

Sec.: _____ Name: _____

Experiment: Venus - The Greenhouse Effect
(E. Science 9-24-2d)

Purpose: To build a model to show the greenhouse effect, compare this model to Earth, and to form a hypothesis about temperatures on Venus using data collected from this model and from the Pioneer spacecraft.

Materials: cardboard

2 - clear plastic storage boxes, lid thermometer
watch soil heat lamp colored pencils

Methods:

1. Place about 3 cm of soil in the bottom of two clear plastic boxes.

2. Thoroughly moisten the soil with water.

3. Cut a piece of cardboard so that it makes a divider for the box. The cardboard should not quite reach the top of the boxes. Insert the divider into both of the boxes.

4. Lean the thermometer against the divider with the bulb end up, see figure.

Put the lid on one of the boxes.

5. Place the boxes & lamp in an area of the room where no direct sunlight reaches.

6. Place the heat lamp about 30 cm above the two boxes. Record room temperature.

7. Turn on the lamp and measure the thermometer every 2 minutes for 20 minutes for both boxes. Record the temperatures in result's table.

Results: Temperature in $^{\circ}\text{C}$

Time:	0	2	4	6	8	10	12	14	16	18	20 m.
Lid off:											
Lid on:											

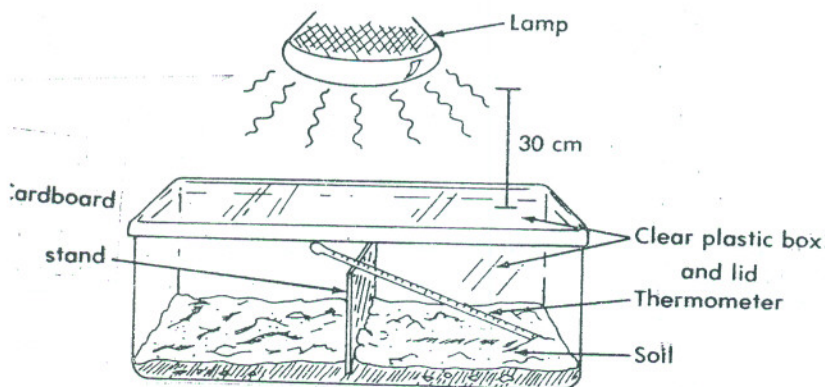
Conclusions:

1. Did the temperature increase the most with the lid on or off? _____

Explain why:

2. Draw a diagram of Earth showing its atmosphere and what occurs to solar radiation in the atmosphere. List the components of Earth's atmosphere on your diagram.

(Remember: The sun emits shortwave and long wave radiation to the Earth's surface. The shortwave radiation from the sun is absorbed by Earth's surface. The surface then reradiates long wave radiation which is absorbed by the atmosphere (by carbon dioxide and water vapor). This process heats the atmosphere near the surface.)



3. Compare this lab activity to the greenhouse effect on Earth. How are they similar? How are they different? (Discuss what happens with the long wave energy).

- similar
- different

Discussion:

1. Venus' atmosphere is composed mainly of carbon dioxide, carbon monoxide, water, nitrogen, and sulfuric acid. Venus' atmosphere is 100 times as dense as Earth's atmosphere. From the surface of Venus up to 20 km, there appears to be a clear region of atmosphere. A thick layer of clouds extends from about 50 km to 80 km above the surface of Venus. These clouds are composed of drops of sulfuric acid. Above and below these clouds are together thinner layers of haze. Venus' ionosphere extends from 100 km to 200 km above the surface. Like the ionosphere of Earth, it has layers. The temperature in the ionosphere of Venus is cooler than the temperature in Earth's ionosphere.

Draw a diagram of Venus showing its atmosphere and what occurs to solar radiation in the atmosphere. List the components of Venus' atmosphere on your diagram. Write a brief explanation of the greenhouse effect on Venus.

2. Compare the greenhouse effect on Earth and Venus. Can you think of a reason why the surface of Venus is so much hotter than the surface of Earth?

3. The average distance from the sun to Earth is 150 million km. How many seconds does it take for light to travel at 300 000 km/s to reach Earth? ($V=d/t$, use algebra to solve for t)

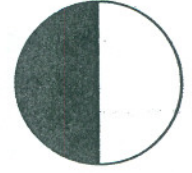
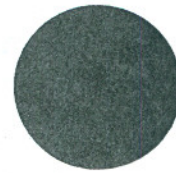
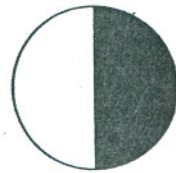
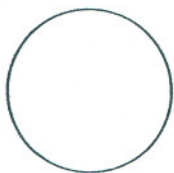
4a. Read Matthew 24: 29-30. What event is about to happen?

4b. What is going to happen to each of the following.

- sun -
- moon -
- stars -
- heavenly bodies (possibly planets) -

5. **Directions:** Identify each phase of the Moon in Figure 1 by writing its name on the line beneath the phase shown. Then answer the following questions on the lines provided.

Figure 1



1. _____ 2. _____ 3. _____ 4. _____

- _____ 5. What phase occurs between the full moon and the third quarter?
 _____ 6. What phase occurs between the third quarter and the new moon?
 _____ 7. What phase occurs between the new moon and the first quarter?
 _____ 8. What phase occurs between the first quarter and the full moon?