Teacher Information
Lesson Title: Global Warming, Green House Effect and Climate Changes

Lesson Description: This lesson helps students to understand or review their understanding of global warming, the green house effect and climate changes. This information is necessary before completing some of the other modules found in the Willow Biomass curriculum. The lesson makes use of the Internet and works on the skills of technical reading and summarizing of scientific information. This is one of the new emphases of the state and national standards. There are step-by-step instructions provided to assist the students.

Learning Outcomes: Students will be able to:
- Access the Internet and search for information on a given topic
- Read and summarize a technical article
- Define the key terms listed on the student worksheet
- Explain the greenhouse effect and be able to draw a picture showing the key points
- List some impacts of global warming in the world

Materials Needed:
Choose one of the following methods depending on how familiar your students are with the internet and how to use it.

Method one: Using the computer lab. For these activities scheduled time in the computer lab will need to be arranged. Make sure all students have access to their computer codes to enter the system before the lesson begins. This will save a great deal of headache the day of the lesson. Some schools also require permission from parents to access the Internet so be sure to check on the schools policies.
- Computer lab with a computer per every two or three students
- You may find it helpful to have a computer set up for yourself with the computer overhead projector to model the steps as you go along.

Method two: In class session with LCD projector and one connection to the Internet
Using a computer that has access to the Internet and a classroom-viewing screen that projects the computer image for the class to view all at once.
- Computer with access to the Internet
- Extension cords (possibly)
- Overhead screen
- Overhead marking pens
- Computer overhead projector LCD
- Copies of the activities for each student

Method three: Combination LCD lesson and computer lab work
Complete the first page of the activity as a classroom unit and the follow up worksheet in the computer lab. Follow the hints provided in method 1.

Time Requirements: Approximately 90 minutes
Non-blocked classrooms: Recommendation use method 3 above introducing the lesson to the whole class one day and completing the worksheet the next day or during the “lab” period.

Blocked or a double period: Recommend method 1 or 2 depending on your student's abilities and computer facilities. If students finish early, check the accuracy of their work, and then have them complete the drawing assignment included in the worksheet, ask them to find more detail on the topic and summarize their findings, including the website.

MST standards: See overview chart for MST standard correlation
Global Warming,
Green House Effect
And Climate Changes

Student worksheet:
Name __________________________ date ______
Partner(s) name ________________________________

Directions:
_____ 1) type in the website www.epa.gov/globalwarming/ on the address bar and type in enter

_____ 2) click the Kids and Educators button

_____ 3) click the global warming option

_____ 4) Read the information provided on the next three website pages. (If there is time remaining go back and read pages 3-10)

_____ 5) Complete the worksheet in this packet with the help of the website information. Please refer back to the reading and use the built in dictionary and aids provided.

_____ 6) Turn in your worksheet when it is completed.

NICE JOB!!
If you have computer time remaining try finding other information on Global warming by typing the term into the search box. List any other sites found and other information you found interesting.

Recommended Rubrics: Rating out of 4
1pt = clearly, mostly finished worksheet
1pt = accurate information
1pt = good use of computer time, active participation
1pt = picture provided at the end of the worksheet or any extra websites found and recorded
Global Warming, Greenhouse Effect, and Climate Change

Student Worksheet
Name ______________________________

Partner(s) initials _________________________

Date: ________________

Directions: Please define each of the following terms. (To use the dictionary included on the website click on the highlighted red term that you want defined.)

This worksheet will become part of your notebook for this unit.

Part I:
1) Greenhouse Effect:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2) Greenhouse gases: (list 3 examples of the gases)

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3) Atmosphere:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

4) Weather:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
5) Global Warming:

Directions: Answer the following questions in your own words.

A) How much has the Earth warmed over the past 100 years (approximately) ________________?

B) Why has the Earth warmed?

C) Are scientist sure that the greenhouse effect causes warming of air?

D) What factors are likely to change on earth due to a warming atmosphere?
E) How is our atmosphere like a greenhouse?

Part II) List three more points that you learned from this reading.

List at least one question prompted by this reading.

Draw a picture of what happens to the sun’s energy as it enters our atmosphere. Include the terms atmosphere, absorption, reflection, transmission, and re-emitted. Use the computer-drawing program or sketch this in the space provided. Be sure to print out a copy of your sketch if you are using the computer draw program. Turn in the completed work to your instructor.
Teacher Information
Lesson Title: Summary of the Major Concepts

Lesson Description: This lesson helps the students summarize the key cognitive concepts covered in the modules up to this point. The summary includes a discussion of ten key points and an optional team task creative activity.

Learning Outcomes:
Students will be able to:
- Summarize the ten key concepts
- Define the key terms given
- Work in a cooperative group to complete a task
- Use a variety of media sources to present the teams information

Materials Needed:
Summary sheet per student
Assessment activity sheet per student
Camera
Tape Recorder
VCR
Other optional media devices

Time Requirements: 20 minutes for the class discussion
90 minutes for the team task
40 minutes to show the completed task work to the class

MST standards: See overview chart for MST standard correlation
Assessment: The sound bites
Synthesis of the Major learning Concepts for Global Warming, Green House Effect and Climate Changes

Key points:

After completing the Venn diagram packet, Global Warming, Green House Effect and Climate Changes computer lesson, and experience with the Terrarium lab, the students should have the following basic knowledge and concepts.

1) The sun is the source of earth’s energy supply

2) The sun gives off energy of various electromagnetic wavelengths

3) The sun’s energy is absorbed, reflected, transmitted and refracted as it enters our earth’s atmosphere and reaches the surface.

4) When the electromagnetic waves called ultra violet rays strike the surface of the Earth many are absorbed by the plants.

5) The trees and plants re-radiate this energy in a lower energy form called infrared rays. These are also known as “heat rays”.

6) The infrared rays are just the right size (frequency) to be absorbed by the greenhouse gases (Carbon Dioxide, methane, ozone, etc)

7) The absorption of the infrared rays by the gases adds to the warming effect of the atmosphere.

8) The greater the level of greenhouse gases in our atmosphere the greater the temperature rise.

9) A rise in global temperature would have far reaching consequences for our world.

10) A great deal of research is underway to help figure out how to supply the world’s need for energy without making the global temperatures rise.

Note: A discussion on the above 10 items would be an easy form of assessment or check for knowledge. A creative activity for assessment is provided below but will require more time, energy and resources.
Assessment Activity:
Using teams of 4, give the students the task of creating a two to three minute educational sound bite, for a radio or television broadcast, which would include the key scientific knowledge and thought regarding Global Warming and the Greenhouse Effect. They should keep a list of resources used and jobs completed by each team member.

Team Task Card:

Task: As a team you are to create an educational television or radio sound bite that will last two to three minutes. It should include information about Global Warming and the Green House Effect. Rely on your notes and your previous experiences with this unit. You may find the library, computer lab, experts in the field to be of help.

The following materials are available: (Instructor should list if there are video cameras, tape recorders, computer lab, library resources, phone numbers of experts etc.)

Due Date: ________________________________

Evidence of everyone’s involvement must be presented with your sound bite.

Rubrics: 10 points
2 pts: Use of notes, outside resources, experts
3 pts: a tape, video, role play, written version of the sound bite that meets requirements listed above
3 pts: Evidence of all the teams’ involvement is presented or is obvious
2 pts: accuracy and depth of information, completed on time