

RESOURCE LIBRARY
ACTIVITY : 55 MINS

Penguins: Built to Swim

Students conduct a series of experiments to test how the physical characteristics of penguins help them to swim and dive.

GRADES

3 - 5

SUBJECTS

Biology, Geography, Physical Geography, Mathematics

CONTENTS

4 Images, 1 Video, 1 PDF

OVERVIEW

Students conduct a series of experiments to test how the physical characteristics of penguins help them to swim and dive.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/penguins-built-to-swim/>

Program



DIRECTIONS

1. Build background.

Show students the photo gallery of emperor penguins. Discuss the physical characteristics of penguins and how their anatomy enables them to be adept at swimming and diving through

icy water. Point out the following physical characteristics:

- streamlined shape
- solid, heavy bones
- stubby, stiff wings

2. Watch the video.

Watch the Crittercam segment "Fishing With Emperor Penguins" from *Wild Chronicles*. Ask students to notice and describe how skillfully the penguins swim and dive.

3. Divide students into small groups and distribute the worksheet.

Divide students into small groups, and give each a copy of the worksheet *Penguins: Which Body Shape Dives Best?* Have each group build an experimental vertical diving chamber using at least five, two-liter plastic bottles with tops and bottoms cut off, taped end-to-end, and filled with water. Have students use modeling clay to build four solid geometric shapes: cube, sphere, 3-D rectangle, and cylinder. Then have students use a scale to make sure each shape weighs the same amount.

4. Have students conduct an experiment.

Have each group predict which of the four shapes will dive the fastest to the bottom of the chamber. Then have students drop each shape into the chamber, time the descent of each, and record the results on the worksheet. Have students conduct three trials for each shape and then average the results.

5. Have students analyze the results.

Ask: How did your results compare with your predictions? Have a whole-class discussion about why some shapes dive faster than others.

6. Repeat the experiment.

Have students repeat the procedure, this time using the clay to make models of actual animals—including humans.

Extending the Learning

Have students float two plastic containers in water. Fill one halfway with sand. Now push down slowly on both containers with equal force. Which container is easier to push down? Have students relate this experiment to what they just learned in order to make connections

about why it is easier for heavy-bodied penguins to dive and stay underwater than it is for lighter birds.

OBJECTIVES

Subjects & Disciplines

Biology

Geography

- Physical Geography
- Mathematics

Learning Objectives

Students will:

- describe the physical characteristics of penguins that enable them to swim and dive in icy water
- build a simulation of a vertical diving chamber
- make predictions about results and record actual results in trials

Teaching Approach

- Learning-for-use

Teaching Methods

- Discussions
- Hands-on learning
- Visual instruction

Skills Summary

This activity targets the following skills:

- Critical Thinking Skills
 - Applying
 - Understanding

National Standards, Principles, and Practices

NCTM PRINCIPLES AND STANDARDS FOR SCHOOL MATHEMATICS

- Geometry (3-5) Standard 4:

Use visualization, spatial reasoning, and geometric modeling to solve problems

NATIONAL GEOGRAPHY STANDARDS

- Standard 8:

The characteristics and spatial distribution of ecosystems and biomes on Earth's surface;

NATIONAL SCIENCE EDUCATION STANDARDS

- (K-4) Standard C-1:

The characteristics of organisms

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- 2-liter plastic bottles, tops and bottoms cut off
- Modeling clay
- Pencils
- Scale
- Transparent tape
- Water

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Projector, Speakers

- Plug-Ins: Flash

PHYSICAL SPACE

- Classroom

GROUPING

- Small-group instruction

BACKGROUND & VOCABULARY

Background Information

Penguins can swim faster and dive deeper than any other bird. They have solid, heavy bones instead of hollow bones filled with air. They have stubby, stiff wings instead of long, flexible wings.

Prior Knowledge

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Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
anatomy	<i>noun</i>	structure of an organism.
physical characteristic	<i>noun</i>	physical feature of an organism or object.

For Further Exploration

Websites

- [National Geographic: Crittercam—Interactive Missions](#)



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