

TEACHER'S GUIDE



Pathfinder (Grade 4)

Vol. 16 No. 4

In This Guide

This guide contains language arts and science lessons for articles in this issue of EXPLORER PATHFINDER.

Explorer Magazine

EXPLORER classroom magazines are specifically written for each grade, 2-5. Through great storytelling and stunning photographs, the EXPLORER magazines develop literacy skills and teach standards-based science content.

The EXPLORER magazines strive to offer a variety of reading experiences for students with different ability levels in the same class. Thus, all articles have been measured using the Lexile® Framework for Reading. Some articles will be easier to read than others, but all articles in EXPLORER PATHFINDER will be within the 450-850L range.

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Your Subscription Includes:

- Magazines
- Classroom Posters
- Projectable Magazine
- Interactive Whiteboard Lesson
- Teacher's Guide
- App (additional subscription required)

Objectives

- Students will identify and explain connections between vocabulary words.
- Students will use details and examples to make inferences about the text.
- Students will use what they learned to write an opinion piece stating their views on human interaction with Florida manatees.

Resources

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

Summary

- The article “Man and Manatee” introduces students to Florida manatees and examines their coexistence with people.

BUILD VOCABULARY AND CONCEPTS

- **activist**
- **advocate**
- **endangered**

Display the Wordwise section on page 6 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: Both activists and advocates work to save endangered species.

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

Let students know in this article they will read about Florida manatees and how humans interact with them. They will learn reasons why some people think human interaction helps manatees and others think it hurts the endangered species.

Tell students that as they read, they will come across many facts that are stated clearly in the text. These facts are explicit statements. But they will also encounter clues that require them to make an educated guess, or inference. To do this, they must combine what the text says with what they know to reach a logical conclusion.

Display the photo on pages 2-3 of the projectable magazine. Instruct students to examine the man and the manatee in the photo. **Say:** *When I look at this photo, I see a man snorkeling next to a large animal. I've never seen an animal like this, so I'm not sure what it is.* Read aloud the headline. Then model how to identify explicit statements and make an inference. *Now I know. The headline tells me that the animal in the photo is a manatee. That is explicitly stated. To understand what's happening here, I'll need to examine the clues. I can see that the man has a camera and he's quite close to the manatee. So I can infer, or make a logical guess, about what the man intends to do. He wants to take photos of the manatee.* Read aloud the deck. **Say:** *The deck raises a good question. Is this man helping or hurting the manatee? The manatee doesn't appear to be alarmed, but I don't know enough about manatees to know for sure. I'll need to read the article to figure out the answer to that question.*

Give each student a copy of the **Language Arts Assessment Master**. Instruct students to read the article on their own. As they do, instruct them to write one explicit statement and make one inference about the introduction and each section of the article.

Man and Manatee

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about manatees. **Ask:** *What is a manatee?* (a large animal that lives in shallow coastal areas) *Why do scientists argue that people should stay away from manatees?* (Manatees are an endangered species.) Invite students to share what else they learned about manatees.

- **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 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. Tell them to discuss similarities and differences in their sentences to get an even deeper understanding of the vocabulary words.

- **Make Inferences** Remind students that making inferences is a strategy to help them understand what they read. **Say:** *Understanding what you just read is important. But interpreting information from a writer's clues takes practice. If you can't follow the clues, you might need to reread the text.* Have students compare their **Language Arts Assessment Masters** with a partner. Did students identify the same explicit statements? Did they find the same clues? If so and they developed different inferences, tell students to review the text once again. Challenge them to explain to their partners how the clues they found helped them each reach logical conclusions.

- **Writing Opinions** Guide students as they discuss the following question: Does human interaction with Florida manatees help or hurt these wild animals? Then have students write a brief essay stating their opinions. Remind students to introduce the topic clearly and state their opinions in an organized way. Encourage them to use the explicit statements they found and inferences they made to support their views. Tell students to begin their essays on the front of their **Language Arts Assessment Masters** and finish it on the back.

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 people so interested in seeing manatees?*
- *In what ways does human interaction hurt manatees?*
- *What surprised you about what you read?*

Man and Manatee

SCIENCE

Objectives

- Students will recognize unique characteristics of the Florida manatee.
- Students will understand why manatees live along the Florida coast in winter.
- Students will identify actions people can take to help protect manatees.

Resources

- Content Assessment Master (page 8)
- "Meet the Manatee" poster (Teacher's Edition and pages 8-9 of the student magazine)
- Comprehension Check (page 9)
- "Man and Manatee" Interactive Whiteboard (optional)

Science Background

Manatees are endangered mammals that live in shallow, coastal waters. Unlike many water mammals, they never leave the water. When a manatee is born, its mother helps it reach the surface. That's where the baby takes its first breath. An hour later, it can swim on its own.

Manatees are herbivores that can grow up to 4 meters long and weigh up to 1,200 kilograms. Despite this size, manatees are actually graceful swimmers. Most of the time, they slowly glide along. But if needed, they can swim 15 mph (24 kph) for a short distance.

Resting manatees can stay underwater for up to 15 minutes. But when manatees swim, they must surface every three to four minutes to breathe. This can put them in danger. Many manatees die each year when they are hit by boats. Others get caught in fishing nets.

There are three different species of manatees. One lives in North America. The others live in the Amazon River and along the west coast and rivers of Africa. Regardless of where manatees live, they must go somewhere warm in winter. Despite their bulk, manatees don't have enough blubber to keep them warm in cold waters.

ENGAGE

Tap Prior Knowledge

As a class, discuss what it's like outside during the summer months. Then discuss what it's like during winter. Invite volunteers to describe how the big differences in temperature affect their lives. Point out to the class that animals must deal with changing seasons, too. Encourage students to identify different animals they've seen. Challenge them to describe what the animals do to survive when seasons change.

EXPLORE

Preview the Lesson

Display pages 2-3 of the projectable magazine. Zoom in on the manatee in the photo. Invite volunteers to describe the animal they see. Then zoom out to show the entire photo. Point out how close the man is to the manatee. **Ask:** *What does this tell you about the manatee's size?* (It's a very large animal.) Instruct students to examine the manatee's environment. **Ask:** *What clues in this photo tell you that manatees live in shallow water?* (The man is snorkeling. He isn't wearing scuba gear. And you can see the bottom of the ocean in the photo) Tell students they will learn more about manatees and where they live as they read the article.

Set a Purpose and Read

Have students read the article in order to recognize unique characteristics of the Florida manatee, understand why manatees live along the Florida coast in winter, and identify actions people can take to help protect manatees.

Man and Manatee

SCIENCE

EXPLAIN

Recognizing Manatee Traits

Display the **"Meet the Manatee" poster**. Invite a volunteer to read aloud the headline and deck. Challenge students to identify six things they learned about manatees just from reading the deck. (They have (1) egg-shaped heads, (2) flat flippers, and (3) fan-shaped tails. (4) They are often spotted in shallow coastal areas. (5) They graze when they eat. (6) They eat sea grasses and algae.) Have students follow along as you review the rest of the poster. Then divide the class into small groups. Instruct groups to review the article. Challenge them to identify additional manatee traits. Invite them to share what they learned with the class.

Understanding Manatee Migration

Display page 4 of the projectable magazine. Zoom in on the partial map of the United States. **Say:** *This map shows where manatees live along the Atlantic and Gulf coasts. They live in areas indicated by both dark and light blue during warm-weather months. But when it gets cold, they only live in the dark blue areas.* Display the map of Florida. Point out that both coastal and inland waterways have been marked with dark blue. Give each student a copy of the **Content Assessment Master**. Have students draw a map showing where manatees live at different times of the year. Remind them to include a map key. Then have them review the article with a partner. Challenge them to explain why manatees only live in Florida habitats during colder times of the year.

Identifying Ways People Can Help Manatees

Display page 6 of the projectable magazine. Zoom in on the sign at the bottom of the page. **Ask:** *Where would this sign be located and why is it needed?* (It would be in boat lanes of shallow waterways. That's where manatees live. When they come to the surface, they may be hurt by boats.) Divide the class into small groups. Instruct groups to review the article to identify things that activists and advocates are doing to help save manatees. Then have them brainstorm ideas and draw their own signs that will, in some way, help save this endangered species.

ELABORATE

Find Out More

Remind students that the article identified groups that want to limit access to manatees and those who don't. It also gave examples of how activists and advocates are trying to protect manatees while still giving tourists access to the animals. Divide the class into small groups. Have groups conduct research to learn more about these measures. Just how effective have these measures been at protecting this endangered species?

Extend Your Thinking About Manatees

Point out to the class that global temperatures are rising. Instruct students to imagine that temperatures rose enough that manatees were no longer limited to Florida habitats during cold-weather months. Discuss what that would mean for the manatees and for Florida businessmen who depend upon them for their income.

EVALUATE

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

- *What is the difference between an activist and an advocate?* (An activist campaigns for some kind of social change. An advocate publicly supports or recommends a particular cause or policy.)
- *Why do manatees flock to Florida in cold-weather months?* (The water is too cold for them to survive anywhere else.)
- *Why are boats such a danger to manatees?* (Manatees must come to the surface to breathe. Boats can hit them.)

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: Man and Manatee

Record each vocabulary word and its definition.

Word	Definition

Write five sentences to tell how different words are connected.

1. _____
2. _____
3. _____
4. _____
5. _____

LANGUAGE ARTS ASSESSMENT: Man and Manatee

Record an explicit statement and make an inference from the introduction and each section in the article.

Explicit Statements
Introduction: Section 1: Section 2: Section 3:

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

Do you think human interaction helps or hurts the Florida manatee? Write about it. Use what you learned to support your opinion.

Name _____

Date _____

CONTENT ASSESSMENT: Man and Manatee

Draw a map showing where manatees live at different times of the year. Include a map key.



Explain why manatees only live in Florida habitats during colder times of the year.

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COMPREHENSION CHECK: Man and Manatee

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

1. When might you spot a manatee along the South Carolina coastline?

- Ⓐ cold-weather months
- Ⓑ warm-weather months
- Ⓒ year-round

2. Why can't manatees stay warm in cold water?

- Ⓐ They are too small.
- Ⓑ They have thin skin.
- Ⓒ They lack the blubber.

3. What is a manatee most likely to do?

- Ⓐ avoid people
- Ⓑ approach people
- Ⓒ attack people

4. Which of these statements is true?

- Ⓐ Manatees have poor vision.
- Ⓑ Manatees breathe underwater.
- Ⓒ Manatees are strong swimmers.

5. Explain why Florida is the best place for manatees to go during winter.

Objectives

- Students will use context clues to understand the meaning of unfamiliar words.
- Students will explain how the writer uses reasons and evidence to support key points in the text.

Resources

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

Summary

- The article “Down to Earth!” introduces students to the force of gravity and explains how it works.

BUILD VOCABULARY AND CONCEPTS

- **force**
- **gravity**
- **mass**
- **weight**

Display the vocabulary words on a word wall or on the whiteboard. Inform students that when they read they will encounter words they don't know or words that they are more familiar with in another context. Remind them that using context clues such as the sentences before and after an unknown word and visuals such as photographs or illustrations on the page can help them understand what the unfamiliar word means.

Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to record each vocabulary word from the article. Have them scan the article to locate each bold word in the text.

Tell students to record text and visual clues from the article that are related to each vocabulary word. Then instruct each student to record his or her own idea about what each word means. Invite volunteers to read aloud the definitions in the Wordwise feature on page 14 of the article. Encourage students to compare the definitions they wrote with those in the text. Discuss how context clues helped them understand the meaning of each word.

READ

Write the words *reasons* and *evidence* on the board.

Then ask: *What's the difference between these two words?* Invite students to share their ideas. Guide the class to understand that a reason tells why something happened. Evidence shows how.

Inform students that valid reasons and solid evidence are crucial elements of any text. Writers use them to support key points on the topic.

Display pages 10-11 of the projectable magazine. Invite a volunteer to read aloud the introduction on the page. Guide students to recognize three key points in the text. (Gravity is a force. Gravity attracts one thing to another. We can't live without gravity.) Give each student a copy of the **Language Arts Assessment Master**. Invite students to record the three points.

Have students read the article on their own. As students read, encourage them to search for reasons and evidence that support each point.

Down to Earth

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about gravity. **Ask:** *What is a force?* (a push or pull that can make something move) *Who is Isaac Newton?* (an English scientist in the 1600s who understood gravity and wrote laws for how objects moved) *Why do things fall to the ground when you drop them?* (The gravity of Earth is pulling them down.)

- **Strengthen Understanding** Inform students that combining what you already know with what you learn can help readers understand new words. **Say:** *Once you understand what a word means, it's easier to use it correctly in a sentence.* Challenge students to make accurate statements using each of the vocabulary words. Encourage them to use their **Vocabulary Assessment Master** as a resource. Remind students to be original. They shouldn't restate sentences from the article. They should create new sentences of their own.

- **Identifying Reasons and Evidence** After reading the article, remind students that reasons tell why something happened. Evidence explains how. Invite students to share their **Language Arts Assessment Masters** in small groups. Challenge them to examine one another's results to determine that all reasons are valid, all evidence is solid, and both support the key points they identified in the text.

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 gravity an important force?*
- *How do you know gravity has a long reach?*
- *What surprised you about what you read?*

Down to Earth

SCIENCE

Objectives

- Students will understand what gravity is.
- Students will recognize how gravity affects their lives every day.
- Students will understand the difference between mass and weight.

Resources

- Content Assessment Master (page 16)
- "May the Force (of Gravity) Be With You!" poster (Teacher's Edition)
- Comprehension Check (page 17)

Science Background

If you drop a book, it falls. If you jump, you come back down. If an airplane takes off, it will land. None of these things floats out into outer space. Why? Gravity. Gravity is a force that pulls one object toward another. It pulls books, people, and planes toward the center of Earth.

The force of gravity is determined by mass and distance. Mass is the amount of material in an object. Objects with more mass have a stronger gravitational pull. Objects that are closer together also have a stronger gravitational attraction to each other.

Gravity is such a constant to life on Earth that people likely don't even think about how it affects their lives everyday. But gravity affects everything you see and do.

When you look up in the sky at night, you see the moon. The moon is there because of gravity. Gravity caused pieces of matter to clump together to form the moon. The pull of Earth's gravity keeps the moon going around Earth. And the pull of the sun's gravity keeps Earth and the other planets going around it.

Gravity acts on all objects, whether they're as big as a moon or as small as a pea. It always attracts and never repels. It's a weak force, but it works over long distances. Because of that, gravity is the most important force in space.

ENGAGE

Tap Prior Knowledge

Ask students if they've ever dropped a book. What happened? Ask them if they've ever seen an apple fall from a tree. What happened? Ask them if they've ever seen someone jump down from a high place. What happened? Now ask the class what all three of these things have in common. Guide them to recognize that the book, the apple, and the person all moved downward. Challenge the class to explain why the objects didn't move up instead.

EXPLORE

Preview the Lesson

Display page 12 of the projectable magazine. Have students examine the worm in the apple. **Ask:** *Why does this worm look scared?* (He's in an apple that's falling from a tree.) *What clues in the illustration tell you the apple is falling?* (The lines from the leaves to the apple.) *And what do you already know that tells you the apple is falling down instead of up?* (Nothing ever falls up.) Inform students that this happens because of gravity. Tell them they'll learn why as they read the article.

Set a Purpose and Read

Have students read the article to understand what gravity is, how it affects people's lives every day, and the difference between mass and weight.

EXPLAIN

Understanding the Force of Gravity

Display the Wordwise feature on page 12 of the projectable magazine. Zoom in on the introduction and invite a volunteer to read that text aloud. Guide students as they discuss what gravity is and how they know it exists. Then divide the class into small groups. Give each student a copy of the **Content Assessment Master**. Instruct students to review the article in their groups. Challenge them to summarize the content in each section. Then have them draw a picture that illustrates the main point each section makes about gravity.

SCIENCE

EXPLAIN

(continued)

Recognizing the Everyday Impact of Gravity

Display the "**May the Force (of Gravity) Be With You!**" poster. Read aloud the headline and deck.

Say: *Gravity is a natural force. Fortunately for us, it's everywhere on Earth. You can't escape it. But this headline raises an important question. What if you had a choice? What if you could turn gravity off? How would our lives be different? Zoom in on the section "Feeling the Force."* Invite a volunteer to read the copy aloud. Invite volunteers to identify examples of other everyday things they do that are affected by the force of gravity. Review the other sections of the poster in this same way.

Understanding Mass and Weight

Display page 15 of the projectable magazine. Instruct students to examine the three illustrations. **Ask:** *What do you notice?* (The same person is shown on Earth, the moon, and Mars. The person's weight changes.) Review the infographic's text with the class. Then challenge volunteers to explain in their own words why the person's weight changed. (The force of gravity changed.) **Ask:** *What would the numbers in the illustrations be like if they showed the person's mass instead of weight?* (the same) *Why?* (The person's mass would stay the same. Gravity has no effect on mass.) Invite students to share what else they know about mass and weight.

ELABORATE

Find Out More

Remind students that the moon's gravity pulls on Earth. According to the article, this is what causes ocean tides on Earth. Divide the class into small groups. Instruct groups to conduct research to learn exactly how the moon's gravity does this. Challenge them to identify additional ways the moon's gravity affects Earth. Then instruct groups to find ways Earth's gravity impacts the moon.

Extend Your Thinking About Gravity

Inform students that scientists have explored the possibility of having people live on the moon and Mars. Remind the class that the force of gravity on the moon and Mars is less than what it is on Earth. Brainstorm ideas about how this change in gravity could impact what people do if they lived on the moon or Mars. What would be easier to do? What would be harder?

EVALUATE

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

- *What is gravity?* (a force that pulls one object toward another object)
- *What is the difference between mass and weight?* (Mass is the amount of material in an object. Weight is how heavy something is. Gravity has no impact on mass, but it does on weight.)
- *Where do people weigh the most, on Earth, the moon, or Mars? Why?* (People weigh more on Earth because it has more mass and a stronger force of gravity than Mars or the moon.)

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

Name _____

Date _____

VOCABULARY ASSESSMENT: Down to Earth

Record information from the article about each vocabulary word.

Word				
Text Clues				
Visual Clues				
What I Think the Word Means				
Definition				

Name _____

Date _____

LANGUAGE ARTS ASSESSMENT : Down to Earth

Identify three key points the writer makes in the text. Record reasons and evidence that support each point.

Key Point	Reasons	Evidence

Name _____

Date _____

CONTENT ASSESSMENT: Down to Earth

Summarize the content in each section. Draw a picture that shows what each section tells you about gravity.

	Weak or Strong?	Putting Gravity to the Test	A Weighty Issue	Gravity's Long Reach	An important Force
Summarize					
Draw					

COMPREHENSION CHECK: Down to Earth

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

1. What does gravity do?
Ⓐ push things apart
Ⓑ pull things together
Ⓒ force things to float

2. What happens when you drop a marble and a bowling ball at the same time?
Ⓐ The marble lands first.
Ⓑ The bowling ball lands first.
Ⓒ The two objects land at the same time.

3. What determines the strength of gravity?
Ⓐ mass and distance
Ⓑ weight and distance
Ⓒ mass and weight

4. Which of these objects has the most gravity?
Ⓐ the sun
Ⓑ the moon
Ⓒ Earth

5. Describe how gravity affects one thing you do every day.

Objectives

- Students will identify and investigate the definitions of unfamiliar words.
- Students will identify the main idea of the article and explain how it is supported by key details.
- Students will summarize the article.

Resources

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

Summary

- The article "Frozen!" takes readers on 14-year-old Jade Hameister's journey to the North Pole. The trek is the first leg in her quest to be the youngest explorer to complete the Polar Hat Trick, or hikes across the North Pole, South Pole, and Greenland.

BUILD VOCABULARY AND CONCEPTS

Display pages 22-23 of the projectable magazine. Point out that there is no Wordwise feature in this article. **Say:** *That doesn't mean, however, that there will be no unfamiliar words in the article.*

Give each student a copy of the **Vocabulary Assessment Master**. As students read the article, instruct them to record each word they find difficult to understand. **Say:** *These may be words you've never seen before or they may be words you do know that are used in a new way.*

Tell students to circle three words on their lists. Have them predict and write a definition for each word. Next, have them write a sentence using each word, based on the definitions they wrote. Then have students find each word in a dictionary and record its definition. If a word has multiple meanings, have students use context clues in the article to select the correct definition. Have students write a new sentence based on the definition they found.

Invite volunteers to identify the words they defined and read aloud the before and after sentences they wrote. As a class, examine how investigating definitions contributed to students' understanding of each word.

READ

Give students a few minutes to scan the article in their magazines. **Then ask:** *What do you think this article is about? Why?* Encourage students to share their ideas.

Explain to students what they just attempted to identify was the main idea or overall topic of the article. Tell students that everything in the article is connected to the main idea. Each section has a main idea. Everything in a section is connected to the main idea of that section.

Display pages 16-17 of the projectable magazine. Model how to identify the main idea of the article. **Say:** *When I look at these pages, I notice two things right away: the photo and the headline. The photo tells me the article is about someone skiing in a very cold place. The headline tells me it's actually frozen here. These are good clues, but I need to know more. Who is this person? Where is the person going? Why is the person or the trip important enough to be featured in an article? Point out the deck in the lower right corner of the screen. Read it aloud. **Then say:** *Sometimes you have to search for the best clues. After reading this, I know exactly what this article is about. As I read, I will learn a 14-year-old girl who took trekked across ice to reach the North Pole.**

Give each student a copy of the **Language Arts Assessment Master**. Tell students to record the main idea of the article. (A 14-year-old girl went to the North Pole.) Then have students read the article on their own. As they read, instruct students to select two sections of the article and record important details in each that support the main idea of the text. After reading each section, challenge students to analyze the information they collected and write a brief summary telling what they learned.

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about Jade Hameister and her trip to the North Pole. **Ask:** *Why did Jade Hameister want to go to the North Pole?* (She listened to her dad's adventure stories and wanted to go after she heard about the Polar Hat Trick.) *What is the Polar Hat Trick?* (hikes across the North Pole, the South Pole, and Greenland) *How many people have complete the Polar Hat Trick?* (very few) Encourage students to share other facts they learned about Jade Hameister and her trip to the North Pole.

- **Support the Main Idea** Point out to students that it's easy to fill a page with details. The challenge for writers is to pick details that are important. The challenge for readers is to recognize important details when they see them. Have students share their **Language Arts Assessment Masters** in small groups. If any group members examined the same sections, encourage them to compare their results. Did they record the same details? If not, what important details did students miss?

- **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 how Hameister prepared for her trip. Prompt discussion with questions such as: *What did Hameister learn at snow survival camp?* (how to ski) *How did she prepare for the low levels of oxygen found in thin mountain air?* (She worked out in a special room that mimicked those conditions.) *How did she build up her strength so she could drag her sled?* (She dragged a tire on a rope as she ran on the beach.)

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 it difficult to find the North Pole?*
- *Why is spring the best time to go the North Pole?*
- *What surprised you about what you read?*

Frozen!

SCIENCE

Objectives

- Students will understand what the environment is like at the North Pole.
- Students will explain how Jade Hameister and her team worked together to reach their goals.

Resources

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

Science Background

The North Pole, located at exactly 90 degrees north latitude, is the northernmost point on Earth. It lies in the middle of the Arctic Ocean. The water here is more than 4,000 meters deep. It is almost always covered in floating ice.

Because of its location, sunlight here comes in extremes. In summer, daylight lasts up to 24 hours. In winter, an equal amount of time is spent in darkness. Each year, there's only one sunrise on the March equinox and one sunset at the September equinox.

Few people have explored the North Pole, likely because it's so difficult to do. There's no land to build a permanent facility, and it's hard to set up equipment.

In 1827, British Admiral William Edward Parry led the first expedition specifically targeting the North Pole. Nobody actually succeeded until the 20th century. And the first verified expedition by foot wasn't accomplished until the late 1960s.

In April 2016, 14-year-old Australian Jade Hameister became the youngest person to ski to the North Pole. Her four-person team succeeded after going more than 150 kilometers in temperatures down to -25° Celsius.

For Hameister, the North Pole is just the beginning. In 2017, she plans to cross Greenland. Then, she'll tackle the South Pole. If she succeeds, she'll become the youngest person ever to complete all three treks.

ENGAGE

Tap Prior Knowledge

Display a globe. Spin it. Stop the globe by placing your finger on it. Invite a volunteer to identify the location you selected. Invite students to share what they know about this place. Then tell them to imagine that they're going on an adventure there. As a class, brainstorm ideas about what someone could do in this place. Challenge students to explain how they would prepare for the trip.

EXPLORE

Preview the Lesson

Display pages 16-17 of the projectable magazine. Invite a volunteer to read aloud the headline and deck. As a class, brainstorm a list of challenges people might face as they try to ski across the ice to reach the North Pole.

Set a Purpose and Read

Have students read the article in order to understand what the environment is like at the North Pole to recognize how Jade Hameister and her team worked together to reach their goals.

EXPLAIN

Understanding the North Pole

Have students scan the article's photos in their student magazines. As they do, instruct them to write adjectives that describe what it is like at the North Pole. Invite volunteers to share their adjectives with the class. Then display page 19 of the projectable magazine. To give students' proper perspective, invite a volunteer to identify the location shown in the map on a globe. Explain how the North Pole's location causes it to be so icy and cold. (The North Pole doesn't get any direct sunlight. Even in summer, the sun is low on the horizon. In winter, it's below the horizon.) Read aloud and discuss the information below the map. Encourage students to scan the article for more details about what the environment is like at the North Pole.

EXPLAIN

(continued)

Recognizing the Benefits of Teamwork

Display page 22 of the projectable magazine. Review the information in the infographic. **Say:** *Climbing Mount Everest, going to the moon, and reaching the South Pole are all lofty goals. Few people have had the opportunity to do these things. But even fewer have attempted to tackle the Polar Hat Trick.* **Ask:** *Why do you think that is?* Invite volunteers to share their ideas. If necessary, remind students that the Polar Hat Trick is three trips: the North Pole, the South Pole, and Greenland. **Say:** *So far, Jade Hameister has tackled one of these journeys. She reached the North Pole. But getting there wasn't easy. It took a lot of planning and preparation to survive the trip. And once she got there, she and her team had to work together to overcome obstacles along the way.* Give each student a copy of the **Content Assessment Master**. Instruct students to identify three problems Jade Hameister and her team faced. Have them describe how planning, preparation, and execution helped them solve the problems and achieve their goal.

ELABORATE

Find Out More

Remind students that Jade Hameister's trek to the North Pole is the just the first leg of the Polar Hat Trick. To reach her goal, she still has to cross Greenland and reach the South Pole. Have students conduct research to learn more about those locations. Tell them to make a list of major obstacles the team could face in each place. Challenge them to find solutions other people have used to solve these problems and safely return from each journey.

Extend Your Thinking About Climate Change

Remind students that Jade Hameister and her team had just a short window in spring to complete their trip to the North Pole. Discuss why. Then remind students that climate change is causing more ice at the North Pole to melt than in the past. As a class, discuss how this change could impact future attempts to reach the North Pole.

EVALUATE

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

- *Where is the North Pole?* (in the Arctic Ocean)
- *What is it like at the North Pole in winter?* (It's pitch dark and gets as cold as minus 50° Celsius.)
- *What is it like there in the summer?* (It's always sunny. The ice gets thinner and melts.)

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

VOCABULARY ASSESSMENT: Frozen!

Record unfamiliar words from the article. Circle three words on the list.
Use the organizer to investigate the meaning those words.

Unfamiliar Words			
Word			
Predicted Definition			
Sentence			
Dictionary Definition			
Sentence			

LANGUAGE ARTS ASSESSMENT: Frozen!

Write the main idea of the article. Then pick two sections of the text. Record important details from each. Summarize what you learned in each section.

Main Idea of the Article	
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Section	
Important Details	
Summary	

Section	
Important Details	
Summary	

Name _____

Date _____

CONTENT ASSESSMENT : Frozen!

Identify three problems Jade Hameister and her team faced. Describe how planning, preparation, and execution helped them solve the problems and achieve their goal.

	Planning	Preparation	Execution
Problem 1:			
Problem 2:			
Problem 3:			

COMPREHENSION CHECK: Frozen!

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

1. What are the three hikes in the Polar Hat Trick?
Ⓐ the North Pole, the South Pole, and Iceland
Ⓑ the North Pole, the South Pole, and Greenland
Ⓒ Greenland, Iceland, and the North Pole
2. Which season is the best time to travel to the North Pole?
Ⓐ spring
Ⓑ summer
Ⓒ winter
3. What did Jade Hameister carry in her "day pack"?
Ⓐ a sled
Ⓑ food
Ⓒ skis
4. How did the team know when they reached the North Pole?
Ⓐ There was a sign that said "North Pole."
Ⓑ Someone had put up a big flag at the site.
Ⓒ GPS told them they were there.

5. What causes negative drift? Why was it a problem for the team?

Man and Manatee

Assess Vocabulary, page 6

Students' predictions and the sentences they write will vary. They should record the words and definitions from the Wordwise feature on page 6.

activist: a person who campaigns for some kind of social change

advocate: a person who publicly supports or recommends a particular cause or policy

endangered: at risk of extinction

Sentences will vary depending on the connections students identify.

Assess Language Arts, page 7

Answers will vary based on what students already know, what they cite from the text, and what they infer. Students should use their explicit statements and inferences to support their opinions.

Assess Content, page 8

Students should draw the map on page 4 of the article that shows the Florida manatee's range along the east coast of the United States. They should include a map key. They should explain that the manatees go to Florida in winter because the water is too cold for them to survive elsewhere. Manatees lack the blubber, or fat, layer that allows animals to survive in water below 20° Celsius.

Comprehension Check, page 9

1. B; 2. C; 3. A; 4. C; 5: Possible response: Manatees can't survive in cold water. The water around Florida is warm in winter.

Down to Earth

Assess Vocabulary, page 14

Students should record the words and definitions from the Wordwise feature on page 14.

force: a push or pull that can make something move

gravity: a force that pulls one object toward another object

mass: the amount of material in an object

weight: how heavy something is

Text clues, visual clues, and what students think each word means may vary. Evaluate answers for accuracy.

Assess Language Arts, page 15

Possible key points include: Gravity is a force; gravity attracts one thing to another; gravity is a weak force; you can test gravity; weight and mass are different; gravity has a long reach; and life on Earth could not exist without gravity. Reasons and evidence may vary but should relate to each point and come directly from the text.

Assess Content, page 16

Summaries should accurately reflect the content in each section and be written in students' own words. Drawings may or may not mimic the illustrations in the article, but they should give an accurate depiction of the content described in each section.

Comprehension Check, page 17

1. B; 2. C; 3. A; 4: A; 5: Answers will vary.

Frozen!

Assess Vocabulary, page 22

All unfamiliar words must appear in the article. Predicted definitions and sentences will vary. Students may use a printed or online dictionary to find each word's actual definition.

Assess Language Arts, page 23

Students should record the main idea of the article. (A 14-year-old girl went to the North Pole.) Details and summaries will vary, depending on which sections students chose to investigate.

Assess Content, page 24

Answers will vary depending on which problems students identify. However, students should identify specific examples from the article showing how the team's planning, preparation, and execution helped solve each problem.

Comprehension Check, page 25

1. B; 2. A; 3. B; 4: C; 5: Negative drift is caused the ocean current and the wind make floating ice drift to the east. It was a problem for the team because, on some days it seemed like they were taking steps backward. It also made navigating even harder.