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Global Warming: Can We Help Curb the Warming Trend?


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Global Warming
Can We Help Curb the Warming Trend?

The following lesson(s) are to be completed with students working in cooperative groups.

Introductory Activities

- A) Students will read the following articles to become familiar with the idea of global warming, what experts are saying, and how carbon dioxide is believed to contribute to this condition.

- Articles:*
- 1) The Carbon Cycle, courtesy of, Lyrae's Naturals:
www.environmentalsciences.homestead.com/carboncycle.html
 - 2) Tropical Forests and Global Environmental Change Unit 4,
courtesy of The Jason Foundation for Education
 - 3) The Culprits (and at least 1 other article from this website),
courtesy of: The Woods Hole Research Center,
"http://terra.whrc.org/resources/online_publications/warming_earth/culprits.htm"
 - 4) What is Photosynthesis?
<http://www.emc.maricopa.edu/facultyfarabee/BIOBKioBookPS.html>
 - 5) A choice from articles from the Democrat and Chronicle:
 - a) All the articles dated from July 20 to July 24, 2006
 - b) The article about Vines
 - c) The article about the Wildfires (2 pages)

After reading the above articles, students will write a 1-2 page summary of their understanding of global warming, how humans contribute to this condition, and how plants and trees may be able to help to lesson the effects of CO₂ emissions.

- B) Students will interact with the following models:
- 1) **Interactive Physics** modeling how infrared light causes chemicals to bounce off of each other which is kinetic energy which creates heat.
 - 2) **Agent Sheets** modeling how deforestation affects CO₂ levels in the atmosphere.

- 3) Students will investigate the data given in **Excel** which shows how CO₂ levels have changed over a time period. They will also analyze which CO₂ sources have contributed the most to CO₂ levels in the air and how this has changed throughout the timeline.
- 4) With IP and AS students will be instructed to make changes to the existing parameters and observe, record, and come to conclusions about the changes and how they affected the models.

After working with these models, students will explain what the models are showing them based on what they have learned from the readings and from manipulating the models. This can be done as a presentation from the group work.

- C) Students will experiment with CO₂ levels through an activity which measures CO₂ levels in fresh spinach leaves, or with leaves from a tree. The activity is courtesy of The Jason Project and uses the **TI-73 Explorer and Datamate, CO₂ sensor and either TI-CBL2 or Vernier LabPro** (which ever is available) to perform the experiment. See activity entitled “Tropical Forests Cleaning the Air?”, by The Jason Project. (Both Student and teacher outline attached).

VOCABULARY

Carbon –(include chemical representation) - _____

Oxygen - (include chemical representation) - _____

Carbon Cycle - _____

Carbon Sink - _____

Terrestrial - _____

Greenhouse Gas - _____

Photosynthesis - _____

Respire / respiration - _____

Fossil fuel - _____

Deforestation - _____

Anthropogenic - _____

Atmosphere - _____

Biosphere - _____

Lithosphere - _____

Hydrosphere - _____

Reservoirs - _____

Biomass - _____

Atmospheric CO₂ concentration - _____

ppm - _____

$6\text{H}_2\text{O} + 6\text{CO}_2 \xrightarrow{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ - _____

Math Standards:

Key idea 4 – modeling and multiple representation. Students will interpret the IP and Agent Sheets models as they relate to global warming. Students will use graphs and their information to come to conclusions about CO₂ levels and their sources as well as a possible sink (forests). Students will interpret the graphs in Excel and to explain how sources of CO₂ have changed over a time period.

Key Idea 7 – Patterns and Functions – Students will be studying patterns in the graphs in Excel, they will work to find the line of best fit for the graphs and come to conclusions based on that line. Students will, during the experiment, make conjectures on the readings the CBL device gives them on the pattern of increasing vegetation to decrease CO₂ levels and try to find a function that may model this relationship.