

NATIONAL GEOGRAPHIC Explorer!

Pathfinder Edition

nationalgeographic.com/ngexplorer/teachers

Dear Teacher:

Welcome back to school! We begin this new year in China—where, for the first time, scientists have released a captive panda into the wild.

We then journey to Central America. There a veteran photographer guides us into the world of “The Amazing Maya,” who created one of Earth’s greatest civilizations.

Next we “Meet the Beetles,” whose 350,000 species make them the largest group of insects. These adaptable bugs live on every continent and in almost any type of habitat.

After that, we blast into space to learn how “Asteroids Rock.” We’ll discover how scientists are working to protect us from the asteroid Apophis, which will come dangerously close to Earth in 2036.

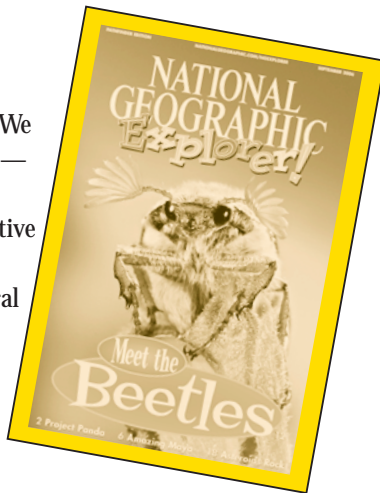
Finally, an EXPLORER Extra takes us to “Critter Camp.” Kids will join a scientist in Alabama on the hunt for the elusive Red Hills salamander.

As you can see, a great year of exploring together awaits us!

Sincerely yours,



Francis Downey
Editor in Chief



In This Issue

THE AMAZING MAYA PP. 6–11

Curriculum Connections

• Social Studies • Reading • Writing

Standards Correlations: Social Studies

• Culture • Time, Continuity, and Change

Literacy Skills

• Genre: first-person • Descriptive writing

MEET THE BEETLES PP. 12–17

Curriculum Connections

• Life Science • Ecology • Reading

Standards Correlations: Science

• Diversity and adaptations of organisms
• Structure and function in living systems

Literacy Skills

• Scientific vocabulary • Text feature: diagram

ASTEROIDS ROCK PP. 18–23

Curriculum Connections

• Space Science • Earth Science • Writing

Standards Correlations: Science

• Earth in the solar system • Earth’s history

Literacy Skills

• Text feature: sidebars • Main idea

Answer Key

Maya Mind Skills • Teacher’s Guide, p. 3

1. Possible answers: The Maya built great cities. The Maya had an advanced system of writing. The Maya were skilled artists. The Maya studied the sky. 2. Farmers lived in wooden houses at the edge of the city and grew corn. Kings ruled from stone palaces in the city. 3. Answers will vary.

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

1. fact, 2. opinion, 3. fact, 4. fact, 5. opinion, 6. fact, 7. opinion, 8. opinion, 9. fact, 10. fact

How to Read a Magazine • Teacher’s Guide, p. 7

1. small headline above an article section, 2. page number, 3. caption, 4. no, 5. four, 6. Planet Pounding, 7. They are glossary words, 8. Answers will vary.

Review • Teacher’s Guide, p. 8

Next Issue

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

Bat Man

Explore the world of bats with a scientist who works to save these maligned mammals.

Earth Movers

See how wind, water, and other forces sculpt the face of our planet.

Parrot People

Meet a tribe in the Amazon rain forest.

The Amazing Maya

Vocabulary

Write *ancient*, *civilization*, *drought*, *glyph*, *mural*, and *tortilla* on the board. Read aloud each definition and ask students to pick the corresponding word.

- advanced way of life for a group (*civilization*)
- from the far past (*ancient*)
- symbol in Maya writing (*glyph*)
- lack of rain (*drought*)
- flat cake made of corn (*tortilla*)
- painting on a wall (*mural*)

Before Reading

Write *archaeologist* on the board. Tell students that an archaeologist is a scientist who studies the past by looking at what people left behind. Then circle the letters *-ologist*. Explain that they appear in terms for other kinds of scientists as well. Challenge students to think of examples. (*Possible answers: biologist, geologist, ophthalmologist, paleontologist, psychologist, radiologist, zoologist*)

Fast Facts

- San Bartolo and Tikal are in Guatemala. Copán is in Honduras, and Palenque is in Mexico.
- The Maya's advanced system of mathematics included a symbol for zero.
- Maya scribes used some 800 different glyphs, combining them to represent words and sounds.
- Extremely accurate, the Maya calendar included a 365-day year.

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Critical Thinking and Writing

- **Main Idea:** Read aloud each sentence below. Ask which best summarizes the article. (*Answer: b*)
 - a. Glyphs are symbols used in Maya writing.
 - b. The Maya created a great civilization in Central America.
 - c. Tikal has 3,000 major buildings.
- **Inquiry:** Challenge students to write five or more questions they would ask author-photographer Kenneth Garrett if they could interview him.
- **Compare and Contrast:** Direct students to make a Venn diagram that identifies similarities and differences between Maya civilization and ours.

Extension Activities

- **Writing:** Have students write an email that author-photographer Kenneth Garrett might have sent to National Geographic headquarters about his visit to San Bartolo.
- **Social Studies:** Form small groups. Assign each group to report on one of the following aspects of Maya civilization: agriculture, architecture, art, ball game, calendar, government, trade, writing.
- **Language Arts:** Direct attention to the kite photo on pp. 10–11. Have students list five or more adjectives that describe the kite. Then tell them to write a descriptive paragraph about it.



National Geographic Maya Materials

The Maya in the Past and Present

by John Perritano (2006)

“The Dawn of Maya Gods and Kings”
in NATIONAL GEOGRAPHIC (January 2006)



Maya Resources on Our Website

nationalgeographic.com/ngexplorer/teachers

- Enrichment Game: *The Mighty Maya*
- Spanish translation of this article

Maya Mind Skills

Read "The Amazing Maya" in NATIONAL GEOGRAPHIC EXPLORER. Then answer the questions below. Use complete sentences.

1. Give two examples of the Maya's achievements.

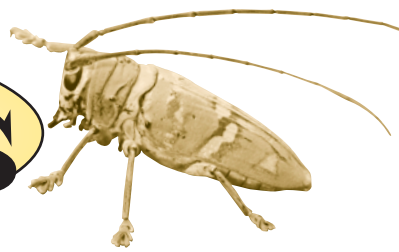
2. How was the life of a Maya farmer different from that of a Maya king?

3. What do you think was the most important change in Maya history? Why?





Meet the Beetles



Vocabulary

Direct students to Wordwise on p. 16. Read aloud each sentence below and ask which glossary entry best fills the blank.

- A beetle's hard _____ helps protect its body. (*exoskeleton*)
- This article's author is an _____. (*entomologist*)
- Dense jungle _____ provides habitats for many insects. (*foliage*)
- There are 350,000 _____ of beetles. (*species*)
- Beetles do not use their _____ to fly. (*elytra*)
- _____ is a food for goliath beetles. (*Nectar*)

Before Reading

Write *birds, fish, insects, mammals, and reptiles* on the board. Ask which group outnumbered all the others (*insects*). Then write *ants, bees, beetles, butterflies, and grasshoppers*. Ask which is the largest group of insects (*beetles*).

Fast Facts

- Beetles belong to the order Coleoptera. Its name, used by Aristotle, comes from Greek words meaning "sheath" and "wing."
- Of a million and a half known animal species, about a million are insects.
- Beetles make up 40 percent of all insect species.
- The smallest beetle species are less than a millimeter (0.039 inch) long.
- Goliaths, the largest of all beetles, can grow to be 12.5 centimeters (5 inches) long.
- Scarab beetles were sacred to ancient Egyptians. Scarabs were symbols of immortality, so embalmers often replaced a person's heart with a stone or metal figure of a scarab beetle.

Comprehension Check

Read aloud each sentence and ask if it is true or false. **(You can print a Comprehension Check handout from our website.)**

- There are 350 beetle species. (*False: There are 350,000 beetle species.*)
- Beetles live on every continent. (*True.*)
- Beetles have eight legs. (*False: They have six.*)
- Beetles have four wings. (*True.*)
- Most beetles eat plants. (*True.*)

Critical Thinking and Writing

- **Analysis:** Read aloud the final sentence on p. 13: "That's right: Our world belongs to the beetles." Then tell students to write a composition saying whether they agree with that viewpoint and why.

Extension Activity

- **Science:** Tell students that many beetles are drawn from dark to light. Encourage students and parents to look for beetles near streetlights. Have students keep journals in which they describe and sketch any bugs they see.

National Geographic Bee

We'll give you a question for each issue of EXPLORER. You can learn more about the Bee at nationalgeographic.com/geographybee.



Q. Which Great Lake lies completely within the United States—Lake Superior or Lake Michigan?

A. Lake Michigan

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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 "Meet the Beetles" in NATIONAL GEOGRAPHIC EXPLORER. Use what you learn to decide if each sentence below is a fact (F) or an opinion (O).

_____ 1. Scientists have identified more than 350,000 beetle species.

_____ 2. The elytra are the most interesting part of a beetle's body.

_____ 3. Entomologists are scientists who study insects.

_____ 4. Beetles live on every continent.

_____ 5. Beetles are the coolest of all insects.

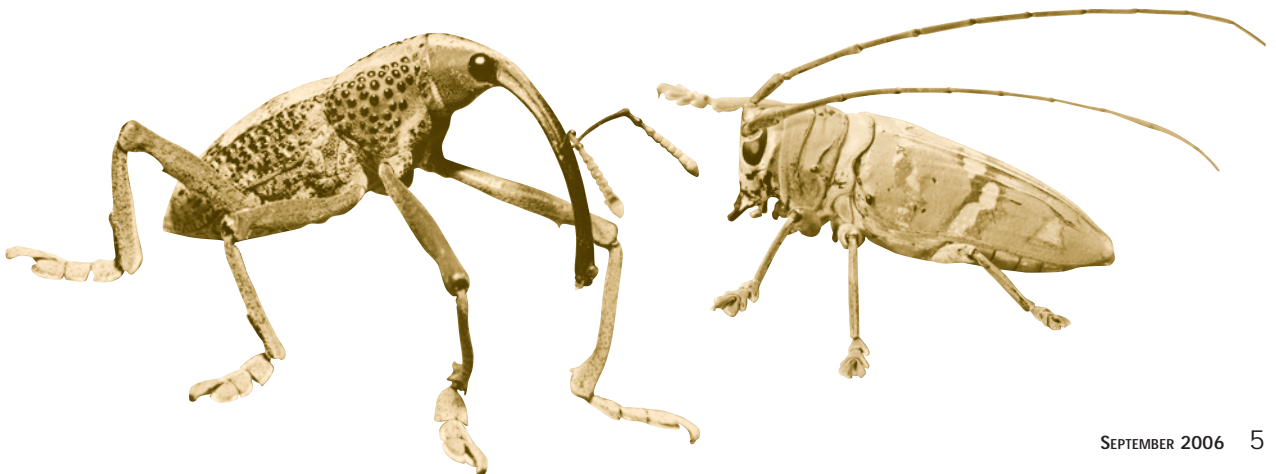
_____ 6. Many leaf beetles eat poisonous plants.

_____ 7. Beetles are ugly and creepy.

_____ 8. The habits of dung beetles are disgusting.

_____ 9. Ladybugs protect plants from aphids.

_____ 10. All beetles have wings.



Asteroids

ROCK

Vocabulary

Write *NASA* and *NEAR* on the board. Have students find these terms in the article. Explain that they are **acronyms**, words formed from the first letters of different words. NASA stands for National Aeronautics and Space Administration. NEAR means Near-Earth Asteroid Rendezvous.

Before Reading

Ask if anyone can tell what an asteroid is (*space rock that is too small to be a planet*). Then invite students to say whether they think an asteroid has ever struck Earth. Ask what sort of evidence might tell us whether that has happened.

Fast Facts

- Asteroids are rocky and metallic objects that orbit the sun but are too small to be considered planets. Asteroids are sometimes called minor planets or planetoids.
- Asteroids are bits of material left over from the formation of the solar system some 4.6 billion years ago.
- Italian astronomer Giuseppe Piazzi discovered the first asteroid in 1801. He named it Ceres.
- English astronomer William Herschel coined the term *asteroid* the following year. It comes from a Greek word meaning “starlike.”
- One hypothesis for the formation of Earth’s moon is that an asteroid the size of Mars collided with the planet. This hypothesis is called the giant impact theory.
- Sixteen asteroids have a diameter of 240 kilometers (149 miles) or greater.
- Ceres, the largest known asteroid, has a diameter of 940 kilometers (584 miles). It is about a quarter of the size of our moon.
- NASA estimates that millions of asteroids lie in the asteroid belt between Mars and Jupiter. Of them, some 90,000 have been numbered.
- In 1993, NASA’s Galileo spacecraft flew by asteroid Ida. It discovered that the 52-kilometer-long (32-mile-long) asteroid has a tiny moon.

Comprehension Check

Read each question aloud. (You can also print a **Comprehension Check** [handout at our website.](#))

- Where can you find evidence that Earth has been hit by space rocks? (*Argentina, Arizona, Australia, and many other places*)
- How did the NEAR spacecraft help us understand asteroids? (*It gave us our first close-up look at an asteroid.*)
- Where is the asteroid belt? (*between Mars and Jupiter*)
- If you gathered all asteroids together into one object, how would it compare in size with Earth’s moon? (*It would be smaller than the moon.*)

Critical Thinking

- **Analysis:** Encourage students to brainstorm the steps that NASA and other agencies might need to take if an asteroid appeared likely to hit Earth.
- **Inference:** Ask: What would it be like to be on a spacecraft saving Earth? What would you name the spacecraft? Why?
- **Cause/Effect:** Invite students to imagine that, against all odds, the asteroid Apophis *does* slam into Earth. Direct them to write an essay about the likely effects of this impact.

Extension Activity

- **Science:** Show how impact craters form by performing a simple experiment. Pour flour into a flat pan. The flour should be at least an inch thick. Then invite students to drop marbles and irregularly shaped stones into the flour. Direct students to draw the resulting craters.



National Geographic Space Book
National Geographic Encyclopedia of Space
(2004)



Space Resource on Our Website
nationalgeographic.com/ngexplorer/teachers

- Comprehension Check [handout for this article](#)

How to Read a Magazine

NATIONAL GEOGRAPHIC EXPLORER uses various nonfiction features to help readers understand articles. Look at the “How to Read a Magazine” poster on your classroom wall. Then answer these questions about the “Asteroids Rock” article on pages 18-23 of the September issue.

Define the Feature

1. What is a **subhead**?

2. What is a **folio**?

3. What is the name for the feature that **tells you about a picture**?

Find the Feature

4. Are the **headline** and **byline** on the same page? _____

5. How many **subheads** appear in the article? _____

6. What does the first **subhead** say?

Think It Over

7. What do the words and phrases in **bold type** all have in common?

8. Try writing a different **headline** for this article.



Name: _____

COMPREHENSION CHECK

Fill in the circle before the correct answer to each question below.

1. You can find craters from space rocks in which South American nation?
 - (a) Argentina
 - (b) Australia
 - (c) Morocco
 - (d) Zimbabwe
2. How many wings does a beetle have?
 - (a) one
 - (b) two
 - (c) three
 - (d) four
3. The asteroid belt is between which two planets?
 - (a) Mercury and Venus
 - (b) Earth and Mars
 - (c) Mars and Jupiter
 - (d) Jupiter and Saturn
4. Which city below was *not* built by the ancient Maya?
 - (a) Copán
 - (b) San Bartolo
 - (c) Tenochtitlan
 - (d) Tikal
5. What is a panda's main food?
 - (a) apples
 - (b) bamboo
 - (c) carrots
 - (d) lettuce
6. What does an entomologist study?
 - (a) ancient cultures
 - (b) asteroids
 - (c) insects
 - (d) mammals
7. What is a glyph?
 - (a) Maya pyramid
 - (b) Maya temple
 - (c) symbol used in Maya writing
 - (d) tomb for a Maya king
8. About how many pandas live in the wild?
 - (a) 1,600
 - (b) 16,000
 - (c) 160,000
 - (d) 1,600,000
9. How likely is it that the asteroid Apophis will hit Earth?
 - (a) It will definitely happen.
 - (b) It will probably happen.
 - (c) It might happen.
 - (d) It will probably not happen.
10. Which skilled workers would you find in a Maya city?
 - (a) potters
 - (b) weavers
 - (c) writers
 - (d) all of the above

