

NATIONAL GEOGRAPHIC Explorer!™

"FOR THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE."

Dear Teacher:

Happy 2004! NATIONAL GEOGRAPHIC EXPLORER is starting the new year with a new contest—the Flag of Freedom contest. The winner will travel to Washington, D.C., to become “mayor” of the Pentagon. To learn more, turn to page 8 of this teacher’s guide.

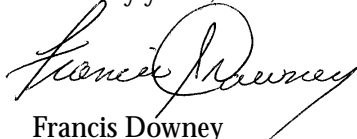
Our cover story takes students on an amazing journey to Mars. Two NASA rovers should land on Mars in January. The rovers will look for water on Earth’s neighbor in space. Water is a sign that the alien world might support life.

Leaving Mars behind, students will join a team of tornado chasers in “Wicked Weather.” Students will learn how tornadoes form and some of the problems they cause.

Next students will head to Denali National Park in Alaska. There they will learn about some of the animals that live in this nearly pristine environment. They will also learn how the animals and their habitat change with the seasons.

Finally students will join kid explorer Jeff Long at the circus. Along the way, Jeff discovers that the circus is more than entertainment; it’s a fun way to learn about geography and other cultures.

Sincerely yours,



Francis Downey
 Executive Editor
 NATIONAL GEOGRAPHIC EXPLORER



Answer Key

STUDENT EDITION

Our Monuments Page 24

1. Liberty Bell, 2. Mount Rushmore,
 3. Washington Monument, 4. Statue of Liberty

TEACHER'S GUIDE

Martian Math Page 5

1. B, 2. A, 3. B, 4. A, 5. C

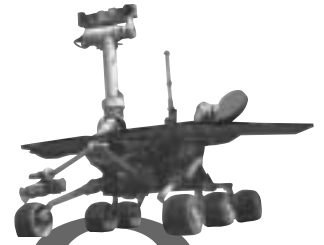
Tracking Tornadoes Page 7

1. 1,071, 2. 1,216, 3. 941, 4. June 2001,
 5. February 2002, 6. 8, 7. 160, 8. April,
 9. May, 10. January

Issue at a Glance

Teaching Unit	Reading	Writing	Science	Soc. Studies	Math	Curriculum Connections	
						Literacy Skills	Topics
Is There Life on Mars? pp. 4-7	■	■	■		■	<ul style="list-style-type: none"> ● Reading for information ● Scientific terms ⌚ Space exploration ⌚ Mars 	
Wicked Weather pp. 8-15	■		■	■	■	<ul style="list-style-type: none"> ● Reading a diagram ⌚ Weather ⌚ Tornadoes 	
Animals of Denali pp. 16-21	■	■	■			<ul style="list-style-type: none"> ● Organizing information ● Comparing and contrasting ⌚ Alaska ⌚ Organisms and their environments 	

Is There Life on Mars?



Vocabulary

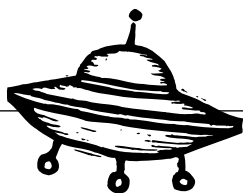
- Write the following words one at a time on the board: *atmosphere*, *orbit*, *explorers*, *robots*, *spacecraft*, and *Mars*. Tell students the words are from this issue of NATIONAL GEOGRAPHIC EXPLORER. As you write each word, ask what the story is about. Then check how many words you wrote before students guessed it was about Mars.

Before Reading

- Ask students: What do you know about Mars? How is Mars different from Earth? Could life exist on Mars? What does life need to exist?

Fast Facts

- Mars is the fourth planet from the sun. Its mean distance from our sun is 141,600,000 miles. Earth is about 93,000,000 miles from the sun.
- Mars has a diameter of 4,223 miles. Only Mercury and Pluto are smaller.
- A day on Mars is slightly longer than a day on Earth. It is 24 hours and 37 minutes long.
- The red planet has a thin atmosphere. It is mainly composed of carbon dioxide, nitrogen, argon, and oxygen.
- The temperature on Mars rarely rises above freezing.
- Mars has two small moons—Phobos and Deimos. Phobos is about 14 miles wide. Deimos is about 7 miles wide.



Web Link

Find out-of-this-world information at nationalgeographic.com/ngexplorer/teachers.

Comprehension Check

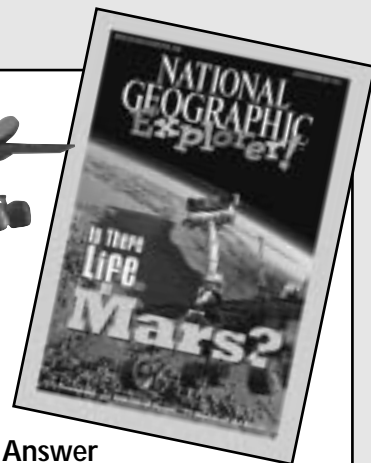
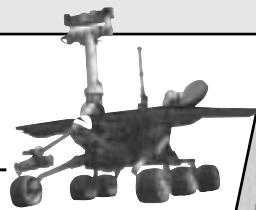
- Read aloud each of the following questions.
 - Who named the two robot explorers? (*Sofi Collis*)
 - What planet are the explorers going to? (*Mars*)
 - What is the largest canyon in the solar system? (*Valles Marineris*)
 - Why are Spirit and Opportunity looking for water on Mars? (*Scientists believe that life needs water to survive.*)
 - What is the largest volcano on Mars? (*Olympus Mons*)

Critical Thinking Questions

- Main Idea:** Ask which statement best summarizes the main idea of this article.
 - Mars is often called the red planet.
 - Sofi Collis named the two robot explorers.
 - Two spacecraft are looking for signs of life on Mars. (*Correct*)
- Analyzing:** Split the class into groups. Ask them to discuss: Why is it important to explore Mars and the other planets in our solar system?

Extension Activities

- Math:** Tell students Earth is about 93,000,000 miles from the sun, and Mars is about 141,600,000 miles from the sun. Then tell them light travels at 186,000 miles per second. Ask: How many minutes does it take a beam of light to travel from the sun to Earth? (*about 8 minutes*) How many minutes does it take a beam of sunlight to reach Mars? (*about 13 minutes*).
- Language Arts:** Tell students to imagine that they are explorers going to Mars. Ask them to write a story about what they think they will see on Mars.

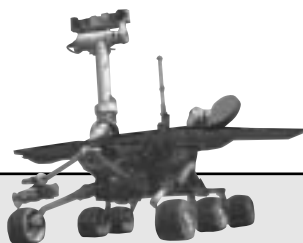
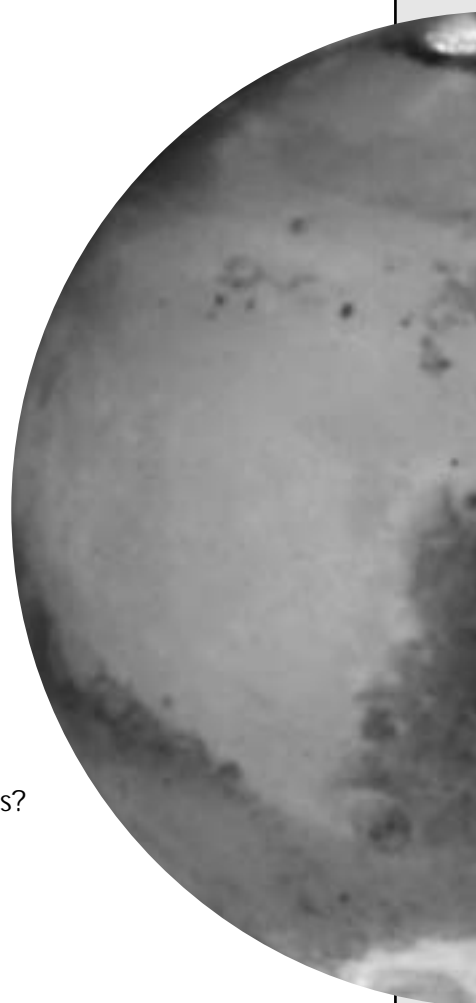


Name: _____

Martian Math

The Martian rovers are on an important mission. They're looking for water and signs of life on Mars. But they're not speed demons. Answer these questions to figure out how long it will take the rovers to explore the red planet.

- The Martian rovers travel 3 miles in a day. How many miles would they cover in a week?
 - 15 miles
 - 21 miles
 - 32 miles
- How many miles would they cover in a month?
 - 90 miles
 - 100 miles
 - 210 miles
- How many miles would they cover in a year?
 - 998 miles
 - 1,095 miles
 - 2,874 miles
- Valles Marineris is nearly 3,000 miles long. How many days would it take the rovers to travel 3,000 miles?
 - 1,000 days
 - 2,000 days
 - 3,000 days
- How many weeks would it take the rovers to go 3,000 miles?
 - 127.9 weeks
 - 134.2 weeks
 - 142.9 weeks



Wicked Weather

Vocabulary

Write the word list below on the board. Have students discuss the meaning of each word. Ask them to identify the compound words. What words make up each compound word?

- supercell (*super, cell*)
- tornado
- daredevil (*dare, devil*)
- thundercloud (*thunder, cloud*)
- occupants

Before Reading

- Draw a KWL diagram on the board. Ask students to fill in the first two sections before they read “Wicked Weather.” Have them fill in the third column after they finish reading.

Fast Facts

- Tornadoes usually last less than ten minutes.
- Most tornadoes—but not all—rotate counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
- The biggest outbreak of tornadoes occurred on April 3–4, 1974, when 147 tornadoes touched down in 13 U.S. states.
- A waterspout is a tornado over water. Waterspouts are common along the southeastern U.S. coast. Although tornadoes by definition, waterspouts don’t count in tornado records unless they hit land. Waterspouts can overturn small boats and damage ships.
- The May 3, 1999, Oklahoma tornado was the costliest in history. It caused more than a billion dollars in damage.

Comprehension Check

- Ask students the following questions.
 1. Why does Josh Wurman like bad weather? (*He studies bad weather to learn more about it.*)
 2. How large can tornadoes be? (*50 feet to a mile wide*)
 3. How long do twisters usually last? (*20 seconds to about an hour*)
 4. About how many tornadoes strike the United States each year? (*800*)
 5. What is Tornado Alley? (*The band of states where tornadoes are most frequent*)
 6. How did the tornado chasers know they were chasing a destructive tornado? (*They could see pieces of houses falling around them.*)

Critical Thinking Questions

- **Analyzing:** Divide students into groups. Ask them to discuss the personality traits and skills needed to be a tornado chaser.
- **Drawing Conclusions:** Ask students to write a short essay that answers the question: Would you want to be a tornado chaser? Why or why not?

Extension Activities

- **Language Arts:** Imagine you were a member of Josh Wurman’s team on May 3, 1999. Write a diary entry for that day. Split the entry into the following time slots: 8:00 a.m., noon, 2:00 p.m., 6:00 p.m., and 9:00 p.m. Direct students to use descriptive language.



Web Link

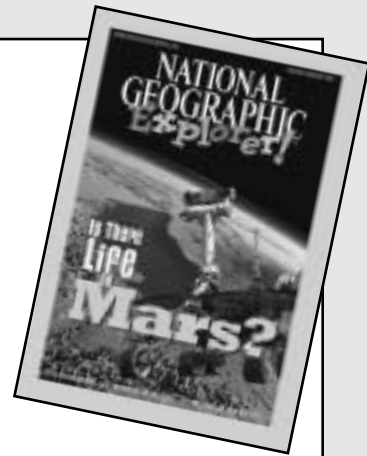
Twirl into tornadoes and other storm websites at nationalgeographic.com/ngexplorer/teachers.

NATIONAL GEOGRAPHIC EXPLORER is a publication of the
NATIONAL GEOGRAPHIC SOCIETY
 brought to you in cooperation with the

Name: _____



Tracking Tornadoes



The table shows U.S. tornado activity from 2000 to 2002. Use it to help you answer the questions.

- How many tornadoes were recorded in 2000? _____
- How many tornadoes were recorded in 2001? _____
- How many tornadoes were recorded in 2002? _____
- Which month had the most tornadoes? _____
- Which month had the fewest tornadoes? _____
- Over the three years, what is the average number of tornadoes in January? _____
- Over the three years, what is the average number of tornadoes in June? _____
- Is a tornado more likely to form in April or August? _____
- Which month in 2002 had the most tornadoes? _____
- According to the chart, which month generally has the fewest tornadoes? _____

TORNADO ACTIVITY 2000-2002

MONTH	2000	2001	2002
JAN	16	5	3
FEB	56	30	2
MAR	103	34	47
APR	136	135	118
MAY	241	240	204
JUN	135	248	97
JUL	148	120	68
AUG	52	69	86
SEP	47	84	62
OCT	63	117	57
NOV	48	112	98
DEC	26	22	99

Source: Storm Prediction Center, NOAA
www.spc.noaa.gov/climo/torn/monthlytornstats.html



Picture This! Choose a month. Then make a bar graph that shows how many tornadoes formed in that month over the three years.



Animals of Denali

Vocabulary

- Write the following words on the board: *hibernate*, *tundra*, *migrate*, and *talons*. Have students use the words to complete each sentence.
 1. The eagle swooped up the fish in its _____. (*talons*)
 2. Mice and bears _____ in wintertime. (*hibernate*)
 3. Each winter, many humpback whales _____ from Alaska to Hawaii. (*migrate*)
 4. Wolves live on the cold and snow-covered _____. (*tundra*)

Before Reading

- Write the four seasons on the board. Ask students to provide words and phrases that describe winter, spring, summer, and fall in your area.

Fast Facts

- Denali means “High One.” It was the name given by the native Athabaskan people to the area’s massive peak.
- Denali was originally created as Mount McKinley National Park in 1917.
- In 1980 the park was renamed Denali National Park and Preserve. The park also tripled in size, mainly to include the wintering and calving grounds of the park’s caribou herd.
- The park has no known reptiles and a single known amphibian, the wood frog.
- A total of 167 species of birds are known to reside in Denali.
- Alaska has 7,000 to 10,000 wolves; about 100 of them live in Denali.



Web Link

Explore Denali resources at nationalgeographic.com/ngexplorer/teachers.

Comprehension Check

- Read aloud each statement below. Ask students whether it is true or false.
 1. The arctic tern is among the few animals that live in Denali all year round. (*False*)
 2. Grizzly bears can smell a dead animal ten miles away. (*True*)
 3. A one-day-old caribou can run faster than a human. (*True*)
 4. As grizzlies prepare for winter, they might gain 40 pounds a week. (*True*)

Critical Thinking Questions

- **Comparing and Contrasting:** How does the weather in Denali National Park compare to where you live? Students might use a Venn diagram to illustrate similarities and differences.

Extension Activities

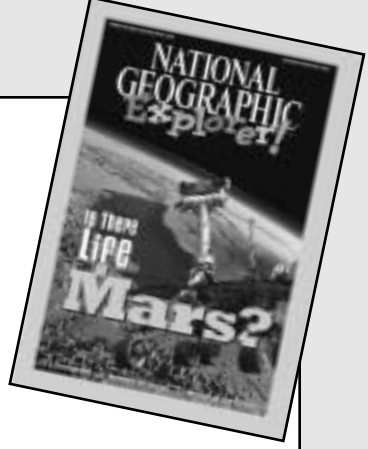
- **Language Arts:** Ask students to replace each underlined word in the sentences below with a synonym. A possible response is given.
 1. Denali is a harsh land. (*rugged*)
 2. The bear stumbled out of its den. (*staggered*)
 3. On the tundra, wolves spend winter looking for scarce food. (*rare*)
 4. Colorful plants blossom in spring. (*bloom*)
 5. The snowshoe hare sheds its white fur in spring. (*loses*)
 6. Denali’s tundra is vast. (*huge*)

NATIONAL GEOGRAPHIC EXPLORER (ISSN 1541-3357) is published six times during the school year—September, October, November–December, January–February, March–April, and May—by the National Geographic Society, 1145 17th Street NW, Washington, DC 20036.

Postmaster: Please send address changes to NATIONAL GEOGRAPHIC EXPLORER, P.O. Box 10597, Des Moines, IA 50340-0597. Periodical postage paid at Washington, D.C., and additional mailing offices.

U.S. Classroom Price: \$4.95 per student per year (10 to 199 subscriptions to same address). U.S. School Price: \$2.50 per student per year (200 or more subscriptions to same address). To subscribe, call 1-800-368-2728.

Copyright © 2004 National Geographic Society. All rights reserved. Reproduction of the whole or any part of the contents of NATIONAL GEOGRAPHIC EXPLORER without written permission is prohibited. NATIONAL GEOGRAPHIC, NATIONAL GEOGRAPHIC EXPLORER, and the Yellow Border are trademarks of the National Geographic Society.



Name: _____

Taking Note of Denali's Seasons

This activity sheet will help you organize the information you find in the NATIONAL GEOGRAPHIC EXPLORER article "Animals of Denali." As you read the article, write short notes and important facts about the animals' activities during the four seasons.



Winter in Denali

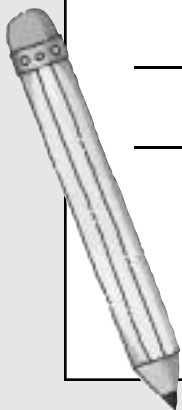
Spring in Denali

Summer in Denali

Fall in Denali

Write About It!

On the back of this page, write a paragraph comparing animal life during two seasons. Use your notes to help you fill in details as you write.



Enter the NATIONAL GEOGRAPHIC EXPLORER Flag of Freedom Contest and become "mayor" of the Pentagon!

NATIONAL GEOGRAPHIC EXPLORER invites you to enter the Flag of Freedom contest, presented by the Pentagon and the U.S. Army. Just write an essay of at least 100 words that answers the question:
What does the American flag mean to me?

Deadline: April 30, 2004

OFFICIAL CONTEST RULES

Contest Prizes

The winner will receive a trip to Washington, D.C., for a family of four, will meet Pentagon officials, will be made "mayor" of the Pentagon, and will be an official representative at Flag Day ceremonies.

Who May Enter

Legal residents of the United States (currently living within the continental U.S.) who entered grades 3-6 in the 2003-2004 school year may enter. Only one entry per person.

How to Enter

- Write an essay of at least 100 words about why the American flag is important to you.
- On the back of your essay, clearly print your name, address, and telephone number as well as a state-

ment, signed by both you and your parent(s) or legal guardian(s), that the essay is your own work.

- Mail your essay to Fran Downey, National Geographic Explorer, Room M2412, 1145 17th Street N.W., Washington, D.C. 20036-4688.
- Contest begins January 1, 2004, and all entries must be received by April 16, 2004. Entries become the property of the Sponsor, National Geographic Society ("NGS"), and will not be acknowledged or returned.
- Representatives of NATIONAL GEOGRAPHIC EXPLORER will judge entries based on literary merit, originality, and creativity.
- Winners will be chosen on or about May 7, 2004, and notified by phone, mail, or e-mail by May 14, 2004.

NO PURCHASE IS NECESSARY, AND A PURCHASE WILL NOT INCREASE YOUR CHANCES OF WINNING. This Contest is VOID IN PUERTO RICO AND WHERE PROHIBITED. Decisions of the judges are final. Contest consists of two rounds. NGS is not responsible for late, lost, stolen, mutilated, incomplete, illegible, misdirected, or postage due mail. Employees or contract employees of NGS and its affiliates, subsidiaries, agents and their immediate families, or persons living in the same household of such individuals, are ineligible. All entries may be used in public information programs. The winner will receive a trip to Washington, D.C. Approximate retail value of trip is \$5,000. Transportation and hotel accommodations will be selected at the sole discretion of the Pentagon and the U.S. Army. Certain meals will be provided. Tips, fees, taxes, and all personal expenses are the sole responsibility of winner. Winners are required to sign an affidavit of eligibility and liability release within 15 days of receipt of prize notification. Noncompliance or return of prize notification as undeliverable will result in disqualification and selection of an alternate winner. NGS reserves the right to substitute prizes of equal or comparable value. By participating, participants and their parent(s) or legal guardian(s) agree to release, discharge, and hold harmless NGS and its respective partners, affiliates, subsidiaries, advertising agencies, agents and their employees, officers, directors, and representatives from any claims, losses, and damages arising out of their participation in this Contest or any Contest-related activities and the acceptance and use, misuse, or possession of any prize awarded hereunder. Participants and their parent(s) or legal guardian(s) also agree (a) to be bound by these Official Rules; (b) that the decisions of the judges are final on all matters relating to the Contest; and (c) if he/she wins that NGS may use the winning essay and each winner's name, photograph, likeness, and/or voice in any publicity or advertising relating to the Contest or future promotions of National Geographic without compensation or approval (except in Tennessee and where prohibited by law). If for any reason the Contest is not capable of running as planned, due to infection by computer virus, bugs, tampering, unauthorized intervention, fraud, technical failures, or any other causes beyond the control of NGS that corrupt or affect the administration, security, fairness, integrity, or proper conduct of this contest, NGS reserves the right, at its sole discretion, to disqualify any individual(s) who tamper with the entry process, and/or to cancel, terminate, modify, or suspend the contest. NGS assumes no responsibility for any error, omission, interruption, deletion, defect, or delay in operation or transmission; communications line failure; theft or destruction of or unauthorized access to Contest entries or entry forms; or alteration of entries or entry forms. And NGS is not responsible for any problems with or technical malfunction of any telephone network or lines, computer online systems, servers or providers, computer equipment, software, technical problems or traffic congestion on the Internet or at any Web site, or any combination thereof, including any injury or damage to participants' or any other persons' computers related to or resulting from participation or downloading any materials in this Contest. All federal, state, and local taxes are the sole responsibility of the winners. For names of winners send a self-addressed, stamped envelope to Flag of Freedom Contest: National Geographic Explorer, 1145 17th St. NW, Washington, DC 20036, (Residents of Vermont need not include postage.) This Contest is subject to federal, state, and local laws and regulations. Certain restrictions may apply. Prizes provided by the Pentagon and U.S. Army. To be excluded from lists used by NGS to mail contests or sweepstakes, submit request in writing to NGS at above address.

Wild Alaska

NATIONAL GEOGRAPHIC EXPLORER ■ Online Adventure Scavenger Hunt

Student Form: www.nationalgeographic.com/ngexplorer/adventures

Source for Answers: www.nationalgeographic.com/greatland/ax/primary_fs.html

1. **ANSWER: 2**
 - a. How many days are there in an Alaskan winter?
 - (b.) How many air sacs does a Pacific walrus have in its neck?**
 - c. How many bald eagles live in Alaska?
2. **ANSWER: 8 feet**
 - (a.) What's the wingspan of a trumpeter swan?**
 - b. How long is a female humpback?
 - c. How far is Alaska from Hawaii?
3. **ANSWER: 15 inches**
 - a. How far do caribou migrate each year?
 - b. How tall is the average Alaskan tree?
 - (c.) How long is the tail of an arctic fox?**
4. **ANSWER: 34**
 - a. How many wolves are in a pack?
 - (b.) How many musk oxen were moved to Alaska in the 1930s?**
 - c. How many people live in Alaska?
5. **ANSWER: 40 miles**
 - a. How long is a beluga whale?
 - (b.) How far might wolves travel in a day of hunting?**
 - c. How far does the arctic tern migrate?
6. **ANSWER: 49 feet**
 - (a.) How long is a female humpback?**
 - b. How tall is the horned puffin?
 - c. How far can a snowmobile go in an hour?
7. **ANSWER: 90 pounds**
 - a. How much does a willow ptarmigan weigh?
 - (b.) How much can an Alaskan brown bear eat in a day?**
 - c. How much does Miss Alaska weigh?
8. **ANSWER: 1,600 miles**
 - a. How far does the average Alaskan drive to work?
 - b. How far do bald eagles migrate?
 - (c.) How far do caribou migrate?**
9. **ANSWER: 2,400 pounds**
 - (a.) What's the top weight of a Steller sea lion?**
 - b. How much ice cream do Alaskans eat each year?
 - c. What's the average weight of a musk ox?
10. **ANSWER: 22,000**
 - a. How many years has Alaska been a state?
 - b. How many caribou herds does Alaska have?
 - (c.) How many miles does an arctic tern fly each year?**