

NATIONAL GEOGRAPHIC Explorer!

Pioneer Edition

nationalgeographic.com/ngexplorer/pioneer/teachers

Dear Teacher:

EXPLORER truly goes to extremes in this issue!

We begin in the harshest climate on Earth—icy Antarctica. There we learn the cool science behind National Geographic's hit movie, *March of the Penguins*.

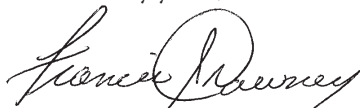
Then we set sail with the first Europeans to reach the New World—the Vikings. These “Viking Voyages” give us a new look at people long miscast as villains in the great drama of history.

Next we check into Giraffe Manor in Kenya, where we come “Neck and Neck” with Earth's tallest animals. Their table manners may not be perfect, but the giraffes prove to be fascinating fellow guests.

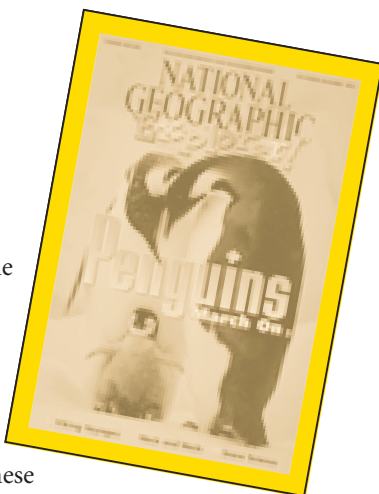
Finally, we snowshoe up Mount Baker in Washington. The peak holds a world record for snowfall and offers a great setting for digging into “Snow Science.”

My colleagues and I know you'll enjoy this cool issue, and we offer warm wishes for joyous holidays!

Sincerely yours,



Francis Downey
Executive Editor



This Issue

PENGUINS MARCH ON PP. 2–5

Curriculum Connections

- Life Science • Reading

Standards Correlations: Science

- Populations and ecosystems • Life cycles

Literacy Skills

- Sequences • Scientific vocabulary

VIKING VOYAGES PP. 6–13

Curriculum Connections

- History • Geography

Standards Correlations: Social Studies

- Culture • Time, continuity, and change

Literacy Skill

- Nonfiction text features: illustrations, diagram

NECK AND NECK PP. 14–19

Curriculum Connections

- Life Science • Writing

Standards Correlation: Science

- Diversity and adaptations of organisms

Literacy Skills

- Scientific vocabulary • Supporting details

SNOW SCIENCE PP. 20–23

Curriculum Connections

- Earth Science • Reading

Standards Correlations: Science

- Structure of the earth system • Human safety

Literacy Skills

- Expository text • Reading a graph

Answer Key

Back Page • Student Edition, p. 24

1. 2004, 2. 61, 3. down

Which Comes First? • Teacher's Guide, p. 3

1. A, 2. E, 3. D, 4. B, 5. C, 6. F

Is That a Fact? • Teacher's Guide, p. 5

1. opinion, 2. fact, 3. opinion, 4. fact,
5. fact, 6. opinion, 7. fact, 8. fact

*Issue review sheet and key are available at
nationalgeographic.com/ngexplorer/pioneer/teachers.*

Next Issue

Sept. Oct. Nov./Dec. **Jan./Feb.** Mar. Apr. May

Freedom Readers

Discover how enslaved African Americans learned to read.

Odd Couples

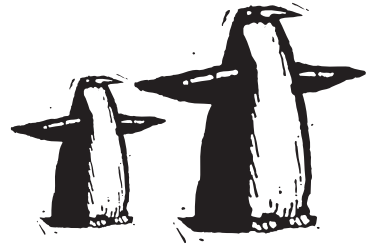
Learn how different animals help one another.

Moon Mission

Rocket into science on the moon.



Penguins



Vocabulary

Invite students to skim the article, circling any words they don't know. Write the unfamiliar terms on the board. Then divide the class into groups. Give each group one or more words to look up. Have groups report what they learn to the class.

Before Reading

- Ask: Has anyone ever seen a penguin? Where? What was it like to watch?
- Tell students that this article is set in Antarctica, the land surrounding the South Pole. Help students find Antarctica on a map or globe.

Fast Facts

- Emperor penguins are the largest of 17 species. Males can grow almost four feet tall.
- Emperor and Adélie penguins are the only species to live year-round in Antarctica.
- While courting a mate and incubating an egg, a male emperor penguin may go 115 days without eating. During that time, the bird may lose almost half its body weight.
- Unlike most birds, penguins have solid, heavy bones. These help penguins dive underwater.
- The tips of a penguin's feathers overlap like scales. That adaptation gives the bird a waterproof covering.
- A penguin's webbed feet act like a rudder while the bird swims.
- Emperor penguins frequently dive deeply without suffering the ill effects—notably nitrogen accumulation, or the bends—that bedevil human divers. Scientists do not know how the birds manage to do so.

Critical Thinking and Writing

- **Pro/Con:** Tell the class that filmmaker Luc Jacquet's crew spent a year shooting in Antarctica. Then have students write a paragraph that answers these questions: Would you like to have been on Jacquet's team? Why or why not?
- **Main Idea:** Have students write a sentence that tells what they see as the key point of the story.

Extension Activities

- **Science:** Form small groups. Assign each group to research and report on one of the following other penguin species: Adélie, chinstrap, king, little, macaroni, Magellanic, yellow-eyed. Topics to cover might include size, appearance, location, food, behavior, and conservation status.
- **Geography:** Have students research similarities and differences between the Antarctic and the Arctic regions, then create Venn diagrams.

National Geographic DVD

March of the Penguins (available November 29)



National Geographic Book

March of the Penguins (2005)



Explore Our Website

- Game: *Penguin Parade*
- penguin postcards
- Creature Feature: *Emperor Penguins*
- links

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Which Comes First?

Read "Penguins March On" in NATIONAL GEOGRAPHIC EXPLORER. Then number the sentences below. Put them in the order in which things happen in nature.

_____ A. Adult penguins walk inland from the sea.

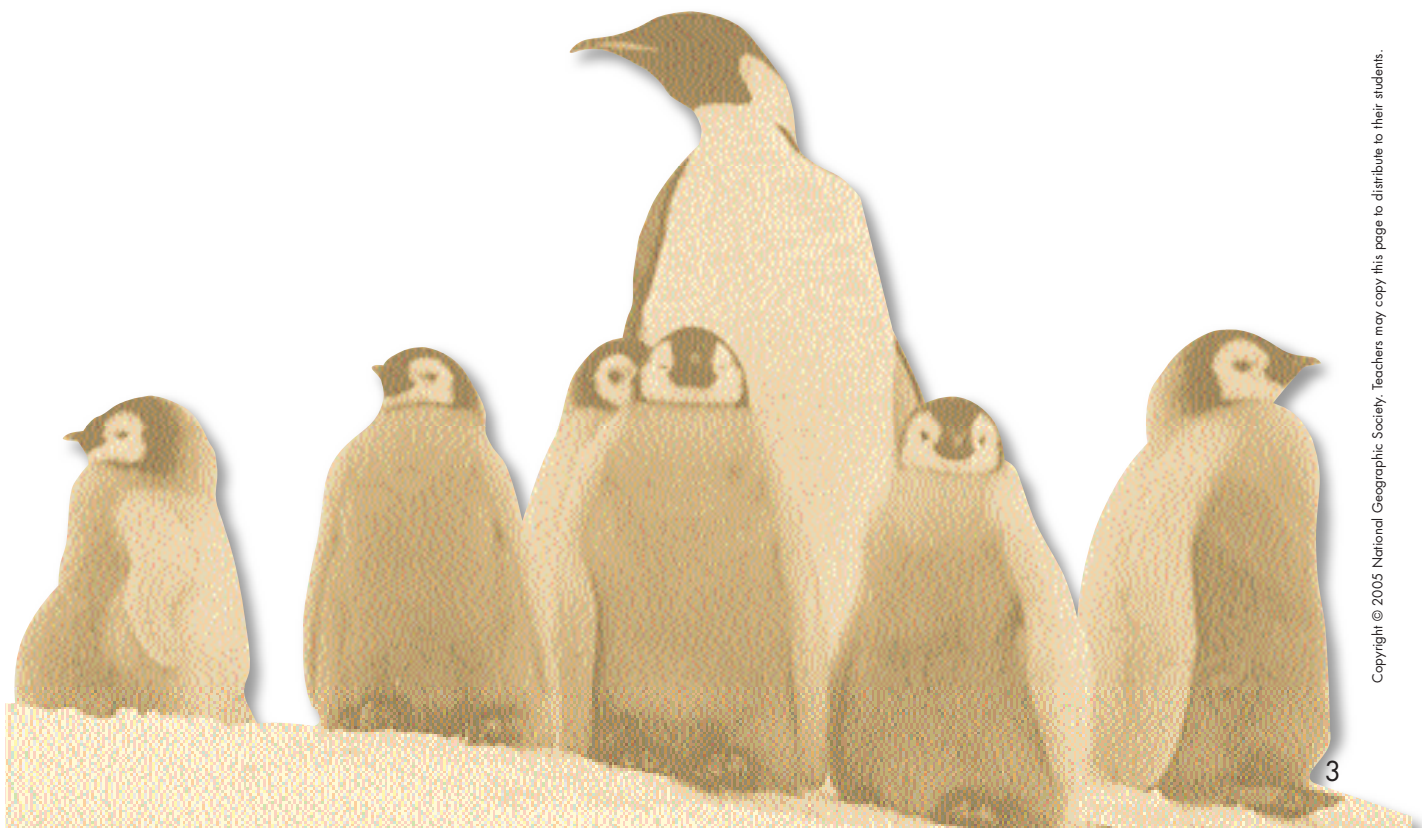
_____ B. Female penguins return to the sea to eat.

_____ C. Female penguins go back to their chicks.

_____ D. Females give eggs to males to watch.

_____ E. Female penguins lay eggs.

_____ F. Female penguins feed their chicks.



Viking Voyages



Vocabulary

- Write *built*, *grew*, *jumped*, and *sailed* on the board. Ask students what these words have in common. (*They are verbs.*) Explain that verbs are action words. Invite students to make up their own sentences that contain these words.

Before Reading

- Direct students' attention to a world map. Have them locate Denmark, Greenland, Iceland, Norway, Scandinavia, and the United States.
- Ask students when the New World was discovered. Write their answers on the board. Ask again after students read "Viking Voyages."

Fast Facts

- Viking explorers found several previously unknown lands. For example, they found the Faroe Islands, Greenland, Iceland, and America.
- Most of Greenland is covered with ice and snow. Erik the Red named it Greenland to get people to move there.
- In about the year 1000, Leif Eriksson became the first European to reach America. He probably landed in Newfoundland, Canada.
- Leif Eriksson named the area he reached Vinland, or Wine Land, possibly mistaking the large huckleberries he saw for grapes.
- Archaeologists have found a Viking settlement in Newfoundland.

Critical Thinking and Writing

- **Inference:** Many people think that Christopher Columbus was the first European to explore the Americas. Ask students to explain how knowledge of the Vikings' voyages could have changed American history. How might the names of some communities be different?
- **Analysis:** Ask students to write a paragraph that explains how the Vikings made history.
- **Main Idea:** Explain to students that a headline should convey a story's main idea. Invite students to brainstorm ideas for a new headline for this story. Ask them to write why they think their headline introduces the story.

Extension Activities

- **Writing:** Ask students to imagine that they are on a Viking voyage. Direct them to keep a journal that tells about their adventures.
- **Geography:** Have students study the Vinland map and compare it to a modern world map. Ask them to point out the similarities and differences.
- **Language Arts:** Tell students to imagine that they work for Viking Voyagers, a travel agency in the year 1000. Invite them to make posters to convince people to move to Greenland.



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National Geographic Books

The Viking World by Ann M. Rossi (2004)

The Real Vikings by Melvin Berger and Gilda Berger (2003)



Explore Our Website

- Spanish translation
- Viking links

Is That a Fact?

People often confuse facts and opinions. A **fact** is a true statement that one can prove. An **opinion** is what someone thinks or feels.

Read “Viking Voyages” in NATIONAL GEOGRAPHIC EXPLORER. Then use what you learned to decide if each sentence below is a fact or an opinion.

- _____ 1. The Vikings were the greatest adventurers of all time.
- _____ 2. The Vikings raided an island near England in 793.
- _____ 3. The Vikings were horrible.
- _____ 4. Leif Eriksson was Erik the Red’s son.
- _____ 5. The Vikings believed in many gods.
- _____ 6. Reading about Vikings is cool.
- _____ 7. Many Vikings lived in villages.
- _____ 8. Archaeologists have found a Viking village in Canada.



Neck and Neck

Vocabulary

Direct students to p. 19. Then read aloud each sentence below and ask which glossary entry best fills the blank.

- An angry _____ can cause injury with its hooves. (*ungulate*)
- The _____ is home to giraffes, zebras, and other animals. (*savanna*)
- The giraffe is growing another _____ (*ossicone*)
- A _____ will often hunt at night. (*predator*)
- A large _____ can eat lots of grass and leaves. (*herbivore*)

Before Reading

Invite students to look at the photos on pp. 14–19. Ask: Which parts of a giraffe’s body might help the animal survive in the wild? How?

Fast Facts

- The giraffe’s scientific name is *Giraffa camelopardalis*. The second word, designating the species, means “camel with a leopard’s coat.”
- A giraffe’s back legs appear shorter than its front, but they are actually about the same length.
- Like humans, giraffes have seven neck bones. Each can be more than ten inches long.
- Giraffes’ eight-foot tails are the longest of any land animal. For centuries, people used giraffe tails for fly swatters and bracelets.
- Giraffes are the tallest animals on Earth. They stand about six feet tall at birth. Over a giraffe’s first year, it can almost double in height.
- Acacia trees are one of the giraffe’s favorite foods. The tree’s thorns hold a lot of water. They help keep giraffes hydrated, allowing them to forgo dangerous trips to watering holes for long periods of time.
- The okapi is the only other living animal in the *Giraffa* genus. The horse-size animal has zebra-like stripes on its legs. Discovered in the Congo in 1901, the okapi is believed to have survived unchanged for 15 million years. Scientists call it a living fossil.

Comprehension Check

Read each question aloud or print a handout from our website.

- **What** is a savanna? (*grassy plain*)
- **Where** is Giraffe Manor? (*East Africa*)
- **When** is an adult giraffe at risk of attack? (*while drinking water*)
- **Why** do zebras and other animals keep their eyes on giraffes? (*Giraffes often spot danger before others animals do.*)

Critical Thinking

- **Analysis:** Tell the class that the owner of Giraffe Manor hopes that visiting schoolkids will fall in love with giraffes. Ask: Why does he hope that kids will fall in love with giraffes? Could that help giraffes survive?
- **Main Idea:** Read aloud each sentence below. Ask which best summarizes the article. (*Answer: c*)
 - a. Giraffes are born with horns.
 - b. Giraffe Manor is in Kenya.
 - c. Giraffes are amazing animals.

Extension Activities

- **Writing:** Invite students to imagine visiting Giraffe Manor. Have them write a letter to a friend back home about the experience.
- **Math:** A male giraffe can eat 140 pounds of food a day. Challenge students to calculate how much the animal could eat in five or ten days.



National Geographic Books

Giraffes by Ruth Huntingdale (2004)
On Safari by Gare Thompson (2002)



Explore Our Website

- Comprehension Check handout
- Quick Flick: *Savanna* ■ resource links
- Creature Feature: *Giraffes*

Details, Details



A **detail** is a specific fact, such as the color of someone's hair or the size of a boat. Writers use details to help readers picture a scene.

Look at the pictures on pages 14-19 of NATIONAL GEOGRAPHIC EXPLORER. Then write a paragraph about a giraffe. Include at least three details.

Snow Science



Vocabulary

Write *avalanche*, *glacier*, and *snowflake* on the board. Then read aloud each definition below and have pupils identify the corresponding term.

- permanent patch of ice and snow (*glacier*)
- tiny piece of ice (*snowflake*)
- large amount of snow or ice moving downhill (*avalanche*)

Before Reading

- **Warm Climates:** Ask if anyone in the class has seen a snowstorm. Invite those who have to describe the experience.
- **Cool Climates:** Ask students how they would describe snow to someone who'd never seen it.

Fast Facts

- The part of Earth's surface where water is frozen is called the cryosphere. The name comes from the Greek word *kryos*, which means "icy cold."
- The cryosphere includes freshwater ice, glaciers, sea ice, snow, and permafrost.
- Seasonal snow covers about one-third of Earth's surface. It is the largest part of the cryosphere.
- Snowfalls are a major source of fresh water. For example, snowfall accounts for 60 to 70 percent of annual precipitation in the Rocky Mountains.
- Glaciers cover about 10 percent of Earth's surface. About 75 percent of Earth's fresh water is locked in glaciers.
- Icebergs are large blocks of ice that fall from ice sheets into the ocean. An ice sheet that produces icebergs is said to be "calving." One of the largest recorded icebergs was about 40,000 square miles—roughly the size of Kentucky.
- The arrangement of oxygen and hydrogen atoms in ice crystals causes most snowflakes to have six sides. Some flakes have twelve sides, but they are fairly rare. Twelve-sided snowflakes sometimes form from the joining of two six-sided ones.

Comprehension Check

Read each question aloud or print a handout from our website.

- What is a glacier? (*permanent patch of ice and snow*)
- How many sides do most snowflakes have? (*six*)
- How fast can avalanches move? (*200 miles an hour*)
- Why are avalanches dangerous? (*They can bury people and destroy buildings.*)

Critical Thinking and Writing

- **Pro/Con:** Have students write a paragraph about whether they would prefer an area that gets a lot of snow or one with no snow—and why.
- **Analysis:** Encourage students to think and talk about how glaciers can change landscapes.

Extension Activities

- **Creative Writing:** Invite students to write poems about snow. Pupils might illustrate their work with drawings, paintings, or photographs.
- **Math:** Remind students that most snowflakes have six sides. Tell them that a six-sided figure is called a hexagon. Challenge them to use a dictionary to find the number of sides in the following figures: pentagon (*five*), heptagon, (*seven*), octagon (*eight*), nonagon (*nine*), and decagon (*ten*).



National Geographic Books

Introduction to Weather by Pamela Bliss (2004)

Weather and Climate by Rebecca L. Johnson (2003)



Explore Our Website

- Comprehension Check handout
- resource links ■ avalanche-survival tips
- Photo Gallery: *Winter Wildlife*