Name: _____ Date: _____

AN INVESTIGATION INTO ALBEDO

In this investigation, we will be modeling the earth's atmosphere using 2L bottles. We will put different types of material in the bottom of each of 4 bottles to model different surfaces on earth and then measure the rise in temperature in each of the bottles.

Inquiring and Designing an Investigation

Explain the problem or question to be tested.

State the testable question, clearly identifying the independent and dependent variables.

Hypothesis and Variables

Hypothesis	Clearly and correctly state your hypothesis in one sentence. Be as specific as you can. Example: *Due to the influences of the albedo effect, I believe black paper will be 50% warmer than light paper after one hour in the sun.*

Independent Variable:	What factor are you changing on purpose?
Dependent Variable (include units):	What factor changes as a result of the independent variable? (you will be measuring this)
Control Variables: List at least 3 variables which might influence your results	Why do you need to control this variable? How will you control it?
	Why: How:

	Why: How
	Why: How:

Perform Investigation

Materials

1. Four similar clear 2 liter bottles with white lids, clean and dry.
2. 4 surface materials (enough to cover bottom of 2L bottle with 5cm of material
    a. Black charcoal granules, (soil amendment) found at garden center.
    b. Perlite (white potting mix ingredient) from garden center.
    c. Medium shade brown soil
    d. White paper, torn in strips
3. 4 small thermometers hanging from a wire attached to each lid (teacher setup: heat a nail and melt a hole in each bottle cap to suspend a small thermometer on a wire, (or unbent paper clip) Label the caps A,B,C & D)
4. Ring stand with a clamp-on lamp
5. timer

Safety Considerations

Be aware of the high temperature of a heat lamp and do not touch it.

Procedure

1. Fill bottom of each 2L bottle with 5cm of each surface material
2. Place cap with suspended thermometer on each bottle
3. Place bottles under an overhead lamp so they are receiving light from the same distance and angle.
4. Prepare a timer for 5 minute intervals and turn on the lamp.
5. Record the temperature of each bottle every 5 minutes on a spreadsheet.
6. Graph and analyze the results.

For repeated trials with successive class periods, cooling time will be required for the materials so that all substrates can return to room temperature.

Processing and Evaluating

Data Collection

Collect and organize your data. Use a spreadsheet or the chart below to organize your data.

Different Surface Types vs. Temperature							
Type of surface	Temperature in the bottle (in 5 min intervals)						
	0	5	10	15	20	25	30
black charcoal							
perlite							
brown soil							
white paper							

Organize, Transform and Present Data

Using a spreadsheet, create graphs and insert here.

Each graph must include:

Title

x and y axis labels with units (the independent variable is usually on the x axis)

Data Analysis

Describe your results- what did your data show?
Interpret your findings

- What is the data telling you?
- Why do you think your results turned out this way?

Conclusion and Reflection

Based on the data collected, discuss the validity of your hypothesis by explaining if your hypothesis was supported, partially supported, or not supported by the data.

What did you learn from this experiment and what could you investigate further? How could your findings be applied to solve a specific problem or issue? How does this experiment interact with other factors: moral, ethical, social, environmental, political, cultural, economic, etc.