

Background Note

UNIT OPENER pages 92–93

The large photo shows a young female student from the University YES Academy in the United States attending Robotics Day at the University of Michigan. She is trying out the i-Limb, a prosthetic hand device that looks and moves like a human hand.

Expansion Activity 1

UNIT QUESTION page 93

1. Introduce the Unit Question: *How can science improve lives?* Ask related information questions or questions about personal experiences to help students prepare for answering the more abstract Unit Question. For example, ask: *What are some different kinds of scientists you can name? What do they study? Do they help people, animals, or the environment?*
2. Read the Unit Question aloud. Give students a minute to silently consider their answers to the question.
3. Put three pieces of poster paper on three different walls of the classroom. Title them: *How scientists help people*, *How scientists help animals*, and *How scientists help the environment*.
4. Divide the class into three groups. Assign one to each poster and give each one a different-colored marker. Tell students: *List as many ways as you can that scientists help people, animals, or the environment.* Give them five minutes to brainstorm and write their ideas on the poster paper.
5. Call time, and have groups move to the next poster. Then repeat the process for the third poster so each group has had a chance to answer each question.
6. Bring the class back together and write the Unit Question on the board: *How can science improve lives?* Ask the class to discuss the Unit Question and write their ideas on the board. Have them refer to the ideas on the three posters to help them.

Background Note

READING 1 page 95

According to the United Nations, energy consumption will have risen by 40% globally between 2011 and 2031. Most of this increase will come from developing countries, where more than a billion people still lack access to electricity because they live in rural areas and are not connected to a larger urban or national grid, a situation known as “energy poverty.” The International Energy Agency reports that around 40% of the world’s population still relies on traditional biomass to meet household cooking needs, mainly in the form of wood. Burning wood as a fuel source is problematic not only because the smoke is a pollutant but also because demand for wood has resulted in massive deforestation, contributing to global warming. Even as companies are

developing more energy-efficient power sources that use wood, coal, and kerosene, experts suggest that the environment and people living in developing countries would be better served with access to renewable energy sources, such as solar and wind energy.

Multilevel Option 1

READING 2: This Device Pulls Water Out of Desert Air C. VOCABULARY page 102

1. Read each of the words in the box aloud.
2. Invite students to repeat the words after you.
3. Have students work with a partner to locate each word in the reading. Invite them to use clues in the text to help define the words they don’t know.
4. Encourage volunteers to share what they learned.

MULTILEVEL OPTION

Pair lower-level students and assist them with the task. Provide example sentences to help them understand the words.

Have higher-level students write a sentence for each vocabulary word. Ask students to write their sentences on the board. Correct the sentences as a class, focusing on the use of the words and expressions rather than other grammatical issues.

Background Note

READING 2 page 103

Water scarcity can refer to either lack of availability due to physical shortage, such as in deserts and other arid areas, or lack of access to water due to poor infrastructure in cities, towns, and rural areas. The UN estimates that more than two billion people live in “high water stress” areas, and UNESCO predicts that the world’s growing population combined with droughts caused by current climate change conditions could displace anywhere from 24 to 700 million people from their homes by the year 2030. In addition to MOFs, other technologies aimed at curbing water scarcity include building hand-pumped water wells, harvesting rainwater, and collecting water from natural underground aquifers (rivers), many of which lie under deserts. A more recent and promising technology is desalination, a process that converts sea water into fresh water for human consumption and is already being used productively in desert countries such as Saudi Arabia, Oman, and the United Arab Emirates.

Expansion Activity 2

WORK WITH THE VIDEO page 108

1. Divide the students into three groups and assign each group one the three inventions from the video (reflective lenses, thickening clouds, releasing sulfur).

- Tell each group they will be the “experts” of that invention and will do an interview role-play on how it works, how likely it is to happen, and what the advantages and disadvantages are. To help students, write the interview questions on the board: *What is the invention? How does it work? Is it likely to work? What are the advantages? What are the disadvantages?*
- Have each group compare their notes about the invention from Activity B. Give each member of the group an index card for them to write short notes about each question. If possible, encourage the group to research more about their invention online to add more information from the video.
- Pair each student up with a different “expert.” Have the pairs interview each other about their invention. Allow students to use their notecards to refer to. Tell students they have three minutes each to interview their expert. Call time after three minutes to let them know when to switch roles. Have students repeat this process two more times, each time with a different expert. During the second interview, give students only two minutes each. During the third, tell them they only have one minute each.
- At the end of the three interviews, have a class discussion on what happened when students repeated the same information in less time. Ask: *How did it feel to speak in less time? Did you explain it better or worse?* Students should notice that they were better able to summarize the information each time they were interviewed due to processing it several times.

Multilevel Option 2



WRITE WHAT YOU THINK page 109

- Ask students to read the questions and reflect on their answers.
- Seat students in small groups and assign roles: a group leader to make sure everyone contributes, a note-taker to record the group’s ideas, a reporter to share the group’s ideas with the class, and a timekeeper to watch the clock.
- Give students five to ten minutes to discuss the questions. Call time if conversations are winding down. Allow them an extra minute or two if necessary.
- Call on each group’s reporter to share ideas with the class.
- Have each student choose one of the questions and write a paragraph of five to seven sentences in response.
- Call on volunteers to share their responses with the class.

MULTILEVEL OPTION

Allow lower-level students to work with partners in response to the question they choose. Ask higher-level students to respond with a two-paragraph answer to expand on their ideas (such as a long “example” paragraph) or choose more than one question to answer.

Vocabulary Skill Note

USING THE DICTIONARY TO DISTINGUISH BETWEEN HOMONYMS page 109

Ask volunteers to read the information about homonyms. Then check comprehension. Ask: *What is a homonym? What homonyms do you know?*

Skill Note

Strict homonyms are words that are spelled the same but have different meanings (*bow*—a thing used to shoot arrows; *bow*—what you tie in your shoelaces). However, the term *homonym* also includes homophones, which are words that sound the same but are spelled differently (e.g., *through*, *threw*). If you add the word *bow* (to move your body or head downward) to the examples above, you have a *heteronym*, or a word with a different meaning that is spelled the same but pronounced differently.

Expansion Activity 3

A. IDENTIFY page 110

- Instruct students to choose three different uses/ definitions of the word *range* and write an example sentence with each one.
- As students are finishing, ask for volunteers to write one of their sentences on the board. Try to get at least five sentences.
- Have students work in pairs to match the sentences to the correct definition.
- Going one sentence at a time, ask pairs which definition they chose for each sentence, and write the number(s) next to the sentence. Then ask the author of the sentence to reveal which definition he or she was trying to illustrate.
- If the sentence doesn’t exactly match the definition, ask the class to brainstorm how to change the sentence to make it match more accurately.

Grammar Note

SUBORDINATORS AND TRANSITIONS TO COMPARE AND CONTRAST page 116

- Read the information about subordinators that show contrast. Ask: *What are some examples of subordinators that show contrast?* Point out that sentences with *although*, *though*, and *while* convey the meaning of “Yes, but...”
- Elicit additional sentences using *whereas*, *while*, *although*, or *though*.
- Read the information about transitions showing comparison and contrast. Check comprehension: *What are some examples of transitions that show comparison? Contrast?*
- Pair students and challenge them to think of another sentence using one of the transition words.

Skill Note

The subordinators *although* and *though* can be used interchangeably at the beginning of a sentence. However, only *though* can be used at the end of a sentence (when used as an adverb). *Though* is also used in the adverbial phrases *even though* and *as though*.

The transitions *in spite of this* and *despite this* must be used when both clauses of a sentence refer to the same person or idea.

Multilevel Option 3

C. APPLY page 118

1. Direct students to complete the sentences with their own ideas.
2. Ask volunteers to write their completed sentences on the board. Identify any errors in the sentence and ask students for ways they might fix them.

MULTILEVEL OPTION

Place students in mixed-ability pairs. Higher-level students can help lower-level students in coming up with ideas and completing the sentences.

Unit Assignment Rubrics

Unit 4 Science and Technology

Unit Assignment Rubric

Student name: _____

Date: _____

Unit Assignment: *Write a five-paragraph essay comparing and contrasting two innovative technologies that can improve lives.*

20 points = Essay element was completely successful (at least 90% of the time).

15 points = Essay element was mostly successful (at least 70% of the time).

10 points = Essay element was partially successful (at least 50% of the time).

0 points = Essay element was not successful.

Write a Compare and Contrast Essay	20 points	15 points	10 points	0 points
The essay explains the relationship between the two subjects or gives reasons why the relationship is important.				
The essay is organized using one of the compare and contrast essay types.				
The essay includes an introduction, three body paragraphs, and a conclusion.				
The essay includes subordinators and transitions to compare and contrast.				
The essay includes correct punctuation, spelling, and grammar.				

Total points: _____

Comments: