Shaping My Knowledge

Warm-up

First, before class, prepare a slide show depicting several scientific breakthroughs in various fields: medicine, technology, space, etc. Then, have students work in groups of three to identify the breakthroughs. Alternatively, give groups time to research a breakthrough you assign as a flipped-classroom task (related to space exploration), ensuring they answer these questions: *1. What is the breakthrough? 2. Who was involved? 3. Why was it important? 4. How would life be different without this breakthrough?* Finally, ask volunteers to share their findings with the rest of the class.

Teaching Tip

For Exercise 3
First, ask the following comprehension questions: *1. What three breakthroughs are mentioned? 2. How did telescopes contribute to this mission? 3. Why is reusability important in space travel? 4. In what ways does AI assist exploration? 5. How does the narrator feel about the mission?* Then, in groups of four, assign each student one of the three breakthroughs (telescopes, reusable ships, AI). Next, each student argues why their breakthrough is the most important for Mars missions—finally, the group votes on the most convincing argument.

Differentiation Strategy

For Exercise 2
Go to the Differentiation Strategies Bank and adapt this exercise using Strategy 6.

Flexi Exercises
(To adjust to students' needs, you can either use or not the activities below)

Exercise 1

Science

How does science build on past breakthroughs?

01 **What are the three most important scientific breakthroughs connected to the study of space and space travel? Compare your list in a group of four.**
Answers will vary.

02 **Read "The Wild Rover" and compare the astronaut's list with yours. Write that list here. With your group, discuss the differences.**

Telescopes | Reusable Spaceships | Artificial Intelligence

03 **Write summaries of the importance of each scientific advance in the study of space and space travel.**
Possible answers
1. High-powered telescopes: They can see further and more clearly and choose Earth-like planets for exploration.
2. Reusable spaceships: They are less expensive and easier.
3. Artificial intelligence: They provide instructions and adaptation for rovers and robots.

The Wild Rover

Student astronaut mission log
Location: Mars temporary base

There are only six days remaining in my temporary, solo trip to Mars, and while it's been challenging, it's also been exhilarating: red skies, red dust, and instant noodles. Establishing a base capable of supporting human life on Mars has long been considered science fiction, so how did it become a reality? Science, and there have been a **myriad** of advances that have helped us, me, get here. Here are three scientific **breakthroughs** that had a significant impact.

First and foremost, **telescopes** such as Hubble and Webb allowed space scientists to see farther than ever. They could even see the beginning of the universe—the immediate effects of the Big Bang in action, so to speak, inside a black hole. Also important was the ability to discover planets with Earth-like qualities and plan missions. The impact of Hubble, Webb, and other telescopes cannot be overstated—they are our eyes, and we now see far and wide.

Next, the science behind the development of reusable **spaceships** opened up space travel and, therefore, the study of space, first used in the NASA Space Shuttle program in 1981. Much later, SpaceX rockets could land, refuel, and return, making this mission to Mars possible and, in general, making space travel less costly, faster, and more routine.

Finally, artificial intelligence has enhanced the study of science in different ways; in particular, it helps **rovers** and robots work without constantly receiving instructions from Earth because these instructions are far away. For example, the Perseverance Rover used AI to land safely by scanning **terrain** and choosing the best location. In addition, AI is used to map terrain, predict dust storms, and make real-time decisions.

04 **Work with a classmate to create the student astronaut's next mission log. What do they see? What technology do they use?**

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Language Structures and Functions Tip

For Exercise 5
First, divide the class into five small groups, each with four students. Each group receives a Mission Card (one sentence per card) containing the sentence with the homograph underlined or highlighted. A mini space log sheet to write: a. The homograph, b. Meaning #1 (from the sentence), c. Meaning #2 (different context), d. A new sentence using the second meaning. Then, set the classroom as a "Mars Base" and say: *NASA has lost contact with the Mars base AI. Your group must interpret the communication logs (sentences) to unlock the rover's next move. The logs contain coded words (homographs) with more than one meaning!* Next, each group works on its assigned sentence. They identify the homograph, explain its meaning in the sentence, and then develop an alternative meaning (dictionary or discussion allowed). Afterward, they write a new sentence using the homograph in its second meaning. Then, each group sends a "Rover Commander" to the board or projector area. One by one, they read their original sentence, say the homograph, explain both meanings, and read their new sentence. The teacher or peers give a "Mission Clear" signal (thumbs up, "ding" sound). Finally, if time allows and you deem necessary, review the grammar point in more detail.

Teaching Tip

For Exercise 8
First, consider adapting this to a debate between two groups of four using the statement as the debate statement. Then, set the rules of the discussion: give groups 10 minutes to prepare, opening statements 2 minutes, rebuttals 2 minutes, and closing statements 1 minute. Finally, have groups get together to discuss their opinions.

Differentiation Strategy

For Exercise 7
Go to the Differentiation Strategies Bank and adapt this exercise using Strategy 7.

Wrap-up

First, close the session by asking students to think of three technologies they have seen in space movies and why they'd like to see them in real life, such as transporters. Then, have them get together in small groups to discuss their choices. Finally, ask volunteers to share their choices with the rest of the class.

Flexi Exercises
(To adjust to students' needs, you can either use or not the activities below)

Exercise 6

05 Circle the homograph in each sentence and write its meaning.

1. The Mars rover began to tire quickly on the rough terrain, so engineers modified its wheel suspension.

to lose energy mentally or physically

2. Instruments needed to be carefully aligned so astronomers could view the exoplanet clearly.

to see something clearly

3. The science fair will be held next month.

an event to enjoy displays

4. Satellites help get close images of the melting glaciers.

near

5. When they started the project, they did not know what type of discovery they would make.

a category or sort of item or concept

06 Write sentences using the other meaning of the homographs from Exercise 5.

Answers will vary.

1.

2.

3.

4.

5.

07 Imagine you are living 50 years in the future. What are the most relevant scientific advances in your life? Write a message describing your daily life. Use three homographs in your text.

Answers will vary.

08 Work in a group of three. Imagine you are a government agency in charge of the study of space. Discuss the statement. Then, share your opinion with another group.

Because technology has improved so much, space travel should be abandoned for investigation from Earth due to its cost and risk.