

# Arctic Ice

## Protecting the Arctic from radiant heat (sunlight)



### INTRODUCTION

Scientists are trying to find ways to slow down global warming and give us a little more time to reduce our carbon emissions. Dr Leslie Field is one of these scientists and she believes that preserving and restoring ice in the Arctic will help. In the 'Arctic Ice Project' the effect of adding a thin layer of tiny, hollow, glass beads in key places is being investigated. The material looks like sand, floats on water and initial tests show it doesn't harm wildlife. In this investigation, children will mirror the research to see whether glass beads might reflect sunlight and reduce melting.

### LEARNING INTENTIONS



- ✓ To understand how science and engineering can be used to solve global problems
- ✓ To plan a comparative test (including recognising and controlling variables where necessary)
- ✓ To compare reflection and thermal conduction in different materials

### KEY QUESTIONS

1. How will you know that the chocolate is warming?
2. What similarities and differences are there between ice and chocolate?
3. Does a layer of glass beads (marbles) slow down melting under radiant heat (sunlight)?
4. What do you predict will happen with other materials?
5. How can you make a fair comparison with other materials?

### KEY VOCABULARY



Thermal insulator	Radiant heat (sunlight)
Global warming	Visible light
Arctic ice	Geoengineering
Reflective	Conductor/ conducting
Reflectivity	
Melt/melting	



### RESOURCES (PER GROUP)



- Desk lamp with adjustable height and incandescent bulb (not LED)
- 2 chocolate buttons
- 2 cake cases
- Timer
- Cling film
- 7 glass marbles
- Block (wood/book)

### EXTENSION / FOLLOW UP ACTIVITIES

- Children could plan an investigation, trying other materials on top of the chocolate, such as sand, foil or plastic beads.
- \*Watch: [tinyurl.com/am5rayxj](https://tinyurl.com/am5rayxj) This shows heat being conducted rather than radiated. Can children predict and then set up a fair test to find out about glass' thermal conduction properties?
- Adding a layer of beads to key areas in the Arctic would cost an estimated \$300 million and some scientists are worried that the material might cause problems later. Alternative geoengineering ideas include making clouds or releasing sun-blocking gases into the atmosphere. Have a class debate, 'Should we be trying to slow global warming with geoengineering, or will it make things worse?'

*\*This is an Explorify activity. You will need to sign in/create a free account in order to access the resource*

### ADDITIONAL RESOURCES (IF REQUIRED):

- Sand, foil, plastic beads
- Ice, materials including glass with the same thickness
- [arcticiceproject.org](https://arcticiceproject.org)

### WHAT TO DO:

Today we are going to be geoengineers

1. Collect the equipment. Explain that the chocolate buttons will represent the Arctic ice and that a desk lamp will represent sunlight.
2. Place the chocolate buttons in the cake cases and cover with cling film. Ensure there is enough cling film so that you can easily lift it up, but that there is only a single layer covering the chocolate.
3. Add the marbles (6-7 should cover the surface of the chocolate) to one cake case. You will compare this to a cake case with only cling film covering the chocolate.
4. Arrange the lamp so that it will shine equally on your samples and measure the height of the bulb.
5. Turn on the light and begin timing. Every minute (or 2 minutes), remove the samples from the light (a block under the cases helps do this quickly) and lift the cling film. Can you press into the chocolate and leave a dent? Is there melted chocolate on the cling film?
6. Return the samples and continue until each sample has melted and compare the times.

ANTICIPATED ACTIVITY TIME: 40 – 90 MINS