Humans Need to Explore Outer Space

Argument by **Claudia Alarcón**

The author argues that space exploration requires a human touch.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

ANALYZE ARGUMENT

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

Interpret: What does the author think we should do?

1 What 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.

Don't forget to **Notice & Note** as you read the text.

2 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. 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 allowing us to venture even farther into space. Such advances are opening windows into worlds we previously could not have imagined. 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

administration
(ăd-mĭn´ĭ-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?

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

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 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 to sustain a human-inhabited lunar base.

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."

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

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Text in Focus Video

Learn more about identifying main ideas.

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.

This section of the immense Carina Nebula was captured by the Hubble Telescope.

Don't forget to **Notice & Note** as you read the text.

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.

This is a view of the Hubble Telescope.

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 a home for future generations. We live in times in which 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.

ESSENTIAL QUESTION:

Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

TURN AND TALK

What reasons in this argument seem especially strong to you? Share your reactions with a partner.

Assessment Practice

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

1. This question has two parts. First answer **Part A**, then **Part B**.

Part A

How does the author support the claim that greater discoveries in outer space are happening thanks to technological innovations?

- (A) The author includes quotations from experts on space exploration.
- (B) The author proposes ideas that may help humans on Earth.
- (C) The author poses questions that are still unanswered.
- (D) The author cites advances made as a result of recent space missions.

Part B

Select **two** sentences that provide relevant support for the answer in Part A.

- (A) "Are there inhabitable planets in our galaxy and beyond?" (paragraph 1)
- (B) "After the explosions of the *Challenger* in 1986 and *Columbia* in 2003, the program was shut down in 2011." (paragraph 3)
- (C) "A prominent example is the Hubble Space Telescope, which has made more than 1.3 million observations since its mission began in 1990." (paragraph 4)
- (D) "The *Juno* spacecraft orbited around Jupiter, sending observations that can help scientists understand the beginnings of the solar system." (paragraph 5)
- (E) "It is imperative that we use all our available resources to continue research on Mars." (paragraph 7)

Ed
Test-Taking Strategies

B

Let Robots Take to the Stars

Argument by **Eiren Caffall**

Should robots lead the journey to outer space? This writer says yes.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

ANALYZE ARGUMENT

Annotate: In paragraph 1, mark the author's central claim and mark the reasons the author will use to support the claim.

Interpret: What will the author's argument be? How does the title of the selection help clarify the author's argument?

1 The lure of human space travel is undeniable. We've all grown up on endless types of entertainment set in the future that portray adventures on distant planets. Imagine yourself as an astronaut, a part of the first manned mission to Mars. Beyond that, there are generations of people who have been working to make space and space travel look cool, even inevitable. But high aspirations and romance aside, we need to face the harsh realities. Our notions about the inevitability and wonder of human space travel need to be checked, and any plans need to be reconsidered. Some of the best reasons to curtail space exploration come down to economics, human cost, and technology.

Space Travel Is Expensive

2 Space travel is extremely expensive. To get humans to Mars, it would take $1 trillion over a 25-year period. Obviously, no single government would want to take on that kind of funding. A Mars mission would require international cooperation at a significant cost to each partner nation. A Mars mission might foster international cooperation, but it would consume funds that could be used for other things.

3 Some people suggest that the only way to get to Mars would be with the help of private companies. Because of this, the space exploration industry is made up not only of government agencies but also private companies headed by dreamers and people interested in profits over practicality. But these organizations are often badly managed. They don't work for the government, so accountability could be a problem. Even well-run companies are unlikely to have enough money to launch a Mars mission on their own. There are some experts who say that it wouldn't be possible to launch a mission to Mars without funding from commercials that would run during coverage of the project. That would turn a scientific mission into a reality television show. Would you want to trust a scientific mission to the people who run reality TV?

Space Travel Could Harm Our Polluted World

4 The risks of space exploration could be grave for a planet already **plagued** by pollution. There is an extra result of space travel: black carbon from rocket exhaust that's deposited in the outer atmosphere. The launch of a suborbital tourist craft is said to produce less carbon emissions than a standard flight from New York to London. However, once the rocket is above the atmosphere, the black carbon it releases can be pretty damaging. Try to imagine the black smoke from a diesel truck sitting above the sky. With no weather to wash it into the oceans, black carbon can stay put for up to ten years.

5 Many space boosters are suggesting that being able to leave our planet once it's exhausted of resources is a priority. They seem to be proposing that we have some sort of Planet B. Somehow they think that a colony on Mars or the moon could take the pressure off our world. Many of these people planning to profit from two things at once are also fans of the **dubious** technology of geoengineering.

Don't forget to **Notice & Note** as you read the text.

ANALYZE ARGUMENT

Annotate: In paragraph 5, mark an opposing viewpoint.

Analyze: What are the author's counterclaims to this viewpoint, as explained in paragraphs 5 and 6?

plague
(plāg) *v.* To *plague* is to cause hardship or suffering.

dubious
(dōō´bē-əs) *adj.* If something is *dubious*, it is questionable or not to be relied upon.

NOTICE & NOTE
NUMBERS AND STATS

When you notice the use of specific quantities or comparisons to depict amount, size, or scale, you've found a **Numbers and Stats** signpost.

Annotate: In paragraph 7, mark specific numbers that identify amounts.

Analyze: What purpose do these specific numbers serve?

6 As covered earlier, the essential ingredients for space exploration are international cooperation, vast investments of money, technological advances, global regulations, and the buy-in of the general population. Yet those ingredients may well be what's needed to tackle the problem of Earth's pollution.

Space Travel Is More Suited to Robots

7 NASA recently collected data from the Mars *Curiosity* rover. The data were used to estimate the radiation impact on an astronaut traveling to and from Mars for 365 days and spending 500 days on the surface. It was determined that during that trip an astronaut would get a radiation dose that was about five percent of what he or she would get over a lifetime on Earth.

8 That significantly increases the risk of cancer. There is also the danger of running low on supplies. Once on the Red Planet, humans would eventually run out of food and materials. A Massachusetts Institute of Technology study guessed that agriculture would make too much oxygen for the small colony

to support inside its dome. Without enough carbon dioxide, the colony would not be able to grow what it needed. Earth would constantly be sending supplies to the colonists. It's obvious that without that resupply, there would be no hope of agriculture supporting a manned station on Mars.

9 Considering the extreme risks for humans, some scientists assert space exploration should be strictly robotic. Think about the achievements of the Hubble Space Telescope and the Mars *Pathfinder* and *Opportunity*. Their exploratory missions have captured the public imagination, and all of us love to see images from those robot explorers. When *Opportunity* landed safely on the surface of Mars, NASA's Mission Control Center **erupted** in as loud a cheer as greeted any human mission.

10 There are scientists who say that robots can't accomplish space travel as cheaply or efficiently as humans. But, as is often the case, those ideas are based on data from the distant history of space travel. As you might guess, the future of space exploration presents a very different picture, one in which robots will replace humans as the better pilots and researchers.

Don't forget to **Notice & Note** as you read the text.

erupt
(ĭ-rŭpt´) *v.* When something *erupts*, it develops suddenly.

ANALYZE RHETORICAL DEVICES

Annotate: Mark an example of direct address in paragraph 10.

Infer: Why does the author use direct address here?

Space Travel Isn't Inevitable or Even Necessary

11 There are many solid arguments against spending money, time, and energy on manned space exploration. There is no solid reason to think of space as the only hope of our bright technological future. There are as many ways to innovate as there are human ideas. Just because the idea of space travel has been with us for decades doesn't mean that it's the best way to direct our dreams. Let's plot a course that doesn't involve humans. Without space travel as the default idea for our future, what new ideas might lead to amazing discoveries and inventions?

ESSENTIAL QUESTION:

Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

TURN AND TALK

Single out any point the writer makes that triggers a response in you. Discuss this point with a partner.

Assessment Practice

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

1. Which **two** sentences from the text support the claim that space travel should be curtailed because of pollution?

- **A** "The launch of a suborbital tourist craft is said to produce less carbon emissions than a standard flight from New York to London." (paragraph 4)
- **B** "However, once the rocket is above the atmosphere, the black carbon it releases can be pretty damaging." (paragraph 4)
- **C** "Try to imagine the black smoke from a diesel truck sitting above the sky." (paragraph 4)
- **D** "With no weather to wash it into the oceans, black carbon can stay put for up to ten years." (paragraph 4)
- **E** "Many space boosters are suggesting that being able to leave our planet once it's exhausted of resources is a priority." (paragraph 5)

2. What perspective is shared by the author of this text and the author of "Humans Need to Explore Outer Space "?

- **A** Pollution is a concern related to space exploration.
- **B** Cost should not be a consideration for space travel.
- **C** Robots should be used to explore outer space.
- **D** Space exploration is essential for human survival.

Test-Taking Strategies

Write an Argument

ELA.7.C.1.3, ELA.7.C.1.5, ELA.7.C.3.1, ELA.K12.EE.5.1, ELA.K12.EE.6.1

Writing Prompt

Using ideas, information, and examples from multiple texts in this unit, write an argumentative essay for your school newspaper in which you support or oppose sending humans into space.

Manage your time carefully so that you can

- review the texts in the unit;
- plan your essay;
- write your essay; and
- revise and edit your essay.

Be sure to

- clearly state the claim of your argument;
- address alternate or opposing claims;
- use and cite evidence from multiple sources; and
- avoid relying too much on one source.

Review the Mentor Texts

For two examples of well-written arguments you can use as mentor texts and as sources for your essay, review:

- "Humans Need to Explore Outer Space" (pages 276–280)
- "Let Robots Take to the Stars" (pages 286–290)

Review your notes and annotations about these texts. Think about how the authors make their arguments convincing.

Consider Your Sources

Review the list of texts in the unit and choose at least two that you may want to use as support for your argument.

As you review potential sources, consult the notes you made on your **Response Log** and make additional notes about ideas that might be useful as you write. Include titles and page numbers so that you can easily find information later.

UNIT 3 SOURCES

- ☐ Dark They Were, and Golden-Eyed
- ☐ Martian Metropolis
- ☐ Challenges for Space Exploration
- ☐ What If We Were Alone?
- ☐ Seven Minutes of Terror MEDIA
- ☐ Humans Need to Explore Outer Space
- ☐ Let Robots Take to the Stars

Analyze the Prompt

Review the prompt to make sure you understand the assignment.

Mark the sentence in the prompt that identifies the topic of your argument. Rephrase this sentence in your own words.

Then, look for words that indicate the purpose and audience of your essay. Write a sentence describing each.

Find a Purpose

As you respond, consider the two common purposes of an argument:

- to **convince** others to agree with your position
- to **motivate** others to take action

What is my topic? What is my writing task?

What is my purpose?

Who is my audience?

Review the Rubric

Your argument will be scored using a rubric. As you write, focus on the characteristics as described in the chart. You will learn more about these characteristics as you work through the lesson.

PURPOSE, FOCUS, AND ORGANIZATION	EVIDENCE AND ELABORATION	CONVENTIONS OF STANDARD ENGLISH
The response includes: • A strongly maintained claim • Alternate or opposing claims • Use of transitions to connect ideas • Logical progression of ideas • Appropriate style and tone	The response includes: • Integrated, thorough, and relevant evidence • Precise references to sources • Effective use of a variety of elaborative techniques • Clear and effective expression of ideas • Academic and domain-specific vocabulary • Varied sentence structure	The response may include the following: • Some minor errors in usage but no patterns of errors • Correct punctuation, capitalization, sentence formation, and spelling • Command of basic conventions

1 PLAN YOUR ARGUMENT

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Help with Planning

Consult **Interactive Writing Lesson: Writing Arguments.**

Develop a Claim

In an argument, the **claim** is the writer's position on an issue. In the chart, identify your position on whether human space travel is necessary. Then, draft your claim, making sure it is direct and specific.

IS HUMAN SPACE TRAVEL NECESSARY?	CLAIM
	

Identify Support

To build a strong argument, you must have solid support for your claim. Support consists of reasons and evidence.

- **Reasons** explain why you have taken a particular position on an issue.
- **Evidence,** such as facts, statistics, examples, or expert opinions, support your reasons.

Use the chart to outline your support. Be sure to record the title of each source and the page number.

Offer the Evidence

As you review your evidence, make sure it is

- **relevant**, or directly related to the claim and reasons.
- **sufficient**, meaning there is enough of it to be convincing.

REASONS	EVIDENCE	SOURCE

Address Opposing Claims

Your essay should include a **counterclaim** in which you address at least one opposing claim and explain why your position is more valid. Review your notes to find claims that disagree with your position. Then write your counterclaim.

Opposing Claim

My Counterclaim

Organize Ideas

Now organize your material in a way that will help you draft your argument. Keep in mind that a well-written argument demonstrates **coherence**, meaning there is a logical progression of ideas. Paragraph breaks and transitional words and phrases help add coherence to your writing.

Use the table below to help you organize your ideas and add coherence to your writing.

Put It in Order

As you plan, try arranging reasons by order of importance.

- Begin with the most important reason and follow with the second most important reason, and so on.
- Begin with the least important reason and build up to the most important one.

INTRODUCTION	• Clearly introduce your claim. • Include an interesting question, quote, or detail to grab the reader's attention.
BODY PARAGRAPHS	• Present reasons and evidence to support your claim, devoting a paragraph to each main idea. • Include a paragraph in which you address an opposing claim. • Use transitional phrases such as "To begin with . . ." and "Another reason . . ." to link ideas.
CONCLUSION	• Restate your claim and its significance. • Include an insight to give readers something new to think about.

2 DEVELOP A DRAFT

Now it is time to draft your essay. You can develop your writing skill by seeing how the experts do it. Read about the techniques professional writers use to craft their arguments.

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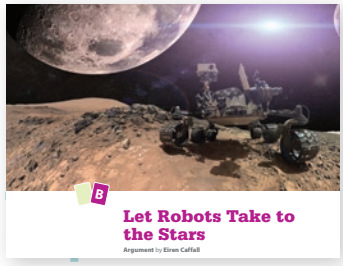
Drafting Online

Check your assignment list for a writing task from your teacher.

Cite Sources Effectively

EXAMINE THE MENTOR TEXT

Notice how the author of **"Let Robots Take to the Stars"** cites a source to support her argument.



The author provides a **reason**.

There is also the danger of running low on supplies. Once on the Red Planet, humans would eventually run out of food and materials. A Massachusetts Institute of Technology study guessed that agriculture would make too much oxygen for the small colony to support inside its dome. Without enough carbon dioxide, the colony would not be able to grow what it needed. Earth would constantly be sending supplies to the colonists.

She refers to her **source** by name and paraphrases from the source.

The author **elaborates** on how the evidence supports her reasoning.

APPLY TO YOUR DRAFT

Use this frame to practice citing a source from your draft. Then, apply this technique to other sources in your argument.

Try These Suggestions

Vary the way you integrate each source into your writing. Try these out:

- In [Title of Text], the author states . . .
- According to paragraph [#], . . .
- The study/statistic proves . . .

Introduce State one reason that supports your claim.	
Cite Name the source that supports the reason. Include the title or the author's name.	
Elaborate Explain how your source and evidence support your reason.	

Address Opposing Claims

EXAMINE THE MENTOR TEXT

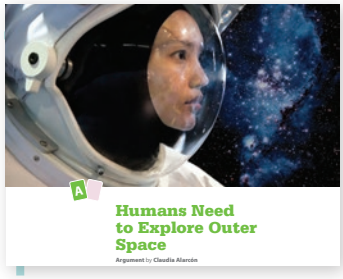
Acknowledging other opinions is one way to strengthen an argument. Here, the author of **"Humans Need to Explore Outer Space"** uses this technique to show that she has carefully considered the risks of space travel.

The author acknowledges an **opposing claim.**

This **transition** signals the contrast between the danger of space travel and its benefits.

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. . . . Space travel has its documented dangers; however, direct human involvement, aided by technological innovation, could likely boost the potential for discovery.

She responds with a **counterclaim** that strengthens her argument.



APPLY TO YOUR DRAFT

As you write, make sure to include an opposing claim in your draft. Then, include a counterclaim that addresses the opposing claim. Use the chart to guide you as you counter and crush opposing claims.

INTRODUCE	COUNTER & CRUSH!
Some people suggest …	… however, …
While opponents will say …	… other research shows …
Yes, it's true that …	… but there is growing evidence to support …