

Albedo Lab

Name: _____ Group: _____

Materials:

- lamp with a 100-watt bulb
- two colors of construction paper
- Vernier LabQuest with two temperature probes

Directions:

Answer this question *in your notebook*.

What is albedo?

- A. Albedo is the percentage of radiant energy produced by the sun.
- B. Albedo is the measure of how much radiant energy from the sun is reflected.
- C. Albedo is the measure of how much radiant energy from the sun is absorbed.

Hypothesis:

In your notebook, make a prediction about the temperature of each color of paper. How will the temperatures of each change over time? Which will get the warmest? Which paper's temperature will rise fastest?

Procedure:

Working in groups.

Place the temperature probes into the paper pockets.

Place the papers with the probes directly under the lamp so that they receive equal amounts of light. The lamp should be pointed straight down.

Set up the LabQuest to record temperature for 4 minutes at an interval of 4 times per minute.

Start the data recording and turn on the lamp at the same time.

Albedo Lab

Data:

Copy the data from the LabQuest's table view into this table.

Time (min)	Temperature (°C)	
0 (start)		
0.25		
0.5		
0.75		
1.0		
1.25		
1.5		
1.75		
2.0		
2.25		
2.5		
2.75		
3.0		
3.25		
3.5		
3.75		
4.0 (end)		

Graph the data in your notebook. Use a different color pen or pencil for each thermometer. Label the key and the axes of the graph.

Subtract the starting temperature from the final temperature for each thermometer. This is the temperature rise. Calculate the rate of change in degrees per minute by dividing the temperature rise by 4. Show your work in a table (like the following) *in your notebook*.

Color		
Ending Temperature (°C)		
Starting Temperature (°C)		
Temperature Rise (°C)		
Change per minute (°C)		

Analysis of Data:

Answer the following questions *in your notebook*.

Which color warmed up the most?

Which one showed the fastest rise in temperature?

Which color has the *higher* albedo?

Albedo Lab

Conclusion:

Based on your work and class discussion, which surface has a higher albedo, ice or open-ocean?

If an increase of 1 degree in global temperatures causes the Arctic Ocean to remain ice-free for two additional weeks each year, how will it affect the ocean's albedo? Why?

If the ocean's albedo decreases, how will this affect ocean temperatures and ice formation in the winter? Explain.