



Title: Investigating the Carbon Cycle	
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Course: Environmental Science	Duration: 1—2 Class Periods
Grade: 9-12	
Objective: Students will learn the various ways that CO ₂ is put into our atmosphere.	
Summary of Lesson: Students will analyze a Carbon Cycle Model	
Standards: Common Core State Standards, Arkansas State Frameworks	
CODE	STANDARD
SP.3.ES.2	Investigate the relationships between human consumption of natural resources and the stewardship responsibility for reclamations including disposal of hazardous and non-hazardous waste
PD.1.ES.4	Categorize the type and composition of various minerals
PD.1.ES.7	Describe tectonic forces relating to internal energy production and convection currents
PD.1.ES.19	Describe the cycling of materials and energy: <ul style="list-style-type: none"> • nitrogen • oxygen • carbon • phosphorous • hydrological • sulfur
Teacher Excellence Support System (TESS): 3b: Using questioning/prompts and discussion 3d: Using assessment in instruction	
Instructional Strategies and Practices: Advance Organizer, Brainstorming and Discussion, Problem-Based Instruction, Cooperative Learning, Writing	



Bloom's Level: Highest Level Only
Analyzing

Materials and Resources:

Student Handout 1 Investigating the Carbon Cycle Sources of CO₂ in the Atmosphere

Student Handout 2 Investigating the Carbon Cycle Essay Assessment

<http://eo.ucar.edu/kids/green/cycles6.htm>

<http://earthobservatory.nasa.gov/Features/CarbonCycle/>

<http://beyondweather.ehe.osu.edu/files/2011/03/620px-Carboncycle.jpg>

<http://www.planetseed.com/relatedarticle/carbon-dioxide-sources>

Formative Assessment:

Students complete a self-assessment for essay.

Notes to Teacher:

Students may need to work in small groups to discuss the model before organizing their essays. Also, students may question that plants give off CO₂. During their lifetime, plants actually give off about half the CO₂ they absorb, much of it during night when the sun is not powering photosynthesis. (www.scienceline.ucsb.edu/getkey.php?key=826)

Student Activity Included:

Carbon dioxide (CO₂) is a greenhouse gas that absorbs thermal energy and radiates it back to earth, warming earth's atmosphere. This process is called the greenhouse effect because CO₂ acts like the walls of a greenhouse that allow the heat from the sun into the greenhouse but prevent the thermal energy from escaping.

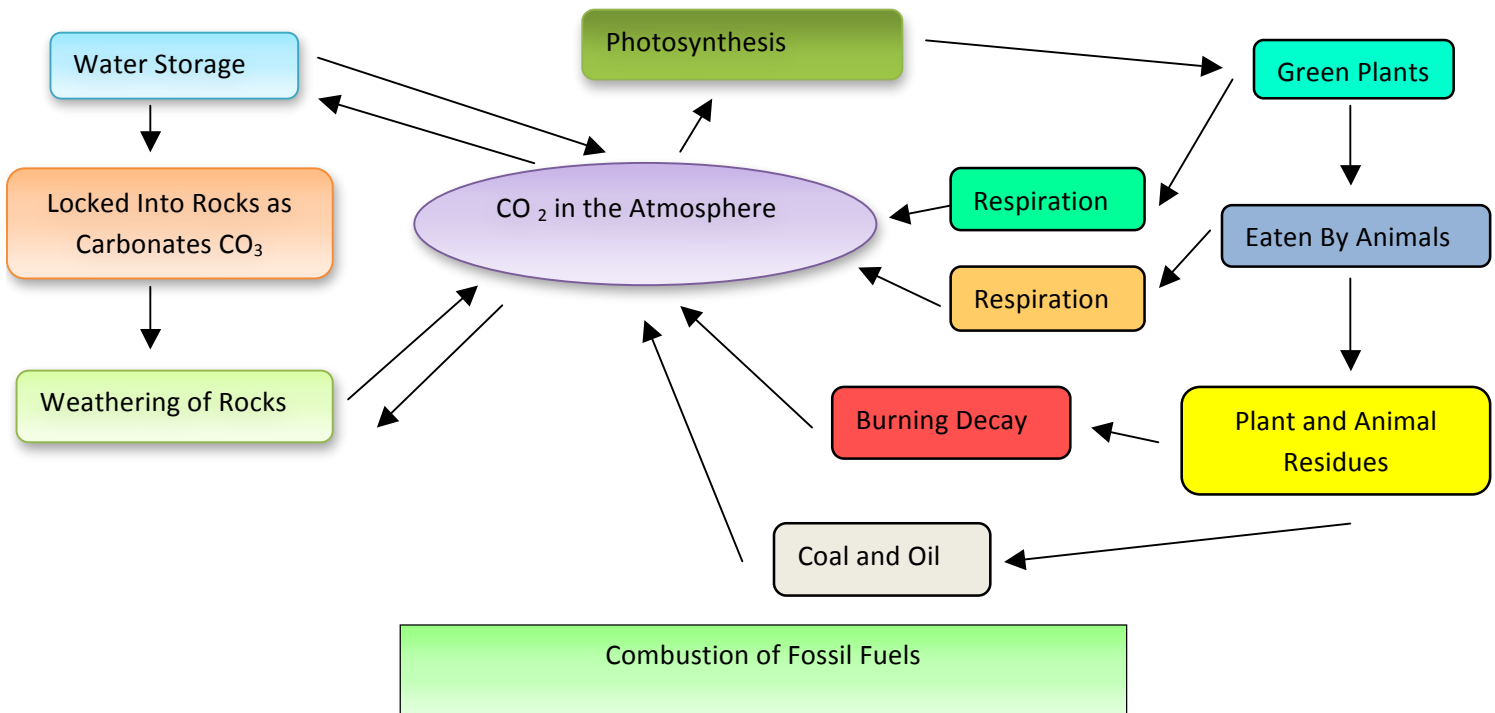
1. Distribute **Student Handout 1 Investigating the Carbon Cycle-- Sources of CO₂ in the Atmosphere** or create a visual to be projected in the classroom. Lead a discussion to analyze the chart. (A printable copy of the handout is available at: <http://www.arkansasenergyrocks.com/educators/index.html>. Select Curriculum, then 9-12 Lesson Plan -- student handouts accompany each lesson plan.)
2. Based on the handout/visual, students will write an essay explaining the various ways CO₂ can enter the atmosphere.
3. Students will complete **Student Handout 2 Investigating the Carbon Cycle Essay Assessment** before submitting their essay. A printable copy of the handout is available at: <http://www.arkansasenergyrocks.com/educators/index.html>. Select Curriculum, then 9-12 Lesson Plan -- student handouts accompany each lesson plan.
4. Evaluate the essay with a teacher-made rubric.



Student Handouts

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Student Handout 1 Investigating the Carbon Cycle | Sources of CO₂ in the Atmosphere



Student Handout 2 Investigating the Carbon Cycle | Essay Assessment

In my essay I have addressed:

- _____ Water Storage
- _____ Locked into rocks as carbonates
- _____ Weathering of rocks
- _____ Photosynthesis
- _____ Respiration from animals
- _____ Respiration from plants
- _____ Burning and decay
- _____ combustion of fossil fuels (coal and oil)