



In This Guide

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

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**
- **proboscis**

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 how bees get food from plants.

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** with a partner. 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?*
- *How do bees find food?*
- *What surprised you about what you read?*

Into the Hive

SCIENCE

Objectives

- Students will understand that honeybees rely on plants for pollen and nectar.
- 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 visiting a flower. Have them describe what the bee did. As a class, discuss reasons why the bee 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. Tell them they'll know the answer after they read the article.

Set a Purpose and Read

Have students read the article in order to understand that honeybees rely on plants for pollen and nectar and how honeybees use their bodies to collect and process these foods. 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

Into the Hive

SCIENCE

pollinate flowers so they can make seeds.)

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 proboscis 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 a proboscis?* (an elongated sucking mouthpart)
- *What is a pollen basket?* (an area on a honeybee's hind leg where she collects pollen)
- *How do bees make beeswax?* (A liquid wax oozes off of a house bee's underbelly. It cools and hardens into scales. The bee chews the hard scales until they are soft and turn into beeswax.)

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**

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 part of a flower provides food for bees?
A leaves
B stem
C flowers

- 2. What do honeybees use to collect and store pollen?
A proboscis
B pollen baskets
C wings

- 3. Where do honeybees store nectar that they take back to the hive?
A in their mouth
B in a stomach
C in pollen baskets

- 4. What do honeybees make to build the hive?
A pollen baskets
B bee barf
C beeswax

5. Explain how honeybees make honey.

Magnificent Magnets

LANGUAGE ARTS

Objectives

- Students will create sketches to understand the meaning of unfamiliar words.
- Students will understand the relationship between examples and scientific concepts.
- 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

Inform students that the purpose of this article is to help them understand how magnets work and how they are used by people and animals. Tell students that throughout the article the writer gives examples that help explain scientific concepts. If readers understand the relationship between items in the examples, they will understand the scientific concepts introduced.

Display pages 10-11 of the projectable magazine. Read aloud the headline. Then draw students' attention to the two large red and silver objects. **Say:** *When I look at this image, I see two large magnets. There's also a lot of smaller silver things. All of the small pieces are lined up. And the bigger things are grouped at the end of the magnets. Each of these objects must be attracted to the magnets.*

Point out to students that readers often use what they already know to identify relationships within the text. They use examples and information in the text to fully understand the concepts. Then read aloud the subhead. **Say:** *According to this, magnets make life better for people and animals. I know that I can use a magnet to pick up some metal objects, but I'm not sure how that will make my life better. And animals can't use magnets like this. Animals must use magnets in a different way. I'll need to read the article to find the connection.*

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 explain how different types of magnets work. Challenge them to explain how the magnets make life better for the people or animals involved.

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

- **Understanding Relationships** Remind students that identifying relationships is a strategy to help them understand scientific concepts when they read.

Say: *Sometimes when we read, we encounter ideas we're unfamiliar with. Scientific concepts, in particular, can be difficult to understand if they're new. Examples help readers visualize the ideas. They give readers the pieces they need to put the ideas together so they can understand.* Have students compare their **Language Arts Assessment Masters** with a partner. Did each partner come up with the same explanations? If not, encourage them to reread the text and review the information again.

- **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.

- *How does magnetic force help animals?*
- *How does magnetic force help people?*
- *What surprised you about what you read?*

Magnificent Magnets

SCIENCE

Objectives

- Students will recognize that Earth is a magnet and that its magnetic field extends out into space.
- Students will understand how Earth's magnetic field creates spectacular light displays on Earth.

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 pile of metal paper clips on a desk. Invite a student to hold a magnet over the objects. Invite a volunteer to explain what just happened. Brainstorm ideas about what this experiment has to do with the planet Earth.

EXPLORE

Preview the Lesson

Display pages 10-11 of the projectable edition. Give students a moment to examine the photo **Ask:** *How are the magnets in this photo like the planet Earth?* Invite volunteers to share their ideas.

Set a Purpose and Read

Have students read the article in order to recognize that Earth is a magnet, that its magnetic field extends out into space, and that its magnetic field can create spectacular light displays on the planet.

EXPLAIN

Recognizing That Earth is a Magnet

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. Inform students that Earth is a giant magnet. Like smaller magnets, it has two magnetic poles. Display the **"Earth's Magnetic Field" poster**. Discuss how Earth's magnetic field is formed. Point out that it extends out into space. Challenge students to explain how Earth's magnetic field affects people and other objects on both Earth and out in space.

Magnificent Magnets

SCIENCE

EXPLAIN

(continued)

Understanding Earth's Magnetic Field

Display the photo of *Aurora Australis* on pages 12-13 of the projectable magazine. Ask students if they've ever seen something like this in the night sky. If so, invite them to describe the experience. **Say:** *In order to see something like this, you must be near one of Earth's poles. Magnetism at Earth's poles interacts with particles from the sun. This creates unusual light displays in the sky.* Tell students that these displays are called *Aurora Borealis* at the North Pole and *Aurora Australis* at the South Pole. Give each student a copy of the **Content Assessment Master**. Using the **"Earth's Magnetic Field" poster** as a guide, instruct students to draw a diagram of Earth's magnetic field. Have them include a light display at each pole.

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 magnetic field?* (the area of magnetic force around a magnet.)
- *What creates a magnetic pole?* (the area of a magnet where the force is strongest)
- *What creates light displays at Earth's poles?* (Earth's magnetic field)

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

Tell how the magnet in each object works. Tell how each magnet makes life better for people or animals.

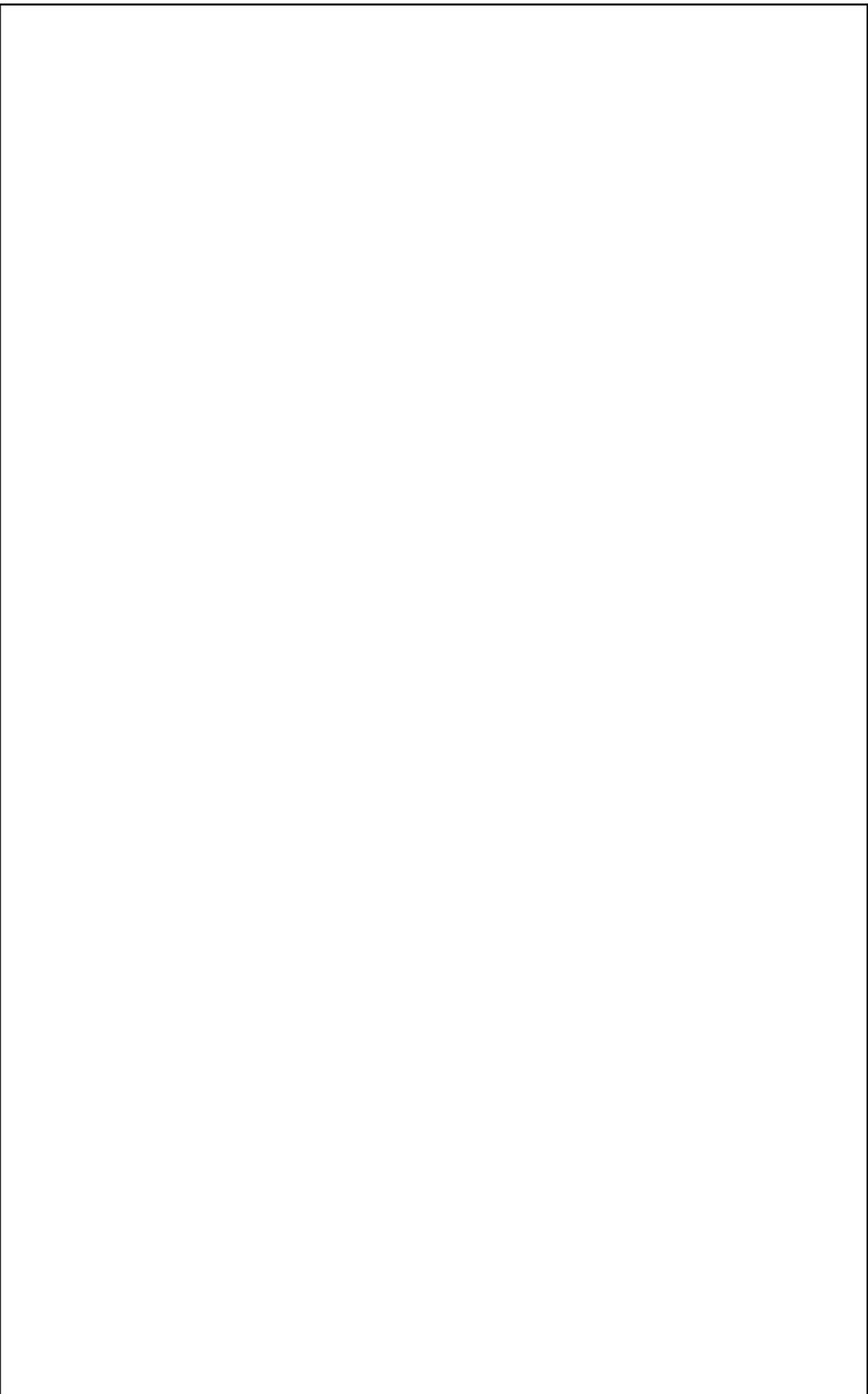
Object with Magnet	How does the magnet work?	How does it make life better?
Lodestone		
Loggerhead Sea Turtle		
Doorbell		
Dishwasher		
Train		

Name _____

Date _____

CONTENT ASSESSMENT: Magnificent Magnets

Create a diagram of Earth's magnetic field. Include a light display at each pole.



COMPREHENSION CHECK: Magnificent Magnets

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

- Which of these extends into space?
A Earth's magnetic pole
B Earth's magnetic field
C Earth's electromagnet
- What is Earth's core made of?
A solid iron
B bands of molten iron
C magnetite and lodestone
- What does magnetism help loggerhead sea turtles to do?
A swim
B sense
C navigate
- Where does Earth's magnetic field create spectacular light displays?
A at the equator
B on the moon
C at Earth's poles

5. Explain how Earth's magnetic field creates spectacular light displays.

Okavango Adventure

LANGUAGE ARTS

Objectives

- Students will predict definitions and then write sentences to better understand unfamiliar words.
- Students will distinguish between facts stated explicitly and inferences made using information in the text.

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.

Tell students that one skill that all good readers have is the ability to make inferences as they read.

Say: *When writers write, sometimes they use facts to say exactly what they mean. These facts are explicit statements. Other times, they leave clues for readers to follow. Those clues help readers make inferences, which are logical conclusions based on information in the text*

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**. Have students read the article on their own. As they do, instruct them to record five explicit statements and 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.)

- **Explicit Statements and Inferences** Remind students that an explicit statement is something directly stated in the text. An inference is a logical conclusion reached after combining what you already know with information in the text. Have students share their **Language Arts Assessments Masters** with a partner. Encourage them to point out where in the article they found each explicit statement. Instruct them to evaluate the validity of each inference. If any inferences are questionable, encourage partners to reread the article to search for more clues.

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 is the Okavango Delta dangerous?*
- *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 1,000th 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.

Word			
Predicted Definition			
Sentence			
Definition from the Article			
Sentence			

LANGUAGE ARTS ASSESSMENT: Okavango Adventure

Record five explicit statements about the Okavango Delta from the text. Then combine information from the text with what you already know to make five inferences.

Explicit Statements	
1.	
2.	
3.	
4.	
5.	

What the Text Says	What I Already Know	Inferences I Can Make

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.

- 1. In which country is the Okavango Delta located?
A Angola
B Namibia
C Botswana

- 2. What kind of ecosystem is the Okavango Delta?
A desert
B wetland
C beach

- 3. Which of these animals lives in the Okavango Delta?
A crocodiles
B mokoros
C bears

- 4. What can people no longer do on the Okavango Delta?
A conduct research
B use technology
C develop the land

5. Explain what a delta is. Tell why the Okavango Delta is different from other deltas.

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

proboscis: an elongated sucking mouthpart

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:

House bees and nurse bees clean and maintain the hive. They care for the queen and young bees. Source: text and captions, pages 5 and 6. 4) Answer:

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. C; 2. B; 3. B; 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 based on students' interpretations of each word. Evaluate each response for accuracy.

Assess Language Arts page, 16

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: These animals 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..

Doorbells: A magnet inside forces a spring-loaded piston to smack a bell. This alerts people that someone has come to visit.

Dishwasher: These appliances have electromagnets inside them. Electricity runs through a wire wrapped around a piece of metal. When the load is finished, it opens the drain valve so water can leave the dishwasher. This helps people in their homes.

Adventurer

ANSWER KEY

Magnificent Magnets

(continued)

Trains: Some trains 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.

Assess Content, page 15

Students' diagrams should resemble the drawing on the "Earth's Magnetic Field" poster. They should include light displays at the North and South Poles.

Comprehension Check, page 17

1. B; 2. A; 3. C; 4. C; 5: Particles from the sun move through Earth's magnetic field. This creates unusual light displays at Earth's poles.

Okavango Adventure

Assess Vocabulary, page 22

Students' predictions for definitions 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

Students should write at least one question that begins with each question word. All questions should relate to the text. Answers should also come from the text.

Assess Content, page 24

Students' illustrations should depict animals mentioned in the article but not shown in the article's photographs. Captions should be accurate and written in students' own words.

Comprehension Check, page 25

1. C; 2. B; 3. A; 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 a desert.