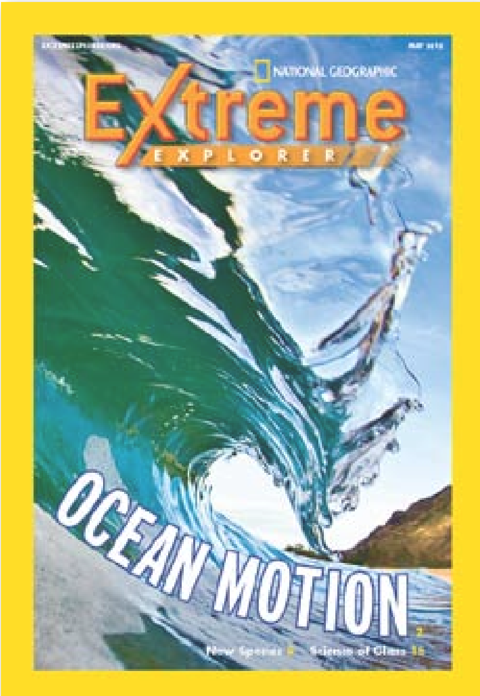
Extreme Explorer May 2010

TEACHERS GUIDE



Dear Educator:

It's hard to believe the school year is almost over! We end with the thrill of discovery. In "What's New?" students trek with scientists to the far corners of Earth searching for new species. "Cooking with Glass" gives readers a new appreciation for a common everyday material they might take for granted. And what better to get ready for summer than to dive into the surf with "Ocean Motion"?

We hope you and your Extreme readers have enjoyed this year's issues. We'll spend the summer getting new magazines ready for the 2010-2011 school year. We hope you include us in your planning, too. Remember, if you place your order for next year by May 31, you'll get a 10% discount. That means Extreme Explorer only costs 32 cents per student per issue. You'll also get a free online Teacher's Guide, free whiteboard content for one story per issue, and a free classroom poster that builds on the stories in the issue. What an affordable way to meet standards and get your students excited about reading and the world around them!

Speaking of the Teacher's Guide, I'd love to hear what you think about the guide for this issue. We listened to your comments about changes we made to the Teacher's Guide earlier this year. We think you'll find the new-and-improved May Teacher's Guide even more user friendly and useful. Feel free to email any comments to me at mmorehouse@ngsp.com.

Have a fabulous summer filled with adventures!

Sincerely,

Macon Morehouse

Macon Morehouse
Editor, Extreme Explorer

Ocean Motion, pp. 2-7

Curriculum: Standards

- Language Arts: Use visualization to deepen understanding
- Earth Science: Earth patterns
- Physical Science: Movement of energy

Literacy Skills

- Reading Strategy: Visualize
- Vocabulary: Context clues; Academic and content vocabulary
- Writing: Poetry

What's New? pp. 8-15

Curriculum: Standards

- Language Arts: Identify main ideas
- Life Science: Diversity of living organisms; Ecosystems

Literacy Skills

- Reading Strategy: Determine importance
- Vocabulary: Descriptive words; Academic and content vocabulary
- Writing: Explorers' notebook; Research

Cooking with Glass, pp. 16-23

Curriculum: Standards

- Language Arts: Text structure
- Physical Science: States of matter
- Social Studies: Technology and society

Literacy Skills

- Reading Strategy: Plan and monitor
- Vocabulary: Academic and content vocabulary
- Writing: Persuasive writing

Ocean Motion

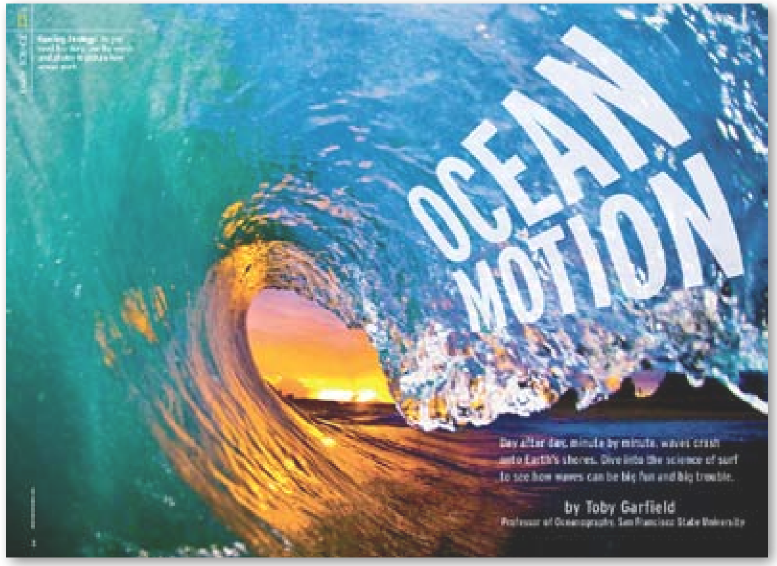
Objectives

Students will learn:

- key parts of a wave: crest, trough, wavelength
- what causes waves
- waves transfer energy without transferring matter
- waves erode Earth's surface

About the Story

Tour the world's biggest, most powerful, and most dangerous waves with oceanographer Toby Garfield. A professor at San Francisco State University, Garfield introduces students to the awe-inspiring power of waves and the science behind them.



Before Reading

Tap Prior Knowledge Ask students to raise their hands if they've ever been to the ocean, a lake, or a wave pool. Ask volunteers to share their personal experiences with waves. Use such prompts as: *What did the waves look like? If you were in the water, how did they feel?* (i.e., were they big or small, rough or gentle?)

Reading Strategy

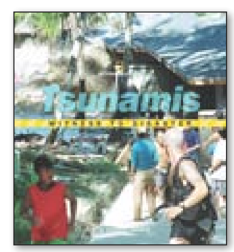
Visualize Discuss with students how picturing what they are reading can help them get more out the text. Read aloud the first two paragraphs on p. 4 of "Ocean Motion." Say: *The writer says surfing down a wave is a little like jumping off a cliff. It sounds scary, exciting, and dangerous!* Remind students that the photographs also can help them picture what's being described in the text.

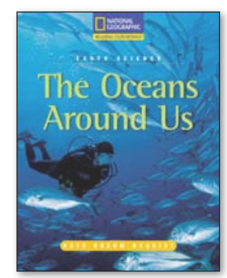
WebConnect

Wave Heights Lesson Plan
http://www.nationalgeographic.com/xpeditions/lessons/07/g35/wavesheights.html

Man-Made: Aqua Power *Capturing the Power of Waves*
http://channel.nationalgeographic.com/series/man-made/3666/Videos#tab-Videos/06427_00

National Geographic Connections





Ocean Motion

Vocabulary

Dictionary Skills/Context Clues
Point out the word *curls* on p. 4. Ask students how to figure out its meaning if they don't know. Prompt a discussion about dictionary use and words with multiple meanings. For instance, *curl* can be a verb that means "to curve or bend around." It also can be a noun that means "a little coil of hair." Ask students which meaning they think is correct in this case. Lead them to understand that they are using context clues (the story isn't about hair; the word is being used as a verb) to understand what *curls* means.

Academic Vocabulary

Preview the academic vocabulary on pp. 4-5 by asking students to find the boldface words: *tsunami, crest, trough, wavelength.* Review each word's Wordwise definition before reading.

EXTREME EXPLORER MAY 2010

Access Science

Wave Anatomy:

- Ask a volunteer to read aloud the second paragraph of the section "Waves in the Water" for a description of these wave parts.
- Use the diagram on p. 5 to identify key parts of a wave: *crest, trough, wavelength.* Have students describe each part.
- Challenge students to use self-stick notes to label any visible wave parts on the photo (p. 4).

Wave Energy: Display the word *energy.* Brainstorm with students words associated with energy. (examples: *movement, power*) Point out that we cannot see energy, but we can see the changes it causes.

Next, read aloud the last paragraph in the section "What is a Wave" on p. 4. To follow up on the author's analogy, you may want to use dominoes to demonstrate wave energy. Turn to Extend the Learning (p. T4) for other demonstration ideas.

Fast Facts

- As many as 100 giant waves a year hit Britain's Atlantic coast, ripping huge boulders from the cliffs and tossing them inland.
- The Mavericks Surf Contest is held every winter in Half Moon Bay on California's San Mateo coast. Surf experts monitor ocean patterns and the weather. They send out an alert when conditions are perfect for monster waves. The world's top surfers then have 24 hours to get there and start competing.
- When a 8.8 magnitude earthquake struck off the coast of Chile in late February 2010, it triggered tsunami warnings and coastal evacuations in places throughout the Pacific Ocean, including Hawaii and Japan. Luckily, the waves were only several feet high, much smaller than expected. Scientists now are studying why the earthquake did not cause the same kind of killer waves that devastated Indonesia in 2004.

Ocean Motion

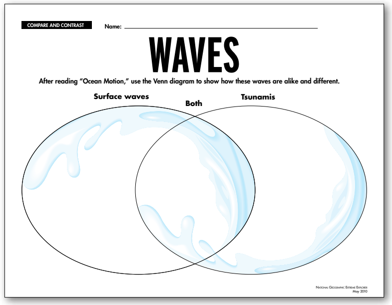
Academic Vocabulary

Display the bold-face word *erode.* Before checking the definition in Wordwise, ask students to look for context clues in the section “Carving Coastlines” to come up with a meaning for the word erode. Check understanding by asking volunteers to use the word in a sentence. Classmates can give a thumbs up if they think the word is being used correctly.

Challenge students to find repeat use of the academic vocabulary introduced on pp. 4-5. (*Tsunami* and *wavelength* are used on pp. 6-7.)

Content Vocabulary

Repeat the context clues strategy with other content words on pp. 6-7 such as *sediment* and *rogue wave.*

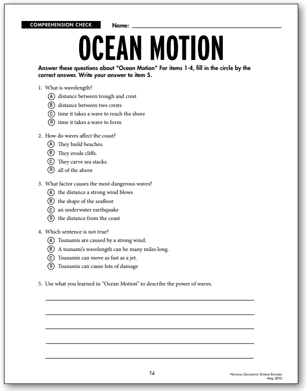


COMPARE AND CONTRAST Name: ______

WAVES

After reading “Ocean Motion,” use the Venn diagram to show how these waves are alike and different.

National Geographic Extreme Explorer May 2010



COMPREHENSION CHECK Name: ______

OCEAN MOTION

Answer these questions about “Ocean Motion” For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. What is wavelength?
   - Ⓐ distance between trough and crest
   - Ⓑ distance between two crests
   - Ⓒ time it takes a wave to reach the shore
   - Ⓓ time it takes a wave to form
2. How do waves affect the coast?
   - Ⓐ They build beaches.
   - Ⓑ They erode cliffs.
   - Ⓒ They carve sea stacks.
   - Ⓓ all of the above
3. What factor causes the most dangerous waves?
   - Ⓐ the distance a strong wind blows
   - Ⓑ the shape of the seafloor
   - Ⓒ an underwater earthquake
   - Ⓓ the distance from the coast
4. Which sentence is not true?
   - Ⓐ Tsunamis are caused by a strong wind.
   - Ⓑ A tsunami’s wavelength can be many miles long.
   - Ⓒ Tsunamis can move as fast as a jet.
   - Ⓓ Tsunamis can cause lots of damage
5. Use what you learned in “Ocean Motion” to describe the power of waves.

______
______
______
______
______

T4 National Geographic Extreme Explorer May 2010

Access Science

Types of Waves: Ask students to explain the different kinds of waves described in the story (surface waves such as ripples, swells, waves good for surfing, waves that cause erosion, and rogue waves, pp. 4-6; tsunamis, p. 7). Point out that most waves are surface waves, caused by wind. Then compare these waves to tsunamis, caused by underwater events such as volcanic eruptions or earthquakes. Use the Venn Diagram on p. T13 to help students compare surface waves and tsunamis.

Earth Science: Point to the section “Carving Coastlines” and the photograph on p. 6. Lead students to understand that the constant motion of water can change land. It causes erosion, the movement of sediment from one place to another. That can build beaches and carve cliffs.

Assess Use the Comprehension Check on p. T15 to assess students’ understanding of the story.

Extend the Learning

Hands-On Science: Pair students. Give each pair a rope (such as a jump rope) or slinky. Each student should hold an end. Have one member of the pair move their end up and down to simulate a wave. Explain that the motion is the energy traveling through the object. Ask them to make observations about the energy and how it affects the object in their science notebooks.

Creative Writing: Invite students to write a haiku or poem about waves. Encourage them to use personal experiences and/or information from “Ocean Motion.” For instance, a poem could be about a day at the beach or what they imagine sailors feel facing down a rogue wave.

Geography: Encourage students to research the tsunamis caused by the 2004 Indonesia and 2010 Chile earthquakes and compare what happened in each case.

What's New?

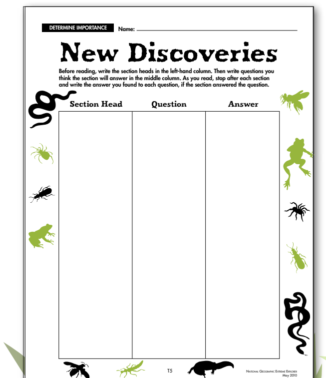
Objectives

Students will learn:

- how species are classified
- the importance of biodiversity
- some species are in danger of becoming extinct.

About the Story

Join National Geographic explorer Kristofer Helgen and other scientists as they look for animals scientists have never seen before. Scientists search rain forests, deserts, oceans, and even neighborhoods to find new species. Each discovery helps scientists better understand our planet's biodiversity and the balance of species needed to keep ecosystems healthy.


DETERMINE IMPORTANCE Name:

New Discoveries

Section Head	Question	Answer

T5

Before Reading

Tap Prior Knowledge Ask students if they have ever taken a walk or hiked in nature. Encourage them to describe their experiences. If needed, use prompts. Ask: *Did you see any interesting plants or animals? Were any species ones you'd never seen before? How did that make you feel?*

Reading Strategy

Determine Importance Ask students to think of three questions they hope the story answers. As students read, remind them to stop after each section and ask themselves:

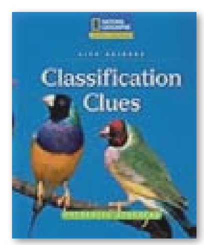
- What's the most important idea in this section?
- Did I answer one of my questions?
- Do I have any new questions?

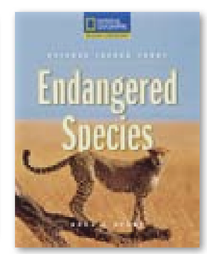
You can use the activity master on p. T17 to help students determine the important facts in each section.

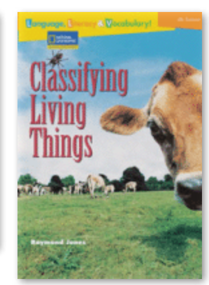
What's a New Species?

Before reading, make sure students know what a new species is. Explain that it is not an animal that was just born, or one that has never existed until now. A new species is a species that scientists have never seen before. It has not been identified, studied, or named by scientists. That doesn't mean that no one has ever seen the species. It may be known by local people who live near the species' habitat, but who are not scientists. Ask students to find an example of this in "What's New?" (the story of the Mindoro stripe-faced fruit bat, p. 11)

National Geographic Connections







What's New?

Vocabulary

Descriptive Words Read aloud the last sentence on p. 10: "That one volcano may be home to 40 new species, including a fanged frog, a grunting fish, and that giant, gentle rat." Ask students to listen closely for **adjectives.** If needed, say adjectives are words that describe nouns.

Display the words *new, fanged, grunting, giant,* and *gentle.* Explain that all these words are adjectives. Discuss how adjectives can make writing more lively and help readers paint a picture in their minds. Read aloud the same sentence without any adjectives. Ask: *Which one sounds more interesting?*

Have students circle other adjectives as they read "What's New?"

EXTREME EXPLORER MAY 2010


Major Mystery
New Places
Going to Extremes


© VIASHESLAV KOSMIN/SHUTTERSTOCK

Academic Vocabulary

Preview academic vocabulary on pp. 10-11 by asking students to find the boldface phrase (*new species).* Review its Wordwise definition. After reading, ask: *What is a new species?* If needed, remind students of your Before Reading discussion about new species (p. T5).

Access Science

- Direct students to look at the two photos on pp. 10-11. Ask: *Does either animal look familiar?* Point out that they may look familiar, but both are newly discovered species.
- Ask: *How do scientists look for new species?* (They explore hard-to-reach places; use traps; ask questions; listen to stories told by local people.)
- Ask: *Why is listening to stories told by villagers important?* (Villagers may know of plants and animals that scientists haven't seen before.)

Fast Facts

- The team exploring the Bosavi crater in Papua New Guinea discovered their first new species—a frog—almost as soon as they got out of the helicopter. "I nearly trod on it!" says explorer George McGavin.
- Two New York City high school students may have discovered a new species of cockroach. They tested the cockroach as part of a DNA project for science class. Its DNA varied from other known cockroach DNA.
- A new kind of spotted sea ray discovered off the coast of Africa "walks" on its front fins and sucks up worms and crabs from the ocean floor. Scientists named this electric ray after a vacuum cleaner. It's name: *Electrolux addisoni* .
- A new species of millipede discovered in the area along the Mekong River is hot pink and makes a poison called cyanide.
- The science of classifying organisms is called taxonomy.

What's New?

Content Vocabulary

Preview the following content vocabulary on pp. 12-13: *sample, organism, specimen, DNA, classification, scientific name.* If students are not familiar with the words, lead them to look for ways to determine their meanings, including:

- Look for context clues
- Tap prior knowledge
- Consult a glossary or reference

Ask volunteers to define each word. Ask: *Which strategy did you use to figure out the definition?*

Encourage students to use each word in a sentence to ensure they understand its meaning.

EXTREME EXPLORER MAY 2010

Access Science

- Ask: *How do scientists use technology to search for new species?* (They use underwater robots to search the bottom of the oceans and satellite photos to find hidden forests.)
- Ask: *How do scientists figure out if a species is new?* (They compare it to known species; observe how it looks at acts; study its DNA.)
- Ask: *How do scientists classify new species?* (They sort organisms into smaller and smaller groups based on common traits; the smallest is a species.)
- Ask: *What do you think is the most important factor in determining whether a plant or animal is a new species, and why?* (DNA; DNA confirmed that the clouded leopard on Borneo was different from all other clouded leopards and, therefore, a new species.)

WebConnect

Video of Newly Discovered Marine Species
http://video.nationalgeographic.com/video/player/news/animals-news/coml-species-vin.html

"Walking" Sharks and Other New Species
http://news.nationalgeographic.com/news/2006/09/060918-walking-shark.html

What's New?

Academic Vocabulary

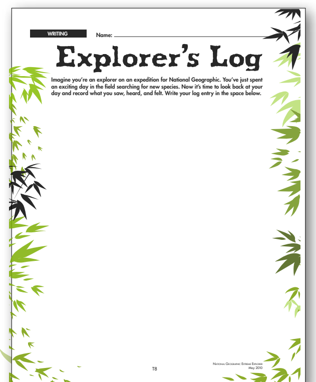
Preview the academic vocabulary on pp. 14-15. First, point out the word *biodiversity* on p. 14.

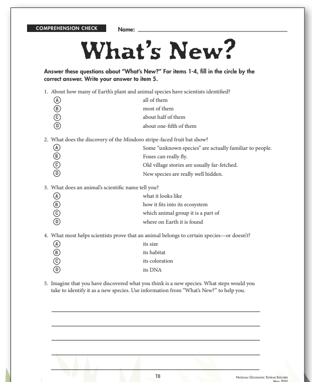
Remind students that if they read an unfamiliar word, one strategy is to look for word parts that they recognize.

Then ask students if they recognize any words within the word *biodiversity.* They may recognize *diverse* or *diversity.* Lead students to understand that *diversity* can mean "variety."

Point out that *bio* means "life." Ask them to put the two meanings together to help define the larger word. Ask: *What does biodiversity mean?* (A variety of life, or living organisms.)

You can repeat the process with *ecosystem.*





Access Science

- Ask: *How many new species did scientists find in the Mekong River area 1997-2007?* (1,000-plus)
- Ask: *Why do scientists want to learn about new species?* (It's exciting. They're a sign of Earth's biodiversity; can teach us what we need to keep ecosystems healthy.)
- Ask: *Why are scientists worried about unknown species?* (Those species may die out before they are discovered.)
- Ask: *What are scientists doing to help new species?* (They work with local leaders to find ways to protect the species' habitats.)
- Ask: *Is the search for new species over?* (No. As many as eight million—or more!—new species have yet to be discovered.)

Assess Use the Comprehension Check on p. T19 to assess students' understanding of the story.

Extend the Learning

Geography: Use the "New Faces in Far-off Places" poster in the Teacher's Edition to show the variety of places explorers find new species. Then divide students into small groups. Tell them that they are National Geographic explorers looking for unknown species. Have them use a world map and/or satellite photos to search for a place they think they might find unknown species. Then ask them to write a proposal that explains why they want to go there and what they expect to find.

Creative Writing: Use the Explorer's Log on p. T18 to let students imagine they are explorers looking for new species.

Research: Ask students to choose a newly discovered species, research it, and write a paragraph that explains how scientists discovered it and how it fits into its ecosystem. You might have them draw the plant or animal and its ecosystem.

Cooking with Glass

Objectives

Students will learn:

- the differences between two states of matter: liquid and solid
- heat can cause changes in some objects' state of matter
- chemical reactions occur when you mix substances to make glass
- how glass technology has changed the way people live

About the Story

"Cooking with Glass" uses the exciting art of glassblowing to introduce students to physics and chemistry concepts. The story also takes students from ancient to modern times, showing how glass has changed—and continues to change—the way we live.


Cooking with Glass

by Macon Morehouse and Patrick McGeehan

Strong but breakable?
See-through yet solid like a wall?
Discover the secrets—and science—behind one of the most beautiful and useful substances on Earth: glass.

© MARK WILLIAM PENNY/SHUTTERSTOCK

Before Reading

Preview Turn to pp. 16-17 and ask students to read the headline and deck, and describe the photo. Then preview the subheads in the story. Say: *The writers are comparing making glass to something you might be more familiar with. What is it?* (Cooking) Ask: *Why do you think they are making that comparison?*

Reading Strategy

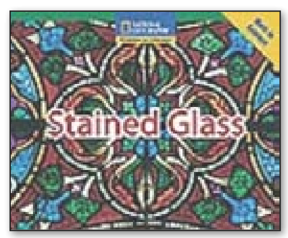
Plan and Monitor Explain that, like following a recipe, the story takes readers step-by-step through the process of making glass. Knowing text structure can help readers plan and monitor their reading. You can use the Ingredients and Procedure Chart on p. T21 to help students monitor their reading. Students can work in pairs or solo to fill it out as they read pp. 20-21. As a challenge, ask students to list on the back all the glass products mentioned in the story.

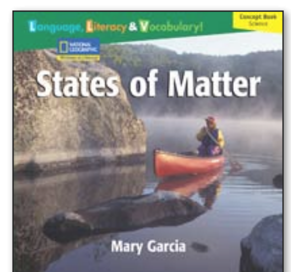
Engage Students

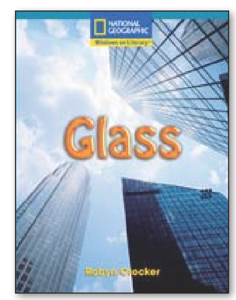
Before teaching "Cooking with Glass," you may want give students visual context by showing a video of glassblowing. For an overview, visit a hot shop in Tacoma, Wash. (http://www.youtube.com/watch?v=4-KPgjZ_3Ww&NR=1.) For a longer, step-by-step introduction, check out this glassblowing video, shot at Louisville Glass Works: http://www.youtube.com/watch?v=O1xb48Y6EdA. Please preview the videos to make sure they are appropriate for your class.

After viewing, ask students to share one surprising thing they learned about glass by watching the video(s).

National Geographic Connections







Cooking with Glass

Academic Vocabulary

Display these academic words from pp. 18-19 of the story: *physics, state of matter, solid, liquid, atom.*

Ask: *Do you recognize any of these words?* Explain that in some cases, a familiar word can have a very specific meaning when it is used in a scientific context. For instance, students may use the word *solid* to mean something hard, or as slang to mean something good. In science, however, the word means "hard substance with a shape that doesn't change."

Refer students to Wordwise for definitions of the other words. If desired, you also may want to suggest they consult the glossary of a science textbook or other scientific sources.

Extreme Explorer May 2010

Access Science

State of Matter

1. Display the phrase *state of matter* and photos of an ice cube, a glass of water, and a steaming tea kettle. These photos show water in its different states of matter: solid, liquid, gas.
2. Ask students to use their observational skills to describe the differences between these three states of matter.
3. Read aloud the first paragraph of "A Pinch of Physics" on p. 19. Ask students to give a thumbs-up when they hear the description of a solid ("It feels rigid and hard like a rock. Its shape doesn't change.") and a liquid (it "flows and changes shape.").
4. Explain that students can observe some differences. But one—the arrangement of atoms within a substance—is invisible.
5. To explain this concept, work through the analogy in the rest of the section. If helpful, let students act out the analogy.

Fast Facts

- Since glass is like both a solid and a liquid, scientists have come up with two special names for its state of matter: supercooled liquid and amorphous solid.
- Over 75 percent of waste glass ends up in landfills, yet 100 percent of glass is recyclable.
- Waste glass is being recycled into a new product called "glassphalt," a mix of glass and asphalt used to pave roads.
- Obsidian, a kind of natural glass created by volcanoes, is still used today to make incredibly sharp medical scalpels.

Cooking with Glass

Content Vocabulary

Display the word *chemistry.* Explain that it means the study of substances and their reactions when heated, cooled, or mixed with other substances.

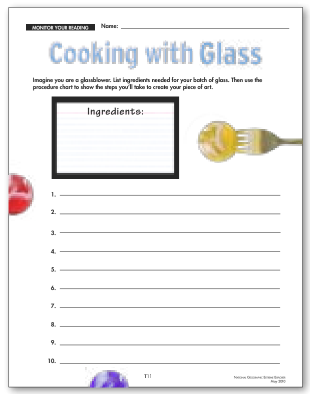
Then preview the following content vocabulary on p. 20: *silica, soda, lime, gold, iron, cobalt, lead,* and *boron.*

Students may be familiar with some words, such as *soda,* but not with the scientific way in which these words are being used.

Lead students to look for context clues that help define each word. (Example: *Silica* "is a very pure type of sand.")

Ask: *What do these words have to do with chemistry?* (All these substances are "ingredients," being mixed together to form different kinds of glass.)

Use the activity master on p. T21 to help students monitor their understanding as they read pp. 20-21.



Access Science

Chemical and Physical Changes

Introduce students to the concept of changes in matter. Some changes are **chemical,** or irreversible (once substances change, they can't go back to their original form.) Others are **physical,** or reversible (they can revert to their original form.)

As students read pp. 20-21, ask them to look for two answers to this question: How can *silica* be changed? (It can be mixed with other substances; it can be heated and cooled.)

Ask students to label one self-stick note "chemical" and a second one "physical." Challenge them to place each note on a part of the story that describes that change. (Mixing ingredients to make a batch of glass is chemical change—the sand will never be sand again; heating and cooling the mixture is physical—the molten goo will always turn back into hard glass once it cools.)

WebConnect

NG News: Ancient Egyptian City Yields World's Oldest Glassworks
http://news.nationalgeographic.com/news/2005/06/0616_050616_egyptglass.html

Corning Museum of Glass "Glass Chemistry Game"
http://www.cmog.org/glasschemistry/

Cooking with Glass

Content Vocabulary

Highlight the following vocabulary and phrases on p. 22: *ancient, first century* *B.C., Romans.*

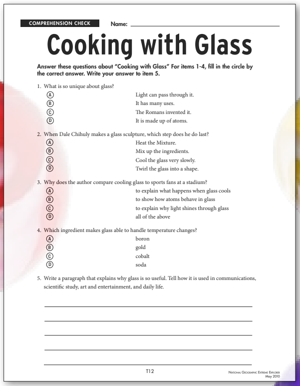
Ask: *What do these words have in common?* (They refer to events a long time ago.)

Ask: *In what kind of texts would you find these type of words?* (History)

Explain that this part of the story traces the history of glass from its origins to today and into the future.

As they read, ask students to look for key words and phrases the writers use to help create a timeline of events in the history of glass (Examples: *Over time; until the first century* *B.C.; then; developed; for the first time; today; new uses for glass)*

EXTREME EXPLORER   MAY 2010



COMPREHENSION CHECK Name: ____________________

Cooking with Glass

Answer these questions about "Cooking with Glass" For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. What is so unique about glass?
   - Ⓐ Light can pass through it.
   - Ⓑ It has many uses.
   - Ⓒ The Romans invented it.
   - Ⓓ It is made up of atoms.
2. When Dale Chihuly makes a glass sculpture, which step does he do last?
   - Ⓐ Heat the Mixture.
   - Ⓑ Mix up the ingredients.
   - Ⓒ Cool the glass very slowly.
   - Ⓓ Twirl the glass into a shape.
3. Why does the author compare cooling glass to sports fans at a stadium?
   - Ⓐ to explain what happens when glass cools
   - Ⓑ to show how atoms behave in glass
   - Ⓒ to explain why light shines through glass
   - Ⓓ all of the above
4. Which ingredient makes glass able to handle temperature changes?
   - Ⓐ boron
   - Ⓑ gold
   - Ⓒ cobalt
   - Ⓓ soda
5. Write a paragraph that explains why glass is so useful. Tell how it is used in communications, scientific study, art and entertainment, and daily life.

T12

National Geographic Extreme Explorer
May 2010

Access Social Studies

Highlight this phrase on p. 22: "Over time, glass changed the way we live."

Ask volunteers for examples of this from the story. (They may also want to look back at the section "Counting on Glass," p. 18.) Display the list. You also might want to challenge students to brainstorm other examples of glass-based inventions that are not included in the story.

Ask: *How has glass-making changed over time?* (At first, it took days to make a single piece. Then the Romans developed glassblowing. Today, factories mass-produce glass items like light bulbs.)

Ask: *Have scientists figured out everything possible that can be made out of glass?* (No. They are still experimenting with things like making clothes out of glass fibers.)

Assess Use the Comprehension Check on p. T23 to assess students' understanding of the story.

Extend the Learning

Persuasive Debate: Ask students to pick one item from the list of ways glass has changed our lives. Ask them to research the item and its impact on everyday life. Then in a debate format, each student can take a turn arguing that his or her item is the most important glass invention. Tell them they must use facts to support their position.

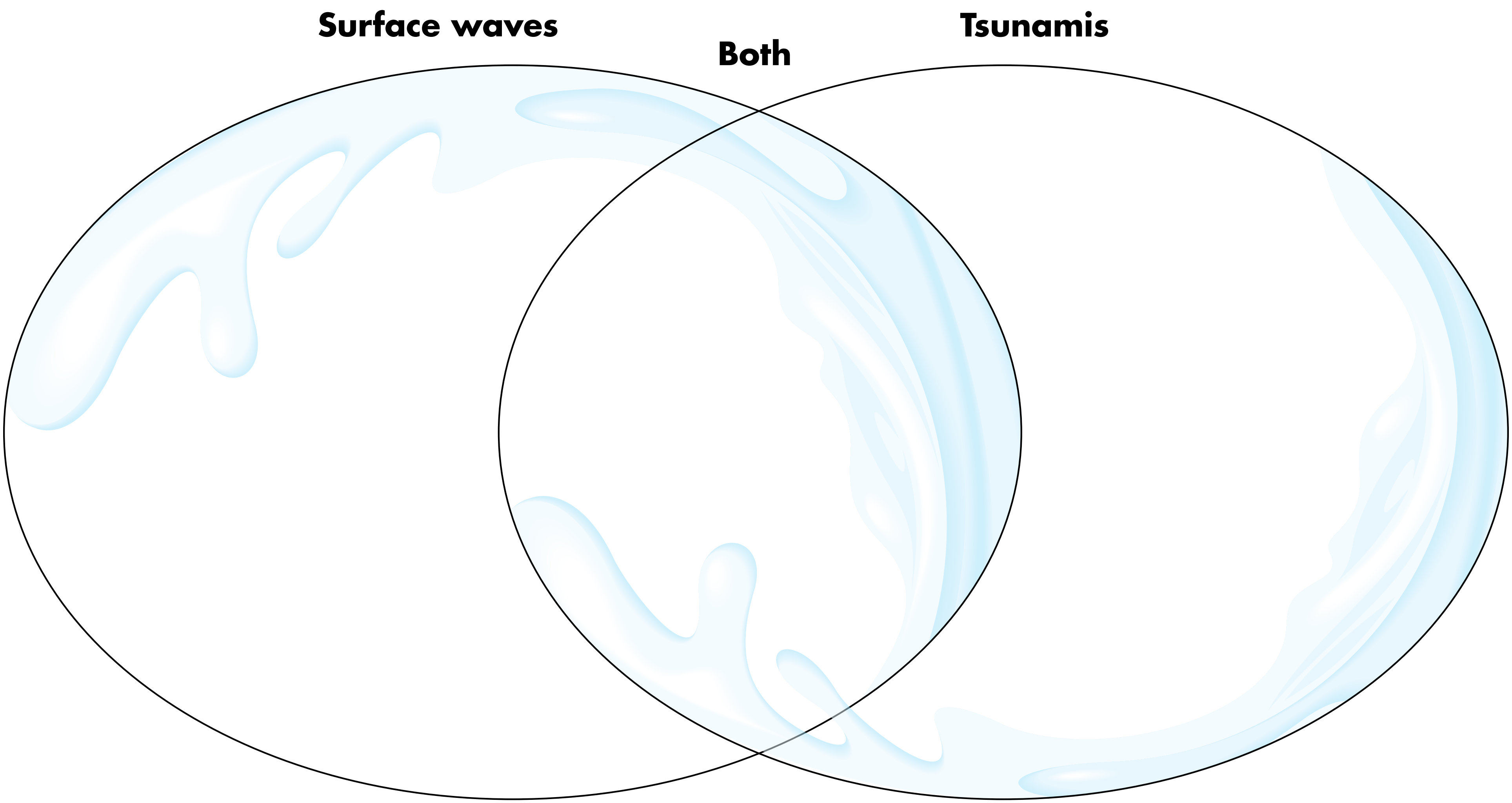
Art: Using Dale Chihuly's nature-based glass sculptures as a model, students can design their own three-dimensional piece of art. They may want to start by looking at photos of his artwork (http://www.chihuly.com/). Students can use wire, pipe cleaners, or other materials to make a shape, then cover parts with tissue paper or colored plastic wrap to simulate glass.

COMPARE AND CONTRAST

Name: ____

WAVES

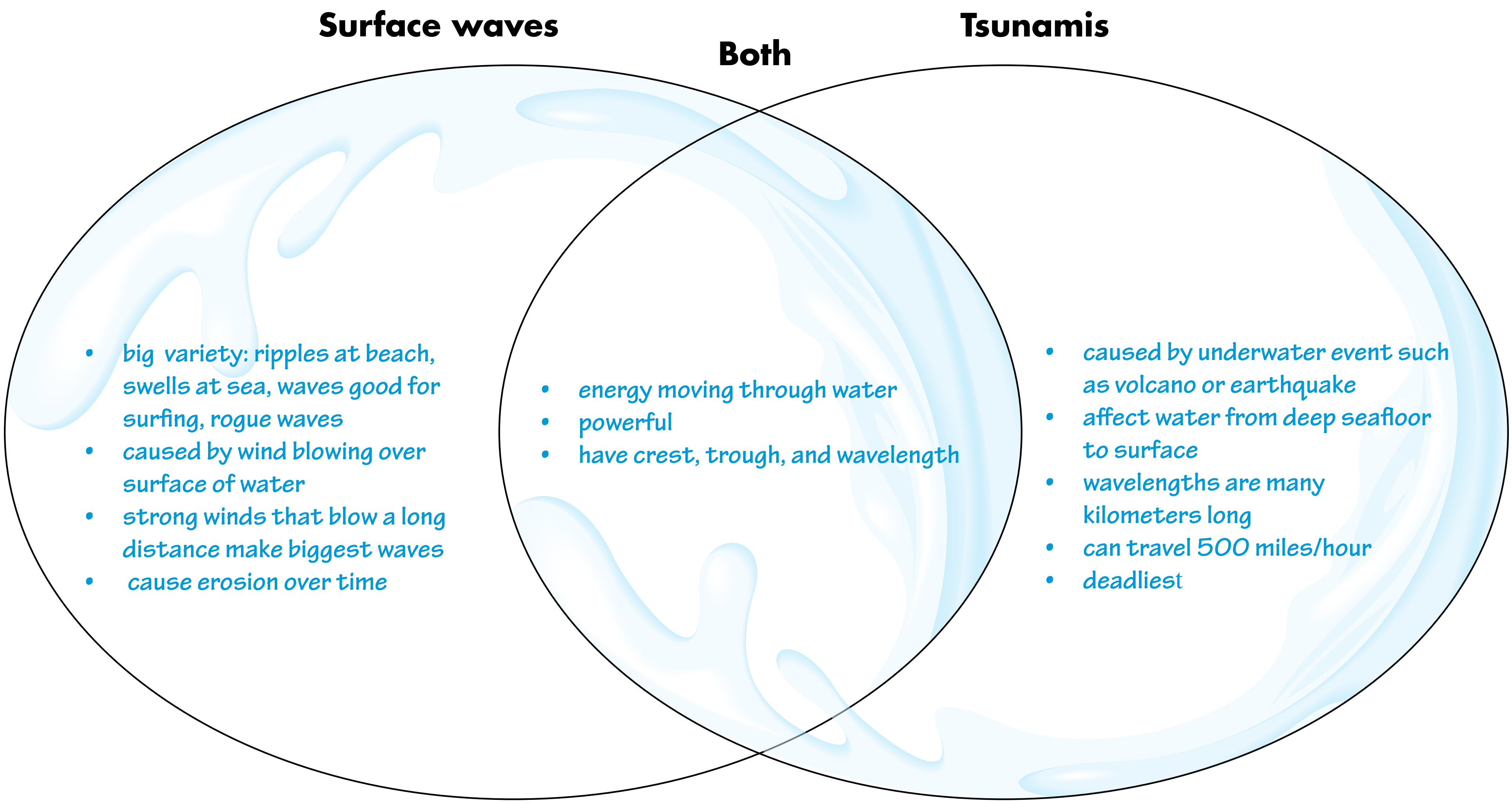
After reading "Ocean Motion," use the Venn diagram to show how these waves are alike and different.



Name: ANSWER KEY

WAVES

After reading "Ocean Motion," use the Venn diagram to show how these waves are alike and different.



© MARGITA/SHUTTERSTOCK

Name: ____________________

OCEAN MOTION

For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. What is wavelength?
   - (A) distance between trough and crest
   - (B) distance between two crests
   - (C) time it takes a wave to reach the shore
   - (D) time it takes a wave to form

2. How do waves affect the coast?
   - (A) They build beaches.
   - (B) They erode cliffs.
   - (C) They carve sea stacks.
   - (D) all of the above

3. What factor causes the most dangerous waves?
   - (A) the distance a strong wind blows
   - (B) the shape of the seafloor
   - (C) an underwater earthquake
   - (D) the distance from the coast

4. Which sentence is not true?
   - (A) Tsunamis are caused by a strong wind.
   - (B) A tsunami's wavelength can be many miles long.
   - (C) Tsunamis can move as fast as a jet.
   - (D) Tsunamis can cause lots of damage.

5. Use what you learned in "Ocean Motion" to describe the power of waves.

Name: ANSWER KEY

OCEAN MOTION

For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. What is wavelength?
   - (A) distance between trough and crest
   - **(B) distance between two crests**
   - (C) time it takes a wave to reach the shore
   - (D) time it takes a wave to form

2. How do waves affect the coast?
   - (A) They build beaches.
   - (B) They erode cliffs.
   - (C) They carve sea stacks.
   - **(D) all of the above**

3. What factor causes the most dangerous waves?
   - (A) the distance a strong wind blows
   - (B) the shape of the seafloor
   - **(C) an underwater earthquake**
   - (D) the distance from the coast

4. Which sentence is not true?
   - **(A) Tsunamis are caused by a strong wind.**
   - (B) A tsunami's wavelength can be many miles long.
   - (C) Tsunamis can move as fast as a jet.
   - (D) Tsunamis can cause lots of damage.

5. Use what you learned in "Ocean Motion" to describe the power of waves.

   Sample response: Waves can shape our coasts. They build beaches and carve cliffs. Out at sea, giant rogue waves are like a wall of water. They can swamp big boats. Tsunamis are so strong, they can wipe out whole towns and kill many people. A wave's power can be good, too. Some big, strong waves are amazing surf waves. That's fun! Someday, the power in waves even could be used to make electricity.

Name: ______________________________

New Discoveries

Before reading "What's New?" write the section heads in the left-hand column. Then write questions you think the section will answer. As you read, stop after each section and write the answer you found to each question, if the section answered the question.

Section Head	Question	Answer

Name: ____________________

Explorer's Log

Imagine you're an explorer on an expedition for National Geographic. You've just spent an exciting day in the field searching for new species. Now it's time to look back at your day and record what you saw, heard, and felt. Write your log entry in the space below.

COMPREHENSION CHECK

Name: ______________________________

What's New?

For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. About how many of Earth's plant and animal species have scientists identified?
   - (A) all of them
   - (B) most of them
   - (C) about half of them
   - (D) about one-fifth of them

2. What does the discovery of the Mindoro stripe-faced fruit bat show?
   - (A) Some "unknown species" are actually familiar to people.
   - (B) Foxes can really fly.
   - (C) Old village stories are usually far-fetched.
   - (D) New species are really well hidden.

3. What does an animal's scientific name tell you?
   - (A) what it looks like
   - (B) how it fits into its ecosystem
   - (C) which animal group it is a part of
   - (D) where on Earth it is found

4. What most helps scientists prove that an animal belongs to certain species—or doesn't?
   - (A) its size
   - (B) its habitat
   - (C) its coloration
   - (D) its DNA

5. Imagine that you have discovered what you think is a new species. What steps would you take to identify it as a new species. Use information from "What's New?" to help you.

____

____

____

____

____

Name: ANSWER KEY

What's New?

For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. About how many of Earth's plant and animal species have scientists identified?
   - (A) all of them
   - (B) most of them
   - (C) about half of them
   - (D) about one-fifth of them

2. What does the discovery of the Mindoro stripe-faced fruit bat show?
   - (A) Some "unknown species" are actually familiar to people.
   - (B) Foxes can really fly.
   - (C) Old village stories are usually far-fetched.
   - (D) New species are really well hidden.

3. What does an animal's scientific name tell you?
   - (A) what it looks like
   - (B) how it fits into its ecosystem
   - (C) which animal group it is a part of
   - (D) where on Earth it is found

4. What helps scientists prove that an animal belongs to certain species—or doesn't?
   - (A) its size
   - (B) its habitat
   - (C) its coloration
   - (D) its DNA

5. Imagine that you have discovered what you think is a new species. What steps would you take to identify it as a new species. Use information from "What's New?" to help you.

Sample response: I would study what it looks like and how it behaves. I also would compare it to other species that we already know about. I'd ask: How is it alike? How is it different? I also might take a DNA sample. Since a species' DNA is unique, it can help prove if a species is new or not. I know that's what helped scientists confirm that the Bornean clouded leopard was a new species.

MONITOR YOUR READING

Name: ____________________

Cooking with Glass

Imagine you are a glassblower. List ingredients needed for your batch of glass. Then use the procedure chart to show the steps you'll take to create your piece of art.

© GEORGE PAPPAS/SHUTTERSTOCK

GJFOTO/SHUTTERSTOCK

© MARK WILLIAM PENNY/SHUTTERSTOCK

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
10. ____________________

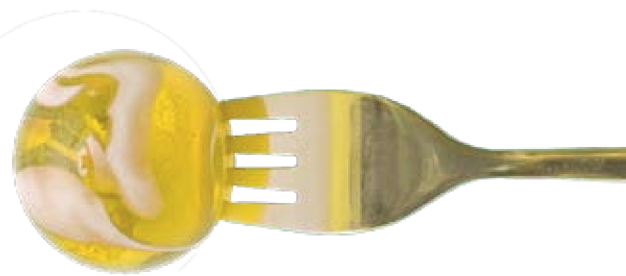
Name: ANSWER KEY

Cooking with Glass

Imagine you are a glassblower. List ingredients needed for your batch of glass. Then use the procedure chart to show the steps you'll take to create your piece of art.

Ingredients:

Silica
Soda
Lime
(optional: gold, iron, cobalt, lead, boron)



1. Start with silica, a type of sand.
2. Add soda to help silica melt at a lower temperature.
3. Add lime for strength and water resistance.
4. Add gold for color, lead for crystal, or boron for glass you can use to cook food.
5. Bake in a 2,200°F oven until it oozes like honey.
6. Gather a gob of molten glass on the end of a hollow, metal tube.
7. Blow and twirl the molten glass into shapes.
8. If the glass gets too stiff, reheat.
9. Place finished piece of art in a 900°F oven.
10. Cool down slowly to room temperature.

COMPREHENSION CHECK

Name: ______________________

Cooking with Glass

For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. What is unique about glass?
   - (A) Light can pass through it.
   - (B) It has many uses.
   - (C) The Romans invented it.
   - (D) It is made up of atoms.

2. When Dale Chihuly makes a glass sculpture, which step does he do last?
   - (A) Heat the mixture.
   - (B) Mix up the ingredients.
   - (C) Cool the glass very slowly.
   - (D) Twirl the glass into a shape.

3. Why does the author compare cooling glass to sports fans at a stadium?
   - (A) to explain what happens when glass cools
   - (B) to show how atoms behave in glass
   - (C) to explain why light shines through glass
   - (D) all of the above

4. Which ingredient makes glass able to handle temperature changes?
   - (A) boron
   - (B) gold
   - (C) cobalt
   - (D) soda

5. Write a paragraph that explains why glass is so useful. Tell how it is used in communications, scientific study, art and entertainment, and daily life.

____
____
____
____
____
____
____

COMPREHENSION CHECK

Name: ANSWER KEY

Cooking with Glass

For items 1-4, fill in the circle by the correct answer. Write your answer to item 5.

1. What is unique about glass?
   - (A) Light can pass through it.
   - (B) It has many uses.
   - (C) The Romans invented it.
   - (D) It is made up of atoms.

2. When Dale Chihuly makes a glass sculpture, which step does he do last?
   - (A) Heat the mixture.
   - (B) Mix up the ingredients.
   - (C) Cool the glass very slowly.
   - (D) Twirl the glass into a shape.

3. Why does the author compare cooling glass to sports fans at a stadium?
   - (A) to explain what happens when glass cools
   - (B) to show how atoms behave in glass
   - (C) to explain why light shines through glass
   - (D) all of the above

4. Which ingredient makes glass able to handle temperature changes?
   - (A) boron
   - (B) gold
   - (C) cobalt
   - (D) soda

5. Write a paragraph that explains why glass is so useful. Tell how it is used in communications, scientific study, art and entertainment, and daily life.

Sample response: Glass is useful in many ways. Thin glass fibers carry data for phones, computers, and TVs. Glass lenses are used in telescopes and microscopes, helping scientists study the world. Artists create beautiful sculptures from glass. A glass sidewalk called the Skywalk at the Grand Canyon lets tourists step out over the Grand Canyon and look straight down. At Boston's Mapparium, a huge glass globe lets people explore Earth in a new and different way. We use glass in daily life, too. Windows let light in, and glass containers have been used since ancient times.