

TEACHER'S GUIDE

Trailblazer

March 2016



In This Guide

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

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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LANGUAGE ARTS

Objectives

- Students will ask and answer questions about chameleons.
- Students will explain concepts based on information in the text.

Resources

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

Summary

- The article “Chameleons” examines how adaptations help chameleons survive in their environment.

BUILD VOCABULARY AND CONCEPTS

- **adaptation**
- **cell**
- **melanin**
- **nanocrystals**
- **pigment**

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.

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 photo 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 9 of the article. Encourage students to compare the definitions they wrote with those in the text. Discuss how context clues helped them to understand the meaning of each word.

READ

Inform students that the purpose of this article is to introduce them to chameleons and the unique adaptations that help them survive.

Explain to students that good readers ask questions before, during, and after they read. They ask questions, in particular, when they encounter something they don't understand or something they want to learn more about. Usually, they can find the answer in the text.

Display pages 2-3 of the projectable magazine. Model how to ask and answer questions. **Say:** *When I look at these pages, it's impossible to miss the animal in the photo. What kind of animal is it? Point out the headline and read it aloud. **Say:** This is a chameleon. I've seen a chameleon before. Chameleons are a type of lizard. But the chameleon I saw didn't look like this. Why is this one so colorful? Point out the subhead and read it aloud. **Say:** This chameleon must be communicating. I wonder what it's saying. And what other unique adaptations do chameleons have? To find answers to those questions, I'll have to read the article.*

Give each student a copy of the **Language Arts Assessment Master**. Explain to student how they can use the worksheet to record questions and answers before, during, and after they read the article.

As a class, brainstorm a list of questions about chameleons. Instruct students to record the questions in the appropriate section of their worksheets. Then have students read the article on their own. As they do, instruct them to record additional questions and any answers they find in the text. If students still have questions about chameleons after reading the article, instruct them to record those questions as well.

TURN AND TALK

Have students turn and talk to discuss what they learned about how adaptations help chameleons survive in their environment. **Ask:** *Which body part helps chameleons communicate?* (skin) *What does it do to help them communicate?* (changes color) *What is a chameleon saying if its skin is brightly colored?* ("Stay away!") Discuss how the ability to change skin color helps chameleons survive

• **Ask and Answer Questions** Remind students that asking and answering questions is a strategy to help them understand what they read. **Say:** *Even the best readers come across words or ideas they don't understand. Asking questions is the first step toward figuring those things out. If you ask questions, you know which answers to search for as you read and re-read the text.* Have students share and compare their **Language Arts Assessment Masters** with a partner. Do they have the same questions? Did they find the same answers? If not, encourage them to identify where in the text they found the answer and make any corrections necessary.

• **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 a chameleon's adaptations help it survive. Prompt discussion with questions such as: *How is a chameleon's tongue adapted to help it catch prey?* (It's very long and moves very quickly.) *What is unique about a chameleon's eyes?* (They are cone-shaped, can swivel in all directions, and can look in different directions at the same time.) *What are a chameleon's feet and tail adapted to do?* (It's feet help it grab onto branches. It's tail helps it balance.)

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 body parts help a chameleon walk on branches? How?*
- *Which adaptation do you think is most important to a chameleon? Why?*
- *What surprised you about what you read?*

SCIENCE

Objectives

- Students will understand a chameleon's adaptations help it survive in its environment.
- Students will understand how a chameleon's skin changes color.
- Students will recognize that different species of chameleons have different inherited traits.

Resources

- Content Assessment Master (page 8)
- "Chameleons" poster (Teacher's Edition)
- Comprehension Check (page 9)
- "Chameleons" Interactive Whiteboard (optional)

Science Background

Chameleons are reptiles that mostly live in the rain forests and deserts of Africa and the Middle East. There are more than 150 different species.

Chameleons have several adaptations that help them survive. One is their long, sticky tongues. A chameleon's tongue can move at a rate of nearly 21 kph. When it hits the intended prey, it forms a small suction cup that pulls the prey in.

Chameleons live in trees and bushes. Their feet and tails help them stay in place. A chameleon's toes are divided into groups. These groupings allow chameleons to grab branches as they walk. Their prehensile tails coil around branches so they can balance.

Chameleon eyes are cone-shaped and can rotate and focus in different directions at the same time. They can see their entire surroundings.

The ability to change color is a chameleon's most notable adaptation. Chameleons can't change any color they want to, and contrary to popular belief they don't form a perfect match with their surroundings. But they do change color to communicate or in response to changes in mood or temperature. Nerve impulses and hormone changes in their four layers of skin cause color cells to expand or shrink. This creates the colors and patterns we see.

ENGAGE

Tap Prior Knowledge

Ask students if they've ever seen a chameleon. Have them describe what the chameleon looked like and what it was doing. Challenge them to explain why they think the chameleon looked and acted this way.

EXPLORE

Preview the Lesson

Display pages 2-3 of the projectable magazine. Tell students to examine the photo and describe the chameleon. Invite a volunteer to read aloud the headline and subhead. **Ask:** *According to the subhead, what is unique about a chameleon's color? (They use it to communicate)* Encourage students to explain how they think this might be possible. Then challenge them to identify other unique adaptations that might be addressed in the article.

Set a Purpose and Read

Have students read the article in order to understand how adaptations help chameleons survive in their environment and to recognize that different chameleons have different inherited traits.

EXPLAIN

Understanding Chameleon Adaptations

Display the "**Chameleons**" poster. Invite a volunteer to read aloud the information related to the chameleon's skin. **Ask:** *Why might a chameleon's skin change color? (to communicate or respond to temperature and mood changes)* *Based on what you learned in the article, what do a chameleon's "everyday" colors help it do? (blend in)* *Why might a chameleon show bright colors? (to warn other chameleons to stay away)* Invite volunteers to read aloud the remaining captions. Have students identify each body part and discuss what it does. Then give each student a copy of the **Content Activity Master**. Instruct students to each draw and color a picture of a chameleon holding onto a branch. Using the poster as a guide, tell students to insert a caption for each body part that identifies the adaptation and explains how it helps the chameleon survive.

SCIENCE

EXPLAIN

(continued)

Understanding Chameleon Skin

Remind students that melanin is a substance that darkens skin and nanocrystals are colorless crystals that reflect different amounts of light. Then display page 7 of the projectable magazine. As a class, review the information in the three text blocks above the diagram. **Ask:** *Why does melanin make a chameleon's skin look dark?* (It absorbs most of the light that strikes the skin.) *What color is a chameleon when the nanocrystals its skin are close together?* (green) *Why?* (The nanocrystals reflect blue light, which mixes with the light reflected by yellow pigments in the top layers of skin.) *Why do excited chameleons look yellow, orange, or red?* (The nanocrystals are farther apart and reflect longer wavelengths of light.)

Display page 6 of the projectable magazine. Invite a volunteer to read the copy aloud. Then read aloud the caption. **Ask:** *Which chameleon won?* (The top one) *How do you know?* (It has brighter colors.)

Recognizing Different Inherited Traits

Instruct students to scan the images of chameleons in their magazines. Invite volunteers to describe their favorite ones. As they do, encourage classmates to guess which chameleon each student is describing. **Say:** *All chameleons have certain traits, such as a long tongue and skin that can change color. But there are many different types of chameleons and each one is unique.* Tell students that some chameleons have odd horns, knobby noses, or ruffled throats. These structures can help them search for mates or fight off other males. Have students search for unusual structures on the chameleons in the article. Encourage students to explain how they think each trait helps chameleons survive.

ELABORATE

Find Out More

Display page 8 of the projectable magazine. Zoom in on the image of the chameleon's toes. Point out that a chameleon's toes function like a person's thumb and fingers. Use this similarity to help the class understand how a chameleon is able to grab branches with its feet. Divide the class into small groups. Have groups conduct research to find examples that illustrate how a chameleon's other body parts work.

Extend Your Thinking About Chameleons

Inform students that there are more than 150 different types of chameleons. Some chameleons have very different body parts that make them look unique. Give students time to find images of chameleons with odd-looking features. Challenge them to explain how each feature helps that kind of chameleon survive.

EVALUATE

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

- *Which part of a chameleon looks like a mitten? foot*
- *How does a chameleon's "everyday" color help it survive?* (It helps the chameleon blend in with its surroundings.)
- *How do a chameleon's eyes help it survive?* (Their eyes are shaped like cones and can look in different directions at the same time.)

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.

Name _____

Date _____

VOCABULARY ASSESSMENT : Chameleons

Record information from the article about each vocabulary word.

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

Name _____

Date _____

LANGUAGE ARTS ASSESSMENT: Chameleons

Record questions you have about chameleons before, during, and after reading the article.
Search for answers in the text.

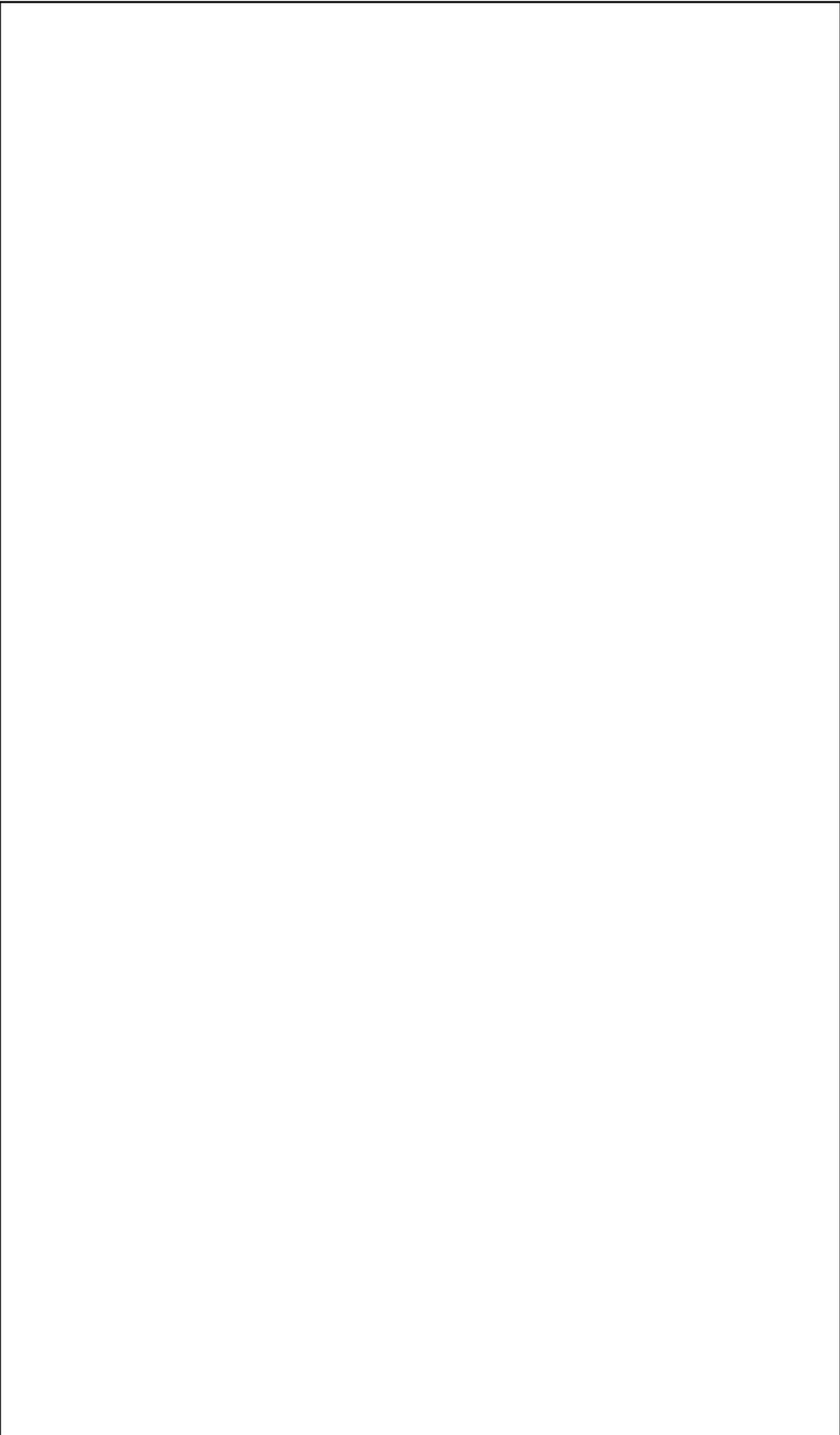
	Questions	Answers
Before		
During		
After		

Name _____

Date _____

CONTENT ASSESSMENT: Chameleons

Draw and color a picture of a chameleon. Write captions that identify each body part and tell how the adaptations help the chameleon survive.



COMPREHENSION CHECK: Chameleons

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

- Which of these chameleons is most likely excited?
A a green chameleon
B a red chameleon
C a brown chameleon
- What are a chameleon's eyes shaped like?
A triangles
B circles
C cones
- What do some chameleons have that others don't?
A horns
B a tail
C mittens
- Which part of a chameleon's body can send messages?
A its tongue
B its eyes
C its skin
- Pick one adaptation that chameleons have. Tell how it helps chameleons survive.

LANGUAGE ARTS

Objectives

- Students will assess their familiarity with and knowledge of vocabulary words.
- Students will identify the main topic of a text.
- Students will recount key details and explain how they support the main idea.

Resources

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

Summary

- The article “The Elements of Life” introduces readers to chemical elements and explores what causes them to change.

BUILD VOCABULARY AND CONCEPTS

- atom
- chemical reaction
- compound
- element

As a class, discuss the difference between familiarity and knowledge. Guide students to recognize that the more familiar you are with something, the more knowledge you have. Challenge students to explain how this concept applies to words when they read.

Display the vocabulary words on a word wall or on the whiteboard. Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to write each word on their papers. Review the categories under the header “Familiarity with the Word.” Tell students to make a checkmark to indicate how well they know each word.

Divide the class into pairs. Instruct partners to write what they think each word means on their worksheets. Then display the Wordwise feature on page 15 of the projectable magazine. Have students write those definitions on their worksheets and compare them with the definitions they wrote.

READ

Inform students that the purpose of this article is to introduce them to chemical elements. Tell student that as they read they will learn about different ways elements can change.

Tell students that identifying the main idea of an article is important because the main idea tells readers what the article is about. To identify the main idea, they must search for clues. **Say:** *The most obvious place to find a clue is the article’s headline. Sometimes it tells you exactly what the article is about. Other times it doesn’t. When that happens, you have to search for more clues.*

Inform the class that good readers search for clues in the subhead, section heads, photos, and captions. If the article has a diagram or sidebar, those text elements can help, too. **Say:** *Articles are full of information. But some details are more important than others. These are the key details. Key details always support the main idea. They are the best clues to use when you’re trying to figure out the main idea of the article.*

Give each student a copy of the **Language Arts Assessment Master**. Instruct students to read the article on their own. As they do, encourage them to record important details in each section of the article. After reading, instruct students to use the details they collected to identify the main idea of the article. Challenge them to explain how the key ideas in each section supported the main idea of the article.

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about elements. **Ask:** *What is an element?* (a substance made up of only one kind of atom) *Why are elements important?* (Everything in the universe is made up of elements.) *What do you get when you combine two or more elements?* (a compound) Encourage students to share what they learned about different elements and compounds mentioned in the article.

- **Identify the Main Idea** Remind students that the main idea is the topic, or what something is about. The article has a main idea. Each section has a main idea, too. Have students share their **Language Arts Assessment Masters** in small groups. Encourage them to compare the main ideas they recorded for each section and for the article itself. Did they record the same main ideas? If not, have groups re-read the article so they can come up with a common response.

- **Support the Main Idea** Remind students that key details are important details in a text. They support the main idea of the text. Have students share their **Language Arts Assessment Masters** in small groups. Encourage groups to analyze the reasons they recorded for how each key detail supports the main idea of the article.

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 the difference between an element and a compound?*
- *Why isn't water an element?*
- *What surprised you about what you read?*

SCIENCE

Objectives

- Students will understand that elements have unique properties.
- Students will recognize the Periodic Table.
- Students will understand that elements combine to change or create something new.

Resources

- Content Assessment Master (page 16)
- "The Elements" poster (Teacher's Edition)
- Comprehension Check (page 17)

Science Background

An element is a pure substance composed of only one type of atom. All matter is composed of elements.

Currently, there are 118 known chemical elements, about 20 percent of which are either man-made or exist in trace amounts in nature.

The Periodic Table is a way of listing the elements. This table arranges elements from left to right and top to bottom in order of increasing atomic number.

Each block of the Periodic Table lists the name of an element along with three vital pieces of information about that element:

- The atomic number is the number of protons in an atom's nucleus. This number defines what the element is.
- The atomic symbol is a one or two letter symbol that represents the element on the chart.
- The atomic mass, is the average mass of an element. It compares how heavy an element is when compared to hydrogen, which is the lightest element known.

A compound is a substance created when the atoms of two or more elements combine. When a chemical reaction takes place, a new substance is formed.

ENGAGE

Tap Prior Knowledge

Write the chemical formula for water, H₂O, on the board. Ask students to raise their hands if they've ever seen this combination of numbers and letters before. As a class, discuss what it represents and why.

EXPLORE

Preview the Lesson

Display pages 10-11 of the projectable magazine. Have students examine the headline and images. Discuss what an element is, and ask students which images most likely show elements. (the yellow cube and gray circle) **Ask:** *What do the other objects look like they might be?* (Possible response: water, fire, bubbling liquid) Tell students that these objects aren't elements. Instead they show what causes elements to change or what elements can become. As they read the article, they'll learn how and why this is possible.

Set a Purpose and Read

Have students read the article to understand that elements have unique properties, recognize the Periodic Table, and understand that elements combine to change or create something new.

EXPLAIN

Understanding Properties of Elements

Inform students that each element has specific properties. Identifying those properties helps people figure out what an element is. **Ask:** *Have you ever crushed an aluminum can or wondered how a gold ring is formed. Aluminum and gold are both elements. They are also both metals. Changing shape is one thing metals can do.* Point out that metals can also carry heat and electricity. **Say:** *If you've ever gone down a slide on a really hot day, you can feel the heat that a metal slide carries.* Tell students that some elements have properties that are unique. Display the sidebar on page 13 of the projectable magazine. Review the information about mercury, copper, and calcium with the class.

SCIENCE

EXPLAIN

(continued)

Recognizing the Periodic Table

Display "**The Elements**" poster. Inform students that this poster shows the Periodic Table, a chart that lists and gives important information about each element. Point out the key, which identifies where to find the atomic number, symbol, and English name on each block. **Say:** *If you know the atomic number, you can quickly find the element on the Periodic Table. The numbers always go across and down. Tell students that the symbol is a shorthand way to write an element's name. Some symbols are easy to figure out. The symbol for hydrogen is H. The symbol for oxygen is O. Others are a little trickier. The symbol for gold, for example, is Au. That's because the Latin word for gold is aurum. Review the color-coded blocks at the bottom of the table to explain how elements are sorted into rows. Then select several elements. As a class, figure out what the Periodic Table reveals about each one.*

Combining and Changing Elements

Display pages 12-13 of the projectable magazine. Invite a volunteer to read aloud the section "Mix and Match." Discuss what a chemical reaction is. Guide students to recognize that water is a compound formed when a chemical reaction takes place. **Say:** *This chemical reaction takes place naturally, but it can also be created if you have the right ingredients. Assign each student a partner and give each student a copy of the **Content Assessment Master**. Have pairs record the ingredients and processes the author used to create water and table salt.*

ELABORATE

Find Out More

Remind students that carbon is described in the article as "the glue that holds everything together." As a class, search the article for details that support this statement. Encourage them to conduct research for more information, if necessary. Have partners write a short essay about the essential properties of carbon.

Extend Your Thinking About Elements

Remind students that Theodore Gray, the article's author, collects chemical elements as a hobby. As a class, identify objects that could be collected to represent some of the well-known elements on the Periodic Table. Encourage students to conduct research to find examples for less familiar elements.

EVALUATE

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

- *What is an atom?* (the smallest part of a substance that has all the traits of that substance)
- *How many kinds of atoms are in an element?* (one)
- *Which elements combine to make water?* (hydrogen and oxygen)

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

Record information from the article about each vocabulary word.

Word	Familiarity with the Word			Knowledge of the Word	
	I know the word very well.	I've seen or heard the word before.	I don't know the word.	What I think the word means:	How the article defines the word:

LANGUAGE ARTS ASSESSMENT: The Elements of Life

Record key details from each section of the article. Identify the main idea. Tell how the key details in each section support the main idea

Main Idea	
Key Details	How They Support the Main Idea
Mix and Match	
Getting a Reaction	
Like Glue	
Out of This World	
Making Elements	

CONTENT ASSESSMENT: The Elements of Life

Describe how the author created water and table salt.

Water
<p>First:</p> <p>Next:</p> <p>Then:</p> <p>Finally:</p>
Table Salt
<p>First:</p> <p>Next:</p> <p>Then:</p> <p>Finally:</p>

COMPREHENSION CHECK: The Elements of Life

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

1. What is oxygen?
A an element
B a compound
C a metal
2. What do you get when you mix sodium and chlorine?
A mercury
B water
C table salt
3. What does a chemical reaction create?
A a new substance
B an element
C an atom
4. Which element would you find in toothpaste?
A copper
B fluorine
C gold

5. What are three things the Periodic Table tells you about elements?

LANGUAGE ARTS

Objectives

- Students will create sketches to understand the meaning of unfamiliar words.
- Students will use information from the text, photos, and diagrams to understand how sand dunes form in the Sahara.

Resources

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

Summary

- The article “Sahara ” examines how weathering and erosion continually reshape the land in this great desert.

BUILD VOCABULARY AND CONCEPTS

- **climate**
- **desert**
- **desertification**
- **erosion**
- **landform**
- **oasis**
- **weathering**

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 aloud the definition of *climate* in the Wordwise feature on page 23 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 sketch showing what it means. To promote ideas, suggest that students discuss ideas in small groups. Inform students that their drawings won't all be the same. The point is for students to draw the word in a way that will help them remember its definition. Examine the other words in this way, too.

READ

Inform students that the purpose of this article is to introduce them to the Sahara. As they read, they will learn what the Sahara is like and how it came to be this way.

Display pages 16-17 of the projectable magazine. Have students read the headline and subhead. Then ask them examine the three photos. Model how to integrate information between text and photos. **Say:** *When I first looked at these photographs, I just saw a bunch of sand. Then I looked closer and saw that the sand in each photo looks different. The top photo has sand dunes surrounding a pool of water. The middle photo shows tall, smooth dunes. I didn't even notice that there wasn't much sand in the bottom photo because I was paying attention to the rocky landforms sticking up from the ground.* Point out that each of these photos was taken in the Sahara, and each one is an example of the giant desert's shifting sand.

Give each student a copy of the **Language Arts Assessment Master**. Have students read the article in small groups. As they do, instruct them to use text, photos, and diagrams to learn about three types of sand dunes in the Sahara.

LANGUAGE ARTS

TURN AND TALK

Have students turn and talk to discuss what they learned about sand dunes in the Sahara. **Ask:** *What do you need for a sand dune to form?* (wind and sand) *What determines the size of a sand dune?* (how much sand is in an area) *What determines the shape of a sand dune?* (direction and force of the wind)

- **Interpret Visual Information** Explain to students that reading definitions tells people what words mean. But sometimes readers have to "see" words to really understand them. Point out that this is exactly what they did when they drew sketches of the vocabulary words in the article. They drew the words in a way that had meaning to them. Instruct students to turn and share the sketches they created on their **Vocabulary Assessment Masters** in small groups. Encourage them to explain how their drawings reflect the meaning of each word.

- **Integrate Information** After reading the article, have students share their **Language Arts Assessment Masters** in small groups. Instruct students to compare the information they recorded. Have students discuss how using text, photos, and diagrams helped them understand the concept. Then display pages 18-19 of the projectable magazine. Encourage students to explain what the photo and diagrams on these pages tell about the Sahara. (where the desert is located, what it looks like, and what lives there)

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 desert?*
- *Where is the Sahara?*
- *What surprised you about what you read?*

SCIENCE

Objectives

- Students will understand that the Sahara is a desert with little rainfall.
- Students will understand how weather and climate affect the Sahara.

Resources

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

Science Background

The Sahara is a subtropical desert located in northern Africa. It covers 8.6 million square km, or about 25 percent of the continent. It is the largest desert in the world.

The Sahara contains many different types of landforms including green oases, rock-covered plateaus, and steep mountains. But it is best known for its sand dunes.

Sand dunes cover about 25 percent of the Sahara's surface. They can grow up hundreds of meters high. Winds cause them to shift a few meters each year. If the wind is violent enough, it can move a dune 20 meters in a single day.

During a sandstorm, Sahara winds can blow up to 100 km per hour. That is strong enough to send sand across the Atlantic Ocean. This sometimes causes sunsets on Florida's eastern coast to be tinted yellow.

Despite its dry climate, the Sahara is home to about 4 million people and a host of animals adapted to survive the heat and lack of water. There are also more than 1,600 species of plants growing in this vast desert.

ENGAGE

Tap Prior Knowledge

Give each student a piece of plain white paper. Then give students one minute to draw a picture of a desert. Have students compare their completed pictures. Did they all show sand and sun? Why?

EXPLORE

Preview the Lesson

Have students scan article's photos in their magazines. As a class, discuss what type of place this is. Encourage students to explain what the weather here would be like.

Set a Purpose and Read

Have students read the article in order to recognize that the Sahara is a desert and understand how weather and climate affect this place.

EXPLAIN

Recognizing the Traits of a Desert

Display page 23 of the projectable magazine. Zoom in on the Wordwise feature and highlight the definition for **desert**. Provide a ruler and have a student measure 25 cm. If possible, conduct research to identify the annual rainfall amount where you live. Have the class compare the two amounts. Then have students examine the photos in the article. Help students understand that the Sahara is filled with sand because it receives so little rain. That's also why they see so few plants and animals in the photos..

SCIENCE

EXPLAIN

(continued)

Understanding Weather and Climate

Display page 23 of the projectable magazine.

Highlight the definition for **climate**. Invite a volunteer to read the definition aloud. As a class, discuss the difference between climate and weather. (Weather is the current temperature, wind, and rain. Climate is a long-term trend.) Then highlight the subhead "Constant Change" and review the section with the class. Give each student a copy of the **Content Assessment Master**. Divide the class into small groups. Instruct students to use information in the section to describe the Sahara's climate at different times. Challenge them to explain how changes in weather can cause a climate to change.

ELABORATE

Find Out More

Remind students that sand dunes are just one of the many different landforms found in the Sahara. As a class, review the article to identify other landforms found in this desert. Encourage students to conduct research to learn more about each.

Extend Your Thinking About the Sahara

Inform students that while the Sahara is a harsh landscape, about four million people live there today. Invite students to share their ideas about what it would be like to live in the Sahara. Encourage them to compare Saharan life to the place they live.

EVALUATE

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

- *What is desertification?* (to change from grassland to desert)
- *What is an oasis?* (a green, fertile area surrounded by a desert)
- *What is the climate like in the Sahara?* (hot and dry)

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: Sahara

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

Word	Definition	Sketch
climate		
desert		
desertification		
erosion		
landform		
oasis		
weathering		

Name _____

Date _____

LANGUAGE ARTS ASSESSMENT: Sahara

Record information about sand dunes from the text, photos, and diagrams in the article.

Type	Text	Photos	Diagram
Barchan Dunes			
Seif Dunes			
Star Dunes			

CONTENT ASSESSMENT: Sahara

Describe what the Sahara's climate was like at different times in history.

10,000 years ago

4,000 years ago

Now

Tell how changes in weather can cause a climate to change.

COMPREHENSION CHECK: Sahara

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

- Where is the Sahara?
A Africa
B Asia
C Australia
- What is the climate like in the Sahara?
A hot and dry
B cool and wet
C cool and dry
- Where in the Sahara can you find water?
A sand dune
B oasis
C hamada
- Which word means "drying up"?
A weathering
B erosion
C desertification
- How does a star-shaped dune form in the Sahara?

ANSWER KEY

Chameleons

Assess Vocabulary, page 6

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

adaptation: a behavior or body part that helps a plant or animal survive

cell: the building block of all living things

melanin: a substance that darkens skin

nanocrystals: colorless crystals that reflect different amounts of light

pigment: a material that reflects colors of light

Text clues, photo clues, and students' definitions will vary. Evaluate each response for accuracy.

Assess Language Arts, page 7

Students' questions will vary, but all questions should relate to the article. All answers should come directly from the text.

Assess Content, page 8

Students should draw a picture of a chameleon and include captions identifying and describing the function of the skin, feet, tail, eyes, and tongue.

Comprehension Check, page 9

1. B; 2. C; 3. A; 4. C; 5: Students' responses will vary depending on which adaptation they select.

The Elements of Life

Assess Vocabulary, page 14

Students should record the vocabulary words from the Wordwise feature on page 15, make checkmarks to show how familiar they are with each word, and write definitions in their own words. Then they should record the definitions from the article.

atom: the smallest part of a substance that has all the traits of that substance

chemical reaction: a process in which atoms break bonds with one another or form new bonds to create a new substance

compound: a substance created by the combination of two or more elements

element: a substance made up of only one kind of atom

Assess Language Arts, page 15

Students' questions will vary. Answers should come from the text.

Assess Content page, 16

Water—First, you mix two parts of hydrogen with one part of oxygen. Next, you add a spark. Then, the gases explode. Finally, liquid water is created.

Table salt—First, you melt sodium. Next, you step out of the way and blow chlorine gas at it. Then, huge clouds of white smoke rise. Finally, tiny specks of table salt form in the smoke.

Comprehension Check, page 17

1. A; 2. C; 3. A; 4: B; 5: Students may identify the atomic number, symbol, English name, or the type of substance formed.

Sahara

Assess Vocabulary, page 22

Students should record the words and definitions from the Wordwise feature on page 23.

climate: the usual weather that occurs in a place, including average temperature and amounts of wind and rain

desert: a place that gets less than 25 centimeters of rain or snow a year

desertification: the change from grassland to desert

erosion: the process in which rock is moved from one place to another

landform: a natural feature on Earth's surface

oasis: a green, fertile area surrounded by a desert

weathering: the process in which rocks are broken into smaller pieces

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

ANSWER KEY

Sahara

(continued)

Assess Language Arts, page 23

Students should include the following information from the text:

Barchan is the "Turkish word for "crescent-shaped." These dunes are found on the edges of sand seas. They form when the wind blows steadily in one direction.

Seif dunes are long, thin rows of sand named after the Arabic word for "sword." They form when two winds blow together from different directions.

Star dunes form when wind blows from several directions in areas with a lot of sand and seasonally changing winds.

Descriptions of photos and diagrams should be consistent with those from page 21 of the article.

Assess Content, page 24

Students should note that 10,000 years ago, parts of the Sahara were covered with grass and low bushes. Plants, animals, and people lived here. About 4,000 years ago it began drying up. Now the Sahara is a desert with a variety of different landforms. Its climate is hot and dry. It is a harsh landscape. Students should explain that if the weather in an area changes, the climate can change, too.

Comprehension Check, page 25

1. A; 2. A; 3. B; 4. C; 5: Wind blows from several directions in areas with lots of sand.