

Strand: 8.3	Standard: 8.3.3	Episode 3	Big Idea: Matter cycles and energy flows through living and nonliving things.
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Title: Discovering the Carbon Cycle	Time: 90 minutes	CCCs: <u>Patterns</u> <u>Energy and matter</u> <u>Stability and change</u>	Practices: Obtaining, Evaluating and Communicating Information Developing and using models
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Narrative of episode: Students **obtain information** as they participate in a Carbon Cycle Activity. They then use this information to **develop a model** of their own unique journey through the carbon cycle. They then compare their journey with other students journey's. Students participate in a discussion where they share what they found out about their journey as an atom of carbon and how that compared to others journeys. Through this activity students are able to see the complexity of the carbon cycle, relate the cycle to the Law of Conservation of Matter, and relate how the carbon cycle is an important process in sustaining life on Earth.

Gather

Tell students that they are representing a single atom of Carbon today. Using a scratch piece of paper students **gather information** as they participate in the carbon activity. The students start at any of the sites they want but, it is important that they do not work in pairs or groups. Each student needs to roll the dice for themselves and follow their own journey. The students write a numbered list of the sites they visit as they go through this activity beginning with where they start. Each site is written down in order of visit regardless if they visited it before or not. If during the activity the student has to stay at one site for more than one roll of the dice they need to indicate that on the list with a tick mark of some kind. When they go to another site they resume their list. This activity goes on for 10 to 15 minutes depending on your student's needs.

(* Teacher Note - Do not tell students about the carbon cycle or call it the carbon cycle at this point).

The students use the list they have generated to **develop a model** of their journey as an atom of carbon. The teacher should show students how to use their list effectively. Otherwise the students may end up with models that don't really help them understand the complexity and importance of the carbon cycle. See model instruction sheet for information on how to model this for students.

Reason

Students compare their model with other students in the class trying to find someone who has the same journey as they do. They should note areas of similarity or patterns such as: sites that everyone seemed to go, sites that others went but they did not, sites that students seemed to go and stay for long periods of time, etc. This should take 10 - 15 minutes depending on your students needs.

The teacher then conducts a class discussion on what the students have found. Have students share where their journey took them. What they found out when they were comparing their journey with other students journeys. This discussion should bring up a lot of interesting points and questions. The teacher should follow the flow of the conversation interjecting questions as needs with the following goal in mind. (Energy and Matter/Stability and Change)

- Carbon is not destroyed it just changes.
- Carbon moves through many different parts of the world both organic (living things) and inorganic (non living things).
- Carbon doesn't follow a certain path, it moves around in whatever way it is needed.

- Much of the movement is through the processes of photosynthesis and cellular respiration.
- There are places that carbon can get stuck or stored. When this comes up explain to the students what a carbon sink is. Have the students identify areas that are carbon sinks. Discuss with the students ways in which they could get out a sink. Let them know they will learn more about it in Earth Systems in 9th grade.
- The movement of carbon has a name, it is known as The Carbon Cycle.

(*Teacher note - it is during the discussion that the students give a name to the cycle. When that comes up they should write a title on their own model of the cycle. I suggest to my students they call it "My journey through the Carbon Cycle" but they can use any title they want as long as they use Carbon Cycle)

Communicate

Students write an explanation of what they have learned about the carbon cycle. The explanation should include the complexity of the carbon cycle, how it relates to the law of conservation of matter, and why it is important to living organisms including themselves.

(*Teacher note - this episode should give students a better understanding as they explore further how abiotic factors can affect the cycle and then investigate a specific problem that may be affecting the cycle and report on it.)

ALTERNATIVE: Students can use the PowerPoint game to work through the carbon cycle. Only works on PowerPoint! The Google slides version currently has too many bugs. If there aren't enough computers available, students can work in pairs to complete the game, then draw their own model.

<p>Assessment: The explanation written by the students is the assessment for this episode.</p>	<p>Materials, resources, handouts, etc:</p> <ul style="list-style-type: none"> • Carbon Cycle Activity • Carbon Cycle Model Sheet • Modeling Instructions • Video: Creating a Model Example • ALTERNATIVE: <ul style="list-style-type: none"> ○ 8.33 E3 CarbonCycleGamePPT - Use PPT version only! Can't guarantee lack of bugs in google slide version.
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