

NATIONAL GEOGRAPHIC Explorer!

Pioneer Edition

nationalgeographic.com/ngexplorer/pioneer/teachers

Dear Educator:

Welcome to a new school year! The September issue explores the themes of sight and observation. Is seeing really believing? Your students will learn the answer is “yes” and “no.”

“Seeing Eye to Eye” introduces readers to the basic structure of the eye and how it catches, bends, and focuses light. Students will compare animals’ eyes and learn how the size, shape and placement of eyes help different creatures survive. You can use the Content Literacy activity to assess your students’ understanding of the key science concepts.

“Fooled You!” takes readers into the world of nature’s copy cats—animals that look, move, and sound like other animals. Students will discover impostors in the plant world as well. The Visualize activity will help them create mental pictures of the mimics they meet through their reading.

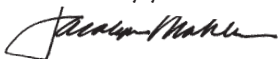
“Search for Survivors” follows scientist David Smith as he studies coral reefs in the Indian Ocean. Smith and his team discovered a thriving underwater ecosystem and are now trying to understand the secrets of its success. The Ask and Answer Questions activity will support students in becoming active readers and help them understand information as they read.

With the start of a new school year, we also have news for you. Teachers told us they’d like to get the teacher’s guide a month early. So to help better meet your needs, we are developing a guide that will be available only online. Starting with our October issue, the guide will be 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.

In this issue, you and your students will find out how we see the world and why things in nature aren’t always what they seem to be. Be on the lookout for engaged readers as they learn about the world and the power of observation.

Sincerely yours,



Jacalyn Mahler
Editor in Chief

In This Issue

SEEING EYE TO EYE

PP. 2-9

Curriculum Connections

- Language Arts • Physical Science
- Life Science

Standards Correlations

- **Language Arts:** Use of comprehension strategies
- **Physical Science:** Properties of light
- **Life Science:** Similarity and differences of living organisms

Literacy Skills

- **Reading Strategy:** Determine Importance
- **Vocabulary:** Action Verbs

FOOLED YOU!

PP. 10-17

Curriculum Connections

- Language Arts • Life Science

Standards Correlations

- **Language Arts:** Using informational text features
- **Life Science:** Diversity and adaptation of living organisms

Literacy Skills

- **Reading Strategy:** Visualize
- **Vocabulary:** Multiple-Meaning Words
- **Writing:** Creative Writing

SEARCH FOR SURVIVORS

PP. 18-23

Curriculum Connections

- Language Arts • Geography • Life Science

Standards Correlations

- **Language Arts:** Purpose of text
- **Geography:** People, places, and environments
- **Life Science:** Interdependence of organisms

Literacy Skills

- **Reading Strategy:** Ask and Answer Questions
- **Vocabulary:** Using Diagrams

Answer Key

Seeing Eye to Eye • Teacher’s Guide, p. T3

1. Light bounces off an object and hits the cornea.
2. Light enters the pupil.
3. Light passes through the lens to focus the image.
4. The image appears on the retina upside down.
5. The brain flips the image right-side up.

Fooled You • Teacher’s Guide, p. T5

Drawings of examples of mimicry and facts will vary.

Search for Survivors • Teacher’s Guide, p. T7

Answers will vary.

Review • Teacher’s Guide, p. T8

1. c
2. d
3. a
4. d
5. a
6. a
7. d
8. b
9. a
10. a

Next Issue

Eye in the Sky: From TV programs to cell phones and weather forecasts, readers will learn about the big part satellites play in their lives.

Frightful Animals: Students tour the world to meet some of the strongest, scariest, and deadliest animals alive.

America the Beautiful: Readers will meet a photographer who has visited all 58 national parks.

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 $\frac{1}{4}$ 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: As you read aloud the first paragraph, ask students to listen for action words. Display the words *flies* and *dives*. Discuss how these action words add to the story and help readers paint a picture in their minds. Have students suggest other action verbs that could replace *flies* and *dives* in the paragraph. Then ask students to create original sentences with the displayed words and share them aloud. Have the class select the most descriptive sentence and explain why they chose it.

Before Reading

Activate Prior Knowledge: Display this question: *What is the story about?* Have pairs of students answer the question by reading the headline and bold headings and by previewing the pictures. Next, have pairs create a KWL chart recording what they *Know* about the topic in the first column and what they *Want* to learn in the second column. Volunteers can share their responses. Point out that different readers come to the story with different knowledge and experiences with the topic. After reading the story, students can record what they *Learned* in the last column of the chart.

Reading Strategy

Determine Importance: Explain that like many nonfiction texts, this story presents facts and information that may be new to students. Tell them there are strategies that can help readers remember important 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 reflects, or bounces off things. It also bends. Light slows down when it goes through water or glass.) Tell students to stop and ask themselves these two questions after each section. You may want to have them read the story in pairs and pause to sum up the main ideas.

After Reading

- **Content Literacy:** Distribute the blackline master on p. T3. For the top portion, students should write the correct order for the five steps. For the bottom portion, they should label the four parts of the eye. Suggest they use p. 5 of the story to find the answers.
- **Language Arts:** Have students find five action verbs in the story and use each one in a sentence. Volunteers can read their favorite sentence aloud. (Examples of action verbs: *catch*, *turn*, *bouncing*, *travels*, *moves*, *bends*, *hitting*, *flips*, *catch*, *soaks*)
- **Math:** Remind students that light is the fastest known thing. Have students find out how fast other things move such as space shuttles, airplanes, cheetahs, etc. Extend the activity by having students create bar graphs with the data.

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SEEING EYE TO EYE

1. 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.

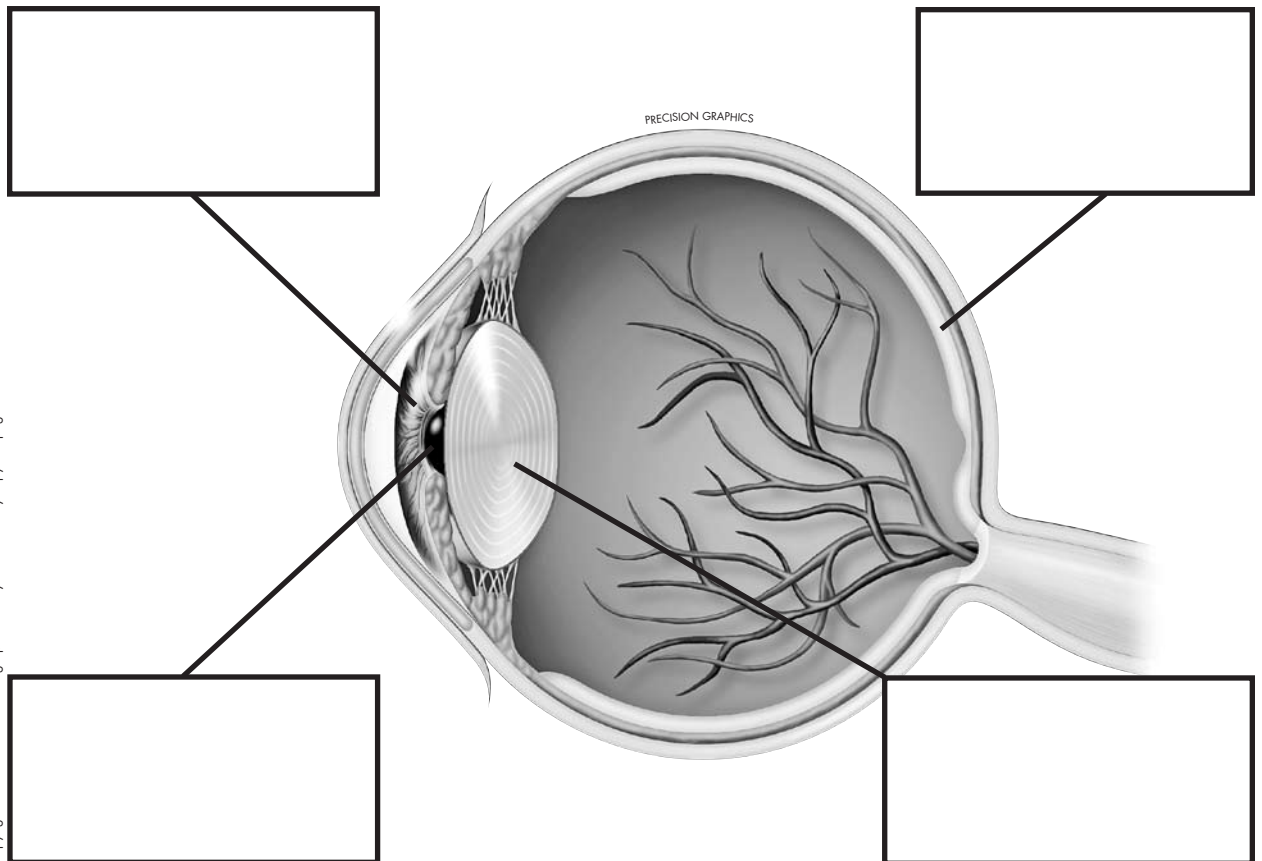
_____ The brain flips the image right-side up.

_____ Light bounces off an object and hits the cornea.

_____ The image appears on the retina upside down.

_____ Light enters the pupil.

2. Fill in each label for the eye diagram. Show the iris, lens, pupil, and retina.



Fooled You!

About the Story

Is it a leaf or an insect? 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 flowers, 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 animals of prey use mimicry to disguise themselves as something dangerous or undesirable to predators. To trick their prey, some predators take on the appearance of harmless animals or flowers.
- Camouflage is another form of animal adaptation used as protection from predators. Animals that use camouflage blend in with their surroundings, making them harder to find. Color camouflage is the most well-known form.

Vocabulary

Multiple-Meaning Words: Display the word *fly* and ask students what it means. Lead them to see that the word can be used in different ways with different meanings. Explain that when students come across a word that is used in different ways, they need to think about the story topic and look for clues in the story to figure out its meaning.

Model for students how to use context. Say: *In this story, the word mimic is used in different ways—each with a meaning that's connected to the idea of copying, or imitating, something else.* Display and read aloud these sentences from the story. *Some deadly animals mimic each other for extra protection. A mimic octopus can copy many toxic sea creatures.* Point out in the first sentence *mimic* is a verb, telling that some animals copy others. In the next sentence *mimic* is an adjective describing the octopus as a copy cat. 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 headings. Have students share with a partner three things they learned from this preview and what they think the story will be about. Invite students to share their predictions about the story.

Reading Strategy

Visualize: As you read aloud the introduction, ask students to picture the scene in their minds. Say: *What do the plants and animals look like? How do they move?* Invite volunteers to describe what they pictured and tell which of the writer's words help them form these mental pictures. Suggest that as students read, they look for words that help them see, feel, hear, and smell what the writer describes.

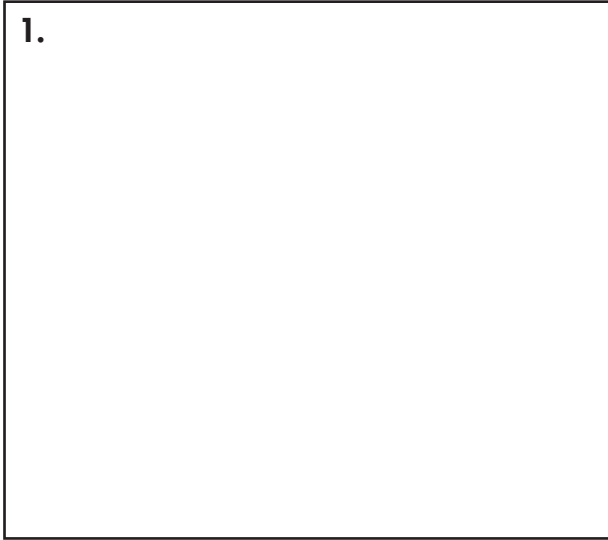
After Reading

- **Visualize:** Ask each student to think of and share a mental picture that he or she formed while reading. Next, help students recall descriptions from the story that appealed to different senses. For example, sight: *a shiny stone*; touch: *prickly branch*; taste: *don't make great meals*; smell: *drop in for a sniff*; hearing: *call that sounds like a whole flock*. Then distribute p. T5. 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 about that plant or animal.
- **Creative Writing:** Have students pretend they are a National Geographic explorer searching for mimics. Invite them to write a paragraph about their activities. Tell them to be sure to answer the questions *who?*, *what?*, *where?* in their reports.
- **Language Arts:** Challenge pairs of students to think of as many multiple-meaning words as they can in three minutes. Give them this hint: think of verbs or action words first.
- **Art:** Invite students to create a BEWARE OF MIMIC poster of one of the plants or animals in the story. The poster should show a drawing of the species and explain what it mimics and why.

Foiled You!

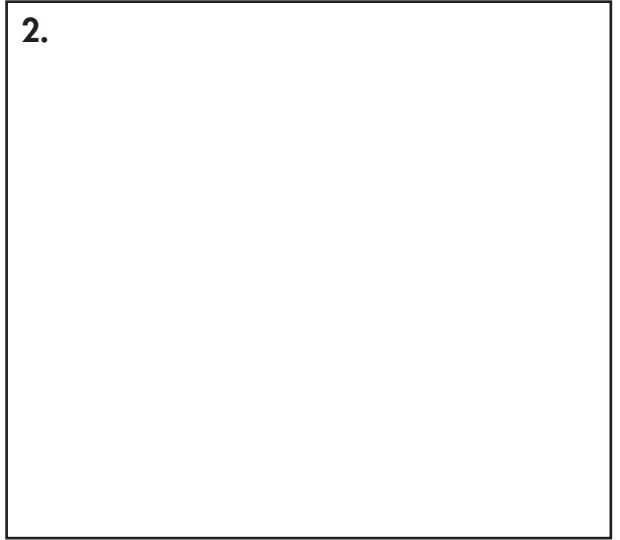
What did you picture in your mind as you read the story? In each box, draw a plant or animal that uses mimicry. Then write a fact you learned.

1.



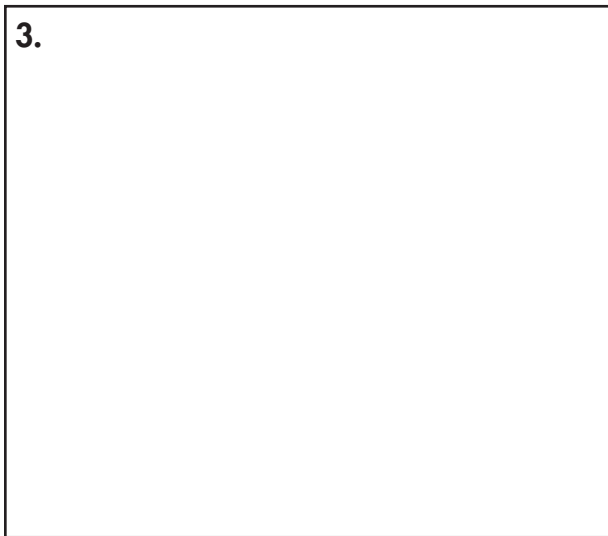
Fact: _____

2.



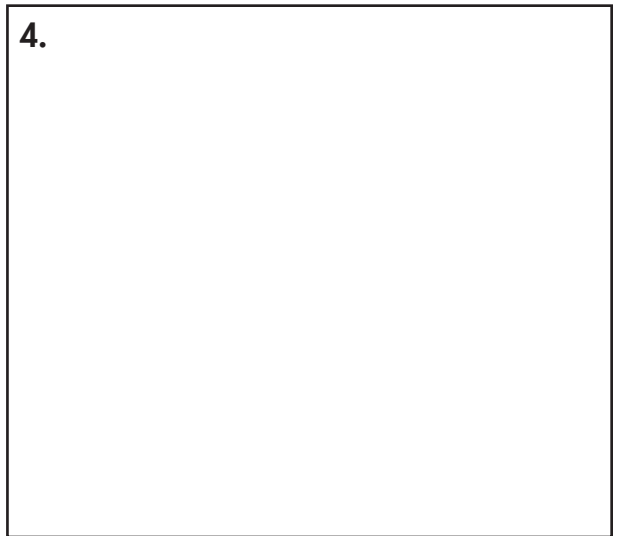
Fact: _____

3.



Fact: _____

4.



Fact: _____

Search for Survivors

About the Story

In the Indian Ocean off the Seychelles Islands, marine scientists are studying a thriving coral reef. Students will learn how this undersea world, built by tiny coral polyps, has survived a tsunami and the effects of a warmer ocean. However, like many other reefs, it still faces natural and human threats that could affect the growth of polyps and coral.

Fast Facts

- Coral reefs are the largest living structures on Earth. They vary greatly in size, ranging from only a few thousand yards to more than 192 square kilometers (74 square miles).
- A coral reef is a diverse ecosystem with as many as 4,000 species of fish, 700 types of coral, and thousands of plants and animals.
- At the present rate of destruction, 70% of the world's coral reefs will be destroyed by 2050.
- Coral reefs protect the coastlines of 109 countries by keeping strong waves from smashing into shore and creating quiet water habitats safe for boating and fishing.
- Reef growth is slow, at only 1 centimeter to 18 centimeters ($\frac{1}{2}$ inch to 7 inches) in any year.

Vocabulary

Visual Literacy: Explain to students that the photos and captions in a story can help them understand new information and new words. Explain that labeled diagrams can also help them better understand what they are reading. Invite a volunteer to read aloud the first paragraph under “Sights and Sounds.” Ask what he or she thinks *tentacles* means. Explain that the other words in the sentence are clues that *tentacles* are “something” that stings, but the meaning still may not be completely clear.

Next, direct students’ attention to the diagram on p. 21. Read aloud the title and the four parts of a coral polyp that are labeled. Discuss with students how a polyp might use *tentacles* to sting prey and then eat the captured food. Suggest that students refer to the diagram as they read to help them better understand the story.

Before Reading

Set a Purpose: Read aloud the headline and deck on p. 18. Ask: *What is the story about?* (a marine biologist who went to the Seychelles Islands) *What does he want to find out?* (if coral reefs are dead or alive) Ask students what questions come to mind when they read this text. Model this for students by thinking out loud with your own questions. For example, say: *I know that coral reefs are made by small sea animals. I wonder what could kill a coral reef and what is needed to keep it healthy.* Display your questions and explain that you are going to read the story to find the answers. Distribute p. T7. Have students write two questions they would like the story to answer.

Reading Strategy

Ask and Answer Questions: Remind students that as they read they should ask and answer questions about the information. Explain that this strategy will help them make sure they understand the text and stay focused on the important ideas. Suggest that students pause after reading two pages of the story and reflect on what they read using the “While you Read” items on p. T7.

After Reading

- **Ask and Answer Questions:** Have students share their answers from the “While you Read” section. Encourage them to write any questions they still have about reefs on the back of the page. Discuss how they might go about finding the answers to their particular questions.
- **Art:** Have students create a shoebox coral reef or desk-size mural. Their work should show the common plant and animal life found in coral reefs.
- **Language Arts:** Remind students that compound words are words made up of two, smaller base words. Point out that this story is filled with compound words such as *butterflyfish*, *parrotfish*, *clownfish*, etc. Working in pairs, have students make a list of all the compound words they find in the story. They can select two to describe and illustrate.

Search for Survivors

Before You Read

Write two questions you would like the story to answer.

1. _____

2. _____

While You Read

Read two pages, then stop and answer this question. "What do you want to remember?"

3. After you read pages 18-19.

4. After you read pages 20-21.

5. After you read pages 22-23.

After You Read

6. When you have finished reading the story, write any questions you still have on the back of this page. How can you find the answers?

COMPREHENSION CHECK

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

1. What is the first thing that happens inside your eye when you see something?
 (A) Light breaks into colors.
 (B) Your brain flips the image.
 (C) Light enters your eye.
 (D) An image shows on your retina.
2. Why does the iris widen the pupil at night?
 (A) to let you see color
 (B) to protect the iris
 (C) to act like a mirror
 (D) to let in more light
3. What is a compound eye?
 (A) an eye with thousands of tiny lenses
 (B) an eye with the shape of a W
 (C) an eye with a mirror behind the retina
 (D) an eye that can only see gray
4. Why do animals mimic other animals?
 (A) to sneak up on prey
 (B) to scare away attackers
 (C) to look poisonous
 (D) all of the above
5. Which of these is a mimic?
 (A) a bug that looks like a thorn
 (B) a bird that sings songs
 (C) a frog that eats toxic ants
 (D) a flower that smells good
6. Why do so many insects mimic ants?
 (A) Ants sting and taste bad.
 (B) Ants walk in a zigzag pattern.
 (C) Ants build big nests.
 (D) Ants live in groups.
7. What do the bee orchid and the carrion flower both do?
 (A) smell very, very bad
 (B) look like a female bee
 (C) use poison as a defense
 (D) attract insects to collect pollen
8. Which words best describe the coral reef David Smith explored?
 (A) loud, scary
 (B) colorful, healthy
 (C) old, crowded
 (D) quiet, empty
9. Why does a clownfish have a slimy coating on its body?
 (A) to protect it from stingers
 (B) to hide it from predators
 (C) to keep it warm
 (D) to make it taste bad
10. What happens when coral polyps die?
 (A) The coral reef stops growing.
 (B) The water warms up.
 (C) The fish get bigger.
 (D) The reef gets healthier.