

GREENHOUSE EFFECT WORKSHEET

1. **Below, place the numbers 1, 2, 3, 4, 5 and 6 next to the mixed-up steps in the greenhouse effect to put them in their proper order starting at the sun.** (6 points)

_____ When solar energy waves hit the earth's surface, they slow down and form longer heat (thermal) energy waves.

_____ Some solar energy waves reflect off of clouds and greenhouse gasses and return to space.

_____ These longer heat energy waves have trouble getting back out into space through the greenhouse gasses.

_____ Heat trapped in the atmosphere warms the planet.

_____ Other solar energy waves make it to the earth's surface.

_____ Short wave solar (radiant) energy waves enter the atmosphere from the sun.

2. **Put a check mark (✓) by only those gasses listed below that are considered to be greenhouse gasses.** (6 points)

_____ Oxygen (O₂)

_____ Natural Gas or Methane (CH₄)

_____ Water Vapor (H₂O)

_____ Nitrogen (N₂)

_____ Carbon Dioxide (CO₂)

_____ Nitrous Oxide (N₂O)

3. **Greenhouse Effect Experiment** (7 points-1 point each for following steps a through g)

Instructions: This experiment is designed to help students understand how increasing the greenhouse effect will affect plant growth. Classes will prepare at least two control pots and two pots of each of the four mini-greenhouse treatments to test the effects on bean or corn growth of different layers of plastic wrap under a heat producing light source. The increasing layers of plastic wrap on the mini-greenhouses represent increasing levels of greenhouse gasses in the atmosphere. In pairs or groups of three, complete each of the 7 steps below for one or two control pots or one or two of the four listed treatment pots. Your teacher will indicate how many pots to prepare. After following these steps in your group, check with your teacher to receive a stamp for following correct scientific procedure.

- a) Fill each 6-inch pot with slightly moistened potting soil to the top of the pot.
- b) Using a metric ruler and a marker, mark 3 cm on the eraser end of your pencil. Use your pencil to push 1 bean or corn seed 3 cm deep in the middle of the pot.
- c) Cover the seed with potting soil. Water the pot with 200 ml of water.
- d) Make a “U” shaped bend in each of two 2-foot pieces of wire and push each wire into your 4 treatment pots going corner to diagonal corner with each wire.
- e) Join the two wires at the top with a twist tie.
- f) Cover the supporting wires with the appropriate layers of plastic wrap placing each successive 60 cm (20 inch) long sheet at 90 degrees to the previous layer for the 2 sheets treatment and 45 degrees to the previous layer for the 4, 8, and 12 sheets treatments. From the bottom of the pot, put a large rubber band over the bottom of the layers to hold them to the pot.
- g) With a pencil, write your and your partners’ names, Mod, and “Control” or the plastic wrap treatment on the label and tape it to the side of your pot. Place the pot under a heat producing light source as directed by the teacher.

Control and Treatments:

- Control = no plastic wrap or wire supports
- Treatment 1 = 2 sheets of plastic wrap over the wire supports
- Treatment 2 = 4 sheets of plastic wrap over the wire supports
- Treatment 3 = 8 sheets of plastic wrap over the wire supports
- Treatment 4 = 12 sheets of plastic wrap over the wire supports

4. Hypothesis (3 points)

Remember to use an if/then/because format and make your writing clear. Check with your teacher if you need some coaching.

Think about these questions as you write your hypothesis: What could you measure on the bean or corn plants to determine if they have grown or not? How will increased temperature affect the growth of your plants? What is changing in the experiment, and what is staying the same? Which treatment will be the best/worse for plant growth?
