



The Albedo Effect in Action

One of the more drastic effects of climate change is the **melting of the polar ice caps** and **sea level rise**. This is occurring due to a combination of average temperature **increases** worldwide and the **albedo effect**. In this activity, students will be introduced to the **albedo effect** through an experiment and learn how it relates to climate change.

We recommend providing an **introduction** to the albedo effect (explained in the activity sheet) before you conduct the experiment. Once you've completed the experiment and your students have a better grasp of the concept, we recommend **discussing** how it relates to climate change using the information provided below.

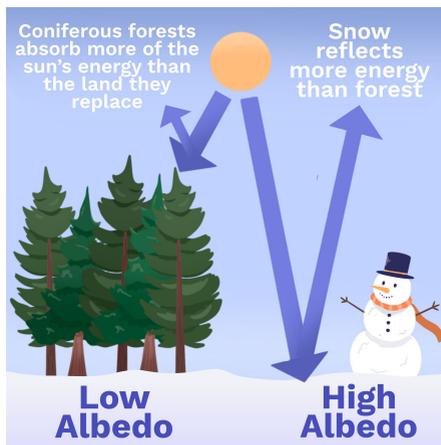
The albedo effect

The albedo is a **measure** of how much of the **sun's energy** a surface **reflects** back into space. Since light-coloured surfaces are **more reflective** than dark-coloured surfaces, they have **higher** albedos. Examples of light-coloured surfaces are snow and ice caps. A surface's albedo can be calculated by dividing the amount of energy it receives by the amount of energy it reflects back. As such, albedo values range between 0 and 1.

Climate change

The Earth is **warming** due to **climate change**. As a result, the polar ice caps have begun to **melt**. As they melt, they are exposing the darker-coloured rocks and ocean water beneath them.

Given that the rocks and ocean water absorb more sunlight, they are **decreasing** the Earth's albedo, which is causing **further** temperature increases and melting yet more ice. This **vicious cycle** is what we call a **positive feedback loop**.





Things you'll need

- One sheet of black paper per student/group
- One sheet of white paper per student/group
- Two thermometers per student/group
- Sunlight
- Timer (optional)

Instructions

Step 1

Have each student/group lay their thermometers on a surface in the sun and record the temperatures.

Step 2

Have each student/group wrap one of their thermometers in the black paper and the other thermometer in the white paper.

Step 3

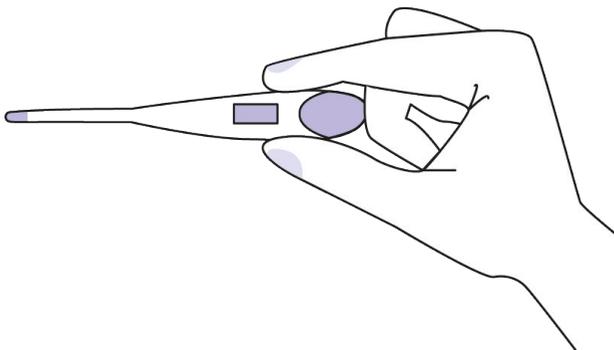
Wait two minutes.

Step 4

Have your students read the temperatures from both thermometers and record them in the appropriate boxes in the table.

Step 5

Repeat steps 2-4 two more times. Once the experiment has been completed three times, have your students calculate the average temperatures and answer the follow-up questions.





Answer key

1. Which paper colour produced the highest temperature?
Black
2. Which paper colour produced the lowest temperature?
White
3. Which paper colour reflected the most heat?
White
4. Albedo is a measure of the amount of energy a surface reflects (instead of absorbing). Which paper colour had the highest albedo?
White
5. What was the difference between both paper colours' average temperatures?
Average temperature black - Average temperature white
6. Based on what you've learnt today, would you expect a planet with a **high albedo** to have a higher or lower average surface temperature than a planet with a **low albedo**?
Lower
7. Based on what you've learnt today, would you expect a planet with a **dark-coloured surface** to have a higher or lower albedo than a planet with a **light-coloured surface**?
Lower
8. Considering that temperatures are rising on Earth because of climate change, is Earth's albedo increasing or decreasing?
Decreasing



We welcome feedback and would be delighted to hear your thoughts on this activity. Feel free to send an email to schools@climatescience.org and we'll be sure to get back to you soon :)