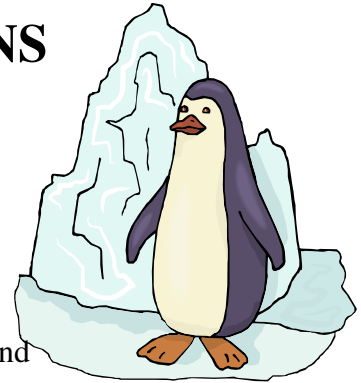


WARMING UP TO PENGUINS



BENCHMARKS and TASK

SC.F.1.1.4 The student understands that structures of living things are adapted to their function in specific environments.

SC.G.1.1.4 The student knows that animals and plants can be associated with their environment by an examination of their structural characteristics.

- The student identifies structural characteristics that enable plants and animals to survive in different kinds of places.

KEY QUESTION

How do penguins and other animals stay warm in frigid environments?

BACKGROUND INFORMATION

Penguins and other animals in Antarctica keep warm with a layer of fat, which is a form of body **insulation**. Their thick, oily coats provide a waterproof layer to keep them warm in extreme temperatures. Penguins also have about 300 feathers per square inch on their bodies to help keep in body heat and to repel water. Penguins can withstand extreme Antarctic weather conditions. Another way penguins keep warm is to huddle together in groups called **rookeries**. A rookery can consist of 10,000 birds or more.

All penguins have wing bones that are fused together to form stiff paddles which are excellent for movement under water. They use their webbed feet, beak, and tail to steer when swimming and their flipper-wings for balance and forward momentum.

MATERIALS

Teacher

pictures of different species of
Antarctic penguins (optional)
cooler for ice storage
world map
Click magazine, Vol. 3, Number 2, Feb. 2000
This Bird Can't Fly (Scholastic)

Per group

2 bowls
ice
1 sandwich-size resealable, plastic
bag filled with 1 cup solid shortening
1 quart-size resealable, plastic bag
2 thermometers
paper towels
newspaper
Warming Up To Penguins recording chart

TEACHING TIP

Place 1 cup of shortening in each group's small bag and seal.

ENGAGE

1. Ask:

Where is Antarctica?

What is the weather like in Antarctica?

What kinds of animals live there?

How do you think the animals are able to survive the cold?

2. Locate Antarctica on a world map and explain to students that Antarctica is a continent totally covered in ice. In some places, the ice is 9,000 feet thick! Tell students they are going to find out how certain animals can survive in such a harsh environment.

EXPLORE

1. Have students cover the tables with newspaper for easier clean-up, and then distribute materials to each group.
2. Have students put ice in each bowl, and then place the bag of shortening on top of one bowl of ice.
3. Tell students to place one thermometer on top of the bowl of ice and one on top of the bag of shortening in the other bowl. Record the beginning temperatures on the *Warming Up To Penguins* recording chart. Ask students to observe for 3-5 minutes, then compare and record the temperature of the two thermometers every two minutes for about 15 minutes.

EXPLAIN

Ask:

What was the final reading on the thermometer sitting on the bowl of ice?

What was the final reading on the thermometer on top of the layer of shortening?

Why do you think there was a difference between the two temperatures?

How can this experiment help us understand how a penguin in Antarctica stays warm?

Do all penguins have short, fat bodies?

Do penguins have fur or feathers?

How do they conserve body heat?

What are some other structural characteristics of penguins that enable them to live in their environment?

EXTEND/APPLY

Have each group place the bag of shortening inside the larger plastic bag, then place the whole 2-bag combination on top of the ice in one bowl. Have one student in each group place one hand inside the large bag, on top of the shortening bag (so the layer of shortening is between the hand and the ice). That same student should place his or her bare hand on top of the second bowl of ice. Have students take turns doing this in their groups so that everyone can then feel the temperature difference the layer of fat provides.

Ask:

If you were to go to the Antarctic to live, what would you have to do to stay warm?

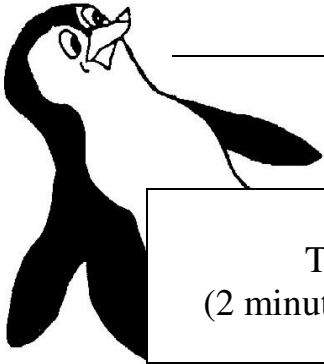
If you have the magazine, *Click*, read the article entitled *The Emperor's Egg*. It has excellent information about the emperor penguin.

Share *This Bird Can't Fly* (Scholastic)

EXTENSIONS

Explain that there are 17 different species of penguins in the world. Of these 17 species, about half are considered tropical. They can live in the temperate climates along the equator. Some can live in temperatures up to 110° F. Ask students to think about this question:

What adaptations might a tropical penguin have?



WARMING UP TO PENGUINS

TIME (2 minute intervals)	TEMPERATURE OF BOWL OF ICE	TEMPERATURE OF BOWL OF ICE WITH BAG OF SHORTENING