

Grades: 3-5

Objective: Students will explore how blubber helps marine mammals survive in the cold seas around Alaska.

Source: Evan-Moor Teaching Supplies and Lesson Plans



Evan-Moor[®]

STEM Challenge: Blubber Glove

Task: Students will work in small groups to design and create a blubber glove that keeps hands warm in extreme cold.

Getting Started

Build Content Knowledge

If you wish to provide students with background knowledge about biological insulation, reproduce and distribute pages 26 and 27. Then have students read and discuss the science concept and the visual literacy graphics on those pages.

Introduce the Challenge

Reproduce and distribute the STEM Challenge on page 28. Then have students read the challenge and the testable goal. Discuss the materials with the students and decide on a plan for gathering the materials.

Next, have students research polar bears, whales, seals, and other arctic animals that stay warm by using blubber. Ask them to think about how science, technology, engineering, and math are connected to blubber protection. Finally, have students independently brainstorm and draw their ideas on page 28.

Completing the Challenge

Assign students to small groups.

Optional: Model the Design Process

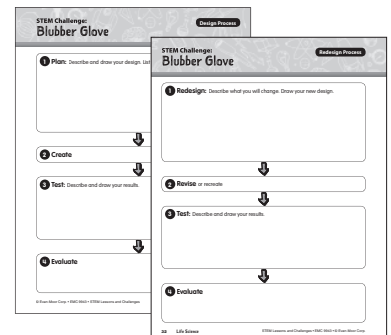
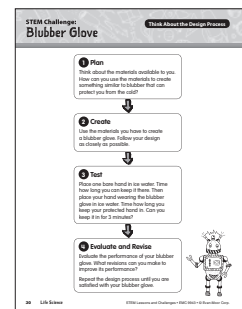
You may wish to reproduce and distribute page 30 to students. This resource is intended to help students think about how to approach each step in the design process.

Design Process Worksheets

Reproduce and distribute the STEM design process worksheets to students. Provide support when needed to help students describe and evaluate their plans.

After the Challenge

Have students share their design processes, compare their blubber gloves, and brainstorm ideas for improvements.



Keeping Warm

Polar bears live in very cold places. In some areas where they live, the temperatures drop far below zero! But polar bears still stay warm and survive. How?

There are two things that polar bears have that **insulate** them, or protect them from extreme cold—their thick fur and their fat, or **blubber**. Here is how it works:

Polar bears have two layers of fur, a long and oily layer and a short and protective layer. The long hairs are hollow. They trap hot air and bring it close to the bear's skin. Their oily coating keeps the short, protective fur dry. The shorter hairs also trap pockets of air close to the bear's skin. Heat travels through water much more quickly than through air. That's why, on a hot day, you'll cool off faster by jumping into a pool or running through a sprinkler than by sitting in shady air. Polar bears go into the water to find food, not to cool off. Their fur helps keep them dry and warm while hunting and eating.

The polar bear's blubber also insulates the bear from the cold, especially keeping its inside parts warm and safe. The blubber is two to four inches thick and is spread throughout most of its body. This firm yet stretchy insulation also helps the polar bear float in water.

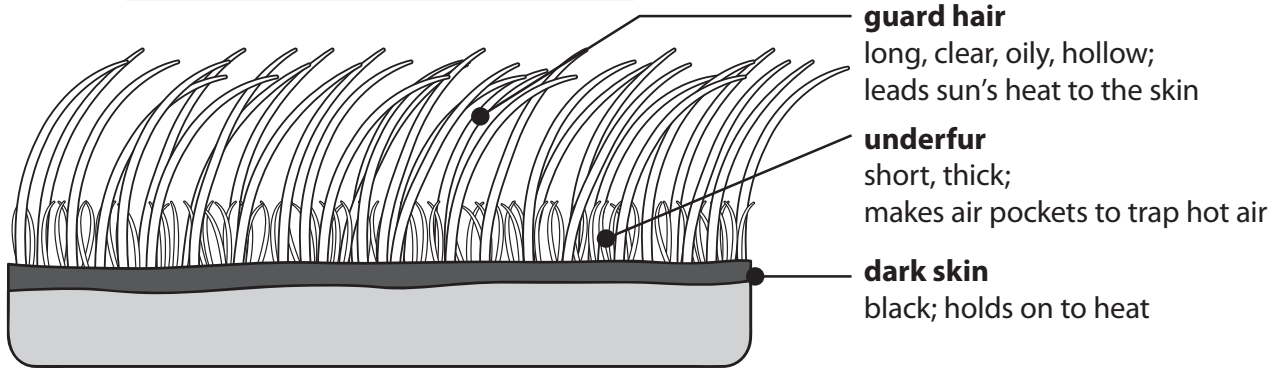
Polar bears manage to stay warm in their icy world. Whales, seals, and sea lions, which also live in Arctic waters, also use blubber to keep warm. The blubber in some whales can be as much as 20 inches (51 centimeters) thick!



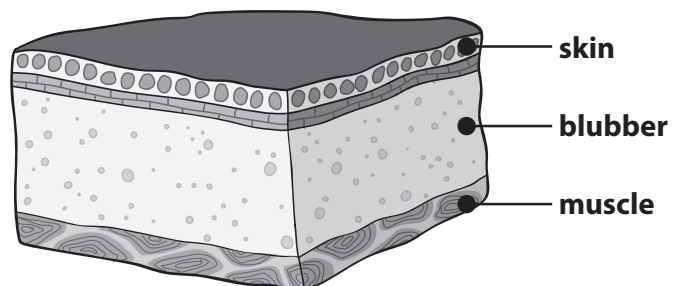
STEM Challenge: Blubber Glove

Visual Literacy

A close-up drawing of polar bear fur



A close-up drawing of polar bear blubber under the skin



STEM Challenge: Blubber Glove

Challenge

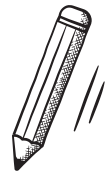
Blubber Glove

Challenge: Make an insulating glove that keeps your hand warm in the cold.

Testable goal: Wear the insulating glove in ice water for 3 minutes.

Research: Look at pictures of arctic and antarctic animals. Figure out how they stay warm. Think about how science, technology, engineering, and math are used to protect the animal.

Brainstorm: Draw one or more design ideas for an insulating glove. There are many different ways to complete this challenge. Be creative!



A large, empty rectangular box with rounded corners, outlined by a dashed line. This box is intended for students to draw their design ideas for an insulating glove.

STEM Challenge: Blubber Glove

Suggested Materials List

Items for each group

- two freezer bags

Items for the whole class

- | | |
|--|--------------------------------|
| <input type="checkbox"/> packing tape | <input type="checkbox"/> _____ |
| <input type="checkbox"/> shortening or butter | <input type="checkbox"/> _____ |
| <input type="checkbox"/> peanut or almond butter | <input type="checkbox"/> _____ |
| <input type="checkbox"/> cream cheese | <input type="checkbox"/> _____ |
| <input type="checkbox"/> cornmeal | <input type="checkbox"/> _____ |
| <input type="checkbox"/> wool | <input type="checkbox"/> _____ |
| <input type="checkbox"/> cotton | <input type="checkbox"/> _____ |
| <input type="checkbox"/> newsprint | <input type="checkbox"/> _____ |
| <input type="checkbox"/> bubble wrap | <input type="checkbox"/> _____ |
| <input type="checkbox"/> sand | <input type="checkbox"/> _____ |

Items for testing

- stopwatch or clock
- pan or sink with ice water
- thermometer

STEM Challenge: Blubber Glove

Think About the Design Process

1 Plan

Think about the materials available to you. How can you use the materials to create something similar to blubber that can protect you from the cold?



2 Create

Use the materials you have to create a blubber glove. Follow your design as closely as possible.



3 Test

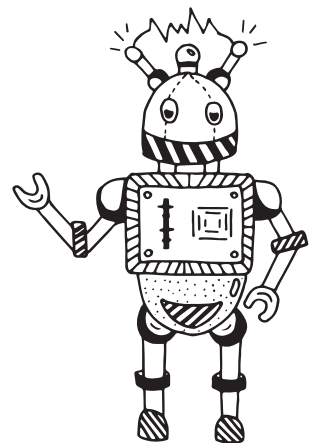
Place one bare hand in ice water. Time how long you can keep it there. Then place your hand wearing the blubber glove in ice water. Time how long you keep your protected hand in. Can you keep it in for 3 minutes?



4 Evaluate and Revise

Evaluate the performance of your blubber glove. What revisions can you make to improve its performance?

Repeat the design process until you are satisfied with your blubber glove.



STEM Challenge: Blubber Glove

Design Process

1 Plan: Describe and draw your design. List your materials.



2 Create



3 Test: Describe and draw your results.



4 Evaluate

STEM Challenge: Blubber Glove

Redesign Process

1 Redesign: Describe what you will change. Draw your new design.



2 Revise or re-create



3 Test: Describe and draw your results.



4 Evaluate