

# Adaptations to Life in Cold Water

## Summary

Students will investigate animal adaptations to a cold environment, specifically how they keep warm.

## Time Frame

1 class periods of 60 minutes each

## Group Size

Pairs

## Materials

For demonstrations:

2 pieces of card stock 2 empty cans a large clear bucket water two toilet paper rolls

For student activity: For each student group:

four freezer size ziplock bags

1 3 lb. container of solid vegetable shortening

masking tape

a plastic container of cold water with ice cubes

stopwatch

weights

- [student sheets](#)  
(attached)

## Background for Teachers

See the [Background for Teachers document](#) (attached). It could also be given to students at the end and used for discussion.

## Instructional Procedures

### 1. Hook:

Discuss how quickly our bodies are chilled in the cold. Brainstorm ways in which seals, penguins, and other animals are well-adapted to cold water and icy environments (blubber, air in feathers, oil on fur, low surface area to volume ratio). Then complete the following demonstrations and discuss with students what they represent:

Flying birds need large wingspans to hold themselves up in the air, but small wings work best for birds swimming through water. Demonstrate this with two pieces of flexible cardstock. Try to push one, flat, through a pan of water. It's hard. Fold another piece five or six times and try pushing that through the water. The smaller, stiffer card, like a penguin's wing, works better.

Most birds have hollow bones to make their bodies light enough to become air-borne. But the penguins' heavy, solid bones help them float lower in the water. With the help of two student volunteers, demonstrate the difference between hollow bones and solid bones using two toilet paper rolls, one empty, the other stuffed with tissue paper.

Float an empty can in a clear bucket of water open end up. It floats high in the water like flying aquatic birds (ducks, for example). Add sand to another can until it sinks slightly. Now push down on both cans. The sand-filled can is easier to push down. In this way, it's easier for penguins to dive deeper into the water.

Hand out student sheets attached. Read through the introduction and procedures with them.

You may wish to put a time limit on how long students should hold their hand with shortening in the water, otherwise they could stay there all day.

Give students time to complete the lab. Give them time to clean up. The shortening can be reused for each class.

Have them complete the analysis and conclusion.

Alternate Activity Option: Repeat the experiment with thermometers in place of the student hands. Record the temperatures over several minutes and graph the temperature vs. time results.

### Assessment Plan

#### Scoring Guide:

1. Students participate in hook discussions and lab..... 4
2. Students complete data tables..... 4
3. Students complete analysis and conclusion..... 4
4. Answers to questions:
  - The control in the experiment is the hand without the shortening on it.
  - The hand with shortening on it.
  - blubber or fat
  - The "glove" with shortening in it. Fat is less dense and so it floats easily.
  - The ability to float; buoyancy.

### Bibliography

Lesson Design by Jordan School District Teachers and Staff.

### Authors

[Utah LessonPlans](#)