What Do You Know About Sharks?

Magazine Article by Sharon Guynup

Can appearances DECEIVE?

COMMON CORE

RI 1 Cite textual evidence to support analysis of the what the text says explicitly. **RI 2** Determine central ideas in a text; provide an objective summary. **RI 4** Determine the meaning of phrases as they are used in a text, including figurative meanings. **RI 5** Analyze the structure an author uses to organize a text.

Cute doesn't always mean cuddly, and frightening doesn't always mean vicious. Appearances can deceive, as you will find out when you read "What Do You Know About Sharks?"

DISCUSS How much do you really know about sharks? Copy the chart shown here, and decide whether each statement is true or false. Then gather with others in a small group and share your answers. Does everyone agree on the "facts"?

Statement	*True or False?*
1. The great white is the largest shark.	
2. Most sharks are dangerous to humans.	
3. Sharks lived at the time of dinosaurs.	

TEXT ANALYSIS: TEXT FEATURES

Writers often organize text and highlight key ideas with design elements called **text features**. Common text features include

- titles
- sidebars
- captions
- subheadings
- graphic aids
- bulleted lists

As you read the article, identify the text features. Ask yourself how each one helps you understand expository text.

READING SKILL: OUTLINE

To find and remember the main or central ideas in a text, you can create an **outline**, a summary of an article's most important information. Begin by looking at the text features and topic sentences in a text. In "What Do You Know About Sharks?" each subhead introduces a new main idea.

Another guide to main ideas is a text's **organizational pattern**. For example, if a text presents a main idea as a cause and its effect, look for other causes and effects. Take notes in your outline on each main idea and label it with a Roman numeral. Place supporting details under each main idea and label each one with a capital letter.

"What Do You Know About Sharks?"

I. Sharks are vanishing

A. Sharks need protection

B. Without sharks, other species would overpopulate.

VOCABULARY IN CONTEXT

The boldfaced words helped Sharon Guynup share her knowledge of sharks and the sea. Use context clues to figure out what each word means.

1. Fish and whales are **aquatic** creatures.
2. The ocean is one kind of **ecosystem.**
3. A terrible disease can **decimate** a species.
4. The **carcass** of a half-eaten sea lion washed ashore.
5. Light will **diffuse** as it enters the water.
6. A life jacket increases a swimmer's **buoyancy.**

Complete the activities in your **Reader/Writer Notebook.**

Meet the Author

Sharon Guynup

born 1958

Animal Lover

Sharon Guynup (gī'nəp) has found a way to combine her two loves, writing and the environment. She completed a master's degree in journalism from New York University's Science and Environmental Reporting program and continues to write articles about animals and the environment. Her work has appeared in national science magazines, in newspapers, and on the Web. Guynup also produces *State of the Wild,* a yearly review of the condition of the world's wildlife and lands.

BACKGROUND TO THE ARTICLE

An Ocean of Knowledge

How do we know so much about sharks? People who study fish and how they live and grow in their environment are called ichthyologists (ĭk'thē-ŏl'ə-jĭsts). Their work in laboratories, in museums, at universities, and on research ships provides information about over 300 species of sharks. "What Do You Know About Sharks?" gives information about sharks in general, as well as facts about specific species.

Author Online

THINK central

Go to thinkcentral.com. KEYWORD: HML7-907

A TEXT FEATURES
The **title** often helps readers identify an article's main idea. What kind of information do you think this article will present?

WHAT DO YOU KNOW ABOUT SHARKS? A

SHARON GUYNUP

They're ferocious predators. They haunt us in nightmares. But the scariest thing about sharks may be that they're vanishing from the world's oceans. . . .

Why do sharks need protection? Sharks are top predators in the **aquatic** food chain—a web that interconnects all organisms, in which smaller creatures become food for larger predators. Without sharks, the ocean's delicate **ecosystem** would be disrupted. Species that sharks devour, like seals, for example, would overpopulate and in turn **decimate** other species, like salmon. Read the following questions and answers to learn more about the world's most fear-inspiring fish.

aquatic (ə-kwăt′ĭk) *adj.* growing or living in the water

ecosystem (ē′kō-sĭs′təm) *n.* a physical environment, such as an ocean, and the community of things that live in it

decimate (dĕs′ə-māt′) *v.* to kill or destroy a large part of

Nurse Shark
Nurse sharks are sluggish bottom dwellers found in the Atlantic Ocean. They're usually not dangerous and are one of the few sharks that breathe by pumping water through their gills while lying motionless. They sometimes suck in prey as well.

Wobbegong Shark
Wobbegongs are found resting on the sea floor in shallow waters of the Indo-Pacific and the Red Sea. The barbels, or fringe of flesh around their mouths, are feelers that act as camouflage.

GRAMMAR IN CONTEXT
Reread the description under the wobbegong shark photograph. The writer uses an **appositive phrase** to explain the noun *barbels*. Notice that the phrase is set off by commas.

What Are Sharks? B

Sharks are fish with skeletons made of rubbery cartilage (tough, flexible tissue) instead of bone. They're cold-blooded (unable to generate their own body heat), breathe through gills (respiratory organs), and have a two-chambered heart. Though most live in warm seas, the Greenland shark thrives in frigid Arctic seas. C

What's the Largest Shark? The Smallest?

Weighing in at 15 tons and stretching up to 14 meters (46 feet) long, the whale shark is the world's largest fish—bigger than a school bus! Nine hundred meters (2,953 feet) below the ocean surface lives the smallest shark: the dwarf shark. An adult measures only 25 centimeters (10 inches) long!

Are All Sharks Dangerous to People?

Most sharks are harmless. "Out of 375 shark species, only two dozen are in any way really dangerous to us," says Robert Hueter, director of the Center for Shark Research at Mote Marine Laboratory. Still, scientists don't know for sure why sharks sometimes attack humans. One theory: sharks may mistake the sound of swimming humans for that of injured fish—which are easy prey.

Goblin Shark

Goblin sharks feature needle-like teeth. They're rarely spotted—only 36 specimens have been counted—most found in waters deeper than 1,150 feet. Scientists think they inhabit seas from Europe to Australia.

Hammerhead Shark

Hammerheads inhabit shorelines and deep seas worldwide. The head, or cephalofoil, provides greater maneuverability—and enlarged nostrils and eyes at the ends of their "hammer" receive more information giving them a hunting advantage. D

B OUTLINE
Each orange question is a **subheading** that introduces a new main idea. State each main idea as a phrase and add it to your outline.

COMMON CORE RI 2

C OUTLINE
An outline shows the relationship between a text's main ideas and its supporting details. In an outline, you arrange the information by using Roman numerals to show the main ideas and capital letters to point out supporting details. If you need to add another level of details, use Arabic numerals to indicate those. What are the important details in this paragraph? Add them to your outline.

D TEXT FEATURES
Sidebars are set off from the main article—usually on the side or bottom of the page—and provide additional information. You can read sidebars at any time. What information does this sidebar give you?

E TEXT FEATURES
A **subheading** signals the beginning of a new topic within a text. Preview the **subheadings** on these pages. Which section will tell you where swimmers are most at risk?

Which Shark Is the Most Dangerous to Humans? E

"In terms of fatal attacks, it's a tossup between the great white, the tiger, and the bull shark," Hueter says. People fear the massive great white the most because of its size—up to 6.4 meters (21 feet) long—and its large razor-like teeth, not to mention the terror stirred up by *Jaws* flicks. But great whites usually inhabit deep seas—not shallow waters where people swim. Worldwide, fewer than 100 human attacks by all shark species are reported each year.

Where Do Most Shark Attacks Happen?

Florida leads the world in shark bites, with 22 to 25 reported incidents each year. But, claims Hueter, they're not repeated shark attacks—usually a single bite. . . . "Most really bad attacks occur off the coasts of California, Hawaii, Australia, and South Africa," Hueter says.

Just How Powerful Is a Shark's Bite?

Scientists built a "shark-bite meter" that measures the jaw strength of one species, the dusky shark. It exerts 18 tons of pressure per square inch on a victim. That's like being crushed beneath the weight of ten cars!

COMMON CORE RI 4

Language Coach

Similes The phrase "like being crushed beneath the weight of ten cars" (lines 45–46) is a **simile**, a comparison using the words *like* and *as*. What is the writer comparing with this simile?

Whale Shark

The largest fish in the sea—whale sharks—are very docile. They feed on plankton, tiny drifting animals. They swim with their enormous mouths open, filtering food from the water with 15,000 tiny teeth.

Leopard Shark

Leopard sharks are commonly found near shore, often in large schools along the Pacific coast from Oregon to Mexico. They feed on small fish and crustaceans and are generally harmless.

What Do Sharks Eat?

Sharks chow down on what they can when they can—usually smaller animals from shrimp and fish to turtles and seabirds. Some, like the bull shark, consume large mammals like sea lions or dolphins; others, like the whale shark, eat only plankton, tiny drifting animals. And tiger sharks devour just about anything—mammal **carcasses**, tin cans, plastic bags, coal, and even license plates have been found inside their stomachs! F

How Do Sharks Find Prey?

Sharks can hear a wide range of sounds but are attracted by bursts of sound—like those made by an injured fish—or occasionally humans romping in water. At close range, sharks also sense vibration with their lateral line, a sensory system that runs from head to tail on each side of a shark's body. Inside the lateral line, which helps a shark maintain balance as well as detect sound, are canals filled with fluid and tiny "hair cells." Sound causes the liquid to vibrate, alerting the shark to the presence of another creature. This sense allows sharks to hunt even in total darkness.

Brushing and Flossing

Sharks continually lose their teeth, but some species grow new teeth as often as every week to replace worn or lost ones. During their lifetime, some species shed 30,000 teeth. Shark teeth vary according to what's on the menu:

top: nurse shark teeth, which chew up shellfish

middle: tiger shark teeth, which crunch everything from fish and birds to tin cans and other garbage

bottom: mako shark teeth, which grind up squid and big fish like tuna and mackerel G

carcass (kär′kəs) *n.* the dead body of an animal

F OUTLINE
How many details about what sharks eat have you included in your outline? Remember that you can include as many lettered or Arabic-numbered details as you need.

G TEXT FEATURES
Graphic aids are visuals, such as graphs, photographs, and maps, that provide more information on a topic. What information do you get from looking at these photographs that you don't get from the text?

Shark Attack

This sea lion managed to survive a vicious shark attack. H

What's a "Feeding Frenzy"?

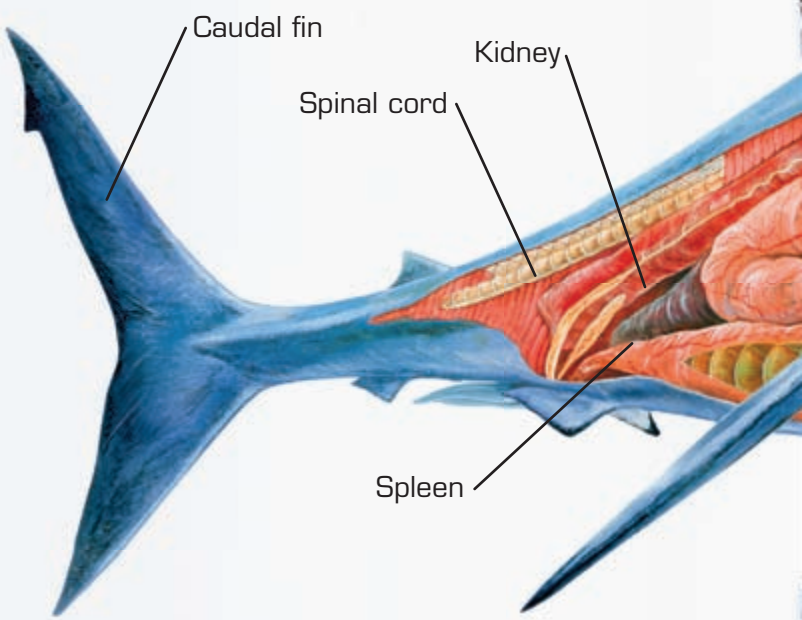
Sharks usually travel solo, but if one finds easy prey, an excited, competitive swarm of sharks may join in the feast, biting anything that lies in its path.

How Do Sharks Breathe?

70 A shark usually swims with its mouth open to force oxygen-rich water to pass over a set of gills housed in a cavity behind its head—a process known as ramjet ventilation. Gill flaps called lamellae absorb and help **diffuse** oxygen into the shark's bloodstream. Lamellae also help sharks expel carbon dioxide, a gaseous waste product of breathing, from the bloodstream.

diffuse (dĭ-fyo͞oz′) *v.* to spread out or through

H TEXT FEATURES
A **caption** is the text that provides information about a graphic aid. How does this caption support your understanding of the photo and reinforce the article?



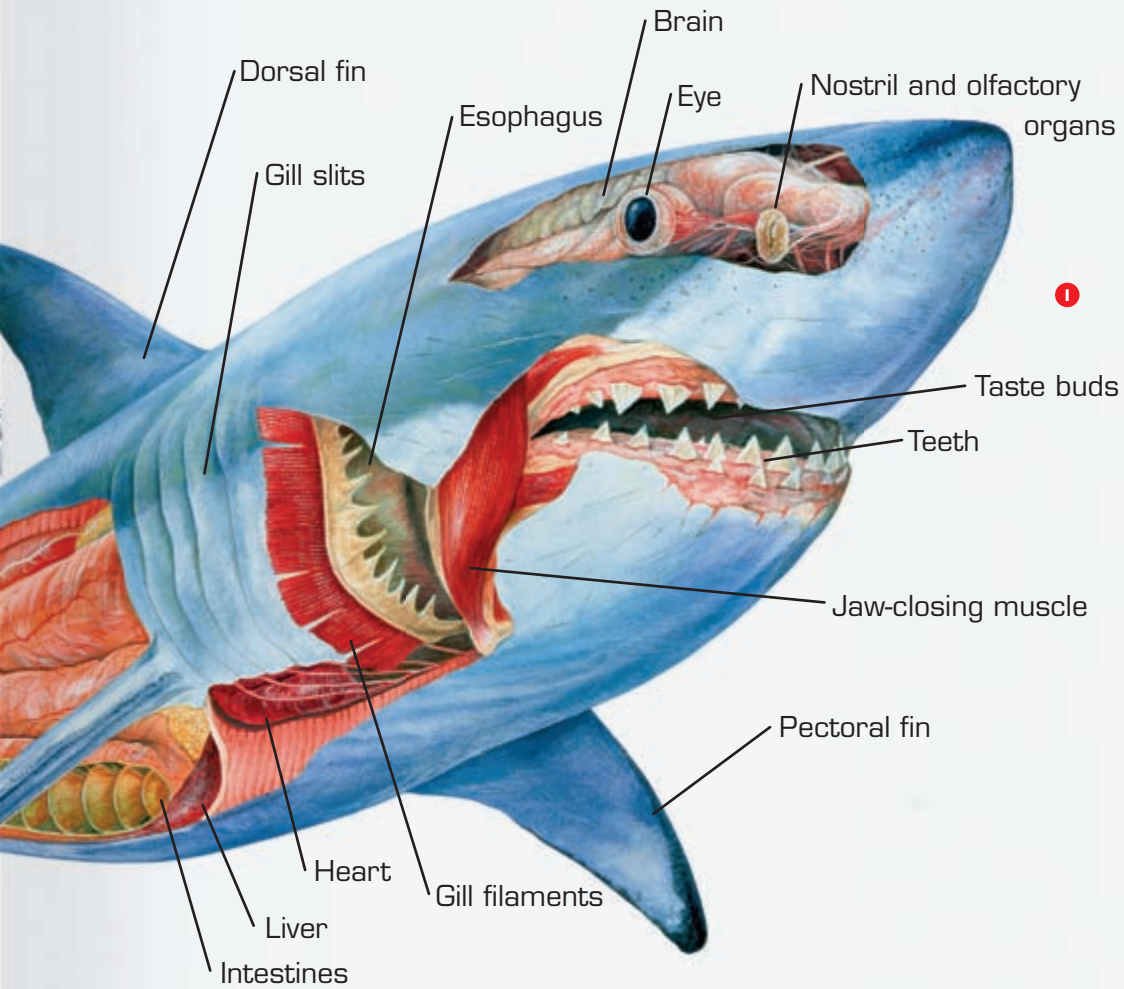
Top-Powerful Tail

Since its upper lobe is larger than the lower one, the great white's thrashing tail movements drive the shark forward and push its head down. This nosedive is countered by the fish's wedge-shaped head and its pectoral fins, which lift the front end.

Are Sharks Smart?

Experiments show that sharks recognize and remember shapes and patterns. Using shark snacks as rewards, scientists have
80 taught lemon sharks to swim through mazes, ring bells, and press targets. “Although we learn new things about sharks every day, there’s still a lot we don’t know about them,” says Hueter.

Great White Shark



Sandpaper Skin

Rough and tough, shark skin is made of hard, platelike scales, like tiny teeth pointing backward.

Gills

Water flows in the mouth and over blood-rich gill filaments. Some dissolved oxygen passes into the bloodstream before the water flows out through gill slits.

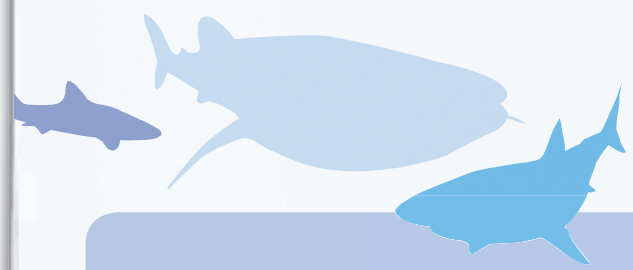
1 TEXT FEATURES
Use the **labels** on the illustration to identify the spinal cord, kidney, and brain.

Shark Eyes

Sharks have good eyesight and can see colors. Their eyes are protected by a nictitating (nĭk′tĭ-tā′tĭng) membrane that moves up and down like an eyelid.

What Are Sharks' Natural Enemies?

Large sharks sometimes eat smaller sharks, and killer whales also dine on sharks. But the shark's greatest enemy is people. Humans kill sharks for food, use their skins for leather, make medicine from their liver oil, and use shark teeth for jewelry. Many sharks are killed senselessly for sport or get trapped and die in fishing nets. And it takes a long time for shark populations to rebound. Most shark species take ten years to reach reproductive age and produce small litters of less than a dozen pups.



Bite-Size Facts

- The first sharks appeared in the ancient oceans about 400 million years ago—200 million years before the dinosaurs!
- Sharks are carnivores (meat-eaters). Most gobble their prey whole or rip it into large, shark-size bites.
- Most sharks are found in the ocean but some, like the bull shark, also swim in lakes and rivers. Most shark attacks occur in warm waters—20° to 30°C (68° to 86°F).
- Sharks lack the inflatable swim bladder that allows bony fish to control **buoyancy**. Most sharks must swim endlessly. If they stop, they sink to the bottom and may drown from a lack of water flowing over the gills. J

buoyancy (boi′ən-sē) *n.* the ability to remain afloat in liquid

J **TEXT FEATURES**
The Bite-Size Facts are organized in a **bulleted list.** Why do you think writers use bulleted lists to present information?

Comprehension

1. **Recall** What does the author think is the scariest thing about sharks?
2. **Clarify** What place do sharks hold in the aquatic food chain?
3. **Represent** Draw a simple illustration of a shark. Label its tail, dorsal fin, pectoral fins, and gill slits.

COMMON CORE

RI 1 Cite textual evidence to support analysis of what the text says explicitly. **RI 2** Determine central ideas in a text; provide an objective summary. **RI 5** Analyze the structure an author uses to organize a text.

Text Analysis

4. **Understand Text Features** Locate the information about shark eyes on page 914. What do you learn from the photograph? What do the other text features add to your understanding of the photograph?
5. **Compare Outlines** Compare the outline you made while reading this article to one created by a classmate. Which main ideas and supporting details did you both have? Which were different?
6. **Analyze Author's Purpose** What do you think is the author's main purpose for writing "What Do You Know About Sharks?" Explain how the **text features** help Guynup achieve this purpose.
7. **Draw Conclusions** Why do sharks need to be protected? Make a chart like the one shown to list details and facts that you think support protecting sharks as well as those that support not protecting them. Use information from your outline or from the article. Which conclusion do you support?

Sharks Should Be Protected	*Sharks Should Not Be Protected*
The ecosystem would be disrupted without sharks.	

8. **Evaluate Objective Point of View** When writing from an objective point of view, the writer leaves out personal opinions and instead presents information in a straightforward way. How does the author's use of the objective point of view influence your response to the article?

Extension and Challenge

9. **Creative Project: Art** Work with a partner to create a poster illustrating **facts** about sharks. Include some of the important information about sharks that you put in your outline.

Can appearances DECEIVE?

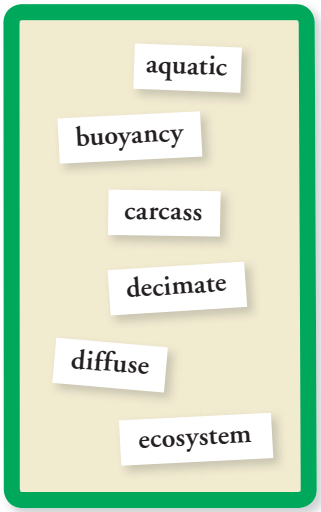
Have you changed your opinion about sharks now that you have read this article? Think of another fish or an animal about which people may have strong opinions that don't match the facts. Compare that fish or animal's appearance with the facts that you know about it. Why do you think its appearance is deceptive?

Vocabulary in Context

VOCABULARY PRACTICE

Answer the questions to show your understanding of the vocabulary words.

1. Which is an example of an **ecosystem,** a desert or a gymnasium?
2. Which would be more likely to **decimate** a species, overhunting or rain?
3. If you wanted to **diffuse** air in a room, would you use a vacuum or a fan?
4. Which has **buoyancy,** a boulder or a raft?
5. If something is a **carcass,** is it alive or dead?
6. Would a person who liked **aquatic** things more likely own a fish tank or a cactus?



ACADEMIC VOCABULARY IN WRITING

• area • domain • hypothesis • objective • resolve

Write a paragraph describing the **domain** of different types of sharks. Include facts from the article about where sharks can be found. Use at least one of the Academic Vocabulary words in your paragraph.

VOCABULARY STRATEGY: CONTENT-SPECIFIC WORDS

Whenever you study a specific subject or explore an area of interest, you are likely to encounter new words that are directly related to that subject. For example, in this article about sharks, you learned that the word *aquatic* refers to things that grow or live in the water. By learning content-specific words, you'll be better able to understand, discuss, and write about the subject yourself.

PRACTICE Match the word in the first column with its definition in the second column. Refer to a dictionary or science textbook if you need help.

1. tsunami	**a.** having to do with the sea or the things in it
2. current	**b.** animals with soft bodies and often hard shells
3. mollusks	**c.** large brown seaweed
4. marine	**d.** ocean stream that moves continuously in one direction
5. kelp	**e.** hard-shelled animals with jointed body and legs
6. crustaceans	**f.** destructive wave caused by an underwater earthquake

COMMON CORE

L 6 Acquire and use accurately grade-appropriate general academic and domain-specific words.

Interactive Vocabulary THINK central
Go to thinkcentral.com.
KEYWORD: HML7-916

Language

GRAMMAR IN CONTEXT: Use Commas Correctly

Commas are used to make the meanings of sentences clear by setting off certain elements. One such element is an **appositive.** An appositive is a noun or pronoun that explains, identifies, or renames the noun or pronoun it follows. Sometimes the appositive has a modifier. This is called an **appositive phrase.**

Original: The tiger shark a ferocious predator will eat just about anything.

Revised: The tiger shark, a ferocious predator, will eat just about anything. (*Insert a comma before and after the appositive phrase "a ferocious predator."*)

PRACTICE In the following sentences, add commas where necessary.

1. Great white sharks the most fearsome fish usually live in deep seas.
2. The whale shark the world's largest fish eats plankton.
3. Humans the shark's greatest enemy kill sharks for leather.
4. The nurse shark a slow bottom dweller is not usually dangerous.

For more help with punctuating appositive phrases, see page R61 in the ***Grammar Handbook****.*

COMMON CORE

L 1 Demonstrate command of the conventions of standard English grammar and usage. **L 2** Demonstrate command of the conventions of standard English punctuation. **W 2** Write informative texts to examine a topic.

READING-WRITING CONNECTION

Increase your understanding of "What Do You Know About Sharks?" by responding to this prompt. Then use the **revising tip** to improve your writing.

WRITING PROMPT	REVISING TIP
Short Constructed Response: Informational Text Rewrite the information in the caption for "Shark Eyes" on page 914 so that it is organized in a question-answer format. Use the organization of the article as a model. Include a subheading in the form of a question and provide a clear main idea and at least two details.	Be sure that you have placed a comma before and after appositives and appositive phrases. If the sentence ends with an appositive phrase, you need only place a comma before it and a period at its end.