earth’s Crust, Round One and Round Two – orange

Copy the Volcano Wild Cards (Activity Cards) onto red paper; they are part of the Earth’s Crust station.

Cut out the Activity Cards and organize into eight sets of cards, with twelve cards per set. The eight sets are:





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- Living Things
- Soil
- Ocean
- Volcano Wild Cards
- Air, Round One
- Air, Round Two
- Earth's Crust, Round One
- Earth's Crust, Round Two

The game is played in two rounds but **only Earth's Crust and Air have different Activity Cards for each round.** In Round Two, human activity is introduced by using the second set of Activity Cards for the Earth's Crust and Air stations. Mark each Activity Card for the second round with a number "2".

**Tip:** Envelopes are useful to help keep the eights sets of Activity Cards separate and when playing the game outdoors.

- 2 Prepare the students' "Travel Logs" (the popsicle sticks or index cards) by labelling one side with a number "1" and the other side with "2". As you are explaining the game procedure to the students, have them label the sticks or cards appropriately if you have not already done so.
- 3 Set up the playing area by placing Station Signs (and cones if desired) at least 10 metres apart in the approximate shape of a circle. At each station, place the matching Activity Cards for Round One in a stack next to the Station Signs. Also, place the matching coloured markers at each station. Reminder: before beginning Round Two, replace Round One Activity Cards at Earth's Crust and Air stations with the Round Two Activity Cards.
- 4 Place the Volcano Wild Cards and the skipping ropes at the Earth's Crust station.

**Tip:** If skipping ropes are not available, students can be directed to do jumping-jacks at this station.

## Warm Up

**Note:** The focus here is on **introducing** the terms and helping students to become aware that there are processes that move carbon through the carbon cycle. As with teaching the water cycle, students will become familiar with the terminology associated with the carbon cycle through repetition over time. For the purpose of this activity, it is sufficient to use the general term "carbon based compound" and "carbon dioxide."

See Carbon Cycle Diagram, Introduction and Background and Primer for more information.

- 1 Explain to the students that carbon is an element and can be found in different forms (compounds) all around us. If helpful, remind students that an example of a compound is water; it is made up of the two elements hydrogen and oxygen.
- 2 To check prior knowledge ask the students, "What things have carbon in them?" Record the students' responses. If students are having difficulties answering the question, provide the hint that all life on Earth is carbon based. See the Introduction and Background section for more information.
- 3 Identify the components of the earth where carbon is located (e.g., atmosphere, living things, soil, ocean, earth's crust). Group items from the student generated list into the earth components. Add things as necessary to help explain what carbon based thing could be found in each component.

## The Activity

### Round One

- 1 Inform students they are about to become carbon and travel through the carbon cycle in an active game. **Point out the location of each of the five stations**, each one a component of the earth. Tell the students that their task is to discover where carbon is found and how it moves from one place to another.



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- 2 Explain to the students they move from station to station by **drawing a card and following the instructions on the cards**. Students should **form lines** at each station; upon arriving at a station, they join the end of the line. When they reach the front of the line, they pick up an Activity Card from the top of the stack and read it aloud. After returning their card to the bottom of the stack, they move to the station indicated on the card. If a student draws a card that instructs them to **stay** at that station, they replace the card and **go to the back of the line**.
- 3 Explain it is important to keep track of where they travel using a **Travel Log**. This will be used at the end of the activity to compare journeys. Hand-out popsicle sticks or index cards to each student. If not already prepared, have each student record a number "1" on one side and a number "2" on the other.

Explain each time they arrive at a station they should **mark one vertical line** on their Travel Log using the coloured markers at each station. Remind them to start on the left and go across to the right (as though reading or writing). Emphasize that if they draw an Activity Card that instructs them to **stay**, they should **make another mark** on their Travel Log – it is important to see how long they stay at a station!

**Note:** Instead of coloured markers, students could use stamps representing each station or have students mark the first letter of the station (e.g., O for Ocean, S for Soil, etc.)

- 4 Indicate that there will be **two rounds** of the game played. For Round One, they should use the side of the popsicle stick or index card that is labelled with the number "1".
- 5 **Tip:** Make this part as unexpected and fun as possible. Do not reveal this aspect of the game before it begins!

Position either yourself or an assistant at the Earth's Crust station to help students "escape" this station by using the **Volcano Wild Cards**. Note the number of times a student

has drawn a card instructing them to "stay". **After** a student draws their **third "stay" card** (there should be three marks on their Travel Log), simulate a **volcanic eruption**, give the student a Volcano Wild Card to read and/or inform them that they have been exploded out of the Earth's Crust and into the atmosphere. The student **moves to the Air station**.

Alternatively, instruct students to draw a Volcano Wild Card when they have drawn their third "stay" card.

- 6 Inform the students that each time they draw a stay card while at the **Earth's Crust** station, they must **jump rope** ten times (using the skipping ropes) or do ten jumping jacks at the end of the line. This serves to help keep students engaged as well as simulating how carbon is trapped for long periods of time in sediments, rocks and fossil fuels.
- 7 To **start Round One**, send approximately equal numbers of students to each station. Start the game by saying "Carbon Cycle!" Allow students to play the game for **five to ten minutes**. Check to ensure students are correctly marking their Travel Logs and reading all the information on the Activity Cards before moving to the next station.
- 8 End Round One by saying "Carbon, stop Cycling!" Gather students and ask what they experienced. It is important that all the students recognize that some of them got "stuck" at the Earth's Crust and Ocean stations, while others may have cycled amongst the Air, Living Things and Soil stations. Briefly discuss why, emphasizing the only way out of the Earth's Crust and directly into the atmosphere is through volcanic eruptions. (Weathering of carbonate rocks releases carbon into water.) Also, ensure they understand plants are important in taking carbon out of the atmosphere. Both of these factors are important in understanding the impact of human activities on the short carbon cycle in the next round.
- 9 If time permits, play Round One again so that students have the chance to move to other stations. Start students who were at Ocean or Earth's Crust at another station. Inform students to continue to use side one of the Travel Log.



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## Round Two

- 1 Replace Round One **Activity Cards** with those for Round Two at the **Earth's Crust and Air** stations.
- 2 Ask students to **predict** what will happen if the human activities of using fossil fuels and removing forests are introduced. Explore their explanations.
- 3 Play game as before, reminding students to use the **second side** of their Travel Logs.
- 4 Student will now be held up at the Air Station. As they do, instruct the students to do jumping jacks at the end of the line each time they draw a stay card.

## Wrap-up

- 1 Debrief the game by asking students what they experienced as carbon. Where does carbon go and why? Remind them to use their Travel Logs to help them remember their journey and to determine patterns. Help them summarize their combined experiences either verbally or by drawing a flow diagram.
- 2 Show students the diagram of the Carbon Cycle as an overhead or replicated on the blackboard. Help the students to recognize and match the two parts of the carbon cycle to their experiences in the game. In the short cycle, carbon moves between Air, Living Things, and Soil while in the long cycle, carbon is stored for long periods of time in large amounts in the Ocean and the Earth's Crust. Identify the processes that move carbon from one component to another, specifically indicating the ones that release carbon dioxide to the atmosphere (respiration, combustion) and those that remove carbon dioxide from the atmosphere (photosynthesis).
- 3 If necessary, review the concept of food chains in ecosystems. Ask the students how the short carbon cycle compares to food chains. Help the students to understand that energy from the sun is captured by plants and made into food (formation of energy rich carbohydrates through the process of photosynthesis) that is then consumed and

used by animals throughout the food chain (carbohydrates broken down by digestion and respiration, releasing energy and carbon dioxide). Organisms such as worms, bacteria and fungi in the soil also feed on dead organisms (final breakdown of carbohydrates through the process of decomposition), releasing carbon dioxide to the air.

- 4 Explain how long ago some of this energy from the sun was trapped in large amounts in dead organisms that became part of the earth's crust. This energy is now stored in the Earth's Crust as fossil fuels. Ensure the students understand that oil and gas are not made of dinosaurs as often portrayed in cartoons, but mostly tiny marine organisms that lived before the dinosaurs and become buried in the ocean sediments, slowly changing over time into fossil fuels. Some coal deposits are from approximately the same time period as dinosaurs, but are made up of plants.
- 5 Compare the two rounds by asking the students how were they different. Did their predications match what happened? As a prompt, ask the students to recall the difference between the activity cards at Earth's Crust and Air between Round One and Round Two. If necessary, read aloud some of the Activity Card instructions. Emphasize how in Round Two, it is human activity, not just volcanic activity, that is releasing carbon from the Earth's Crust by using fossil fuels as a source of energy. The result is more carbon being released into the atmosphere; thus more students ended up at the Air Station. Also emphasize less carbon (students) was able to leave the Air Station and move to the Living Things Station because of the human activity of clearing forests, resulting in fewer trees to take up the carbon.
- 6 Revisit the carbon cycle diagram, indicating this change in carbon flow by bolding the arrow from the Earth's Crust to Air and reducing the arrow from Air to Living Things.
- 7 If the lesson "Greenhouse Gas Game" has not been done, briefly introduce the concept of the **Natural Greenhouse Effect** explaining how **greenhouse gases**, such as carbon dioxide, trap much of the heat released from the surface of



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the earth. Ensure students understand that the Natural Greenhouse Effect is necessary to support life on earth. See the Primer for more information.

- 8 Briefly explain the how carbon dioxide is a greenhouse gas in the atmosphere. Explain how as the amount of carbon dioxide in the atmosphere increases due to human activity, the warmer the overall earth's temperature becomes because more heat from the earth is trapped. This is the **Enhanced Greenhouse Effect**. Identify how the increase of global temperatures directly relates to the current climate change. See the lesson "Greenhouse Gas Game" and the Primer for more information.
- 9 End the discussion by helping the students to identify some of the things they can do to reduce the amount of carbon dioxide released into the atmosphere (e.g., use less fossil fuel energy by walking or biking more often) and what they can do to promote carbon dioxide being captured and removed from the atmosphere (e.g., by planting trees).

## Assessment

- 1 Ask students to draw the movement of carbon through the short cycle and explain how this also represents the flow of energy through food chains in ecosystems. Look for evidence that the student understands how energy is passed in a food chain from producer (plants) to consumers (herbivores, carnivores and decomposers). Organisms use the energy from carbohydrates in the food to fuel their bodies, grow and reproduce.
- 2 Ask students to create a story of how carbon moves through both the short and long carbon cycle and over time ends up as a fossil fuel. Students should be able to

describe the main components of the carbon cycle and the basic processes by which carbon moves from one component to another. Look for evidence that the student understands that time scale difference between the short and long carbon cycles, as well as where most carbon is found.

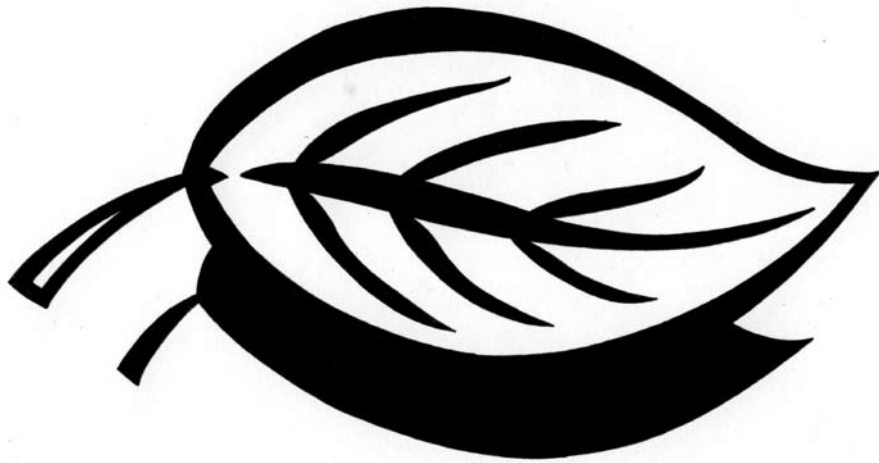
- 3 Have students choose one thing they could do to reduce the amount of carbon dioxide being released into the atmosphere (e.g., walking, riding their bike, or taking a bus to school more often; buying locally made products, thus reducing the amount of energy used in transportation) or increase the amount of carbon removed from the atmosphere (e.g., grow and plant a tree). Ask them to write a Plan of Action, which indicates what they plan to do, the time line, what they will use to indicate their success, and how they will celebrate. Students should also include any challenges they foresee with their plan and how they might overcome these challenges.

## Extensions

- 1 Start a class Action Project that helps students to see what they can do to slow climate change by reducing the amount of carbon dioxide in the atmosphere. Possibilities include: walk/ride to school days, establishing "no idle zones" near the school, set up recycle/reuse boxes in the classroom, make and decorate cloth shopping bags, and planting a native garden or trees in the schoolgrounds.
- 2 Students write and add new Activity Cards for each station and play the game again. Try adding in different human activity scenarios and observing the impact on the carbon cycle.



# *Living Things*





# Carbon Cycles!

Station Activity Cards *Living Things* – Rounds 1 and 2



Carbon becomes part of a plant's leaves and stems.

Stay at *Living Things*.



Carbon becomes part of an animal's skeleton.

Stay at *Living Things*.



Carbon in a plant is eaten by an animal.

Stay at *Living Things*.



Carbon-based food is used by plants to grow (respiration); carbon dioxide is released.

Go to *Air*.



Carbon-based food is used by plants to grow (respiration); carbon dioxide is released.

Go to *Air*.



Carbon-based food is used by animals to move, grow and reproduce (respiration); carbon dioxide is released.

Go to *Air*.



Carbon-based food is used by animals to move, grow and reproduce (respiration); carbon dioxide is released.

Go to *Air*.



Carbon-based food is used by animals to move, grow and reproduce (respiration); carbon dioxide is released.

Go to *Air*.



# Carbon Cycles!

Station Activity Cards **Living Things** – Rounds 1 and 2



The plant or animal dies.

Go to **Soil**.



The plant or animal dies.

Go to **Soil**.



A plant dies and is buried by sediment.

Go to **Earth's Crust**.



A plant dies and is buried by sediment.

Go to **Earth's Crust**.



# *Soil*





# Carbon Cycles!

Station Activity Cards **Soil** – ROUNDS 1 AND 2



Carbon is in dead plant material that has not yet been decomposed by bacteria and fungi.

Stay at **Soil**.



Carbon is in dead plant material that has not yet been decomposed by bacteria and fungi.

Stay at **Soil**.



Carbon is in dead plant material that has not yet been decomposed by bacteria and fungi.

Stay at **Soil**.



Carbon is in dead plant material that has not yet been decomposed by bacteria and fungi.

Stay at **Soil**.



Carbon in dead plant is buried under layers of sediment.

Go to **Earth's Crust**.



Carbon in dead plant is buried under layers of sediment.

Go to **Earth's Crust**.



Carbon is swept into the ocean after a flood.

Go to **Ocean**.



Carbon becomes part of an animal decomposer's body.

Go to **Living Things**.



# Carbon Cycles!

Station Activity Cards **Soil** – ROUNDS 1 AND 2



Carbon becomes part of an animal decomposer's body.

Go to **Living Things**.



Carbon in dead animal and plant tissues is decomposed by bacteria and fungi and is released as carbon dioxide.

Go to **Air**.



Carbon in dead animal and plant tissues is decomposed by bacteria and fungi and is released as carbon dioxide.

Go to **Air**.

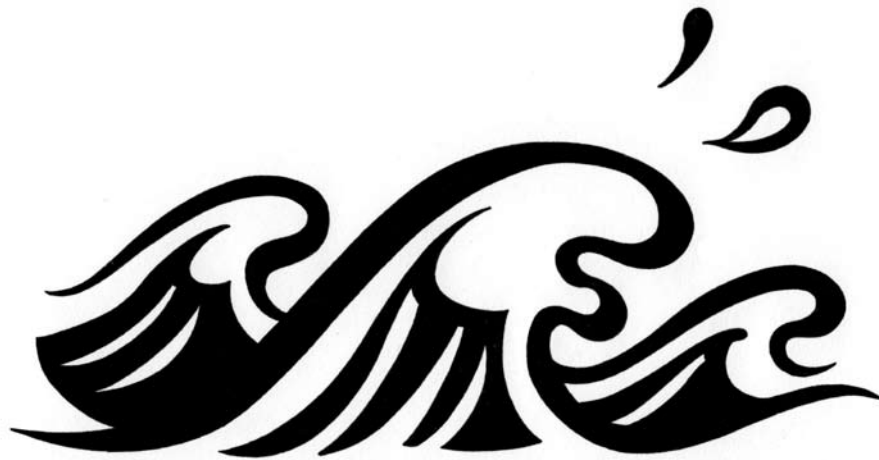


Carbon in dead animal and plant tissues is decomposed by bacteria and fungi and is released as carbon dioxide.

Go to **Air**.



# *Ocean*





# Carbon Cycles!

Station Activity Cards **Ocean** – ROUNDS 1 AND 2



Carbon mixes (dissolves) into the water.  
Stay at **Ocean**.



Carbon mixes (dissolves) into the water.  
Stay at **Ocean**.



Carbon from shells of dead  
animals dissolves into the water.  
Stay at **Ocean**.



Carbon from shells of dead  
animals dissolves into the water.  
Stay at **Ocean**.



Carbon is used by an animal  
in the ocean to build a shell.  
Go to **Living Things**.



Carbon is used by a plant in the ocean.  
Go to **Living Things**.



Carbon stays as carbon dioxide in ocean water.  
Stay at **Ocean**.



Carbon in a coral reef  
becomes part of ocean sediments.  
Go to **Earth's Crust**.



# Carbon Cycles!

Station Activity Cards **Ocean** – ROUNDS 1 AND 2



Carbon in a shell is discarded.  
Sink to the bottom of the Ocean.

Go to **Earth's Crust.**



Carbon becomes part of tiny marine organisms.  
They die and become part of sediments.

Go to **Earth's Crust.**



Wind and waves mix carbon out of the water.

Go to **Air.**



Wind and waves mix carbon out of the water.

Go to **Air.**



***Air***





# Carbon Cycles!

Station Activity Cards **Air** – ROUND 1



1

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to **Living Things**.



1

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to **Living Things**.



1

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to **Living Things**.



1

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to **Living Things**.



1

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to **Living Things**.



1

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to **Living Things**.



1

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to **Living Things**.



1

Carbon as carbon dioxide stays in the air.

Stay at **Air**.



# Carbon Cycles!

Station Activity Cards **Air** – ROUND 1



1

Carbon as carbon dioxide stays in the air.

Stay at **Air**.



1

Carbon as carbon dioxide stays in the air.

Stay at **Air**.



1

Wind mixes carbon into water.

Go to **Ocean**.



1

Wind mixes carbon into water.

Go to **Ocean**.



# Carbon Cycles!

Station Activity Cards *Air/Human Effects* – Round 2



2

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to *Living Things*.



2

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to *Living Things*.



2

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to *Living Things*.



2

A plant takes in carbon dioxide through its leaves and creates food (photosynthesis) that is used by the plant to grow.

Go to *Living Things*.



2

Wind mixes carbon into water.

Go to *Ocean*.



2

Wind mixes carbon into water.

Go to *Ocean*.



2

Carbon as carbon dioxide stays in the air.

Stay at *Air*.



2

Carbon as carbon dioxide stays in the air.

Stay at *Air*.



# Carbon Cycles!

Station Activity Cards *Air/Human Effects* – Round 2



2

Carbon as carbon dioxide stays in the air.

Stay at ***Air***.



2

Carbon as carbon dioxide stays in the air.

Stay at ***Air***.



2

Carbon as carbon dioxide stays in the air.

Stay at ***Air***.



2

Carbon as carbon dioxide stays in the air.

Stay at ***Air***.



# ***Earth's Crust***





# Carbon Cycles!

Station Activity Cards *Earth's Crust* – ROUND 1



1

Carbon is locked away in ocean sediments and will become rock.  
Stay in *Earth's Crust*.



1

Carbon is locked away in ocean sediments and will become rock.  
Stay in *Earth's Crust*.



1

Carbon is locked away in ocean sediments.  
Stay in *Earth's Crust*.



1

Carbon is locked away as limestone rock.  
Stay in *Earth's Crust*.



1

Carbon is locked away as limestone rock.  
Stay in *Earth's Crust*.



1

Carbon is locked away as limestone rock.  
Stay in *Earth's Crust*.



1

Carbon is locked away as sedimentary rock.  
Stay in the *Earth's Crust*.



1

Carbon is locked away as sedimentary rock.  
Stay in the *Earth's Crust*.



# Carbon Cycles!

Station Activity Cards **Earth's Crust** – ROUND 1



1

Carbon is locked away as chalk.  
Stay in the **Earth's Crust**.



1

Carbon is locked away as chalk.  
Stay in the **Earth's Crust**.



1

Carbon is locked away as oil and gas (fossil fuel).  
Stay in the **Earth's Crust**.



1

Carbon is locked away as oil and gas (fossil fuel).  
Stay in the **Earth's Crust**.



# Carbon Cycles!

Station Activity Cards  
*Earth's Crust/Human Effects* – ROUND 2



2

Carbon is locked away in ocean sediments and will become rock.

Stay in *Earth's Crust*.



2

Carbon is locked away in ocean sediments and will become rock.

Stay in *Earth's Crust*.



2

Carbon is locked away as chalk.

Stay in the *Earth's Crust*.



2

Carbon is locked away as chalk.

Stay in the *Earth's Crust*.



2

Carbon is locked away as limestone.

Stay in the *Earth's Crust*.



2

Carbon is locked away as limestone.

Stay in the *Earth's Crust*.



2

Carbon is locked away as sedimentary rock.

Stay in the *Earth's Crust*.



2

Carbon is locked away as sedimentary rock.

Stay in the *Earth's Crust*.



# Carbon Cycles!

Station Activity Cards  
**Earth's Crust/Human Effects** – ROUND 2



2

Carbon as a fossil fuel is piped as natural gas to heat homes, buildings, and water. Once used as a fuel, Carbon is released as carbon dioxide.

Go to **Air**.



2

Carbon as a fossil fuel is mined as coal and used to generate electricity. Once used as a fuel, Carbon is released as carbon dioxide.

Go to **Air**.



2

Carbon as a fossil fuel is dug up and used in cars, trucks, and airplanes. Once used as fuel, Carbon is released as carbon dioxide.

Go to **Air**.



2

Carbon as a fossil fuel is dug up and used in cars, trucks, and airplanes. Once used as fuel, Carbon is released as carbon dioxide.

Go to **Air**.



# Carbon Cycles!

Station Activity Cards  
**Volcano Wild Cards** – ROUNDS 1 AND 2



Carbon is released from the Earth's Crust as carbon dioxide gas from a volcanic eruption.

Go to **Air**.



Carbon is released from the Earth's Crust as carbon dioxide gas from a volcanic eruption.

Go to **Air**.



Carbon is released from the Earth's Crust by a volcanic eruption.

Go to **Air**.



Carbon is released from the Earth's Crust by a volcanic eruption.

Go to **Air**.



Carbon is released from the Earth's Crust by a methane vent at the bottom of the ocean.

Go to **Air**.



Carbon is released from the Earth's Crust by a methane vent at the bottom of the ocean.

Go to **Air**.



Carbon is released from the Earth's Crust as carbon dioxide by the flow of lava from a volcano eruption.

Go to **Air**.



Carbon is released from the Earth's Crust as carbon dioxide by the flow of lava from a volcano eruption.

Go to **Air**.



# Carbon Cycles!

Station Activity Cards  
**Volcano Wild Cards** – ROUNDS 1 AND 2



Carbon is released from the Earth's Crust as carbon dioxide gas from a volcanic eruption.

Go to **Air**.



Carbon is released from the Earth's Crust as carbon dioxide gas from a volcanic eruption.

Go to **Air**.



Carbon is released from the Earth's Crust by an underwater volcanic eruption in the Ocean.

Go to **Air**.



Carbon is released from the Earth's Crust by an underwater volcanic eruption in the Ocean.

Go to **Air**.