

BACKGROUND

Exploring the outer reaches of our solar system and sending humans to Mars is no longer the stuff of science fiction. NASA has sent orbiters and rovers to the Red Planet for decades. But now the goal is to send humans to orbit Mars by the 2030s. Many scientists and politicians are rallying around this goal, as well as around other missions that will allow humans to probe the mysteries of space.

SPACE EXPLORATION SHOULD BE MORE SCIENCE THAN FICTION

Argument by Claudia Alarcón



PREPARE TO COMPARE

As you read, pay attention to the persuasive language and to the reasons and evidence this author uses to support her argument. Consider how forms of persuasion can differ.

- W**hat is out there? Are we alone in the universe? Are there inhabitable planets in our galaxy and beyond? For decades, science-fiction novels, movies, and TV shows fired our curiosity. After the real-life *Apollo 11*'s moon mission in 1969, enthusiasm for new discoveries soared. Now, well into the twenty-first century, we must face the fact that these same questions are still unanswered. With so much human investment made, we must go forward, fully embracing space exploration as an important priority. Our future in space depends on science.
- Space exploration in the 1960s was fueled by the Cold War space race between the United States and Russia. The twenty-first century has brought a universal spirit of collaboration among scientists from around the globe.

NOTICE & NOTE



Notice & Note

Use the side margins to notice and note signposts in the text.

ANALYZE ARGUMENT

Annotate: Underline the author's central claim in paragraph 1.

Interpret: What does the author think we should do?

TEACH

BACKGROUND

After students read the Background note, explain that everyone on Earth, not just in America, has a stake in space exploration. If commercial space travel becomes a reality, many people may one day get to experience it, and the minerals and resources that are extracted in space will benefit all humankind.

PREPARE TO COMPARE

Direct students to use the Prepare to Compare prompt to focus their reading.



ANALYZE ARGUMENT

Remind students that a **claim** is a central idea or argument that the author will pursue. **(Answer: We must continue to explore and prioritize space exploration.)**



For **listening, speaking, and reading support** students at varying proficiency levels, see the **X-Ray** on pages 326C–326D.

TEACH

ANALYZE RHETORICAL DEVICES

Remind students that **loaded language** is the use of words with strong connotations meant to influence the reader towards the author's view. (**Answer:** They are words with positive connotations; they help enhance the argument by suggesting that exploring is exciting.)



NOTICE & NOTE

Tell them about Hubble and show them the vid.

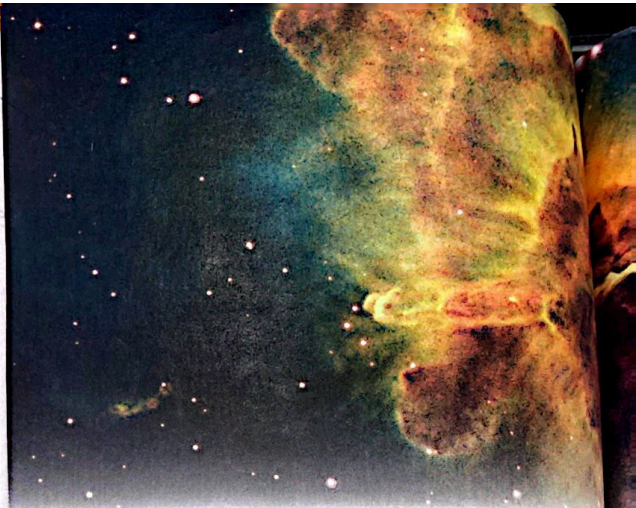
administration
(ăd-mĭn 'T-strā'shən) *n.* A president's *administration* is his or her term of office.

ANALYZE RHETORICAL DEVICES

Annotate: Mark examples of loaded language in paragraph 4.

Analyze: Why do you think the author chose these words? How do they enhance her argument?

330 Unit 4



This section of the immense Carina Nebula was captured by the *Hubble Space Telescope*. Inset at right: a view of *Hubble*

An excellent example is the International Space Station. This orbiting laboratory and construction site combines the scientific expertise of 16 nations. It allows for a permanent human outpost in space. The hope is that the station can serve as a launching platform for further space exploration.

3 But space travel is not without risk. NASA's Space Shuttle Program, which was the main connection to the International Space Station, suffered two terrible losses. After the explosions of the *Challenger* in 1986 and *Columbia* in 2003, the program was shut down in 2011. Recent presidential **administrations** supported putting priority on the commercial space flight industry. A program was put into place to help private companies pursue work on human space flight. There are dozens of private companies in the industry known informally as "New Space." These companies have set their sights on what seem to be impossible goals. These range from tourist trips to the moon to the colonization of Mars. Space travel has its documented dangers; however, direct human involvement, aided by technological innovation, could likely boost the potential for discovery.

4 Technological innovations are developing to allow us to venture even farther into space. Such advances are **opening windows into worlds we previously could not have imagin**



NOTICE & NOTE



Robotic spacecraft have conducted some of NASA's most exciting and productive missions. A prominent example is the Hubble Space Telescope, which has made more than 1.3 million observations since its mission began in 1990. It has traveled more than 4 billion miles, sending back stunning photos of faraway stars and galaxies.

5 NASA has also conducted robotic missions within our solar system. The Cassini's mission to Saturn was one of the most ambitious efforts in planetary space exploration. This robotic spacecraft carried the Huygens probe, which parachuted to the surface of Titan, Saturn's largest moon. The Juno spacecraft orbited around Jupiter, sending observations that can help scientists understand the beginnings of the solar system. The New Horizons spacecraft flew by Pluto in 2015 after an almost ten-year flight. According to the National Academy of Sciences, the exploration of Pluto and the Kuiper belt is the highest priority for solar system exploration. The asteroids in the Kuiper belt offer a great opportunity for mining. Space mining presents an important step for finding resources necessary for interstellar travel and exploration. In addition, icy asteroids may provide a cost-effective solution to space travel. Space entrepreneurs are looking into using hydrogen and oxygen from asteroid ice to

prominent
(prəm'ə-nənt) *adj.* If something is prominent, it stands out.

LANGUAGE CONVENTIONS

Annotate: Underline the two complex sentences in paragraph 5 and circle the relative pronouns.

Interpret: What two ideas do the relative pronouns connect in each sentence?

TEACH

LANGUAGE CONVENTIONS

Remind students that a **complex sentence** includes one main idea and at least one other idea, or subordinate clause. (Answer: First sentence: The robotic spacecraft carried the Huygens probe. The Huygens probe parachuted to the surface of Titan. Second sentence: The Juno spacecraft orbited around Jupiter and sent observations.)



ENGLISH LEARNER SUPPORT

Evidence Point out specific details identified in paragraph 5, including probe names, space mission titles, and the names of spacecraft and orbiters. Ask students why the author included this information and where she got it from. (She included it to support her argument that space exploration is important and exciting. She got the information from her research.)

MODERATE

TEACH

ANALYZE ARGUMENT

Remind students that a **reason** is a declaration made to explain an event, action, or belief. (Answer: The reason is relevant because discovering a new home for humanity is important, and it supports the claim that we must embrace space travel.)

ANALYZE RHETORICAL DEVICES

Remind students that a **rhetorical question** needs no answer but should make readers think or consider something in a new way. (Answer: It engages the readers and makes them think about what space exploration could accomplish.)

EXTREME OR ABSOLUTE LANGUAGE

Remind students that authors will loosely link this signpost to **claims** and **evidence** in order to make an argument seem factual or incontrovertible, even if it's not. Have students point out the words in paragraph 11 that signal the signpost. ("the human race and Earth itself is at stake"). Then have them answer the question to determine the purpose of this extreme language. (Answer: They suggest the importance and urgency of exploring space.)

CRITICAL VOCABULARY

beneficial: Space exploration isn't only for science, but



NOTICE & NOTE

beneficial
(bĕn'ĭ-fĭsh'ĭ-əl) *adj.* When something is *beneficial*, it is good or favorable.

advancement
(əd-vāns'mənt) *n.* Something that is an *advancement* is an improvement or step forward.

ANALYZE ARGUMENT

* **Annotate:** In paragraph 7, mark a reason that the author uses to support her claim that we must continue to explore space.

Evaluate: Is the reason relevant? Does it make sense? Explain.

Discover
answer

ANALYZE RHETORICAL DEVICES

* **Annotate:** Mark the rhetorical question in paragraph 9.

* **Analyze:** What purpose does the rhetorical question serve?

EXTREME OR ABSOLUTE LANGUAGE

* **Notice & Note:** Mark the words in paragraph 11 that seem to exaggerate or overstate a case.

* **Analyze:** How does the use of these words help the author's argument?

manufacture rocket fuel. This space-made fuel can be used to launch expeditions farther out into space at considerably less cost.

6 Our moon contains helium-3, an element that could be useful on Earth for energy developments such as nuclear fusion research. Mining there can also yield rare-earth metals (REMs) that are used in electronics and in the construction of solar panels. This form of mining, therefore, would be incredibly **beneficial** for our survival and **advancement**. In recent years, geological surveys have indicated the presence of water on the moon, which can serve to sustain a human-inhabited lunar base. **Text in Focus**

7 Scientists are also **looking toward** Mars as a **potential new home for humankind**. New discoveries keep emerging that raise more questions. It is imperative that we use all our available resources to continue research on Mars.

8 Early missions to Mars such as Mars *Odyssey* were designed to make discoveries under the theme of "Follow the Water." These missions showed the possibility of liquid water below the surface of Mars. With the *Curiosity* rover, the Mars Exploration Program is following a next-step strategy known as "Seek Signs of Life." This exploration phase aims to discover the possibilities for past or present life on the Red Planet. *Curiosity* is seeking evidence of organic materials, the chemical building blocks of life. Future Mars missions would likely be designed to search for life itself in places identified as potential past or present habitats.

9 **With all these advances and technologies in place and in development, will we see a human colony on the moon or on Mars in our lifetime?** The best-case scenario will involve a partnership between NASA and international space travel companies.

10 Some New Space pioneers have tested supersonic retropropulsion technology, landing rocket boosters on floating platforms and on land. This technique could be important for future Mars landings. NASA's rovers, weighing up to a ton, have successfully landed on Mars. However, they have dropped to the planet's surface in air bags, using rockets, and with the assistance of cables extended from a "sky crane." A human mission would weigh much more, making landing more problematic. The previous solutions would not work for spacecraft carrying humans.

11 **On the other hand, the future of the human race and Earth itself is at stake.** We are close to surpassing our planet's carrying capacity and exhausting our natural resources. Yet scientists and space entrepreneurs remain hopeful. Private companies seeking

to colonize Mars believe the risk of space flight is similar to that of climbing Mount Everest. As we all know, this is a risky, but not impossible, proposition.

- 12 The final frontier is a vast and dangerous place, difficult and expensive to explore. But it offers infinite possibilities for expanding our scientific knowledge of our planet and its origins. Exploring outer space can yield new sources for precious natural resources and perhaps even find a home for future generations. We live in times where space travel and exploration should be more science than fiction. Let's keep pursuing the compelling questions that have driven us to these times. Space exploration may very well hold the key to humanity's future.

CHECK YOUR UNDERSTANDING

Answer these questions before moving on to the **Analyze the Text** section on the following page.

- 1 The author opens the text with questions most likely to —
- A introduce the topics that she will cover in the selection
 - B suggest that her essay will attempt to answer the questions
 - C note that science fiction fuels our interest in science
 - D remind readers that there is much we still don't know
- 2 In paragraph 2, the author brings up the example of the International Space Station to make the point that space exploration —
- F has come a long way since the 1960s
 - G encourages cooperation among scientists
 - H has led to a permanent human outpost
 - J requires a great deal of human investment
- 3 The author mostly supports her ideas with —
- A expert opinions
 - B interesting anecdotes
 - C scientific evidence
 - D references to other texts

APPLY

ANALYZE THE TEXT

Possible answers:

- DOK 2:** The government has shifted the focus because of the people who are interested in space travel. Space travel involves risks, as evidenced by the Challenger and Columbia explosions. Private industry sets bigger goals, like colonization of Mars and tourist trips to the moon.
- DOK 3:** The moon contains helium-3, which could be used in nuclear fusion research.
- DOK 3:** You can conclude that water is a necessary component for life, because the early missions were under the theme of "Follow the water." Once they found the potential for water, the next step was missions under the theme "Seek signs of life." This suggests a connection.
- DOK 4:** The retropropulsion technology being tested to land humans safely on Mars supports the author's claim that science will make it possible for Mars colonization.
- DOK 4:** The use of absolute or extreme language is alarming and is meant to frighten the reader into agreeing, but it often makes the reader doubt the author's claim.

RESPOND

ANALYZE THE TEXT

Support your responses with evidence from the text. **NOTEBOOK**

- Infer** Why might the government have shifted from supporting space travel through NASA to prioritizing commercial travel?
- Cite Evidence** How could space mining aid in scientific research? Cite evidence from the text that explains the importance of space mining.
- Draw Conclusions** Review paragraph 8. What can you conclude from the support provided by the author about the connection between water and the possibility of life on Mars? Explain.
- Explain** Why does the fact that New Space pioneers are testing supersonic retropropulsion technology support the author's claim? How does it add to your understanding of the argument?
- Notice & Note** Explain the overall effect that the author's use of extreme or absolute language has on the reader. Does it make you more persuaded by the argument, or less so? Why?

RESEARCH

The *Cassini* orbiter ended its journey in 2017. Research the details of its contributions. Record what you learn in the chart.

RESEARCH TIP

Remember that the *Cassini* mission has been in the news since its launch. To get an overview of its findings, scan search results that are dated

QUESTION