Extreme Explorer

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Dear Educator:

Welcome to a new school year! The September issue explores the themes of sight and observation. Is seeing believing? Your students will learn the answer can be "yes" and "no," depending on circumstances.

"Fooled You!" takes students into the world of nature's copy cats—animals that look, move, and even sound like other animals. Readers will discover impostors in the plant world, too, including an orchid that looks and smells like a female bee. The Visualize activity will support students in using the writer's words to create mental pictures of plant and animal mimicry.

"Seeing Eye to Eye" introduces readers to the science of light and vision, including the basic anatomy of the eye and how it catches, bends, and focuses light. Students will compare different animals' eyes and learn how their special features help these animals survive. You can use the Content Literacy activity to assess your students' understanding of key science concepts.

"Cracking the Code" shows how keen observation helped scientists solve an ancient mystery. The story takes readers to Central America, where the Maya wrote glyphs on stones, pottery, books, and more. For over a century, no one could read these glyphs. Readers will follow epigraphers, or writing experts, who finally saw patterns in the glyphs and decoded them. The Make Connections activities let students track the sequence of key events and do some code breaking of their own.

With the start of a new school year, we also have some news for you. Teachers told us they'd like to get the teacher's guide a month early. They'd also like a more in-depth guide. So, to help meet instructional and planning needs, we are developing an even better guide that will be available only online. Starting with our October issue, you'll find the teacher's guide posted online a month before the issue date. Starting with the January-February 2010 issue, teacher's guides will be available online only. This will help you prepare, and it will help the environment, too.

During your visit to our online teacher's page, also look for a new link to lessons we've developed for use with an interactive whiteboard. As of this issue, you will have free access to in-depth whiteboard content for each issue.

As you explore this issue, be on the lookout for engaged readers as they learn about the power of observation.

Sincerely yours,

Jacalyn Mahler
Editor in Chief

In This Issue

Answer Key

Seeing Eye to Eye • Teacher's Guide, p. T5
1. Light bounces off an object and hits the cornea. **2.** Light enters the pupil. **3.** Light passes through the lens to focus an image. **4.** The image appears on the retina upside down. **5.** The brain flips the image right-side up.

Breaking the Code • Teacher's Guide, p. T7
Timeline: 1830s: Explorers find Maya ruins; **1860s:** Discovery of Landa's "alphabet;" **1880s:** Counting system and calendar decoded; **1950s:** 800 glyphs identified; **1980s:** New way to read glyphs based on phonetics.

Code breaking: Bird Jaguar sits as king. (Or: Bird Jaguar is the king.)

Review • Teacher's Guide, p. T8
1. d **2.** c **3.** a **4.** d **5.** c **6.** d **7.** b **8.** a **9.** c **10.** a **11.** c **12.** d

Next Issue

Sea Monster? People once called the octopus a sea monster. Find out if truth is stranger than fiction.

Eye in the Sky: Discover the big part satellites play in your everyday life.

Passport to Wonder: Take a globe-trotting trip to explore the New 7 Wonders of the World.

PAGES 2-9

Fooled You!

About the Story

Is it a leaf or a toad? Is it a poisonous snake or a harmless copy cat? In this story, students will discover the surprising ways that plants and animals use mimicry. They'll meet insects that disguise themselves as thorns, spiders that act like ants, and a bird that can mimic the sound of an entire flock.

Fast Facts

- Both plants and animals use mimicry though it is most prevalent among insects.
- Some prey animals use mimicry to disguise themselves as something dangerous or undesirable to predators. Some predators take on the appearance of harmless animals or flowers to surprise unsuspecting prey.

Vocabulary

Multiple-Meaning Words: Display the word *sharp* and ask students what it means. Lead them to see that the word can be used in different ways with different meanings. For example, on pp. 4-5, *sharp* is used in two ways, meaning "smart" and "pointy." Explain that many words in English have more than one definition. When students come across a word that has different meanings, they need to think about the story topic and look for clues to figure out how it's being used. Model for students how to use context. Say: *In this story, the word* mimic *is used in three ways—each with a meaning that's connected to the idea of copying, or imitating, something else.* Display these phrases from the story and read them aloud; *when the mimic needs it, they mimic animals, a mimic octopus*. Point out in the first usage, *mimic* is a noun, or the subject. Next, it is an action verb. In the last phrase, it's an adjective that describes the octopus. Discuss the clues that students can use to understand how *mimic* is being used in each case.

Before Reading

Preview and Make Predictions: Page through the story with students, previewing the photos and captions. Invite different students to read aloud the subheads. Then have volunteers share aloud one thing they learned from this preview. Ask them to write the answer to this question on a piece of paper: *What will the story be about*? Tell them they will come back and check their predictions after they read the story.

Reading Strategy

Visualize: As you read aloud the boldface introduction, ask students to picture the scene in their minds. Tell them to imagine what the plants and animals look like and how the animals move. Invite volunteers to describe what they pictured and how the writer's words helped them make these mental pictures. Suggest that as they read the story, they use the writer's words to see, feel, hear, taste, and smell what the writer describes.

After Reading

- **Check Predictions:** Have students check the predictions they made before reading. Discuss how they used photos to predict what the story would be about and as a starting point for the mental pictures they made as they read the story.
- **Visualize:** Ask each student to share a mental picture he or she formed while reading the story. Help them recall descriptions from the story that appealed to different senses. For example, sight: *a twig whizzes by;* touch: *prickly parts;* taste: *don't taste very good;* smell: *perfume to flies;* hearing: *chirps a warning.* Then distribute the blackline master on p. T3. Explain that in each box, they should draw an example of a plant or animal that uses mimicry. Under the box, they should write one important fact they learned.

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VISUALIZE

Name: _____

Fooled You!

What did you picture in your mind as you read the story? In each box, draw a plant or animal that uses mimicry. Then write a fact you learned about that plant or animal.

1.

Fact: _____

_____

2.

Fact: _____

_____

3.

Fact: _____

_____

4.

Fact: _____

_____

PAGES 10-17

SEEING EYE TO EYE

About the Story

Birds, insects, lizards, and humans too, use vision to make sense of the world. In this story, students learn the basic anatomy of an eye and how it catches, bends, and focuses light. The story also introduces students to some differences between animals' eyes and the ways these adaptations contribute to animals' survival.

Fast Facts

- A human eye weighs about ¼ ounce and is shaped like a slightly flattened ball.
- Human babies are born with poor vision and must learn to see by developing muscles and habits—much like learning to walk.
- In photos, people's eyes sometimes look red because light from a camera's flash reflects off the blood vessels that nourish the retina.

Vocabulary

Action Verbs: Read aloud the first paragraph. Ask students to listen carefully for action words. Display the words *soars, scan, spies, dives,* and *scurries.* Discuss how these precise action words add to the story and help readers paint a picture in their minds. Substitute a more general verb in each sentence and compare it with the original sentence. Suggest students keep a log of favorite verbs and use them to add impact to their writing.

Before Reading

Build Background: Ask students what they know about light. Then explain that light does interesting things such as bend and split into colors. Reinforce these ideas with some hands-on experiments:

- Demonstrate how a prism breaks white light into different wavelengths of color. Then let students try to use a prism to separate light waves.
- Fill a clear glass three-quarters full of water. Then hold up a pencil and ask students to make observations about it. (Example: *It's straight.*) Then put the pencil in the glass. Ask them to make new observations about the pencil. (Example: *It looks broken.*) Explain that it looks like that because the water bends the light.

Reading Strategy

Determine Importance: Explain that like many nonfiction texts, this story presents facts and information that may be new to students. Ask them to share some of the things they've done in the past as they're reading to help them keep track of important ideas and information.

Explain that one way is to stop at the end of each paragraph and sum up what they read. Model the strategy with the second paragraph in the section "Light Rules." Ask and answer these questions: *What did I just read? What are the most important ideas? (*Light is so fast it takes just over eight minutes to go from the sun to Earth. Water and glass can slow light down.) Tell students to stop and ask themselves these questions after each section. You may want to have them read the story in pairs and practice summing up the main ideas.

After Reading

- **Content Literacy:** Distribute the blackline master on p. T5. For the top portion, students should write the correct order for the five steps to turn light into sight. For the bottom portion, they should label the parts of the eye.
- **Multiple-Meaning Words:** Remind students that many English words have several meanings. One example is the word *focus.* Ask them to find the places where the word appears in boldface in the story. Have them match each use with the appropriate definition shown in Wordwise on p. 17. Encourage them to look for other multiple-meaning words in the story. (Examples: *change, duck, waves*)

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CONTENT LITERACY

Name: _____

SEEING EYE TO EYE

1. The steps below tell what happens when you see an object. Write a number next to each step to show the right order.

_____ Light passes through the lens to focus the image.

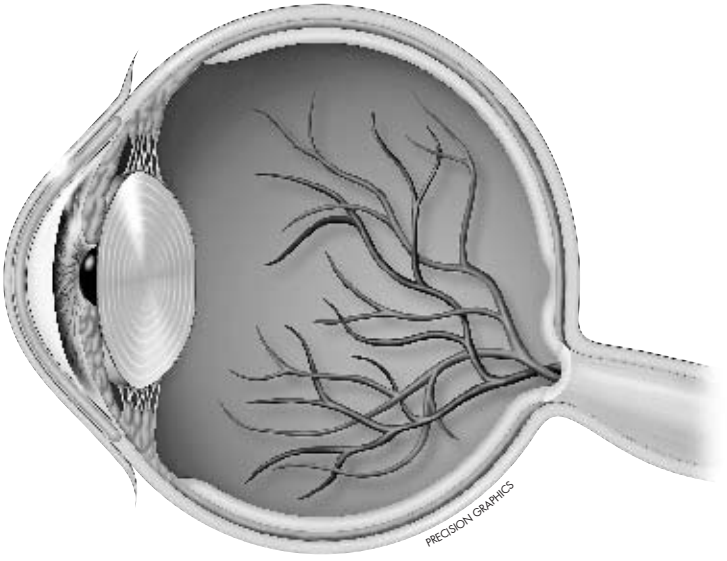
_____ The brain flips the image right-side up.

_____ Light bounces off an object and hits the cornea.

_____ The image appears on the retina upside down.

_____ Light enters the pupil.

2. Draw lines pointing to each of these parts on the eye diagram: iris, lens, pupil, retina, cornea, optic nerve. Then label each part.



PAGES 18-23

Cracking the Code

About the Story

The Maya's prolific and puzzling hieroglyphic writing was one of that civilization's most enduring mysteries. People have been trying to crack the Maya code for more than 150 years. Students will see how finding patterns in the glyphs led to being able to read the glyphs, and how that led to discoveries of the Maya's skill with math, astronomy, calendars, and recorded history.

Fast Facts

- Students and their families can read more about the Maya in "The Maya: Glory and Ruin" in the August 2007 issue of National Geographic.
- Although the Maya abandoned their cities, they did not disappear. They scattered to other parts of Central America and Mexico. Today about six million Maya descendents live in the region, speaking Mayan languages and practicing many of the customs of their ancestors.
- The English word "shark" comes from the Maya word for fish: *xoc*

Vocabulary

Jargon: Groups of people often use very specific words, or jargon, to describe what they do. If you are not part of these groups, the words can be hard to understand. To explain this concept, preview the story. Read the headline and deck on pp. 18-19. Explain who the ancient Maya were. Ask students to share what they know about the Maya or other ancient civilizations, and then predict what words they expect to find in a story on this topic. (Examples: *archaeologist, ancient, ruins, artifacts*). Students should make a list. As they read, they can check off words on their list and add new ones.

Explain that many of these words are specific to the study of ancient civilizations. If the jargon is unfamiliar, students have several ways to figure out the meaning. They can read on to look for context clues in the text. They can predict the meaning and test it in the sentence to see if that meaning makes sense. Or they can look it up in a print or online dictionary.

Before Reading

Build Background: To continue building background on the ancient Maya (started in the Vocabulary lesson), locate the region where they lived on a map or globe. Use the National Geographic map at *http://ngm.nationalgeographic.com/ngm/0601/feature5/map.html* to find the key Maya sites mentioned in the story: Tikal, Copán, San Bartolo, and Palenque.

Reading Strategy

Make Connections: Distribute the blackline master on p. T7. Remind students they are going to read a history story about the ancient Maya. Ask them to think of other history texts they have read. Encourage them to look for features in both the text and the graphic supports that are common to history stories. This can include references to real people and events, and dates that show how the history unfolded over time. Encourage students to use the timeline to track key dates in the quest to break the Maya code.

After Reading

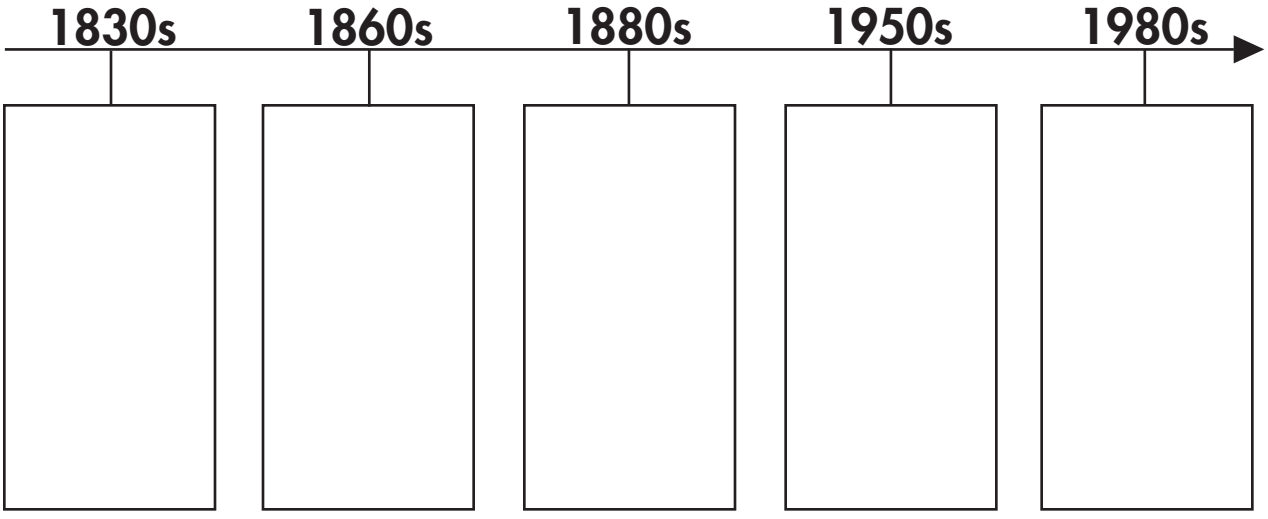
- **Timeline:** Have students use their completed timelines to recount key events in efforts to decode the Maya's hieroglyphic writing.
- **Code Breaking:** Tell students they are about to become code breakers. Their clues on the blackline master are real Maya glyphs and the glyphs' translations. Before starting, explain that the Maya put their words in a different order than in English. English usually has a subject, then a verb. (Example: *John played ball.*) The Maya put the verb first. (Example: *Played ball John.*) Once students break the code, they will need to rearrange the order of the words so it makes sense in English.
- **Critical Thinking:** Ask students to choose one artifact and one piece of writing from their room at home. Tell them to imagine that archaeologists 1,000 years in the future find these two items. Then ask them to write a short essay explaining what these items tell archaeologists about how people lived in 2009.

MAKE CONNECTIONS

Name: _____

Cracking the Code

1. As you read "Cracking the Code" in EXTREME EXPLORER, use the timeline to record key events.



2. Become a Maya glyph decoder! Use this key to decode the sentence.

KEY

Bird Jaguar

cacao

sits

he of 20 captives

as king

glyph sentence

+

+

English translation _____

REVIEW Name: _____

COMPREHENSION CHECK

Answer each question. Fill in the circle by the correct answer.

1. Why do animals use mimicry?
- (A) to sneak up on prey
- (B) to scare away attackers
- (C) to look poisonous
- (D) all of the above

2. Which of these is *not* an example of mimicry?
- (A) an orchid that looks like a bee
- (B) a bird that sounds like a whole flock
- (C) a toxic frog that eats ants
- (D) a flower that smells like dead animals

3. Why do so many insects mimic ants?
- (A) Ants sting and taste bad.
- (B) Ants walk in a zigzag pattern.
- (C) Ants are beautiful and hardworking.
- (D) Ants live in groups.

4. What do the bee orchid and the carrion flower both do?
- (A) smell very, very bad
- (B) resemble a female bee
- (C) use poison as a defense
- (D) use mimicry to attract insects

5. What is the first thing that happens inside your eye when you see something?
- (A) White light breaks into colors.
- (B) Your brain flips the image.
- (C) Reflected light enters your cornea.
- (D) An image appears on your retina.

6. What does the pupil do?
- (A) tells you how far away things are
- (B) glows in the dark
- (C) mixes different colors
- (D) lets light enter your eye

7. How does seeing in different directions at once help some animals?
- (A) They can stay active at night.
- (B) They can see danger coming.
- (C) Their eyes can take in more light.
- (D) Their eyes see while they are sleeping.

8. What does a compound eye have?
- (A) thousands of tiny lenses
- (B) the shape of a W
- (C) a mirror behind the retina
- (D) a blue iris

9. Which of these are *not* examples of artifacts?
- (A) pottery
- (B) tools
- (C) plants
- (D) jewelry

10. Where did the ancient Maya build cities?
- (A) Central America
- (B) South Asia
- (C) Eastern Europe
- (D) West Africa

11. Why were the Maya glyphs hard to decode?
- (A) They tracked the movements of the stars.
- (B) They were carved in stone and clay.
- (C) There wasn't a "map" explaining how to read them.
- (D) Their shapes contained patterns.

12. What did epigraphers learn from reading Maya glyphs?
- (A) The Maya had a counting system.
- (B) The Maya had a calendar.
- (C) The Maya loved power.
- (D) all of the above