

RESOURCE LIBRARY  
ACTIVITY : 45 MINS

## Build a Pterosaur

Students explore the origins of the word *pterosaur* and a pterosaur's relationship to dinosaurs. They examine pterosaur adaptations as a volunteer is dressed up as a pterosaur.

### GRADES

K, 1 - 5

### SUBJECTS

*Biology, Geology, English Language Arts, Mathematics*

### CONTENTS

7 Images, 1 Video

## OVERVIEW

Students explore the origins of the word *pterosaur* and a pterosaur's relationship to dinosaurs. They examine pterosaur adaptations as a volunteer is dressed up as a pterosaur.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/dress-a-pterosaur/>

## Program



## DIRECTIONS

### 1. Activate prior knowledge about pterosaurs' relatives, the dinosaurs.

Ask students to name any species, or types, of dinosaurs. If possible, display images of two or three dinosaurs they list, or project those found in the provided Dinosaur Gallery. Ask students

to list characteristics these animals have in common. Repeat together the names of the dinosaur species they're seeing. Challenge students to identify the suffix that they hear in each name: "saurus."

## 2. Examine roots of the name *dinosaur*.

Explain that many scientific names are Greek or Latin terms that also have an English meaning. In this case, "saurus" refers not just to dinosaurs, but also to a kind of animal that still lives on Earth today. Give students the opportunity to think about what those animals might be: lizards. Project the image of the Carolina anole, and compare its appearance to the dinosaurs students saw before. The segment "dino" also has another meaning, as an adjective, in English. Ask: *What words might describe a huge prehistoric reptile?* Elicit responses from students such as big, mean, or strong. *Dino* means "terrible," so *dinosaur* means "terrible lizard."

## 3. Examine the name *pterosaur*.

Project the images of *Tapejara* and *Dimorphodon*. Explain that these animals are called pterosaurs. Ask: *Can you identify a part of that name? What does it mean?* (*saur*, which means "lizard"). The other segment is *ptero*. Remind students that *dino* means "terrible." Ask: *Looking at these two animals, what do you think ptero might mean?* (flying, bird-like, airborne) Explain that *ptero* means "winged," so *pterosaur* means "winged lizard." Explain to students that the word *pterosaur* names a group of flying reptiles that survived for over 150 million years alongside the dinosaurs, long before humans lived on Earth.

## 4. Ask a volunteer to become the pterosaur.

Ask a student or teacher to volunteer to become a pterosaur. Explain that the volunteer, a human, has many special adaptations, or body parts and behaviors that help him or her survive. Have the volunteer move his or her thumbs around for the class. Explain that these opposable thumbs, which are able to be placed against one or more of the other fingers on the same hand, allow the volunteer to pick up and manipulate small objects. Pterosaurs were amazing creatures and the first vertebrates to fly.

## 5. Examine *Dimorphodon* and *Tapejara* characteristics.

Continue to display images of *Dimorphodon* and *Tapejara*, and read together the captions describing them. Discuss how pterosaurs existed for over 150 million years, during which time their characteristics changed. Ask: *In what ways were Dimorphodon and Tapejara similar?* (both had wings and could fly) *In what ways were they different?* (*Tapejara* has a large head crest; *Dimorphodon's* wingspan was about 1.2 meters (4 feet), and *Tapejara's* wingspan was 3-4

meters (13 feet); *Dimorphodon* had teeth, *Tapejara* did not.) Explain that students will create a *Tapejara* to look more closely at its adaptations. As you add each characteristic to the volunteer, write and describe each adaptation on the board.

### **6. Model the pterosaur's wing bones.**

Begin by holding up a wrapping paper roll, explaining that it will be one of the pterosaur's bones. Have students describe the bone: long, thin, light, and hollow inside. Ask: *What about this "bone" might be a helpful adaptation?* (Ideas will vary; hollow, light bones could make flight easier.) Explain that one of the first pterosaur fossils discovered astounded the scientists who found it. The fossil had three regular-sized finger digits. Count out the volunteer's thumb, pointer, and middle fingers. Explain that scientists were surprised by the very long fourth finger. Extend the wrapping paper roll over your fourth finger. Ask: *Why do you think pterosaurs had this?* (Ideas will vary; the elongated finger is a special body part, or adaptation, which allowed for long wings. The *Tapejara* had this elongated fourth finger, allowing for a huge wingspan.) Put the cardboard roll or dowel onto the volunteer's fourth finger. Secure it in the volunteer's hand with tape to represent the long finger bone.

### **7. Attach the membranes, skull crest, and tail.**

Explain that, like other pterosaurs, *Tapejara* had a thin skin, or membrane, along that fourth finger, along its body, and down its back limbs. Using tape, attach the plastic bag triangles to the roll or dowel, then to the arm, the hips, and the legs. A striking feature of the *Tapejara* is the skull crest. Fossils indicate that it had a crest that was about 44 centimeters (1.5 feet) long and nearly 87 centimeters (almost 3 feet) tall. Staple the prepared construction paper crest to the baseball cap; then position the cap on the volunteer's head. Ask: *How do you think this skull crest might have been a helpful adaptation for Tapejara?* (Accept a wide range of ideas; some scientists believe the *Tapejara* used this crest as a sail as it hunted along the surface of the water; others believe it helped to attract a mate.) Finally, explain that *Tapejara* had a short tail. Tape the construction paper tail to the volunteer's back.

### **8. Discuss pros and cons of *Tapejara* adaptations.**

Show students the "Flying Monsters: The *Tapejara*" film clip. Have students describe what the *Tapejara* could do well in the film clip, and discuss which body part(s) helped the animal. Accept a variety of ideas, such as fly, glide, flap its wings, and find prey in the air.

## **Modification**

Either while the *Tapejara* is created or after, have students draw a picture of it and label the adaptations discussed.

# Extending the Learning

Have students model the length of pterosaurs' wingspans. Using a tape measure, have two students stand 1.2 meters (3.9 feet) apart to demonstrate the wingspan of *Dimorphodon*. Two other students can stand 4 meters (13 feet) apart to demonstrate the wingspan of *Tapejara*. Students may be awed to model the wingspan of *Quetzalcoatlus*, which is 10-12 meters (33-40 feet).

## OBJECTIVES

## Subjects & Disciplines

### **Biology**

### **Earth Science**

- Geology
- English Language Arts
- Mathematics

## Learning Objectives

Students will:

- explain meanings of the terms
- compare and contrast characteristics of different pterosaurs
- describe adaptations of the pterosaur,

## Teaching Approach

- Learning-for-use

## Teaching Methods

- Demonstrations
- Discussions
- Hands-on learning
- Visual instruction

# Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Learning and Innovation Skills
    - Creativity and Innovation
- Critical Thinking Skills
  - Creating
  - Remembering

## National Standards, Principles, and Practices

### IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- Standard 3:

Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

### NCTM PRINCIPLES AND STANDARDS FOR SCHOOL MATHEMATICS

- Geometry (3-5) Standard 4:

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

- Geometry (preK-2) Standard 4:

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

- Measurement (3-5) Standard 1:

Understand measurable attributes of objects and the units, systems, and processes of measurement

- Measurement (preK-2) Standard 1:

Understand measurable attributes of objects and the units, systems, and processes of measurement

### NATIONAL SCIENCE EDUCATION STANDARDS

- (5-8) Standard C-5:

Diversity and adaptations of organisms

- (K-4) Standard C-1:

The characteristics of organisms

## **Preparation**

## **What You'll Need**

### **MATERIALS YOU PROVIDE**

- Baseball cap
- Butcher paper
- Construction paper
- Large plastic garbage bags
- Scissors
- Stapler
- Transparent tape

### **REQUIRED TECHNOLOGY**

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

### **PHYSICAL SPACE**

- Classroom

### **GROUPING**

- Large-group instruction

### **OTHER NOTES**

Have all materials for this activity assembled and prepared ahead of time. From the large plastic bags, cut two triangles, 3' x 4' x 5' in size.

## **BACKGROUND & VOCABULARY**

# Background Information

Pterosaurs were the first vertebrates to take to the skies. They survived for over 150 million years. Their survival depended on the adaptations they developed over time. Most shared the following adaptations and characteristics: an elongated fourth finger, leathery skin forming wings, large skulls and limbs compared to small bodies, and light and air-filled bones.

## Prior Knowledge

### ☐ Recommended Prior Activities

- None

## Vocabulary

Term	Part of Speech	Definition
adaptation	<i>noun</i>	a modification of an organism or its parts that makes it more fit for existence. An adaptation is passed from generation to generation.
fossil	<i>noun</i>	remnant, impression, or trace of an ancient organism.
paleontology	<i>noun</i>	the study of fossils and life from early geologic periods.
pterosaur	<i>noun</i>	extinct order of flying reptiles that flourished from 220 million-65 million years ago.

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### For Further Exploration

#### Websites

- [National Geographic Science: Dinosaur Quiz](#)
- [National Geographic Entertainment: Flying Monsters 3D](#)

