PROLOGUE

LAB P-6: ABSORPTION & RADIATION OF ENERGY

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 a material affect the relative rates of energy absorption and radiation.

VOCABULARY:

absorption:

reflection:

re-radiation:

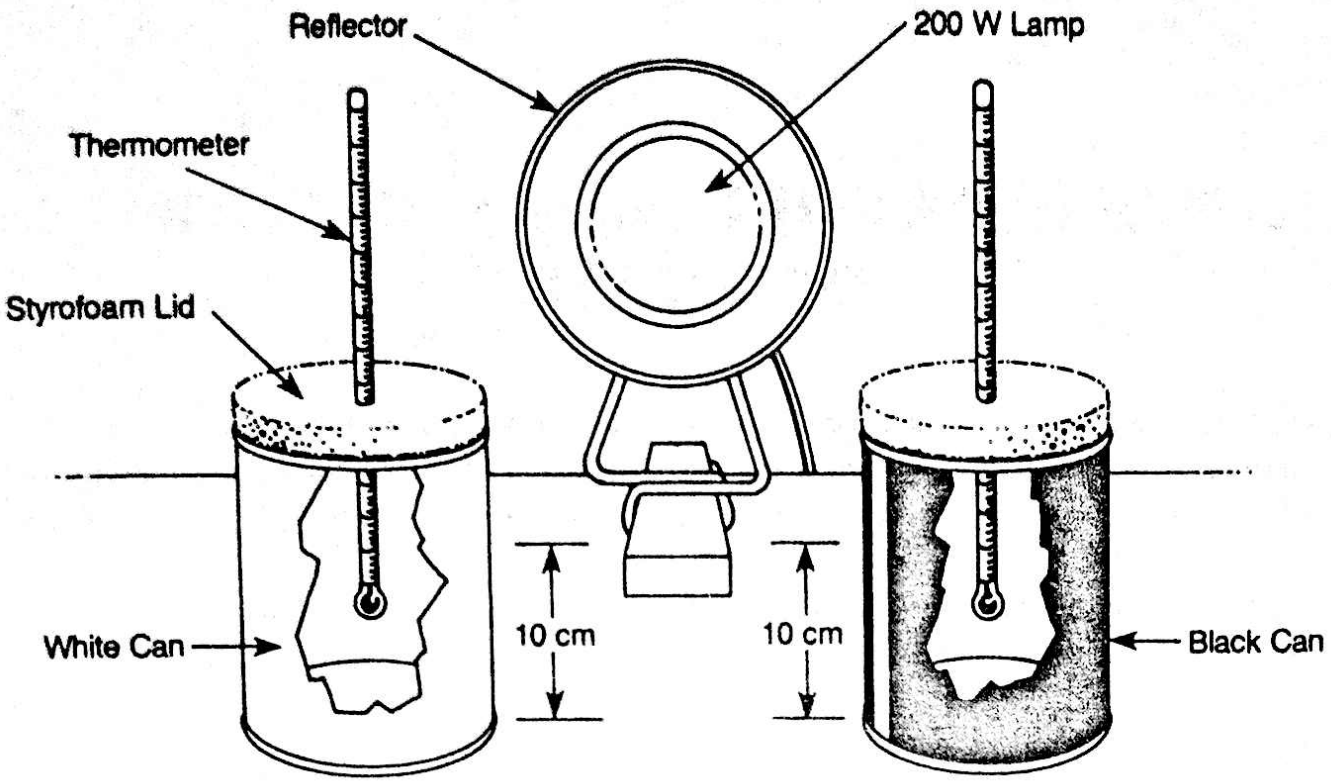
radiative balance:

PROCEDURE:

YOU MUST WEAR SAFETY GOGGLES!

1. Calibrate your thermometers.
2. Arrange the black and white (shiny) cans as shown in the diagram.
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 these data 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. Graph your data. Plot both curves on the same set of axes. Place time on the horizontal axis.

DIAGRAM

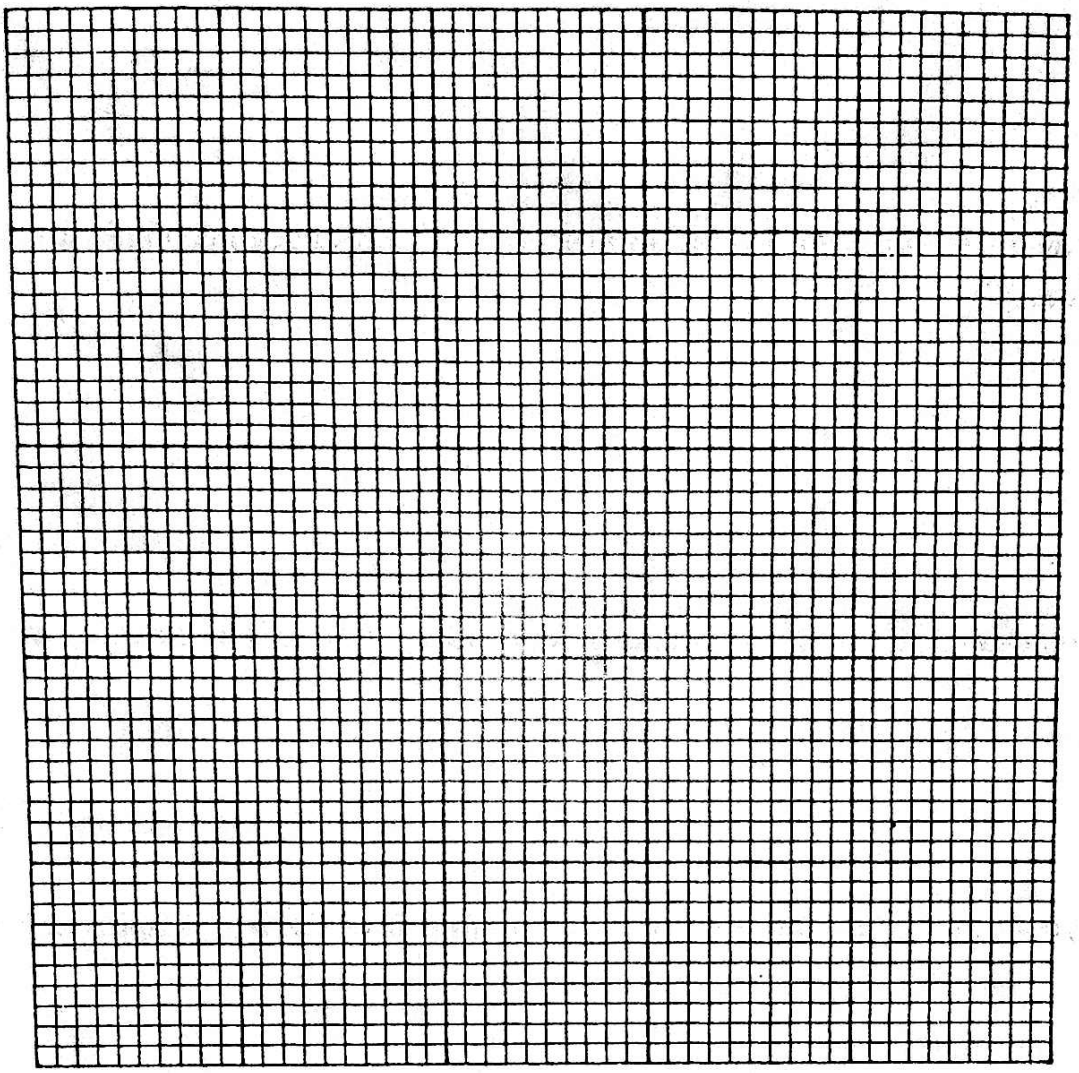


REPORT SHEET

Time, min	Black can temp, °C	White can temp, °C
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Time, min	Black can temp, °C	White can temp, °C
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

ABSORPTION & RADIATION GRAPH



DISCUSSION QUESTIONS: *(Answer in Complete Sentences)*

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 reradiated energy more quickly? How does your graph illustrate this?

5. Which can had the greatest rate of change throughout 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. What would cause the graph lines tend to level off near the end of 20 minutes?

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

CONCLUSION: What characteristic of the surfaces used in this lab determined the rates of heating and cooling?