

NATIONAL GEOGRAPHIC Explorer!

Pathfinder Edition

nationalgeographic.com/ngexplorer/teachers

Dear Teacher:

This is the last issue of EXPLORER for 2005-2006. It serves up a final foursome of great teaching opportunities.

We begin by climbing aboard a roller coaster to learn why "Gravity Rules" the world of amusement park thrills.

Next we meet a "Rock Hound" who introduces students to three main types of rock.

Then we crawl into a world of deceit, daring, and deadly "Bug Battles" between mantids and katydids.

Finally, we jet around the world, looking at "Ancient Art" from the exquisite cave paintings of southern France to the mammoth and mysterious heads of Easter Island.

With this issue, you'll find a poster called "Racing Against Hunger." It tells how a school-meal program in Kenya changed the life of marathon champion Paul Tergat and why he's working with the World Food Programme and International Paper to help Africa's next generation.

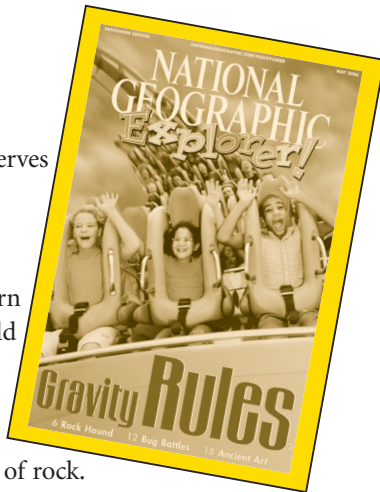
It's been great exploring together. Let's do it again next year. You can renew your subscription by sending in the postage-paid card on our cover wrap or calling 1-800-368-2728.

Warmest wishes for a restful and joyful summer!

Sincerely yours,



Francis Downey
Editor in Chief



This Issue

GRAVITY RULES PP. 2-5

Curriculum Connections

• Physical Science • Reading • Math

Standards Correlation: Science

• Motions and forces

Literacy Skills

• Text feature: diagram • Scientific vocabulary

ROCK HOUND PP. 6-11

Curriculum Connections

• Earth Science • Geography • Reading

Standards Correlation: Science

• Properties of Earth materials

Literacy Skills

• Genre: photo-essay • Text feature: locator maps

BUG BATTLES PP. 12-17

Curriculum Connections

• Life Science • Reading • Writing

Standards Correlation: Science

• Diversity and adaptations of organisms

Literacy Skills

• Genre: first-person • Text feature: sidebars

ANCIENT ART PP. 18-23

Curriculum Connections

• Social Studies • Reading • Geography

Standards Correlations: Social Studies

• Culture • Time, continuity, and change

Literacy Skills

• Expository text • Evidence and conclusions

Answer Key

Coaster Calculations • Teacher's Guide, p. 3

1. 137 feet 10 inches, 2. 259 feet 2 inches,
3. 86 feet 11 inches, 4. 150 feet 11 inches

Earth Science Rocks! • Teacher's Guide, p. 5

1. c, 2. d, 3. j, 4. g, 5. i,
6. a, 7. h, 8. b, 9. f, 10. e

Bug Blanks • Teacher's Guide, p. 7

1. smell, 2. entomologist, 3. 7,000, 4. Mimicry,
5. millions, 6. jaws, 7. invertebrate,
8. predators, 9. outside, 10. wings

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

Next Issue

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

This is the last issue for the
2005-2006 school year.

NATIONAL GEOGRAPHIC EXPLORER
will begin another exciting year
in September 2006.

Gravity Rules



Vocabulary

Write *gravity* on the board. Tell students that the word has two different meanings. It can refer to the invisible force that pulls all objects, including us, toward the ground. It can also mean seriousness, as when people talk about the gravity of a situation.

- Ask: How is the word used in the title “Gravity Rules”? (*to mean Earth’s pulling force*)
- Have students use each meaning of *gravity* in a sentence.

Before Reading

Direct attention to the roller coaster photo on p. 2. Ask: Would you want to ride this roller coaster?

Fast Facts

- Back in the 1600s, Russians set up ice slides at fairs. Thrill seekers rode down the steep drops in sleds, sometimes going 50 miles an hour.
- A sharp dip at the beginning of the first true roller coaster, Russian Mountains, frequently catapulted passengers out of their cars.
- According to the Roller Coaster DataBase (RCDB), the fastest coaster is the Kingda Ka in Jackson, New Jersey. It can go 128 miles an hour.
- The Kingda Ka is also the tallest roller coaster in RCDB’s records, soaring to 456 feet and dropping passengers 418 feet.
- According to RCDB, the longest coaster currently in operation is the Daidarasaurus in Osaka, Japan. Its track is 7,677 feet and 2 inches.
- Several of the world’s fastest coasters are in Japan. Most are in the United States.
- As g-forces increase, the heart has a harder time pumping oxygen to the brain. Exposure to overly strong g-forces can make a person pass out or even lead to injury. Consequently, roller coasters are carefully tested for g-force safety. Most coasters cause riders to feel 2 to 4 g’s of force.

Comprehension Check

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

- **Who** is Chuck Monson? (*roller coaster safety tester*)
- **What** is a g-force? (*a measure of gravity*)
- **Where** was the first true roller coaster built? (*Paris*)
- **When** was it built? (*1804*)
- **Why** does Chuck Monson use Fred to test roller coasters? (*to make sure they are safe for people*)

Critical Thinking

- **Main Idea:** Remind students that the article is entitled “Gravity Rules.” Then assign them to write a paragraph about how gravity affects roller coaster riders.
- **Inference:** Remind students that the author advises coaster passengers to keep their arms and legs inside the car. Ask why this is important.

Extension Activities

- **Writing:** Invite students to script a dialogue in which two friends—one adventurous, one cautious—discuss whether to try a new roller coaster that has opened in their area.
- **Math:** Direct students to the Record Holders section of the Roller Coaster DataBase at rcdb.com/rhr.htm. Have them use the information to make graphs of the fastest, highest, and longest roller coasters in operation.



National Geographic Book

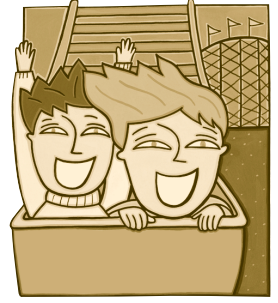
Using Force and Motion
by Glen Phalen (2002)



Explore Our Website

- Comprehension Check handout
- resource links

Coaster Calculations



Read each problem carefully, then do the math to solve it.
Show your work. Remember: A foot has 12 inches.

Roller coaster data source: rcdb.com/rhr.htm

1. The Tower of Terror is 377 feet and 4 inches tall. The Silver Star is 239 feet and 6 inches. How much taller is the Tower of Terror?

Answer 1: _____

2. The Bandit is 196 feet and 10 inches tall. It is 62 feet and 4 inches shorter than the Fujiyama. How tall is the Fujiyama?

Answer 2: _____

3. The Thunder Dolphin drops 218 feet and 2 inches. The Insane Speed drops 131 feet and 3 inches. How much farther does the Thunder Dolphin drop?

Answer 3: _____

4. The Horror Express is 170 feet and 7 inches tall. That is 19 feet and 8 inches taller than the Cobra. How tall is the Cobra?

Answer 4: _____



Rock Hound



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.

Before Reading

Write *solid as a rock* on the board. Ask: What does this expression mean? What does it suggest about rocks? Tell students that rocks can actually change quite dramatically, though often slowly. Ask if students are surprised to learn this.

Fast Facts

- There are some 3,500 known minerals. They are the ingredients that make rocks.
- Talc, often used in powder, is the softest mineral. Diamond is the hardest.
- A mineral is the same substance through and through. A rock can be a mix of different minerals. In the case of a conglomerate, a rock can even be a mix of other rocks.
- Meteorites can contain minerals not otherwise found on Earth.
- Obsidian, an igneous rock, is extremely sharp. Ancient peoples used it to make spear points. Modern scalpels sometimes use obsidian in place of steel.
- In 1564, Georgius Agricola, a German doctor, wrote the first known field guide to rocks and minerals.
- The bits of minerals in a rock are commonly called its grains. Grain size is one trait used by geologists to classify rocks.

Critical Thinking and Writing

- **Compare and Contrast:** Direct students to make a Venn diagram that identifies similarities and differences between two of the three main types of rock.
- **Main Idea:** For each of the three main types of rock, have students write a sentence that summarizes how that type is formed.

Extension Activity

- **Research:** Assign students to find out whether the following rocks are igneous, sedimentary, or metamorphic: arkose (*sedimentary*), breccia (*sedimentary*), eclogite (*metamorphic*), flint (*sedimentary*), gabbro (*igneous*), obsidian (*igneous*), peridotite (*igneous*), phyllite (*metamorphic*), pitchstone (*igneous*), phonolite (*igneous*), quartzite (*metamorphic*), skarn (*metamorphic*), travertine (*sedimentary*).



National Geographic Books

Rocks and Minerals

by Glen Phalen (2004)

My First Pocket Guide: Rocks and Minerals

(2001)



Explore Our Website

- Quick Flick: *Rock Cycle* ■ [links](#)

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Earth Science Rocks!

Read "Rock Hound" in NATIONAL GEOGRAPHIC EXPLORER.
Then match each cause with the effect that best matches it.

CAUSES

EFFECTS

- | | | |
|-------|--|----------------------------|
| _____ | 1. Shale changes beneath Earth's surface. | a. Large crystals form. |
| _____ | 2. Heat and pressure beneath Earth's surface change igneous and sedimentary rocks. | b. Limestone forms. |
| _____ | 3. Heat and pressure change granite. | c. Slate forms. |
| _____ | 4. Lava cools into rock. | d. Metamorphic rocks form. |
| _____ | 5. Heat and pressure change basalt. | e. Sedimentary rock forms. |
| _____ | 6. Igneous rock cools slowly beneath Earth's surface. | f. Shale forms. |
| _____ | 7. Igneous rock cools quickly above Earth's surface. | g. Andesite may form. |
| _____ | 8. Seashells turn into rock. | h. Small crystals form. |
| _____ | 9. Mud and clay turn into rock. | i. Schist forms. |
| _____ | 10. Weight presses down on layers of natural material. | j. Gneiss forms. |



Bug Battles



Vocabulary

Write *entomologist* on the board. Tell students that an entomologist is a scientist who studies insects. 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: archaeologist, biologist, geologist, ophthalmologist, paleontologist, psychologist, radiologist*)

Before Reading

Write *mimicry* on the board. Have students look up the word's meaning (*when one thing looks or acts like another thing*). Invite students to brainstorm about how mimicry could help an animal survive.

Fast Facts

- The way mantids hold their front legs reminds many people of a person praying. As a result, mantids are often called praying mantises.
- The term *mantid* comes from an ancient Greek word meaning “prophet.”
- African giant mantids can be seven inches long.
- Mantids eat insects, frogs, lizards, birds, turtles, and other mantids.
- Mantid females are notorious for devouring their mates, but this behavior has been seen almost exclusively in captivity, where males cannot escape. It may not be common in the wild.
- Predators that eat mantids include birds, spiders, snakes, toads, rodents, and bats.

Critical Thinking and Writing

- **Main Idea:** Read aloud each sentence below. Ask which best summarizes the article. (*Answer: c*)
 - a. An entomologist studies insects.
 - b. Katydid sit still during the day and are active at night.
 - c. Mantids and katydids have found ways to survive for millions of years.
- **Inference:** How does it help katydids to be active at night? How might it hurt them?
- **Analysis:** The author says the katydid and the mantid help each other. What do you think he means by this? Do you agree?
- **Compare and Contrast:** Direct students to make a Venn diagram that identifies similarities and differences between mantids and katydids.

Extension Activities

- **Science:** Remind students that mimicry is a common survival strategy in the animal kingdom. Direct students to report on how one of the following animals disguises itself: arctic fox, leafy sea dragon, ptarmigan, sloth, stonefish, vine snake, or walking stick.
- **Writing:** Some people keep mantids as pets. Have students look into what is involved in doing so. Then have them write a composition telling whether they would want a mantid as a pet. Why or why not?

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National Geographic Resources

“Mantids: Armed and Dangerous”
in NATIONAL GEOGRAPHIC (January 2006)

Bug Faces by Darlyne A. Murawski (2000)



Explore Our Website

- Spanish translation
- bug postcards
- resource links

Bug Blanks



Read “Bug Battles” in NATIONAL GEOGRAPHIC EXPLORER.
Then fill in the blanks in the sentences below.

1. Katydids count on their sense of _____ to find food at night.
2. An _____ is a scientist who studies insects.
3. There are nearly _____ known species of katydids.
4. _____ is when an animal looks like something that it is not.
5. Katydids and mantids have lived on Earth for _____ of years, since the days of the first dinosaurs.
6. A katydid’s _____ can slice into a person’s finger.
7. An _____ is an animal with no backbone.
8. Mantids are _____. That means they kill and eat other animals.
9. An exoskeleton is on the _____ of a bug’s body.
10. A mantid eats all of a katydid except the _____.



Ancient Art



Vocabulary

Direct students to the glossary on p. 23. Ask which entry best fills the blank in each sentence.

- Days slowly get shorter after the _____. (*summer solstice*)
- Music is an important part of a _____. (*culture*)
- The ____ began thousands of years ago. (*Stone Age*)
- The ____ takes place in late December in the Northern Hemisphere. (*winter solstice*)
- The ____ wrote a book about Easter Island. (*archaeologist*)

Before Reading

Direct students to the Stonehenge photograph on p. 21. Ask: How did the stones get like this?

Fast Facts

- The large sandstone blocks at Stonehenge weigh roughly 26 tons apiece.
- Those stones were transported 20 miles to the site of Stonehenge.
- Stonehenge began as a large circular pit dug during the late Stone Age. The giant rocks seen today were likely moved and carved later, during the Bronze Age.
- Easter Island was named by Dutch explorers who landed there on Easter Sunday in 1722.
- It is believed that the giant figures on Easter Island represent the ancestors of different clans. Clans vied to see which could make the largest statues.
- Easter Islanders moved their giant statues without the benefit of the wheel.
- Lascaux Cave, in southern France, is the world's most famous cave-painting site.
- One of the painted bulls at Lascaux Cave measures 18 feet from head to tail.
- Four teenagers discovered the Lascaux Cave murals while hunting rabbits in September 1940. A fallen tree revealed the entrance to a tunnel.
- Lascaux painters sometimes put pigments into a pipe, then blew them onto cave walls.

Comprehension Check

Read aloud each sentence below or print a handout from our website. Ask students which ancient art site the sentence describes.

- It took 400 people to move a single stone into this circle. (*Stonehenge*)
- Ancient people decorated cave walls with animal paintings. (*southern France*)
- A single giant head can weigh as much as 50 elephants. (*Easter Island*)
- One lizard picture is the size of two football fields. (*Peru*)

Critical Thinking and Writing

- **Inquiry:** Tell students to write five questions they wish they could pose to the Nazca Indians who made the giant images.
- **Inference:** Remind students that cave paintings in France show animals that no longer live in that country. Ask: How did the painters know about these animals? Why don't these animals live in France today?

Extension Activities

- **Language Arts:** Tell students that Dutch explorers landed on Easter Island in 1722. Invite pupils to imagine being part of the group. Have them write a letter home about what they found.
- **Geography:** Print the "A World of Art" work sheet from our website. Distribute copies for students to complete.

National Geographic News

Outdoor Classroom Grants: Visit nationalgeographic.com/ngexplorer/grants to learn which schools have received grants so far.

Fond Farewell: National Geographic Society Chairman Gilbert M. Grosvenor retires this month after a long and distinguished career. A passionate advocate for geography education, he will be much missed.