Teaching Activity: Life in a Bag

Introduction: Our Earth maintains an average surface temperature of 14° C (57 ° F). This comfortable temperature is due to the greenhouse effect caused by the Earth's atmosphere. Mars, with very little greenhouse effect, has an average surface temperature of -23° C (-9.4° F). Venus, because of a "runaway" greenhouse effect and an average surface temperature of 475 ° C (887° F). Earth's atmosphere is able to sustain life because of the unique balance between the greenhouse effect and the environment.

Objective:

- To understand that gases in the atmosphere affect the temperatures at the Earth' surface;
- To model the Earth's greenhouse effect by using student's bodies as the Earth;

Materials (For each group) : 1 plastic laundry or trash bag, 2 thermometers, scissors, graph paper, tape, watch/ clock with second hand, paper/pencil, colored pencils;;

Procedure:

1. Review the role of the atmosphere in the greenhouse effect.
   - Explain that this activity only models the greenhouse effect, using their bodies as the Earth. This is a crude approximation of the real effect, and so there are certain flaws.
2. Have students develop their own hypothesis about the temperatures inside and out of the plastic bag.
   - Students should write their hypotheses in the space provided on the **Student Activity Sheet** under question #1, "what do you think will happen to the temperature both inside and outside the bag when exposed to sunlight?"
3. Student should cut a whole in the sealed end of the bag just big enough to fit their head through.
4. Students should "put on" their plastic bag.
   - They should hold one thermometer inside the bag, but not directly touching their bodies.
   - They should record the temperature when they started the activity and then every minute after that on the **Data Table**.
5. Students should hold the other thermometer outside of the plastic bag and record that temperature in the same way they did in #4.
6. Temperatures should be recorded for both locations until the temperatures stops changing.
7. After completing the **Data Table**, should create a graph of the data they recorded.
   - Label the **X-axis: Time** and the **Y-axis: Temperature**.
8. After completing the graph and the Data Table, students should go on to complete the questions in the **Analysis and Comprehension** section.

Student Activity Sheet: Life in a Bag

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Objective:

- To understand that gases in the atmosphere affect the temperatures at the Earth' surface;
- To model the Earth's greenhouse effect by using student's bodies as the Earth;

Procedure:

1. Develop a hypothesis about the temperatures inside and outside of the bag. Write your idea in the space provided on the **Student Activity Sheet**.

2. Cut a whole in the sealed end of the plastic bag just large enough to fit your head through and "put on" the bag.

3. Hold one thermometer inside the bag, but not touching your body, and the other outside the bag.
   - Record the temperatures of both at the start of the activity on the **Data Table**.
   - Record the temperatures for both thermometers every minute until the temperatures stop changing.

4. After you complete recording on the **Data Table**, create a graph of your data.
   - Label the **X-axis : Time** and the **Y-axis: Temperature**.
   - Use two different colored pencil to signify the location where the temperature were taken.

5. Answer the questions in the **Analysis and Comprehension** sections.

Student Activity Sheet #1

PART I: HYPOTHESIS: What do you think will happen to the temperature both inside and outside of the plastic bag when exposed to sunlight?

PART II: ANALYSIS AND COMPREHENSION:

1. Compare the temperatures inside and outside of the bag. _____

2. Why do you think that these results occurred? _____

3. Do you think there are one or two energy forms involved? Explain. _____

4. What changes could you make in the experiment which would cause a change in the results? _____

5. How are the conditions on Earth and in this experiment similar? How are they different? _____

6. Name some ways that humans have changed the composition of the atmosphere. _____

_____

_____

7. How do the increased greenhouse gas concentrations resulting from human activity affect the temperature of the planet in the same way that the plastic bag affected the temperature around your body? _____

_____

_____

_____

PART III: DATA TABLE:

TIME/TEMPERATURE INSIDE AND OUTSIDE OF THE BAG

TIME (minutes)	TEMPERATURE ° C INSIDE BAG	TEMPERATURE ° C OUTSIDE BAG
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		