

NATIONAL GEOGRAPHIC Explorer!

Pathfinder Edition

nationalgeographic.com/ngexplorer/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 anatomy of the eye and how it catches, bends, and focuses light. Students will compare animals’ eyes and learn how the structures help animals survive. You can use the Content Literacy activity to assess your students’ understanding of key science concepts.

“Fooled You!” takes students into the world of nature’s copy cats—animals that look, move, and 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 each example of plant and animal mimicry.

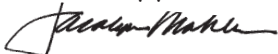
“Search for Survivors” follows scientist David Smith as he studies coral reefs in the Indian Ocean. Smith and his team discovered a thriving underwater ecosystem and are now trying to understand the secrets of its success. The Ask and Answer Questions activity will prompt students to be active readers and help them understand and clarify 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:** Compound Words
- **Writing:** Persuasive Writing

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. b
4. a
5. d
6. c
7. a
8. d
9. d
10. a
11. a
12. d

Next Issue

Eye in the Sky: From TV programs to cell phones and weather forecasts, readers 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.

From Acadia to Yosemite: 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 carefully for action words. Display the words *soars*, *scan*, *spies*, and *dives*. 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 that they use them to add impact to their writing.

Before Reading

Activate Prior Knowledge: Display this question: *What is the story about?* Have pairs of students prepare to answer the question by reading the headline and deck and previewing the pictures and bold headings. Next, have pairs work together to create a KWL chart. Students should write what they *Know* about the story topic in the first column and what they *Want* to learn in the second column. Encourage volunteers to share their responses. Point out that different readers come to the story with different knowledge and experiences with the topic. Explain that after reading the story, in the last column of the chart, students will have a chance to record what they *Learned*.

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. 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.
- **Language Arts:** Have students use at least five of the precise action verbs from the vocabulary activity in a descriptive paragraph. Volunteers can read their paragraphs aloud.
- **Math:** Remind students that light is the fastest known thing. They can research how fast other things move such as sound, airplanes, cheetahs, space shuttles, etc. Extend the activity by having students create math problems with the data.

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SEEING EYE TO EYE

1. The five 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.

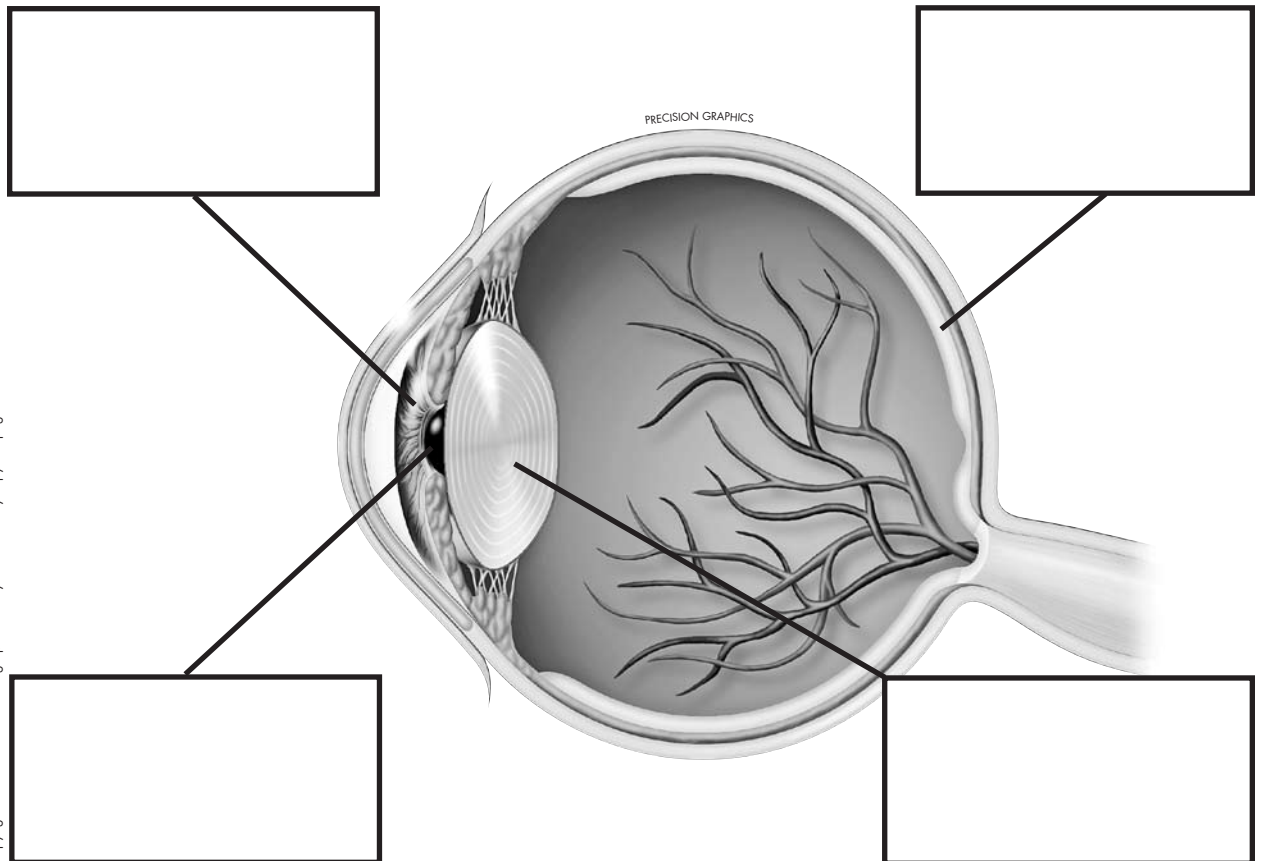
_____ The brain flips the image right side up.

_____ Light bounces off an object and hits the cornea.

_____ The image appears on the retina upside down.

_____ Light enters the pupil.

2. Label these parts on the eye diagram: iris, lens, pupil, 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 prey animals use mimicry to disguise themselves as something dangerous or undesirable to predators. To surprise unsuspecting prey, some species of 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 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 is 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 students turn to a partner and share three things they learned from this preview. Encourage 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, and smell what the writer describes.

After Reading

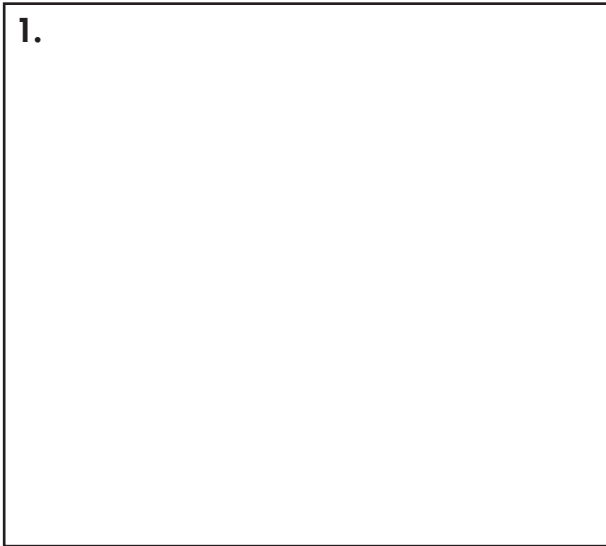
- **Check Predictions:** Have students check the predictions they made before they read the story. Discuss how they used the photos to predict what the story would be about and how they used the photos as a starting point for the mental pictures they made as they read the story.
- **Visualizing:** Before you distribute the activity on p. T5, ask each student to think of and then share a mental picture he or she formed while reading the story.

Help students recall descriptions from the story that appealed to different senses. For example, sight: *a shiny stone*; touch: *prickly parts*; taste: *aren't very tasty*; smell: *perfume to flies*; hearing: *chirps a warning*. 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 about that plant or animal that they learned from reading the story.

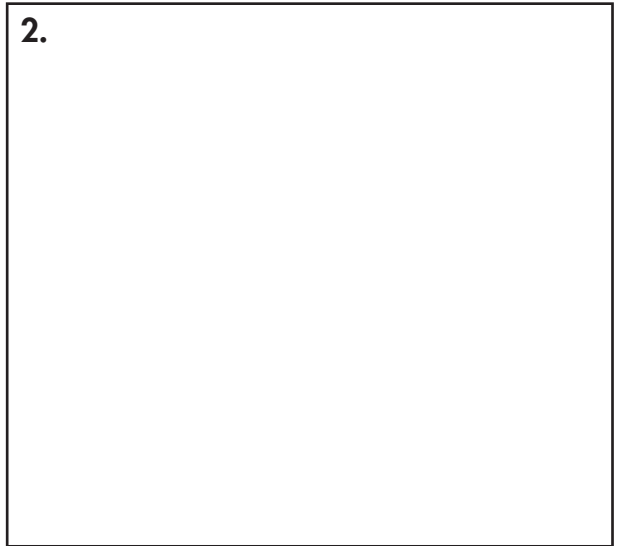
Foiled You!

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 about that plant or animal.

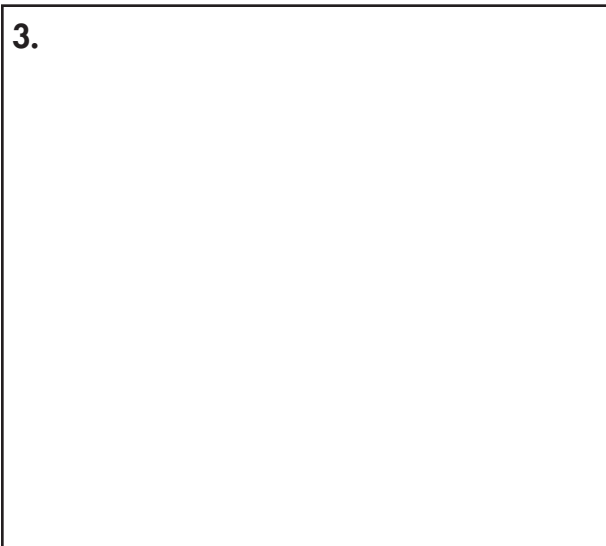
1.

Fact: _____

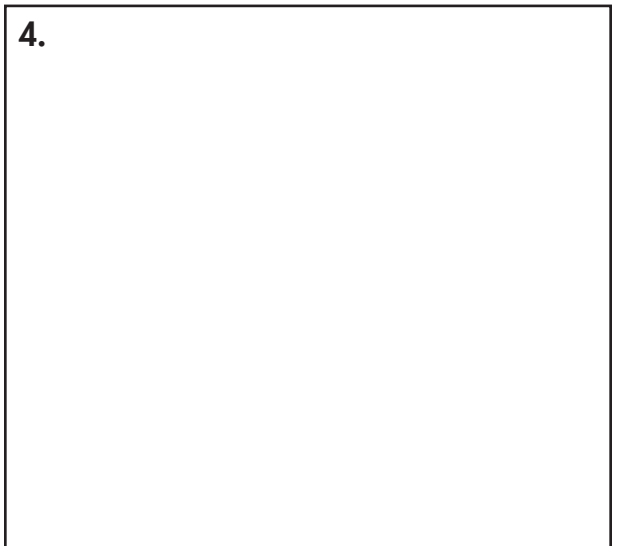
2.

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 El Niño. However, like many other reefs, it still faces the threats of warming oceans, overfishing, and tourism.

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. By protecting shorelines, coral reefs also create quiet water habitats that are safe for boating and fishing.
- Reef growth is slow, at only one centimeter to 18 centimeters ($\frac{1}{2}$ inch to seven inches) in any given year.

Vocabulary

Compound Words: Explain that readers often come across new or unusual words that are made up of two smaller words. In “Search for Survivors,” students will find many of these compound words that are names for different types of fish.

Ask students what they think a *clownfish* might look like? Why might a fish be named *sweetlips*? Model how to figure out the meaning of a compound word by thinking about the meaning of each base word. Have students skim p. 20 for additional compound words and discuss their meaning by looking at both word parts. (Compound words in the story: *damsel*fish, *file*fish, *surgeon*fish, *parrot*fish)

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 called coral polyps. I wonder what type of conditions can kill a coral reef. I also wonder what are the signs of a healthy reef.* Display your questions and explain that you are going to read the story to find the answers to these questions. Distribute p. T7. Have students write two questions they would like to answer when they read the story.

Reading Strategy

Ask and Answer Questions: Point out that asking questions about facts and ideas and then checking for the answers is also important during reading. Explain that this strategy can help readers make sure they understand the text and stay focused on what's important. Suggest that students pause and ask questions about each section of the story. They can use p. T7 to record their questions as they read. If they can't come up with the answers, they should reread before reading on.

After Reading

- **Ask Questions:** Have students share their questions and answers. Then have them complete the After Reading section.
- **Persuasive Writing:** Have groups create a public service announcement about a coral reef. Suggest they use the coral reef poster in the issue as a reference source. Groups will have two minutes to explain why coral reefs are important and how to protect them.
- **Art:** Have students create a shoebox coral reef or desk-size mural. Their product should show the common plant and animal life found in coral reefs.

Search for Survivors

Before You Read

Write two questions you would like the story to answer.

1. _____

2. _____

While You Read

As you read these sections, ask yourself questions about what you are reading. Then try to answer your questions.

Construction Zone

3. Question: _____

Answer: _____

Coral Casualties

4. Question: _____

Answer: _____

Reef Troubles

5. Question: _____

Answer: _____

After You Read

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

COMPREHENSION CHECK

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

- What is the first thing that happens inside your eye when you see something?
 - White light breaks into colors.
 - Your brain flips the image.
 - Reflected light enters your cornea.
 - An image appears on your retina.
- What does the pupil do?
 - tells you how far away things are
 - glows in the dark
 - mixes different colors
 - lets light enter your eye
- How does seeing in different directions at once help some animals?
 - They can stay active at night.
 - They can see danger coming.
 - Their eyes can take in more light.
 - Their eyes see while they are sleeping.
- What does a compound eye have?
 - thousands of tiny lenses
 - the shape of a W
 - a mirror behind the retina
 - a blue iris
- Why do animals use mimicry?
 - to sneak up on prey
 - to scare away attackers
 - to look poisonous
 - all of the above
- Which of these is *not* an example of mimicry?
 - an orchid that looks like a bee
 - a bird that sounds like a whole flock
 - a frog that eats toxic ants
 - a flower that smells like dead animals
- Why do so many insects mimic ants?
 - Ants sting and taste bad.
 - Ants walk in a zigzag pattern.
 - Ants are beautiful and work hard.
 - Ants live in groups.
- What do the bee orchid and the carrion flower both do?
 - smell very, very bad
 - resemble a female bee
 - use poison as a defense
 - use mimicry to attract insects
- Which words best describe the coral reef David Smith and his colleagues found?
 - dangerous, loud, scary
 - quiet, empty, damaged
 - big, deep, wide
 - noisy, colorful, busy
- What does the shiny coating on a clownfish do?
 - protects it from stinging anemones
 - lets it slide through the corals
 - makes it invisible to predators
 - gives it a bad taste that fish hate
- What happens when coral polyps die?
 - The coral reef stops growing.
 - The water warms up.
 - The fish population grows.
 - The reef gets healthier.
- What would you find in a natural area that has biodiversity?
 - animals that look like plants
 - animals that get along with each other
 - many animals that live a long time
 - many kinds of plants and animals