

Hypothesize This!

OBJECTIVE

Students will be able to predict, measure, collect, and analyze data to investigate heat loss in water.

BACKGROUND

Scientists explore our world by objectively testing hypotheses using the scientific method: define the problem / ask a question, collect background information, formulate a hypothesis, test the hypothesis, make and record observations, and draw conclusions. In this exercise, students will act as laboratory scientists trying to determine if walruses stay warmer in water or in air. In other words, in which environment might walruses lose less body heat? (Heat loss occurs about 22 times faster in water than in air.

MATERIALS

per class:

- smooth peanut butter
- crockpot or microwave
- large spoon
- tape

per student group:

- 1 pan or bowl of room-temperature water
- 2 beverage cups
- 2 thermometers
- 2 popsicle sticks
- pencil
- copy of *Hypothesize This!* funsheet on page 13



ACTION

1. Before beginning activity, heat peanut butter in crockpot or microwave to between 80° and 90°F.
2. Tell students that for this exercise they are laboratory scientists. They are trying to solve the question, "Do walruses stay warmer in water or in air?" Explain the scientific method of stating a testable hypothesis, then devising an experiment to confirm or disprove the statement.
3. Divide class into student groups and distribute copies of *Hypothesize This!* funsheets and pencils. Ask students to state their hypothesis and write their team members' names. One possible hypothesis would be "Heat loss occurs at the same rate in water and in air."
4. Distribute pans or bowls of water, thermometers, popsicle sticks, cups, and tape. Students tape a popsicle stick to each thermometer so that one end of the stick extends slightly past the thermometer bulb (don't tape the bulb). This technique will help students stir without the thermometer bulb touching the bottom or sides of the cup or pan.
5. Students record the temperature of the water in the pan or bowl.
6. Fill the cups half-full with peanut butter. Each student group has two half-full cups of peanut butter.

7. Students record the initial temperature of the peanut butter in each cup. Then, one student in each group holds one cup of peanut butter in the pan of water (but don't touch the bottom of the pan). Another student holds the cup in the air. Students use thermometers to continuously stir the peanut butter in each cup to ensure a uniform temperature throughout. A third student in each group records temperatures at 30-second intervals,

for 4 minutes. Students analyze the results and answer the questions on the funsheet.

DEEPER DEPTHS

Given the question, ask students to devise their own experiment. Students should include materials needed, hypothesis, and procedure in addition to any handouts.

Hypothesize This!

Our hypothesis statement: _____

Our scientific team members: _____

Our data:

Temperature changes in peanut butter

cup in	0 min	0.5 min	1.0 min	1.5 min	2.0 min	2.5 min	3.0 min	3.5 min	4.0 min
air									
water									

Our results: _____

Our conclusion: _____

Answer the following questions.

Did heat loss occur faster in water or in air? _____

Is your hypothesis still viable? _____

Use the back of this sheet to create a graph displaying your results.

Evaluate the testing procedure. Was it effective? How could it be improved? _____

Can you design a different experiment to test your hypothesis?

How might the results of your investigation help field scientists studying walruses?