

RAFT IDEAS

Topics: Marine mammals, Environments, Ecology, Adaptations

Materials List

- ✓ Plastic cup
- ✓ Plastic sandwich bags or equivalent
- ✓ Duct or masking tape
- ✓ CD spindle cover (or small tub)
- ✓ Shortening, lard, feathers, foam, and other desired insulating materials for testing
- ✓ Optional: Thermometer for Ice water bath

This activity can be used to teach:

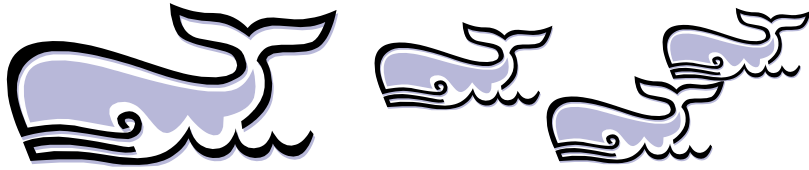
Next Generation Science Standards:

- Organisms and their environment (Grade K, Earth and Space Science 3-1; Grade 3, Life Science 3-2)
- Observations of Organisms (Life Science, Grade K, 1-1; Grade 2, 4-1)
- Climates in Different Regions (Grade 3, Earth and Space Science 2-2)
- Thermal energy transfer (Middle School, Physical Science 3-3)



Testing the Waters

Testing Insulating Materials on a Small Scale



Whales and seals do not just survive in very harsh, freezing cold environments... they thrive! In this activity, discover the insulation properties of several materials by testing them in a tub of ice water.

Assembly

1. Fill the plastic cup approximately 1/3 full with material (For example: lard or feathers).
2. Insert the plastic bag into the cup and distribute the insulating material evenly between the around the bag.
3. Bring the opening of the bag over the opening of the cup and tape down the bag tightly very near the outside rim. Trim the plastic bag, if necessary.

To Do and Notice

Students take turns inserting their hands in the insulation sample cups and dipping the cups in the ice water bath to see how well each material insulates. Push each cup into the water only to the ¾ level to ensure that ice water does not spill over into the cup.

The Science Behind the Activity

Because marine mammals (including whales, seals, and walruses) are warm-blooded, they need to have some method of insulating themselves from the cold water to avoid freezing to death. A thick layer of fat (blubber) between their muscles and skin serves this purpose. As students will discover in this activity, fat is an excellent insulator, keeping in body heat. Blubber also serves as energy storage for the winter months when food sources are limited; some marine mammals do not eat at all during winter. Land mammals use a combination of fat and fur to survive cold winters.

One common misconception that students might have about insulation is that it “keeps the cold out”. Since energy flows in the direction from the warmer object to the cooler object (in other words, heat flows, not cold), it is more accurate to say that the insulating material keeps the heat in. Insulating materials greatly slow down the rate at which heat is conducted through the material, much in the same way that insulators prevents electricity from flowing through them. Different materials provide different insulating effects.

Resources - (Visit www.raft.net/raft-idea?isid=429 for more resources!)

- For an excellent activity that explores insulation on a quantitative level, see “**The Arctic in a Cup**” in *Human Body Explorations*, by Karen E. Kalumuck and the Exploratorium Teacher Institute
- More information on marine mammals - <http://www.marinemammalcenter.org/education/marine-mammal-information/>
- Printable ocean life coloring pages are available at Enchanted Learning: <http://www.enchantedlearning.com/subjects/ocean/Oceanlife.shtml>