

Who Killed the Iceman?

 Video link at thinkcentral.com

Magazine Article

Skeletal Sculptures

Process Description by Donna M. Jackson

VIDEO TRAILER



KEYWORD: HML9-578

How do scientists **UNLOCK** the past?

COMMON CORE

RI 2 Analyze a central idea's development over the course of a text, including how it emerges and is shaped and refined by details; provide an objective summary of the text.

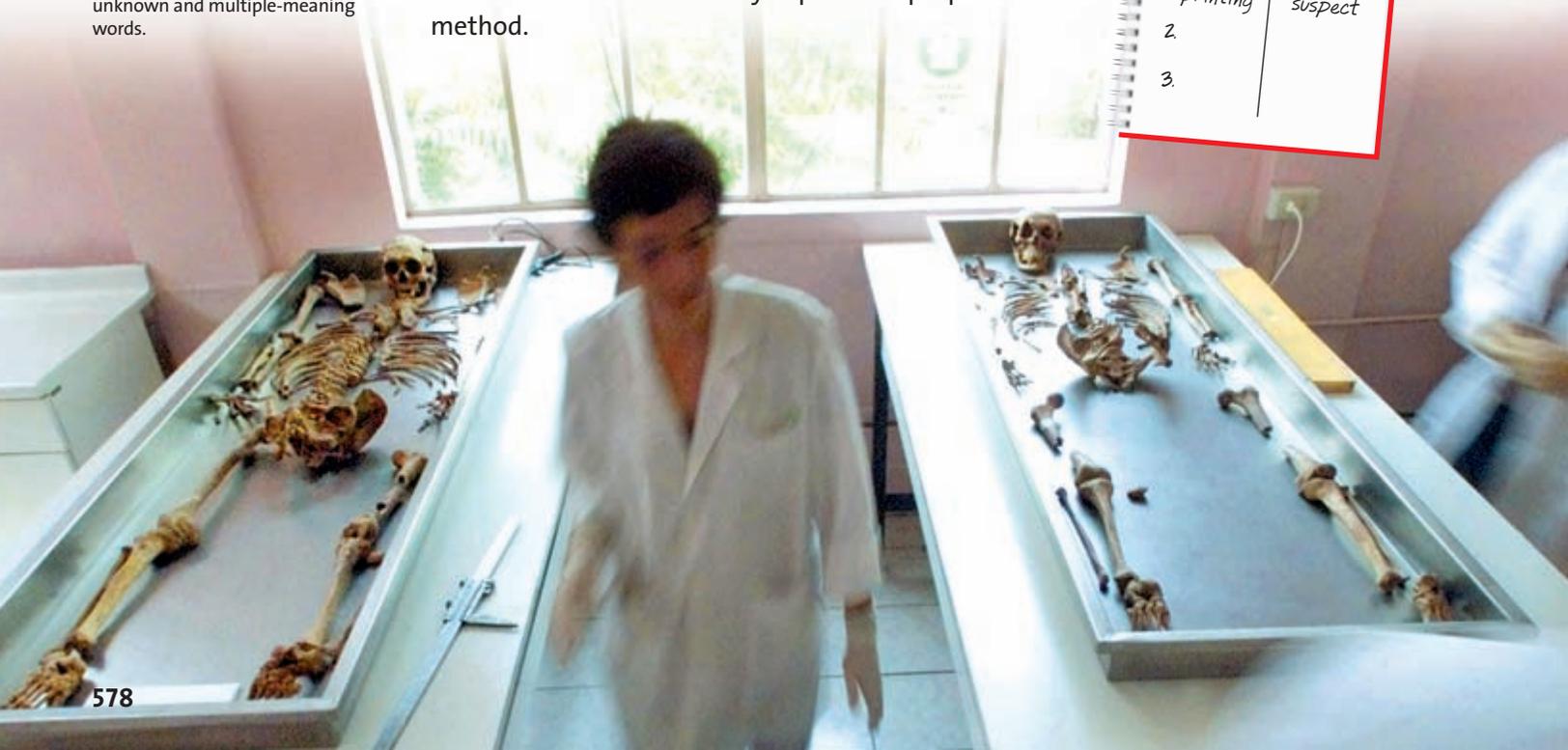
RI 5 Analyze how an author's ideas or claims are developed and refined. **SL 2** Integrate multiple sources of information presented in diverse formats. **L 4** Determine or clarify the meaning of unknown and multiple-meaning words.

Everyone knows bones and corpses can't talk. Or can they? As you may know from true-crime shows or sci-fi thrillers, human remains often have their own stories to tell. As police detectives unravel intricate cases and scientists investigate unexplained phenomena, these remains often tell stories that help piece the past together.

DISCUSS What types of criminal or scientific investigation do you know about? With a partner, choose a type to discuss. List the methods investigators use to track down the truth. Then briefly explain the purpose of each method.

Criminal Investigation

Method	Purpose
1. Finger-printing	Identify suspect
2.	
3.	



● TEXT ANALYSIS: TEXT FEATURES

Text features are design elements that highlight the organization and key information of a text. They can help you preview what you'll read and recognize central ideas.

- **Subheadings** signal the beginning of a new topic or section. They often identify the focus of the text that follows them.
- **Graphic aids**, such as maps and photographs, present information visually. They are frequently accompanied by **captions**, which describe or clarify the information.
- **Numbered lists** often consist of steps in a process that should be followed in order.

As you read, use text features to help you analyze how claims and ideas are developed in each article.

● READING STRATEGY: TAKE NOTES

When you **take notes**, your goal should be to summarize a text's claims, central ideas, and details in a way that is easy to understand and remember. Since text features highlight central ideas and key information, including them in your notes can help.

As you read each section of "Who Killed the Iceman?" jot down its subheading. Then record the important details included in the section.

As you read "Skeletal Sculptures," note the key information in each step.

Review: Monitor

Who Killed the Iceman?

Background

- He was frozen for 5,000 years.
- Hikers found him in 1991 on the border between Austria and Italy.

Skeletal Sculptures

Facial Reconstruction

step 1



step 2



step 3

Stumbling onto a Mummy

"Who Killed the Iceman?" chronicles some of the theories surrounding the death of a man who met his demise around 3000 B.C. The "Iceman," the oldest frozen mummy ever found, was discovered by German hikers vacationing in the Alps. When they spied a body embedded in the ice, the hikers assumed they had found the remains of a mountain climber who'd met a dismal fate. They had no idea they'd stumbled onto a 5,000-year-old relic. The Iceman now resides at the South Tyrol Museum of Archaeology in Bolzano, Italy.



Rescue workers and forensic experts examine the Iceman.

Crime-Fighting Scientists

"Skeletal Sculptures" describes how forensic anthropologists help police track down the truth. Anthropology is the scientific study of humans—our origins, behavior, environment, and physical features. Forensics is the use of science to solve crimes. Forensic anthropologists use their knowledge of human characteristics to assist in cracking tough cases involving human remains. The scientists identify the victim's age, sex, race, and physical characteristics. They also determine the likely cause of death, which makes them an integral part of many murder investigations.

▲ VOCABULARY IN CONTEXT

Find a word that could be used in each newspaper headline.

WORD	anthropology	compile	refute
LIST	artifact	presumed	

1. Woman **Thought** Guilty of Murder
2. New Study to **Pull Together** Years of Research
3. Unusual **Object** Found in Archaeological Dig
4. **Science** Spotlight: Ancient Tribes
5. Scholar to **Deny Accuracy** of Theory



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

WHO KILLED THE ICEMAN?



A TEXT FEATURES

Examine this **photograph** and its accompanying **caption**. Does the 5,000-year-old mummy look as you expected him to, or does his appearance surprise you? Explain your answer.

B TAKE NOTES

What is the most important information provided in the section labeled “Background”? Be sure to record each section’s essential details in your notes.

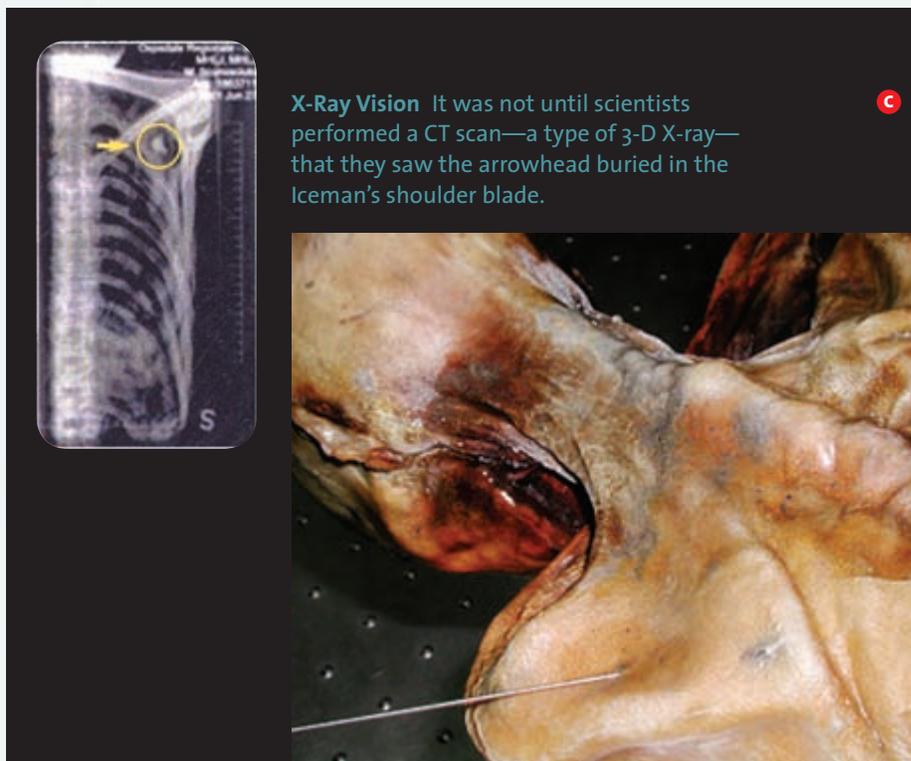
Among the first to reach the scene, these mountaineers used makeshift tools to help free the mummy.

Background

He spent some 5,000 years frozen in a mountain glacier on the Austro-Italian border before passing hikers discovered him, sprawled in the melting snow, in 1991. He now resides in a refrigerated room at a museum in Italy. Over the 11 years since his discovery the Iceman mummy has been examined from every possible angle. But not until this past summer did those studying his still frozen body notice a crucial piece of evidence that dramatically rewrites his story: “Ötzi,” nicknamed for the Ötztal Alps where he was found, didn’t freeze to death in a sudden snow storm while tending sheep as some had suggested. Instead he was killed, a victim of warfare, murder, or human sacrifice. **B**

Clues Discovered

- 10 X-rays reveal an arrowhead buried deep in the Iceman's left shoulder—an injury that could not possibly have been self-inflicted. This discovery consequently led archaeologists to believe that the Iceman had been killed. The wound, visible as a small dark smudge beneath the mummy's leathery skin, had been overlooked in all previous examinations. Though no arrow shaft protrudes from the wound and no blood marks the arrow's entrance, it's now clear that the Iceman was shot in the back. But who did it? And why?



X-Ray Vision It was not until scientists performed a CT scan—a type of 3-D X-ray—that they saw the arrowhead buried in the Iceman's shoulder blade.

Differing Theories **D**

“There’s no way anyone can ever really know,” says archaeologist Johan Reinhard, a National Geographic Society explorer-in-residence. “It might have been murder. Or it might have been ritual sacrifice.”¹

- 20 Reinhard knows mummies. Among the many he has discovered is the Inca “ice maiden,” a victim of sacrifice, on the frozen slopes of Peru’s Nevado Ampato² in 1995. His experience studying mountain cultures in the Andes, the Himalayas, and elsewhere has convinced him that the Iceman’s death was not a random killing.

1. **ritual sacrifice:** a sacrifice that is part of a religious ceremony.
2. **Nevado Ampato** (nə-vä'dō äm-pä'tō): a volcano in the Central Andes.

COMMON CORE L.4a, c

Language Coach

Roots and Affixes A prefix is an affix (word part) added before a root or base word. One meaning of the prefix *pro-* is “forward.” What do you think *protrudes* in line 15 means? (Hint: the root *-trud-* means “thrust.”) Check your answer in a dictionary.

C TEXT FEATURES

How do these photographs support the **central idea** of the “Clues Discovered” section? Explain, citing details from the text and the photos.

D TAKE NOTES

As you begin reading the section about the controversy surrounding Ötzi’s death, take careful notes to keep track of the differing theories.

artifact (är'tə-fäkt') *n.*
something created by
humans, usually for a
practical purpose

COMMON CORE SL 2

E GRAPHIC SOURCES

Examine the map that accompanies this article. **Graphic sources** such as maps clarify information in the text and present additional factual data. What information does this map convey? List two details you can learn from this graphic source.

“Look at where he died,” Reinhard says. “It’s a prominent pass, between two of the highest peaks in the Ötztal Alps. This is the kind of place where people from mountain cultures have traditionally made offerings to their mountain gods. We know that mountain worship was important in prehistoric Europe during the Bronze Age,” he says. “And there is good
30 evidence that it may also have played a role earlier, in the Copper Age.”³

Reinhard’s interpretation seems to answer questions about **artifacts** found with the mummy that have long puzzled experts. For example, breaking objects was a ceremonial practice in Neolithic⁴ Europe. This might explain the broken arrows lying near the mummy. The Iceman’s copper ax—the oldest prehistoric ax in Europe with its bindings and handle intact—is also significant. Its copper had to have been mined, and mountains, as the source of valuable metals used to make tools, “were worshiped by miners throughout the world,” says Reinhard. “This helps explain why the ax was left with the
40 body after the killing.” Murderers would likely have taken something so useful with them. But people performing a ritual might have left it for the Iceman’s use in the afterlife or as a tribute to the gods.



Ötzi was found at approximately 10,500 feet in the Ötztal Alps on the border between Austria and Italy. After closely examining Ötzi’s clothing and possessions—including a sheath and dagger (shown at right)—archaeologists realized they had uncovered a 5,300-year-old find.



3. **Bronze Age . . . Copper Age:** The Bronze Age in Europe, when bronze tools began to be used, lasted roughly from 3500 B.C. to 1000 B.C. The Copper Age overlaps with the earliest part of the Bronze Age.
4. **Neolithic** (nē'ə-līth'īk): having to do with the prehistoric period when food growing began, but before metal tools were used—about 4000 B.C. in Europe.

Another clue: The Iceman's body was found in a naturally formed trench along the pass. Prior explanations had him taking shelter there from sudden bad weather. "But the trench is not deep and is at a high point of the pass. It would have been a poor place to sit out a storm," explains Reinhard. Perhaps, instead, the Iceman was buried there by whoever killed him, which would account for the body's being so well preserved. **F**

Reinhard's ideas have not been met with enthusiasm by European experts. In contrast with his beliefs, the mummy's caretaker, pathologist Eduard Egarter Vigl of South Tyrol Museum of Archaeology, believes that Ötzi may have been fleeing from an attacker, saying, "The Iceman was hit by an arrow from behind." Others maintain that arrows aren't efficient means of ritual killing and that no clear evidence of any other Copper Age sacrifice exists.

So Who Killed the Iceman?

"They view the idea of human sacrifice as too sensational," says Reinhard. "But they can't **refute** what I've pointed out, and I believe my theory better explains the known facts.

"I know it's controversial," he admits. "But it's time to **compile** all the evidence and reexamine it from a different perspective. Let's look at these artifacts not only relative to each other but also within social, sacred, and geographical contexts."



A scientist examines the skeletal remains of the Iceman.

F MONITOR

One important part of monitoring your reading is **evaluating** the information that's provided. Do you find Reinhard's theory convincing? Why or why not?

refute (rĭ-fyŏŏt') v.
to prove false by
argument or evidence

compile (kəm-pĭl') v.
to put together by
gathering from
many sources

Skeletal

SCULPTURES

anthropology

(ăn'thrə-pŏl'ə-jē) *n.* the science or study of human beings, including their physical characteristics and cultures

COMMON CORE L4

Language Coach

Multiple Meanings

Many words have more than one meaning.

Reread lines 11–15.

Likeness can mean “portrait,” “similarity,” or “appearance.” Which meaning best fits the word’s use in these lines?

G MONITOR

As you read, stop to **clarify**: why does Dr. Charney call facial reconstruction “a last resort at identification”?

Dr. Michael Charney is an expert in forensic¹ **anthropology**. His expertise has enabled him to take a few pieces of a skeleton found in Missouri and compile a portrait of a five-foot, 120-pound Asian woman in her mid-twenties. Still, that isn’t enough to identify her.

The dead woman’s “face” needs
10 to be brought back to life.

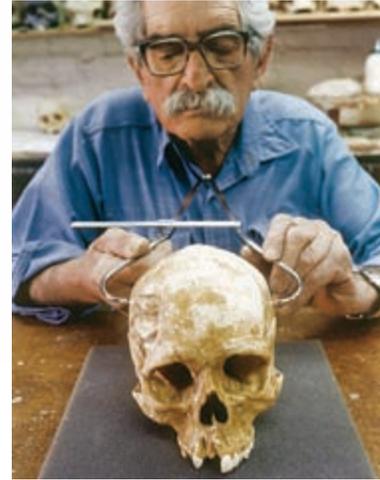
Reconstructing the likeness of a person in clay, using the skull as a guide, is a last resort at identification, Dr. Charney says. It gives police a new lead to follow, a visual clue that can be photographed and displayed in the media.

Facial reconstruction is not
20 an identifying tool, he warns. The goal is to trigger someone to recognize the model and to identify the person through scientific means.

“All that’s needed is a general recognition that it looks like so-and-so,” he says. **G**

Before re-creating a face, Dr. Charney and forensic sculptor
30 Nita Bitner search the skull for signs of disease, injury, and structural defects.

“We look for things that shouldn’t be there,” Bitner says. “Sometimes we find broken noses, cuts, or dentures.” These



Dr. Michael Charney measures a skull with spreading calipers.

affect the face’s appearance and aid in the identification process.

If the nose bone is curved to one
40 side, for example, it’s important to show it in the face because it’s a distinguishing feature.

“We have to be careful, however, not to include anything that happened at the time of death,” Bitner notes, “because it wouldn’t be recognizable to others.”

Age also influences how a face is built. Wrinkled skin, which
50 might help illustrate an older person, is often incorporated into a sculpture for accuracy.

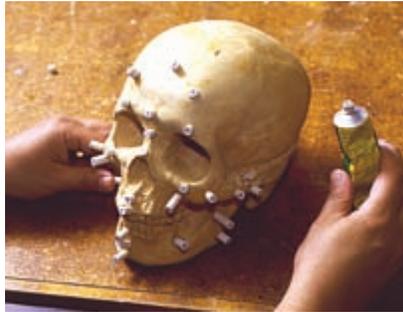
After studying the Missouri woman’s skull, Bitner makes a latex mold and pours a plaster cast. Now she’s ready to sculpt the face.

1. **forensic**: having to do with applying scientific methods to crime investigation.

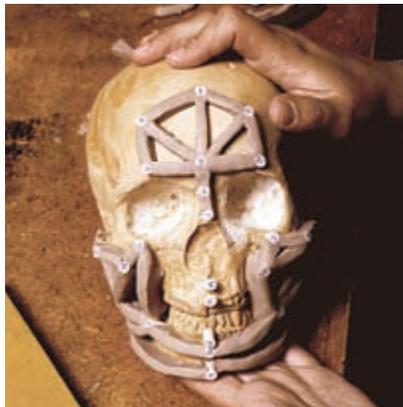


1. Forensic sculptor Nita Bitner begins a facial restoration by cutting round rubber pegs into different lengths. The pegs, called landmarks, represent the thickness of the soft tissue (muscle, fat, and skin) at different points on the face. These tissue depths, which vary for men and women of varying ages, were first calculated from corpses by nineteenth-century scientists and later updated. **H**

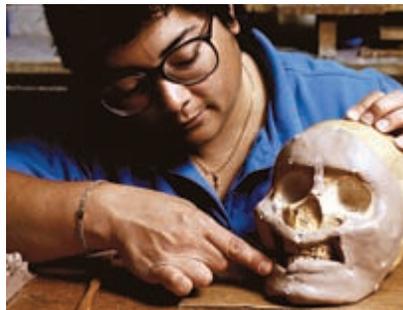
2. She then glues the rubber pegs to the skull cast.



3. Bitner “connects the dots” with strips of modeling clay. When attaching the strips of clay, she begins at the forehead and works her way down to the cheekbones, nasal area, chin, and mouth.



4. Once the dots are connected, Bitner fills in the spaces with clay and fleshes out the face. Now the prominent cheekbones of the Missouri woman become strikingly clear. Suddenly her broad face and delicate nose emerge.



H TAKE NOTES

As you read the numbered items in this section, record the steps of the process in your notes. For each step, include only the **details** that are most important.



5. As Bitner smooths the clay with her thumb and fingers, the face develops like a photograph.



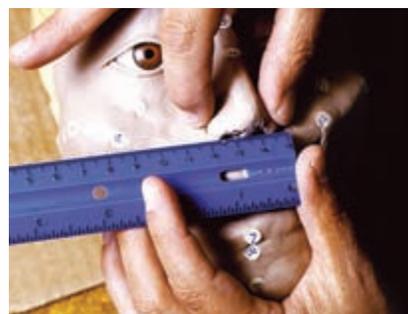
6. Bitner sets the plastic brown eyes in their sockets.



7. Next come the eyelids.



8. Bitner then sculpts the sides of the nose.



9. She measures the nose with a ruler to ensure it is the correct width.



10. Now it's time to mold the upper lip.



11. The face is nearly complete. Because the Missouri woman is **presumed** to be Asian, Bitner will add a black wig. She will then add a scarf for a finishing touch.



12. The model is now ready to be photographed and publicized in the media so that millions of amateur detectives can help solve the riddle of her identity. **1**

presumed (prĭ-zōōmd')
adj. thought to be true
presume *v.*

1 **TEXT FEATURES**

Review the **photographs** illustrating the process. Which step do you think is the most critical for transforming a skull into a recognizable human face? Explain your answer.

Comprehension

- Recall** Why is the Iceman nicknamed Ötzi?
- Summarize** What is Johan Reinhard’s theory about how the Iceman died?
- Clarify** What is facial reconstruction, and for what is it used?

Text Analysis

- Summarize Notes** Review the notes you took as you read “Skeletal Sculptures.” Using these, summarize the process of facial reconstruction.
- Draw Conclusions** In your opinion, is disagreement between scientists helpful or harmful to further investigation? Use evidence from “Who Killed the Iceman?” to support your conclusion.
- Analyze Text Features** If you had simply scanned the text features—the title, subheads, and graphic aids—of “Who Killed the Iceman?” would you have had an accurate idea of what the article was about? Explain your answer.
- Evaluate** Complete the chart below, noting the information that each method of investigation provided to the scientists studying the Iceman. Which method do you think yielded the most crucial information? Explain.

Method of Investigation	Information Provided
X-rays of Ötzi’s shoulder	
Analysis of where the body was found	
Evaluation of artifacts found with the Iceman’s body	

COMMON CORE

RI 2 Analyze a central idea’s development over the course of a text, including how it emerges and is shaped and refined by details; provide an objective summary of the text. **RI 5** Analyze how an author’s ideas or claims are developed and refined. **SL 2** Integrate multiple sources of information presented in diverse formats.

READING-WRITING CONNECTION

WRITING PROMPT

Short Constructed Response: Comparison and Contrast

How do Reinhard’s theories about the mummy’s death and the evidence he offers differ from those of the other scientists mentioned in “Who Killed the Iceman?” Using your notes and examples from the text, write **one or two paragraphs** comparing and contrasting Reinhard’s theories with the other scientists’ beliefs.

REVISING TIP

Review your response. Did you clearly explain each of the differing theories? Did you include the evidence each theory relies upon?

How do scientists UNLOCK the past?

How does learning about the past give us insight into our own time?

Vocabulary in Context

▲ VOCABULARY PRACTICE

Decide whether these statements are true or false.

1. A wildflower originally identified centuries ago is an ancient **artifact**.
2. If I **refute** an argument, I make a convincing case against it.
3. To write a good report, you should **compile** information from several sources.
4. A person interested in animal behavior might want to study **anthropology**.
5. Someone **presumed** to be at fault has already been proved wrong.

WORD LIST

anthropology
artifact
compile
presumed
refute

ACADEMIC VOCABULARY IN SPEAKING

• conclude • construct • implicit • primary • specific

When you listen to oral instructions, you can't rely on illustrated steps like those in "Skeletal Sculptures," but you can include clarifying questions in your notes to ask the speaker directly. Use at least two Academic Vocabulary words each as you practice giving and following oral instructions: Think of a task or process you've performed or a **specific** problem you've solved by following steps. Prepare the steps as instructions and present them orally to a partner. Then switch roles. Can you **conclude** that you understood each other's instructions? Explain.

VOCABULARY STRATEGY: SPECIALIZED FIELDS, OR "OLOGIES"

The words for many fields of study, such as *anthropology*, end with the Greek suffix *-ology*, meaning "study of." The word for the person doing the studying often ends in *-ologist*, as in *anthropologist*. Many of these words, such as *toxicology* (the study of poisons), are recognizable because they have a familiar root. Others, like *penology* (the study of prisons), have a Greek or Latin root you may have to learn.

PRACTICE Choose the word in parentheses that fits each sentence. Use context clues, your knowledge of roots, or, if necessary, a dictionary.

1. Because his grandfather had Alzheimer's disease, Jeremy decided to specialize in (gerontology, geology).
2. A (cosmetologist, criminologist) was brought in to examine the murder scene.
3. If you study (ornithology, psychology), you will become an expert on birds.
4. Please have your hearing checked by an (audiologist, ecologist).
5. Ed, an amateur (cytologist, herpetologist), viewed lizards, snakes, and turtles near the beach.
6. Learning a little about (meteorology, oncology) helped me anticipate thunderstorms.

COMMON CORE

L 6 Acquire and use accurately general academic and domain-specific words; demonstrate independence in gathering vocabulary knowledge.

Interactive Vocabulary **THINK** central

Go to thinkcentral.com.
KEYWORD: HML9-589