



STAYING WARM ON ICE

Emperor penguins breed during the Antarctic winter when temperatures are a numbing -40°C , and ferocious winds and blizzards are common. Male emperor penguins, left on the ice to incubate eggs, protect themselves from cold by huddling together in large groups.

Huddling together prevents emperor penguins from losing body heat to their surroundings. Additionally, temperatures at the centre of an emperor penguin huddle can reach an astonishing 24°C . It's clearly worth huddling to stay warm.

Aim

Use test tubes and hot water to investigate how emperor penguins' social huddling helps to reduce heat loss to the icy Antarctic environment.

What you need

- 8 test tubes or small glass jars
- rubber bands
- 2 thermometers
- 2 stands or similar
- 2 clamps or similar
- stopwatch/timer
- source of hot water



What to do

1. Predict which test tubes or jars will stay the warmest: the tube at the centre of the group, or a single test tube? Write your answer in your workbook or investigation planner.
2. Fasten seven test tubes or jars together using rubber bands.
3. Attach group of test tubes to stand using clamp.
4. Attach single test tube alone to stand using clamp.
5. Fill all test tubes with hot water. Take care when handling hot water.
6. Place thermometer in the centre of your test tube group.
7. Place a second thermometer in single test tube.
8. Record temperature from each thermometer at the start, and then every two minutes for 10 minutes.
9. Record your observations in your workbook or investigation planner.

