



### In This Guide

In this guide, you will find language arts and science lessons for the stories in the May issue of EXPLORER PATHFINDER.

### Explorer Magazine

EXPLORER magazine is a classroom magazine specifically written for each grade, 2-5. Each grade's magazine contains a grade-appropriate reading experience, develops literacy skills and teaches standards-based science content. Great storytelling and stunning photographs teach your students about our planet and the people, plants, and animals that live on it. Use EXPLORER in your classroom to encourage students to explore our world and make it a better place.

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# Into the Hive

## LANGUAGE ARTS

### Objectives

- Students will identify and explain connections between vocabulary words.
- Students will interpret and explain information visually, orally, and quantitatively to quickly answer questions about the text.

### Resources

- Vocabulary Assessment Master (page 6)
- Language Arts Assessment Master (page 7)

### Summary

- The article “Into the Hive” introduces students to the three different types of honeybees that live in a hive, examines the role of each, and explores the important connection between honeybees and the pollination of plants.

## BUILD VOCABULARY AND CONCEPTS

- **beeswax**
- **hive**
- **nectar**
- **pollen**
- **pollinate**

Display the Wordwise section on page 9 of the projectable magazine. Invite volunteers to read aloud the words and their definitions. Encourage students to share what they know about each word.

Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to record each word and its definition. Then have them think about how the vocabulary words are related. Tell them to record five connections they see. For example: Honeybees carry pollen back to the hive.

After reading the article, divide the class into small groups. Have students share the connections they predicted before reading the article. Instruct them to reevaluate each connection based upon what they have learned. If necessary, have students rewrite their ideas to more accurately reflect connections between different vocabulary words.

### READ

Inform students that the purpose of this article is to introduce them to the different types of honeybees in a hive and to explore what each type of bee does.

Display pages 2-3 of the projectable magazine. Tell students to look at the photo. Remind the class that there are three types of bees in a hive. **Ask:** *How many kinds of bees do you think are shown here?* **Say:** *That seems like an impossible question to answer. But it's not if you know a little bit about honeybees.*

Display the diagram on page 7 of the projectable magazine. **Say:** *The illustrations in this diagram show you what each type of bee looks like. The labels tell you what they're called. And the captions tell you what the bees do. Based on the information in the captions, I'm pretty sure I can figure out how many kinds of bees are shown in the photo. Invite volunteers to read the captions aloud. **Say:** *These bees are busy. They aren't mating or laying eggs. They're working outside the hive. My guess is only one type of bee is shown in the photo. I think all of these bees are worker bees.**

Point out the class that you could have answered that question after reading the entire article, but often that's not necessary. Many times, readers can get information from photos, captions, diagrams, and other text elements in an article. That information can quickly answer some of the questions they have.

Give each student a copy of the **Language Arts Assessment Master**. Review the questions on the worksheet with the class. Then have students read the article on their own. As they do, instruct them to answer each question and record where they found the answer in the article.

# Into the Hive

## LANGUAGE ARTS

### TURN AND TALK

Have students turn and talk to discuss what they learned about honeybees. **Ask:** *Where do honeybees live?* (in hives) *What are the three kinds of honeybees?* (drones, queen, workers) *What does each type of bee do?* (Drones mate with the queen. The queen lays eggs. Workers do everything to take care of the hive and the other bees.) Invite students to share what else they learned about the three types of bees.

- **Finding Connections** Explain to students that reading definitions tells people what words mean. But readers can get a more thorough understanding if they recognize how important words are connected. Point out that this is exactly what they did when they wrote sentences about the vocabulary words in the article. Instruct students to turn and share the sentences they wrote on their **Vocabulary Assessment Masters** with a partner. Encourage them to discuss similarities and differences in their sentences to get an even deeper understanding of the vocabulary words.

- **Interpreting Information** After reading the article, remind students that article contain much more than text. They often contain photos, diagrams, captions, and other text elements, too. These text elements usually highlight important points in the text. Because of that, readers can often find answers to questions more quickly if they study the text elements on the page. Have students share their **Language Arts Assessment Masters** in small groups. Instruct students to compare the answers they recorded for each question. If their answers differ, suggest that they revisit the text they elements identified as sources and reevaluate their responses.

### WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *Why are there so many worker bees in a hive?*
- *What do worker bees do?*
- *What surprised you about what you read?*

## SCIENCE

### Objectives

- Students will understand why honeybees and plants need each other to survive.
- Students will understand how honeybees use their bodies to collect and process pollen and nectar.
- Students will recognize characteristics that distinguish honeybees from wasps and other types of bees.

### Resources

- Content Assessment Master (page 8)
- "The Buzz on Bees" poster (Teacher's Edition)
- Comprehension Check (page 9)
- "Into the Hive" Interactive Whiteboard (optional)

### Science Background

Honeybees are small insects (5-15 mm) that live in very large colonies or swarms. There may be more than 60,000 honeybees in one hive.

There are three types of bees: the queen, drones, and workers. Each hive has one queen. The queen is the largest bee in the hive. She can live up to five years. Her one job is to lay eggs. A queen bee can lay up to 2,500 eggs a day.

There are several hundred drones, or male bees, in a hive. The sole purpose of the drone bee is to mate with the queen.

The vast majority of bees in a hive are workers. These are female bees that do all of the work to keep the hive going. Worker bees clean the hive, take care of the young, build wax combs, guard the entrance, and find the food that feeds all of the other bees. They also make honey.

Honeybees get their food from flowers. They eat pollen and drink nectar. To guide other bees to flower, a honeybee dances. The worker bee lands on a vertical surface. If she runs straight up, she's telling the other bees to fly toward the sun. If she runs down, the food is in the opposite direction. She wiggles her abdomen to communicate distance. The more she wiggles, the further away the food is.

### ENGAGE

#### Tap Prior Knowledge

Ask students to think of a time when they saw a bee landing on a flower. Have them describe what the bee did when it got to the flower. As a class, discuss what the bee was doing and why it might have landed on the flower.

### EXPLORE

#### Preview the Lesson

Display pages 2-3 of the projectable magazine. Give students a moment to read the headline to themselves and to examine the photo. **Ask:** *What type of insect does this photo show? (honeybees) Where are they going? (into the hive) Why? (The hive is their home.)* Draw students' attention to the honeybee above the word "Into" in the headline. Point to its hind leg. **Say:** *This bee has a very fat hind leg. The leg looks yellow.* **Ask:** *Do you think that's just the way the leg looks in the photo or is there something on the honeybee's leg? If so, what could it be?* Encourage students to share their ideas.

#### Set a Purpose and Read

Have students read the article in order to understand how honeybees use their bodies to collect and process pollen and nectar. They will also recognize characteristics that distinguish honeybees from wasps and other types of bees.

### EXPLAIN

#### Honeybees and Plants

Display pages 8-9 of the projectable magazine. Point out to students that the honeybees in both of these photos are visiting flowers. **Ask:** *Which subhead on this page tells you why the honeybees are visiting the flowers? (Finding Food)* Read that section aloud.

**Ask:** *What do bees get when they visit flowers? (pollen and nectar) What do they do with the pollen and nectar? (They eat the pollen and drink the nectar. They also use the nectar to make honey.)* Discuss how their visit also helps flowers survive. (Bees pollinate flowers so they can make seeds.)

## SCIENCE

### EXPLAIN

(continued)

#### Understanding Bee Body Parts

Display pages 8-9 of the projectable magazine. Ask students what the honeybees are doing in each photo. (Page 8: drinking nectar; page 9: collecting pollen) **Say:** *Honeybees eat some of the pollen and nectar they get when they visit flowers. But not all honeybees leave the hive. So bees that do fly out into the field need to collect pollen and nectar and bring it back to the hive so all of the other bees have food, too.* Discuss how the honeybees do this. (The bee drinks nectar with its mouth and stores it in its two stomachs. The bee collects pollen in pollen baskets its hind legs and on tiny hairs on its body.) Give each student a copy of the **Content Assessment Master**. Then divide the class into small groups. Challenge students to explain how honeybees use their body parts to collect pollen and nectar, how they make honey, and how they use other body parts to make the wax cells where they store the pollen and nectar in the hive. Tell students to circle each body part they include in their descriptions.

#### Honeybees vs. Wasps and Other Bees

Display "**The Buzz on Bees**" poster. Invite a volunteer to read aloud the headline and subhead. Then examine the four bees on the poster. Discuss how the different physical and behavioral characteristics help each type of bee survive. Then zoom in on the section "Wasp vs. Bee." Review the traits of wasps and bees. As a class, discuss how wasps and bees are different.

### ELABORATE

#### Find Out More

Remind students that honeybee larvae eat something called "bee bread." The article says that "bee bread" is made out of honey, pollen, and royal jelly. But it doesn't tell readers how bees make this food. Instruct students to conduct research to learn how honeybees make this important food for their growing larvae.

#### Extend Your Thinking About Insects

Inform students that honeybees are the only insects in the world that make a food people eat. But in some parts of the world, people eat insects for food. Divide the class into small groups. Instruct groups to conduct research to find one insect people eat for food. Challenge them to write a recipe that would entice their friends to eat that insect for lunch!

### EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *What is beeswax?* (a substance excreted from the glands located on the underside of a honeybee)
- *What is a pollen basket?* (an area on a honeybee's hind leg where she collects pollen)
- *Why do honeybees and flowers need each other to survive?* (Flowers make food that honeybees eat. Bees pollinate flowers so they can make seeds that grow into new plants.)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article. You may also wish to examine the optional **Interactive Whiteboard** lesson that accompanies this article.

**VOCABULARY ASSESSMENT: Into the Hive**

Record each vocabulary word and its definition.

Word	Definition

Write five sentences to tell how different words are connected.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

**LANGUAGE ARTS ASSESSMENT: Into the Hive**

Answer each question about bees. Record where you found the information in the article.

	Answer	Source
How long does it take for a bee to grow from an egg into an adult?		
What does a bee larvae look like? Where does it grow?		
Which bees work in the hive? What jobs do they do?		
Which bees work outside of the hive? What do they do?		

**CONTENT ASSESSMENT: Into the Hive**

Explain how honeybees use their body parts to collect and process pollen and nectar. Tell how they make honey and beeswax. Circle each body part you include.

Collect Pollen	Collect Nectar
Make Honey	Make Beeswax



**COMPREHENSION CHECK: Into the Hive**

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. Which kind of honeybee collects pollen and nectar from flowers?

- A drone
- B queen
- C worker

2. Where is a honeybee's pollen basket located?

- A on its back
- B on its hind legs
- C in its mouth

3. Which body parts do honeybees use to collect and store nectar?

- A mouth and stomachs
- B legs and hairs
- C wings and antennae

4. What do honeybees make to build the hive?

- A pollen baskets
- B bee barf
- C beeswax

5. Explain how honeybees make honey.

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# Magnificent Magnets

## LANGUAGE ARTS

### Objectives

- Students will create sketches to understand the meaning of unfamiliar words.
- Students will use details and examples to make inferences.
- Students will explain concepts based on information in the text.

### Resources

- Vocabulary Assessment Master (page 14)
- Language Arts Assessment Master (page 15)

### Summary

- The article “Magnificent Magnets” invites students to discover how magnets work and how they are used in the world.

## BUILD VOCABULARY AND CONCEPTS

- **attract**
- **electromagnet**
- **magnet**
- **magnetic field**
- **magnetic pole**
- **repel**

Display the vocabulary words on a word wall or on the whiteboard. Point out to students that when they read they will encounter words they don't know. Remind them that using context clues such as the sentences before and after an unknown word and photographs on the page can help them figure out what the unfamiliar word means.

Invite a volunteer to read the definition of *attract* in the Wordwise feature on page 15 of the article. Examine this word in context. Then give each student a copy of the **Vocabulary Assessment Master**. Instruct students to write the word's definition and create a detailed sketch showing what it means. Inform students that their drawings won't all be the same. The point is for students to draw the word in a way that helps them remember what it means. Examine the other words in this same way.

### READ

Let students know that the purpose of this article is to discover how magnets work and how they are used in the world.

Inform students that sometimes that as they read about magnets they will find examples where the writer says exactly what he means. But other times, the writer gives clues. It is up to the reader to interpret and connect those clues and then come to a logical conclusion, or inference.

Display pages 10-11 of the projectable magazine. Model how to make an inference. Read aloud the headline. **Say:** *According to the headline, this article is about magnets. That's pretty clear. Knowing that, I can infer that the two silver and red objects in the photo are magnets. It makes sense to have a photo showing what the article is about. Point out the silver lines in the photo. **Say:** When I look at these lines, I notice something strange. All of the lines are pointing toward the magnets. And all of the larger objects are near a magnet's end. I wonder why.*

Read aloud the comprehension strategy in the upper left corner of the page. **Say:** *Here it tells me that there is a relationship between magnets and some objects. Based on the photo, I can infer that a relationship exists here. Each of these objects is pulled toward the magnet. To find out why, I'll need to read the article.*

Give each student a copy of the **Language Arts Assessment Master**. Have students read the article on their own. As they do, instruct them to record three questions they have about the text. Challenge them to find clues in the photos and text that help answer each question. Then have them write what they already know about each subject. Challenge students to make logical inferences based on the information they have recorded.

# Magnificent Magnets

## LANGUAGE ARTS

### TURN AND TALK

Have students turn and talk to discuss what they learned about how magnets work. **Ask:** *What is a magnet?* (a material that has a magnetic force) *What does that mean?* (A magnet can attract or repel objects.) *What is the biggest magnet shown in the photos in this article?* (Earth)

- **Make Inferences** Remind students that an inference isn't a wild guess. It's a logical conclusion based on information in the text. **Say:** *Writers want readers to understand any inferences they make, so they try to leave a clear path of clues for readers to follow.* Have students share their **Language Arts Assessment Masters** with a partner. Did students investigate the same questions? Did they make the same inferences? Have students share the clues they found with their partners. Challenge them to explain how the clues and what they already knew led them to each logical conclusion.

- **Explain Concepts** After reading the article, **say:** *One way to see if you understand information is to try to tell someone else about the topic. If you can't explain the concept, you might need to read the article again.* Have students turn and talk to explain to a partner why some of the robots in the article are humanoid robots and some are not. Prompt discussion with questions.

### WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *What is a magnetic field?*
- *Why are some magnets stronger than others?*
- *What surprised you about what you read?*

# Magnificent Magnets

## SCIENCE

### Objectives

- Students will understand how magnets work.
- Students will recognize how magnets make life better for people and animals.

### Resources

- Content Assessment Master (page 16)
- "Earth's Magnetic Field" poster (Teacher's Edition)
- Comprehension Check (page 17)

### Science Background

A magnet is a material that has a magnetic force. Although that force is invisible, it is powerful. It allows magnets to pull other objects toward them or to push the objects away.

Magnets get this power from the spinning motion of electrons. Electrons circle the nucleus, or core, of the atoms that make up matter. When electrons spin, they create electricity. This occurs in all types of matter. But in most materials, equal numbers of electrons spin in opposite directions, canceling out the magnetism.

In some materials—like iron, cobalt, and nickel—most of the electrons spin in the same direction. If a material like this enters the magnetic field of another object, such as Earth, that object obtains its own magnetic force.

Every magnet has two poles, north and south. Opposite poles are attracted to each other. They are pulled together. The same poles repel, or push apart.

An electromagnet is a type of magnet created when a material becomes magnetic after an electric current is passed through a wire coiled around it. Magnets like these need electricity to create a magnetic field. When the electric current is turned off, they can no longer attract or repel other objects.

### ENGAGE

#### Tap Prior Knowledge

Display a mixture of plastic and metal paper clips on a desk. Invite a student to hold a magnet over the objects. Give students a moment to observe as the metal the paper clips move toward the magnet but the plastic ones don't. Challenge students to explain what just happened.

### EXPLORE

#### Preview the Lesson

Display pages 10-11 of the projectable edition. Read aloud the headline and subhead. **Ask:** *What is this article about?* (magnets) *What does the subhead claim?* (that magnets make life better for people and animals) Brainstorm ideas about how this might be possible.

#### Set a Purpose and Read

Have students read the article in order to understand how magnets work and recognize how magnets make life better for people and animals.

### EXPLAIN

#### Understanding How Magnets Work

Display page 12 of the projectable magazine. Zoom in on the small photo of the magnet. Point out the letters "N" and "S" on the magnet's two ends. Inform the class that these letters identify magnetic poles. **Say:** *All magnets have magnetic poles. The objects in this photo are attracted to the poles because that's where the magnet's force is strongest.* Remind students that the north and south poles of two magnets attract. But two of the same poles will repel. Point out that Earth is a giant magnet. Like smaller magnets, it has two magnetic poles. **Say:** *Earth also has a giant magnetic field, or area of magnetic force. It is so strong that it extends into space.* Display the **"Earth's Magnetic Field" poster**. Discuss how Earth's magnetic field is formed. Then display the photo of *Aurora Australis* on pages 12-13 of the projectable magazine. Discuss how Earth's magnetic field causes this to happen.

# Magnificent Magnets

## SCIENCE

### EXPLAIN

(continued)

#### Recognizing the Benefits of Magnets

Remind students that magnets use an invisible force to push and pull some objects without even touching them. **Say:** *Often when people think of magnets they picture something like the magnet shown on pages 10-11 of this article. They see a bar or a horseshoe-shaped object that picks up metal objects. But there are different types of magnets. And using magnets helps people and animals in different ways. Give each student a copy of the **Content Assessment Master**. Then assign each student a partner. Instruct partners to review the article to find information about magnets. Challenge them to explain how the magnets that animals and people in different situations use work. Then have them tell how the magnets make their lives better.*

### ELABORATE

#### Find Out More

Display pages 14-15 of the projectable magazine. Inform students that the article explained how people use magnets to operate doorbells, dishwashers, and trains. But it only showed a picture of an electronic device. Instruct students to conduct research to learn how electronic devices use magnets. Invite them to share what they learned with the class.

#### Extend Your Thinking About Magnets

Remind students that in some parts of the world people use magnets to move trains. These trains can travel at speeds of up to 500 kilometers per hour! Discuss the pros and cons of using a train that could travel that fast.

### EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *What is an electromagnet?* (a piece of iron that becomes magnetic after an electric current is passed through a wire coiled around it)
- *What creates a magnetic field?* (the spinning motion of electrons inside a magnet)
- *What does magnetism help loggerhead sea turtles do?* (follow their annual migration route)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article.

## VOCABULARY ASSESSMENT: Magnificent Magnets

Record the definition of each vocabulary word. Create a sketch to help you remember what each word means.

Word	Definition	Sketch
attract		
electromagnet		
magnet		
magnetic field		
magnetic pole		
repel		

Name \_\_\_\_\_

Date \_\_\_\_\_

**LANGUAGE ARTS ASSESSMENT: Magnificent Magnets**

Use this organizer to make three inferences about magnets.

Questions I Have	Clues I Found	What I Know	What I Infer

Name \_\_\_\_\_

Date \_\_\_\_\_

## **CONTENT ASSESSMENT : Magnificent Magnets**

Use this organizer to record information about how people and animals use magnets.

Person or Animal	How does the magnet work?	How does it make life better?
Early Explorers		
Loggerhead Sea Turtles		
People at Home		
People Who Travel		



**COMPREHENSION CHECK: Magnificent Magnets**

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

- Where on a magnet is the force the strongest?  
A in the field  
B at the poles  
C around the magnetite
- What natural magnet did early explorers use as a compass?  
A iron oxide  
B pistons  
C lodestone
- What does magnetism help loggerhead sea turtles do?  
A swim  
B sense  
C navigate
- What does the spinning motion of electrons in a magnet create?  
A magnets  
B a magnetic field  
C magnetic poles

5. Describe one way magnets make people's lives better.

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# Okavango Adventure

## LANGUAGE ARTS

### Objectives

- Students will predict definitions and then write sentences to better understand unfamiliar words.
- Students will use details and examples to make inferences about the text.
- Students will explain concepts based on information in the article.

### Resources

- Vocabulary Assessment Master (page 22)
- Language Arts Assessment Master (page 23)

### Summary

- In the article “Okavango Adventure,” National Geographic Explorer Steve Boyes takes readers through the Okavango Delta in Botswana, Africa in a traditional dugout canoe. Boyes explains the importance of the Okavango ecosystem to African wildlife and identifies potential threats to the delta from human activities.

## BUILD VOCABULARY AND CONCEPTS

- delta
- mokoro
- wetland

Give each student a copy of the **Vocabulary Assessment Master**. Point out to students that they may have heard some or all of these words before.

Using that background knowledge as a base, instruct students to predict and write a definition for each word. Then have them write a sentence using each word, based on the definitions they wrote.

Display the Wordwise feature on page 23 of the projectable magazine. Review the definitions as a class. Have students add these definitions to their worksheets. Instruct them to write new sentences, using each word as it is defined in the article.

Invite volunteers to read aloud the before and after sentences they wrote for each word. As a class, examine how new knowledge contributed to students' understanding of each word.

### READ

Let students know that the purpose of this article is to introduce them to Africa's Okavango Delta. As they read, they will learn why the ecosystem here is important to African wildlife. They will also learn about human activities that can harm the delta. Display pages 16-17 of the projectable edition.

**Say:** *Sometimes writers state things explicitly. That information is easy to understand. Other times, they don't. Readers have to follow clues to figure out what the writer means.*

Invite a volunteer to read aloud the headline. **Say:** *This headline is great example. It says this article is about an adventure. I wonder why. Model how to make an inference. **Say:** The first clue that will help me figure this out is the photo. I can see the very tip of a dugout canoe. It is floating in some sort of marshy water. This water looks pretty calm, though. How can this be an adventure? Perhaps we'll learn more if we read the text. Invite a volunteer to read aloud the text. **Say:** So much for those calm waters! Based on this information, something big is going to jump out of the water. And based on what I already know about places like this, I'm guessing that it might an alligator. Or perhaps it's a hippo. Hippos are huge! To find out for sure, I'll have to read the article. But at least I answered one question. I now know why the writer called this trip an adventure!*

Give each student a copy of the **Language Arts Assessment Master**. Instruct students to read the article on their own. As they do, challenge them to combine what they know with what the text says to make five inferences about the Okavango Delta.

## LANGUAGE ARTS

### TURN AND TALK

Have students turn and talk to discuss what they learned about the Okavango Delta. **Ask:** *Where is the Okavango Delta? (Botswana, Africa) Why is the Okavango Delta special? (Most deltas form where a river empties into the ocean. This delta is in the middle of Africa's Kalahari Desert.)* Encourage students to share other interesting facts they learned about the Okavango Delta. **Then ask:** *Why was it helpful when the Okavango Delta was identified as a World Heritage Site? (That action prevents people from developing on the delta in any way that would hurt the environment.)*

- **Make Inferences** Remind students that an inference isn't a wild guess. It's a logical conclusion based on information in the text. **Say:** *Writers want readers to understand any inferences they make, so they try to leave a clear path of clues that readers can follow.* Have students share their **Language Arts Assessment Masters** with a partner to evaluate the validity of each inference students made. If any inferences are questionable, encourage partners to reread the article to search for more clues.

- **Explain Concepts** After reading the article, **say:** *One way to see if you understand information is to try to tell someone else about the topic. If you can't explain the concept, you might need to read the article again.* Have students turn and talk to explain to a partner what a mokoro is and why the researchers used them when they studied the Okavango Delta. Prompt discussion with questions.

### WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *Why do researchers study the Okavango Delta?*
- *Why is it important to protect the Okavango Delta?*
- *What surprised you about what you read?*

# Okavango Adventure

## SCIENCE

### Objectives

- Students will understand why the Okavango Delta ecosystem is important to African wildlife.
- Students will recognize how human activities can harm or help the delta.

### Resources

- Content Assessment Master (page 24)
- Comprehension Check (page 25)

### Science Background

Located in the northwest corner of Botswana, the Okavango Delta spreads out across 15,000 square kilometers. It is the largest freshwater ecosystem in the world.

Africa's Okavango Delta is unique. Most deltas form where rivers flow into the ocean. This delta exists where the Okavango River empties into the Kalahari Desert.

The Okavango Delta is home to some of the world's most endangered large animal species. This includes cheetahs, white rhinoceroses, black rhinoceroses, African wild dogs, and lions. Other large animals include giraffes, antelopes, Nile crocodiles, warthogs, and the plains zebra. About 400 species of birds and 71 species of fish live here, too.

Life on the delta is ruled by the weather. The wet season typically begins in March and peaks in July. Many large animals leave the delta during this time to make their homes in the lush grasslands that surround the delta.

In 2014, the United Nations named the Okavango Delta as its 1,000<sup>th</sup> World Heritage Site.

## ENGAGE

### Tap Prior Knowledge

Encourage students to think of nature shows about Africa that they've seen on television. Invite volunteers to describe what the places they saw looked like. Brainstorm a list of animals that lived there. Discuss what it would be like to explore a place like this in real life.

## EXPLORE

### Preview the Lesson

Instruct students to turn to page 19 of their student magazines. Invite a volunteer to read aloud the text in the box at the bottom right corner of the page. Then encourage students to scan the photos in the article. Discuss reasons why the writer would call Okavango the wildest place on Earth.

### Set a Purpose and Read

Have students read the article in order to understand why the Okavango Delta ecosystem is important to African wildlife and how human activities can harm or help the delta.

## EXPLAIN

### Understanding the Delta Ecosystem

Display the Wordwise feature on page 23 of the projectable magazine. Read aloud the definition for *delta*. Review with the class what a delta is. Then display the article's photos one at a time. Invite volunteers to read aloud each caption. Use the information in the photos and captions to paint a picture in students' minds that shows what the Okavango Delta is like. Discuss how a place like this could provide animals with everything they need to survive. Then give each student a copy of the **Content Assessment Master**. Instruct students to select three examples of animals in the Okavango Delta that were not represented in the article's photos. Based on the descriptions in the text, challenge students to draw a picture of each animal in its natural habitat. Encourage them to write informative captions for each of their pictures.

# Okavango Adventure

## SCIENCE

### EXPLAIN

(continued)

#### Recognizing the Impact of Humans

Display page 23 of the projectable magazine. Zoom in on the section "Saving the Okavango." Invite volunteers to read the section aloud. Inform the class that researchers have spent years keeping track of the wildlife that live on the Okavango Delta. **Ask:** *Why is this work important?* (Many of the animals are endangered species. By studying the animals' movements and habits, researchers can learn how to save the animals.) Tell students that the Okavango Delta is now a World Heritage Site. Discuss what that is and how having this status can help protect the area. Then point out that the Okavango Delta is very large. And it is fed by rivers that cross three countries. Challenge students to explain why this could be a threat. (Everything people do upstream affects the delta. Pollution flows down the river. If people decided to build a dam, less water would flow to this area.) Divide the class into pairs. Challenge each pair to think of a way to teach more people about the Okavango Delta.

### ELABORATE

#### Find Out More

Point out to students that the scientists who conduct research on the Okavango Delta get a lot of help from members of the ba'Yei tribe. Have students conduct research to learn more about these people, who call the Okavango Delta their home.

#### Extend Your Thinking About the Okavango Delta

Display page 22 of the projectable magazine. Point out that the researcher in this photograph is using solar-powered technology to study the delta. Discuss why this is necessary. Brainstorm ideas about other ways researchers could use technology to overcome obstacles when working in remote locations.

### EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *What is a delta?* (an area of land shaped like a fan and formed by deposits of sand and mud at the mouth of a river)
- *Why is the Okavango Delta so large?* (It forms at the mouths of three rivers.)
- *What is a wetland?* (land consisting of marshes or swamps)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article.

Name \_\_\_\_\_

Date \_\_\_\_\_

**VOCABULARY ASSESSMENT : Okavango Adventure**

Use this organizer to study each vocabulary word in the article.

<b>Word</b>			
<b>Predicted Definition</b>			
<b>Sentence</b>			
<b>Definition from the Article</b>			
<b>Sentence</b>			

## LANGUAGE ARTS ASSESSMENT: Okavango Adventure

Combine what you know and what the text says to make five inferences about the Okavango Delta.

What I Know

What the Text Says

What I Can Infer

+

=

+

=

+

=

+

=

+

=

Name \_\_\_\_\_

Date \_\_\_\_\_

**CONTENT ASSESSMENT: Okavango Adventure**

Draw pictures of three animals that live in the Okavango Delta. Write captions to tell about each.

Captions			Pictures		



**COMPREHENSION CHECK: Okavango Adventure**

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

- Where is the Okavango Delta located?  
A Asia  
B Australia  
C Africa
- What is the land on the delta like?  
A It is a desert.  
B It is a wetland.  
C It is a beach.
- Which of these animals lives on the Okavango Delta?  
A mountain goats  
B hippos  
C mokoros
- Why do researchers worry about the river that flows into the delta?  
A The river is not large.  
B The river is not protected.  
C The water in the river is not pure.

5. Explain what a delta is. Tell why the Okavango Delta is special.

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## ANSWER KEY

### Into the Hive

#### Assess Vocabulary, page 6

Students should record the words and definitions from the Wordwise feature on page 9.

**beeswax:** a substance excreted from the glands located on the underside of a honeybee

**hive:** a bee's home

**nectar:** a sweet liquid secreted by flowers

**pollen:** tiny grains a plant makes to reproduce

**pollinate:** to transfer pollen from one flower to another

Sentences will vary depending on which vocabulary words students select.

#### Assess Language Arts, page 7

1) Answer: It takes 21 days for a bee to grow from an egg to an adult. Source: diagram, page 4. 2)

Answer: A bee larva looks like a c-shaped white worm. Source: diagram, page 4; photo, page 5. 3)

Answer: Worker bees that are house bees and nurse bees work in the hive. They clean, care for the queen and young bees, and make beeswax and wax cells. Source: text and captions, pages 5 and 6. 4) Answer:

Worker bees that are field bees work in the field. They collect pollen and nectar and bring it back to the hive. Source: Text and captions, pages 6 and 7.

#### Assess Content, page 8

Possible response are noted below. Words in bold are body parts that students should circle.

Collect pollen: Honeybees collect pollen in **pollen baskets** on their hind **legs**. Pollen also sticks to **tiny hairs** on their bodies.

Collect nectar: Honeybees drink nectar with their **mouths**. They have two **stomachs**. One is used to store nectar that they take back to the hive.

Make honey: A bee vomits nectar from her **stomach** into another bee's **mouth**. The saliva breaks down the nectar. The bees spread the nectar out. They fan it with their **wings** until it dries to form thick honey.

Make beeswax: House bees ooze a liquid wax from their **underbellies**. It hardens into scales. Bees chew on the scales in their mouths. These soft softened scales become beeswax.

#### Comprehension Check, page 9

1. A; 2. B; 3. A; 4. C; 5: Field bees vomit nectar into the mouths of house bees. Their saliva breaks the nectar down. They spread the nectar out and fan it with their wings. When it's thick, it becomes honey.

### Magnificent Magnets

#### Assess Vocabulary, page 14

Students should record the words and definitions from the Wordwise feature on page 15.

**attract:** to pull toward

**electromagnet:** a piece of iron that becomes magnetic after an electric current is passed through a wire coiled around it

**magnet:** a material that has a magnetic force

**magnetic field:** the area of magnetic force around a magnet

**magnetic pole:** the area of a magnet where the force is strongest

**repel:** to push away

Sketches will vary depending on students' interpretations of each word. Evaluate each response for accuracy.

#### Assess Language Arts, page 15

Students' questions will vary but all clues should come directly from text and photos in the article. Evaluate students' inferences to ensure that they are logical conclusions based on information in the text and student's prior knowledge of magnets.

#### Assess Content page, 16

Students' responses should resemble the following:

Early explorers used a natural magnet called lodestone. When magnetite in it is electrified by lightning, the atoms align and point toward the North Star. Magnets like these make life better for people who need a compass to navigate.

Loggerhead sea turtles have iron oxide in their brains. It helps them sense Earth's magnetic field and navigate along their migration route. Magnets like these make life better for any animal that is able to navigate in this same way.

# Pathfinder

## ANSWER KEY

### Magnificent Magnets

(continued)

People at home have magnets in doorbells. A magnet inside forces a spring-loaded piston to smack a bell. There are also electromagnets in dishwashers. Electricity runs through a wire wrapped around a piece of metal. When a load is finished, it opens the drain valve so water can leave the dishwasher. Magnets like these make life better for people who use products that contain them.

Some people who travel ride trains that use electromagnets to move. Magnets on the track repel and lift magnets on the train. This moves the train along the track very quickly. This makes life better for people who need to get somewhere very quickly.

#### Comprehension Check, page 17

1. B; 2. C; 3. C; 4. B; 5: Answers will vary but should be based on information in the text.

### Okavango Adventure

#### Assess Vocabulary, page 22

Students' predictions and the sentences they write will vary. They should record the words and definitions from the Wordwise feature on page 23.

**delta:** an area of land shaped like a fan and formed by deposits of sand and mud at the mouth of a river

**mokoro:** the traditional dugout canoe of the people of the Okavango Delta

**wetland:** land consisting of marshes or swamps

#### Assess Language Arts, page 23

Answers will vary depending on what students know, what they cite from the text, and what they infer.

#### Assess Content, page 24

Illustrations should depict animals named in the article but not shown in photos. Captions should be accurate and written in students' own words.

#### Comprehension Check, page 25

1. C; 2. B; 3. B; 4: B; 5: A delta is an area of land shaped like a fan and formed by deposits of sand and mud at the mouth of a river. The Okavango Delta is special because it is in the middle of Africa's Kalahari Desert.