21st CENTURY COMMUNICATION
LISTENING, SPEAKING, AND CRITICAL THINKING

SAMPLER

NGL.Cengage.com/21centurycomm
TED Talks programs with National Geographic Learning take inspiring ideas and examples of effective communication from the TED stage to enable learners to express themselves thoughtfully and confidently in English.

Through use of the TED Talks and related, relevant content, National Geographic Learning and TED prompt learners to ask “Isn’t this interesting?” We want to focus the learner’s journey around questions like “What if?”, “Have you ever wondered?”, and “Could this be true?” To achieve this, our learning materials use 21st century themes and topics to help learners of English explore ideas and learn about creative solutions.

National Geographic Learning materials created with TED Talks introduce authentic and compelling content to the English language learning classroom. Alongside content from National Geographic and with one-of-a-kind instructional support, the inspiring ideas introduced on the TED stage provide a springboard for learners to express themselves thoughtfully and confidently in English.

Explore 21st century themes

The 21st century themes and topics featured in our learning materials bring real and relevant content to the classroom, encouraging learners to explore ideas that they will want to talk about!

Learn from inspiring speakers

Inspiring thinkers, doers, and innovators have shared their ideas on the TED stage and generated billions of views at TED.com. Each speaker is a respected leader in their field and has been selected because they have an idea worth spreading — and the skills to share it!

Develop essential skills

Programs created with TED Talks develop essential language and skills for learners to succeed in today’s global society. Each program teaches important language and incorporates 21st century skills such as global awareness, information literacy, and critical thinking.

To learn more about all of our materials with TED Talks, please visit NGL.cengage.com/TED
21st Century Communication: Listening, Speaking, and Critical Thinking is a four-level series that uses powerful ideas from TED Talks to teach learners to think critically and communicate effectively. Through authentic models of effective communication, students build fluency in the listening and speaking skills needed to achieve academic and personal success.

21st Century Skills

TED Talks are used to develop essential 21st century skills, including critical thinking, collaboration, and visual literacy.

Presentation Skills

Presentation skills include:
- Rehearsing
- Creating effective hooks
- Using visual aids
- Making emotional connections
- And more!

For more information, visit NGL.Cengage.com/21centurycomm
Listening and Note-taking

A variety of listening inputs, including lectures, podcasts, and classroom discussions, provide a realistic context for developing key listening skills.

Listening and Note-taking

SPEAKING

SPEAKING SKILL  Use Signposts to Organize Ideas

1. First, just . . .  Second, understand that this quality can . . .  Finally . . .
3. , . . .

LESS IS MORE

1. First of all . . .  Secondly . . .  Finally . . .
2. Second, understand that this quality can . . .
3. . . .

Students learn and practice both academic and general speaking skills to help learners express ideas confidently in any situation.

To access unit audio and video, visit NGL.Cengage.com/21centurycomm
An Olympic swimmer in a swimsuit made of fabric based on shark skin.
PART 1
The Science of Surfaces

BEFORE YOU LISTEN

A COMMUNICATE Work with a partner. Look at the photo. How would you describe shark skin?

B 2.2 PREDICT You are going to hear a documentary about how scientists copy nature to create new products. Listen to the beginning of the documentary. Then discuss these questions with a partner.

1. Why do you think scientists are interested in shark skin?
2. What do you think they can learn from it?

VOCABULARY

C 2.3 Read and listen to the sentences with words from the documentary. Guess the meanings of the words in bold. Then choose the correct meanings.

1. There is a layer of thin ice on the top of the lake. It is dangerous to walk on it. A layer is:
   a. sheet; covering        b. piece        c. type; kind
2. This animal catches its food in a unique way. I've never seen anything like it. Unique means:
   a. frightening        b. strange; difficult to understand        c. one of a kind; very unusual
3. A bird’s feathers have several functions. They keep the bird warm and they help it to fly. Function means:
   a. origin        b. purpose        c. design
4. There are thousands of organisms in the world, from tiny bacteria to animals as large as whales. Organisms are:
   a. living things        b. parts of the body        c. diseases
5. Mathematics has many practical applications in everyday life, for example, in managing your money. An application is a:
   a. factor        b. use        c. explanation
6. There is ice on the ground so it is very slippery. Be careful and walk slowly. Slippery means:
   a. dangerous        b. making things very cold        c. causing things to slide or fall
7. The author adapted the story so that young children could understand it. Adapt means:
   a. to improve        b. to change for different conditions        c. to use again
8. The screen of the cell phone was protected by a clear plastic film. A film is a:
   a. thin covering        b. hard case        c. liquid
9. The scientists needed a powerful microscope to see the complex structure inside the tiny bacteria. Structure means:
   a. use; purpose        b. behavior        c. arrangement; design
10. When there is no wind, the surface of the water is smooth. The surface is the:
    a. top part        b. color        c. temperature
D COMMUNICATE Write an example of each of the following. Then compare your answers with a partner.

A: I went on a cruise to the Antarctic.
B: Really! What a unique experience.

1. A unique experience you had on vacation
2. A practical application of something you learned in high school
3. One function of the human tongue
4. A story or book that has been adapted for a movie
5. A slippery surface
6. Something that has layers

LISTEN

E LISTEN FOR MAIN IDEAS Read the statements below. Then listen to the documentary. Use three of the vocabulary items from exercise C to complete the statements about the main ideas of the documentary.

1. Many organisms have surface structures.
2. Each surface has a special that is important for the organism.
3. Scientists and engineers can the structures found in nature for other applications.

F CONFIRM PREDICTIONS Work with a partner. Review your predictions from exercise B on page 84. Discuss whether your predictions were correct.

LISTENING SKILL Recognize References to Key Terms

Most speakers refer to key terms several times during a lecture or presentation. They may repeat words and phrases exactly, but sometimes they refer to the same term in different ways. For example, they use synonyms or phrases with similar meanings. Notice the reference to the key term "adapt" in the following example:

Some lizards can adapt to their surroundings by changing their skin color. This ability to change helps them survive.

Listening for these key terms can help you understand what the speaker thinks is most important.

G Work with a partner. One of the key terms the presenter talks about is surfaces. Read the excerpts below. Then listen to segment 1. Complete each excerpt with words and phrases that repeat or refer to this key term.

1. "Right, so what do I mean by surfaces? Well, your skin is a natural surface—a that your whole body.
2. "The shark's has a unique structure. It is covered with a of tiny scales in the shape of a diamond."
3. "Engineers adapted the structure of shark skin and created a thin that can be used on walls, floors, and other ."
AFTER YOU LISTEN

I THINK CRITICALLY Reflect. Work with a partner. Each of the biomimicry projects in the documentary began with an observation by a scientist. What were the scientists’ observations for the shark and the pitcher plant? Complete each statement.

1. For sharks, the scientists observed that _____________________________.
2. For pitcher plants, the scientists observed that _____________________________.

J THINK CRITICALLY Apply. Work in a small group. Describe an observation that you can make about a different plant or an animal, such as how a cheetah runs or the way an octopus moves through the water. Think about an application this could have if scientists and engineers were able to adapt this for a new purpose.

A: I’ve noticed that the plants in my apartment always turn toward the sun. So, is there a way scientists could adapt this function?
B: Well, there could be applications for solar energy. What if solar panels could automatically turn toward the sun?

NOTE-TAKING SKILL Take Notes Using Key Terms
When you listen to a lecture or presentation, you can organize your notes around key terms. The first time you listen, notice the different words and phrases that refer to the key terms. Write the key terms down and leave space underneath them. When you listen a second time, listen for details about these key terms and take notes underneath them.

<table>
<thead>
<tr>
<th>KEY TERM 1</th>
<th>KEY TERM 2</th>
<th>KEY TERM 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>details</td>
<td>details</td>
<td>details</td>
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</tbody>
</table>

H LISTEN FOR DETAILS Listen to segments 1 and 2 of the documentary. Complete the notes with details based on the key terms.

Segment 1

<table>
<thead>
<tr>
<th>SURFACE</th>
<th>FUNCTION</th>
<th>APPLICATION</th>
</tr>
</thead>
</table>
shark has tiny shape | prevents growth of film on walls |

Segment 2

<table>
<thead>
<tr>
<th>SURFACE</th>
<th>FUNCTION</th>
<th>APPLICATION</th>
</tr>
</thead>
</table>
pitcher plant rough when slippery, slippery when | catches food; causes slippery that prevents anything from falling into pitcher and die to it |

UNIT 5 Engineered by Nature
SPEAKING SKILL  Use Signal Words to Mark Transitions

Speakers often use signal words such as now, right, so, and well to get their listeners’ attention. Then speakers may transition (move on) to do one of the following:

1. Introduce a new topic
   Now/Right/So/Well, let’s look at some of the research I am doing.
2. Expand or explain a topic they have introduced
   Now/Right/So/Well, what’s the best way to solve this problem?
3. Sum up what they have said
   Well/So, that’s how I see it.

Signal words also give listeners an extra moment to process what they have just heard. When you are speaking, you can help your listeners by pausing briefly after you use one of these signal words.

(See page 165 in the Independent Student Handbook for more information on signal words.)

K COLLABORATE Work with a partner. Read the excerpts below from the documentary. Underline the signal words in each. Then choose the reason why the speaker made each transition.

1. “This week, we are going to look at how scientists and engineers are adapting the surfaces of plants and animals for new purposes. Right, so what do I mean by surfaces? Well, your skin is a natural surface—a layer that covers your whole body.”
   a. Introduce a new topic
   b. Expand or explain current topic
   c. Sum up

2. “So, let’s start with the shark. The shark’s skin has a unique structure.”
   a. Introduce a new topic
   b. Expand or explain current topic
   c. Sum up

3. “The film helps prevent the growth of bacteria. Now, let’s move to the world of plants. Most plants use air, water, and sunlight to make their own food.”
   a. Introduce a new topic
   b. Expand or explain current topic
   c. Sum up

4. “Just think of all the uses this could have! So, these are just two examples of biomimicry and how scientists and engineers can adapt designs from nature to improve our lives.”
   a. Introduce a new topic
   b. Expand or explain current topic
   c. Sum up

PRONUNCIATION SKILL  Linking Sounds

Speakers often link the sound at the end of one word to the sound at the beginning of the next word. This makes their speech sound smooth and fluent.

If the end of one word is a consonant sound and the sound at the beginning of the next word is a vowel, or if the consonant sound at the end of one word is the same as the beginning of the next, hold the sound of the consonant into the next word. Listen to the examples below:

| people are | people i-are |
| scared of | scare d-of |
| because of | becau z-of |
| shark’s skin | sharks-skin |

Most people are scared of sharks because of their large, sharp teeth.

L Underline the sounds that you think should be linked in the excerpt below. Then listen and check your answers.

“The shark’s skin has a unique structure. It is covered with a layer of tiny scales in the shape of a diamond.”

M Work with a partner. Take turns saying the excerpt from exercise K. Link the sounds that you underlined. Listen to your partner and check that he or she links the sounds correctly.

learnmore People have been copying designs from nature for centuries. Leonardo da Vinci (1452–1519) was one of the first biomimicry inventors. He designed a “flying machine” based on observations of birds and how they flew.
THINK CRITICALLY Interpret an Infographic. Work with a partner. Study the infographic below. Then answer the questions.

1. The biomimicry projects in the documentary are based on the surface structure of the organisms. What feature are the biomimicry projects below based on?
2. How do you think the Kingfisher’s beak helps it survive?
3. What is another possible application for the mosquito’s proboscis?

BEFORE YOU WATCH

A PREDICT Work with a partner. Read the title of Sarah Bergbreiter’s TED Talk and the information about her below. What possible applications might micro-robots have?

B Read the following statements. Choose the number that you think makes each statement true. After you watch the talk, check your answers.

1. Micro-robots can jump (10/100/1,000) times higher than their size.
2. Some micro-robots weigh only (3/30/300) milligrams.

SARAH BERGBREITER  Micro-roboticist

Sarah Bergbreiter is an engineer who uses advanced technology to design tiny robots—micro-robots—that can run, roll, and jump high into the air. Many are only a few millimeters long.

Bergbreiter’s idea worth spreading is that robots the size of insects may have widespread and very useful applications.
**COMMUNICATE** Work with a partner. Take turns answering the questions.

1. Where is the safest place to store important personal information?
2. What steps has your school or college taken to help people with limited mobility?
3. What do you think is a computer’s most important capability?
4. The scale of electronics such as cell phones has gotten smaller and smaller. Now some of them are going in the other direction. What size do you prefer for a cell phone, and why?

**WATCH**

Watch Bergbreiter’s edited TED Talk.

Check ✓ the two most important ideas that Bergbreiter wants her audience to understand.

1. The scale of robots is getting smaller every year.
2. Micro-robots have many possible applications.
3. Micro-robots of the future will be semi-intelligent.
4. Engineering mobility on a small scale is a big challenge.

**VOCABULARY**

The sentences below will help you learn words in the TED Talk. Read and listen to the sentences. Guess the meanings of the words in bold. Then match each word to its definition.

a. The robots used electricity that is **stored** in small batteries.

b. You need to use **rigid** building material. If you use something soft, the structure cannot stand.

c. We need to **inspect** every part of the machine to make sure it is safe to operate.

d. Adding more legs improved the robot’s **mobility**. It can now move faster and more easily.

e. We made a model of the robot on a small **scale** before we started building the full-size version.

f. The robot has a **mechanism** that makes it jump really high.

g. When the robot’s main light switched on, it gave off a **flash** of light.

h. Ants have the **capability** of carrying something that weighs more than they do.

i. If you put too many heavy things on one side of the cart, it will **tip over**.

j. The machine is very **robust**. It works even in difficult conditions.

1. _____________  (adj) strong; unlikely to break
2. _____________  (n) part of a machine that performs a function
3. _____________  (adj) stiff; difficult to bend
4. _____________  (adj) kept for use in the future
5. _____________  (n) the ability or power to do something
6. _____________  (v) to look over very carefully
7. _____________  (v) to fall to one side
8. _____________  (n) size; level, especially compared to something else
9. _____________  (n) the ability to move around
10. _____________ (n) a sudden burst of light

**WORDS IN THE TALK**

**locomotion** (n): movement

**rubble** (n): broken bits of bricks from destroyed buildings
RECOGNIZE KEY TERMS

One of Bergbreiter’s key terms is mobility.

Watch and complete the excerpts below with different words and phrases that refer to this key term.

Segment 1

1. “First of all, how do we get the capabilities of an ant in a robot at the same size scale? Well, first we need to figure out how to make them _______ when they’re so small.”

2. “I’ll start with __________. Insects _______ around amazingly well. This video is from UC Berkeley. It shows a cockroach moving over incredibly rough terrain without tipping over.”

3. “_________________________ is another really interesting way to _______ when you’re very small.”

Segment 2

4. “So, the next video is one of my favorites. So you have this 300-mg robot _______ about eight centimeters in the air.”

5. “So, I think you can imagine all the cool things that we could do with robots that can _______ and _______ and _______ and _______ at this size scale.”

UNDERSTAND TRANSITIONS

Read the excerpts from Bergbreiter’s talk. Underline each signal word. Choose the reason she made each transition.

1. “To make these things really functional, we want a lot of them working together in order to do bigger things. So, I’ll start with mobility. Insects move around amazingly well.”

2. “And the basic idea is that we’re going to compress this, store energy in the springs, and then release it to jump. So, there’s no motors on board this right now, no power.”

3. “So, I think I’ve given you some of the possibilities of what we can do with these small robots.”

WATCH FOR DETAILS

Watch segments of the Talk again and complete the notes with details.

Segment 1

Intro:
- Bergbreiter and students work on __________ robots
- Think of robotic versions of __________
- Challenge = get capabilities of ant in robot same __________ scale

Segment 2

Contributions for B’s lab:
- Combine __________ and __________ materials in small mechanism
  - __________ material = silicon
  - __________ material = silicon rubber
- No __________ on board, no power

What we could do with micro-robots:
- After natural __________, look for __________
- Inspect __________ to make sure it’s __________
- They could operate without having to __________ you open
EXPAND YOUR VOCABULARY
Watch the excerpts from the TED Talk. Guess the meanings of the phrases in the box.

- figure out
- semi-intelligent
- rough terrain
- set off
- destination

WATCH MORE
Go to TED.com to watch the full TED Talk by Sarah Bergbreiter.

AFTER YOU WATCH

THINK CRITICALLY
Infer. Work with a partner. Read the excerpt from the TED Talk. Then discuss your answers to the questions.

“And we’ve made some advances so far, but there’s still a long way to go, and hopefully some of you can contribute to that destination.”

1. What does Bergbreiter mean by “there’s still a long way to go”?
2. What does she mean by “destination”?

COMMUNICATE Work with a partner. Discuss the questions below.

1. Read the possible applications for micro-robots below. Check [✓] the ones you think are the most useful.
   a. Tasks that are dangerous
   b. Tasks that require absolutely perfect performance every time
   c. Tasks that are too complex for humans
   d. Tasks that are very repetitive
   e. Tasks that are in spaces too small for humans
   f. Other: ___________________________

2. Which jobs do you think could be most affected by the use of micro-robots?

THINK CRITICALLY
Synthesize. Work in small groups. In what ways are the biomimicry projects in Parts 1 and 2 similar? Check [✓] the boxes in the chart. Then explain your answers to members of the group by giving examples from the two presentations.

A: The projects in Parts 1 and 2 are both inspired by nature.
B: Right. They were inspired by plants or animals.

<table>
<thead>
<tr>
<th></th>
<th>&quot;SHARK SKIN&quot; FILM</th>
<th>NON-STICK FILM</th>
<th>MICRO-ROBOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inspired by nature</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>works on a very small scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>focuses on mobility</td>
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<td></td>
<td></td>
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<tr>
<td>focuses on surface structure</td>
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<td></td>
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<tr>
<td>many possible applications</td>
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<td></td>
<td></td>
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<tr>
<td>applications already in use</td>
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</tbody>
</table>

COMMUNICATE Work with a partner. Which of the biomimicry projects from this unit do you think are the most useful? Explain your answer.

A: I think the hypodermic needle is the most useful.
B: I agree. I hate getting shots!
ASSIGNMENT: Group Presentation  Your group is going to give a presentation about another application for one of the projects you learned about in Parts 1 and 2. Review the ideas, vocabulary, and skills in the unit as you prepare for your presentation.

PREPARE

PRESENTATION SKILL  Have a Strong Ending

It is important to have a strong ending to your presentation so that your audience will remember your ideas. You can summarize what you have said to make your point clear. You can also connect key ideas to your audience in a concrete way. It is not a good idea to introduce any new ideas in the conclusion. Notice how Bergbreiter ends by summarizing briefly and asking her audience to get involved.

1.24 “So, I think I’ve given you some of the possibilities of what we can do with these small robots. And we’ve made some advances so far, but there’s still a long way to go, and hopefully some of you can contribute to that destination.”

(See page 174 of the Independent Student Handbook for more information on having a strong ending.)

C  Work with your group. Use the information and questions below to brainstorm other applications for the projects you have learned about. Do not worry about whether the idea is technically possible yet. Write short notes about your ideas.

- The “shark skin” film prevents bacteria from growing. How could this be used? Where would it be useful?
- The non-stick film is slippery; in other words, ice, oil, paint, etc. will not stick to it. How could this be used? Where would it be useful?
- Micro-robots may be better for some jobs than humans. What kinds of jobs might these be?

D  COLLABORATE  Choose one of the ideas you brainstormed in exercise C. In your group, discuss who will do the following parts of your presentation. Remember to repeat key words and use signals words and pauses to mark transitions.

- Explain how nature inspired this project:
  - Review your notes from Part 1 (page 88) or Part 2 (pages 96–97).
  - Be sure you can explain the key ideas.
  - Consider showing a photo or diagram of the plant or animal.
- Explain your application:
  - Explain the connection between the original research and your idea.
  - Describe how your idea will work.
- Give a short conclusion:
  - Explain why your application is useful and important.
  - Restate the importance of learning from nature.

E  Read the rubric on page 182 before you present. Notice how your presentation will be evaluated. Keep these categories in mind as you present and watch your classmates’ presentations.

PRESENT

F  Give your presentation to a small group. Watch your classmates’ presentations. After you watch each one, provide feedback using the rubric as a guide. Add notes or any other feedback you want to share.

G  THINK CRITICALLY  Evaluate. As a class, discuss what each presenter did well and what might make each presentation even stronger. Decide the two things you did well, and two areas for improvement.

REFLECT

Reflect on what you have learned. Check [✓] your progress.

I can  □ recognize references to key terms.
□ take notes using key terms.
□ use signal words to mark transitions.
□ link sounds.
□ end strong.

I understand the meanings of these words and can use them.
Circle those you know. Underline those you need to work on.

- adapt [AWL]
- application [AWL]
- capability [AWL]
- function [AWL]
- inspect [AWL]
- layer [AWL]
- mechanism [AWL]
- organ [AWL]
- organism [AWL]
- rigid [AWL]
- robust [AWL]
- scale [AWL]
- slip [AWL]
- surface [AWL]
- store [AWL]
- structure [AWL]
- tip over [AWL]
- unique [AWL]
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The Classroom Presentation Tool allows the teacher to present Student Book pages with audio and video and interactive activities.

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Using TED Talks as the springboard to share ideas, 21st Century Reading shows learners how to understand and respond to ideas and content in English.

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