

Introduction:

Earth's surface varies in both chemical and physical properties. The wavelength of solar radiation that is absorbed by an earth material is changed and re-radiated as heat. The characteristics of the surface determine what happens to the incoming solar radiation.

Objective:

You will determine how the surface characteristics of material affect the relative rates of energy absorption and radiation.

Vocabulary:

Absorption - _____

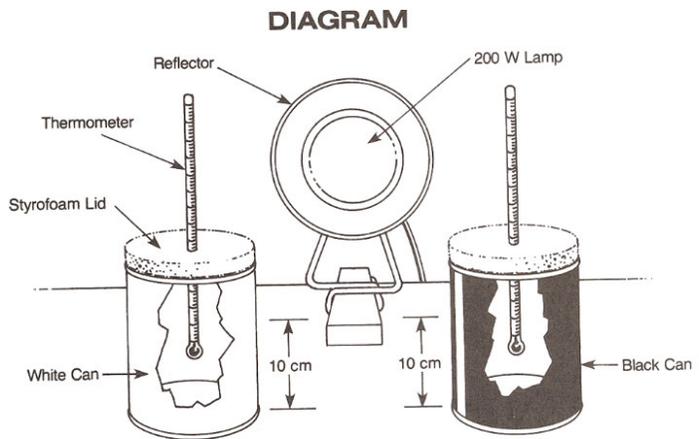
Reflection - _____

Re-radiation - _____

Radiative Balance - _____

Procedure

1. Calibrate your thermometers.
2. Arrange the black and silver (shiny metal) cans as shown in the diagram below.



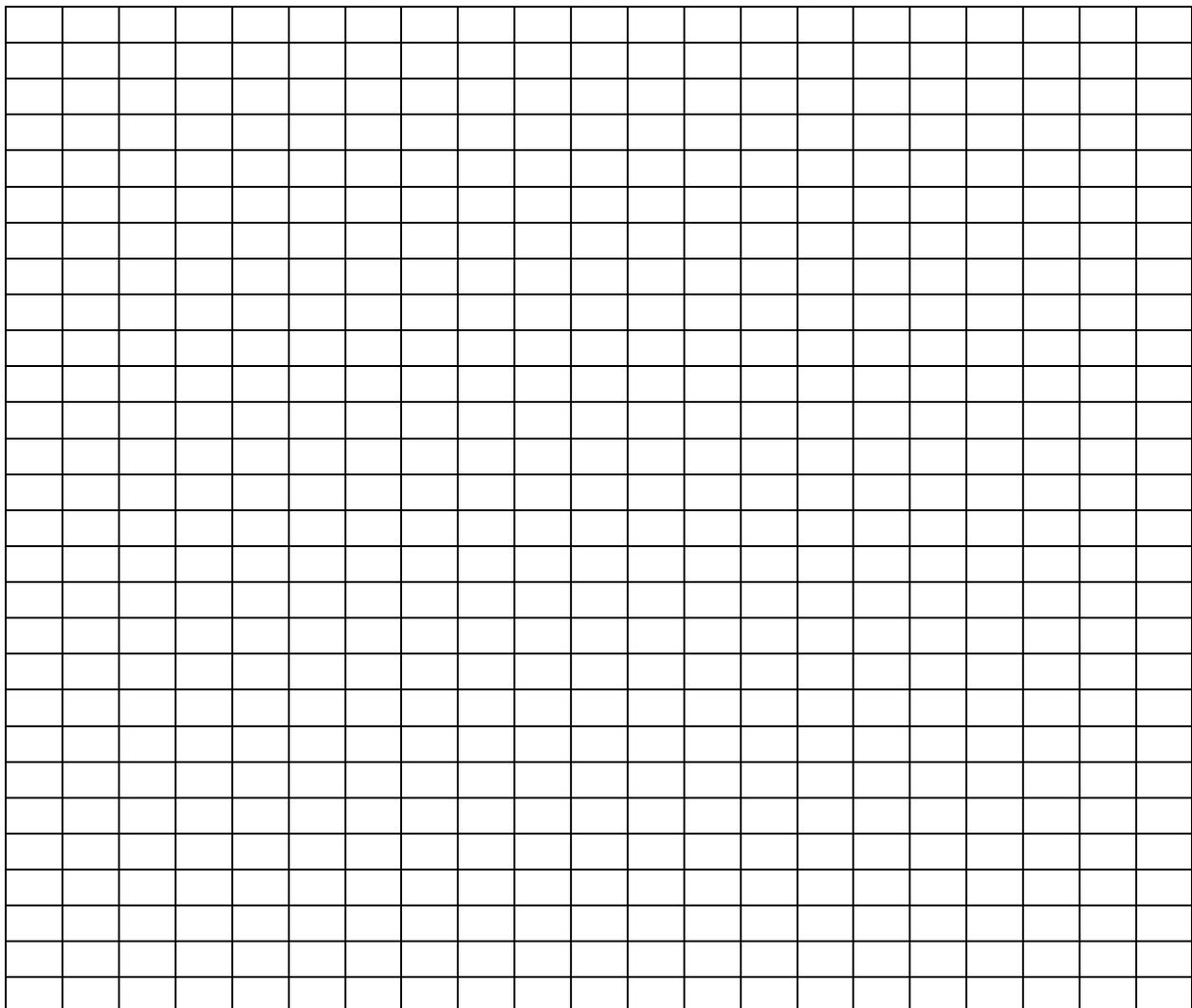
3. On the Report Sheet, record the temperature of each thermometer at Time 0.
4. Turn on the lamp and read the thermometers at one minute intervals for 10 minutes. Record the temperature for each can at each interval and record on the Report Sheet.
5. Without disturbing the position of the cans, turn off the lamp and turn it away from the area of the cans. CONTINUE TIMING.
6. Continue to take temperature readings every minute for another 10 minutes recording them on the Report Sheet.
7. When you are done recording temperatures after 20 minutes, graph your data. Plot both curves on the same graph. Place time on the horizontal axis.

REPORT SHEET:

Light ON - Time	Black Can Temp - °C	Silver Can Temp - °C
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Light OFF - Time	Black Can Temp - °C	Silver Can Temp - °C
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

ABSORPTION & RADIATION GRAPH



Questions:

1. Why was it important to place each can an equal distance from the lamp? _____

2. After 10 minutes why was it necessary to turn the lamps away from the area of the cans? _____

3. Which can absorbed energy more quickly? How does your graph illustrate this? _____

4. Which can re-radiated energy more quickly? How does your graph illustrate this? _____

5. Which can had the greatest rate of change through this experiment? _____

6. What evidence can you find from your graph that indicates neither cup heated up nor cooled off at a constant rate? _____

7. If you know that a surface is a good absorber of energy, what can you infer about its ability to radiate energy? _____
8. Why did the graph lines tend to level off near the end of 10 minutes? _____

9. How do wavelengths absorbed by the cans differ from the wavelengths radiated from the cans? _____

10. What characteristics of the surfaces used in this lab determined the rates of heating an cooling? _____
