Amplify ELA

The Space Race Collection

Teacher Edition • Grade 8

The Space Race Collection

Amplify ELA

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Icon Key:

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The Space Race Collection

"We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard..."

— President John F. Kennedy, Rice University address, September 12, 1962

On October 4, 1957, the Soviet Union launched *Sputnik* into orbit. This small satellite circled the earth every 92 minutes at a speed of 18,000 miles per hour. The Soviets were ecstatic. The Americans, shocked and humiliated that the Soviets had beaten them into space, were not. *Sputnik* ignited the Space Race, a fierce competition between the world's two superpowers that would continue for nearly 18 years. It's a story of heroic accomplishments on a grand scale. The dramatic story of the Space Race offers students a rich research topic to explore. They will examine primary source documents and conduct independent research to develop a deep understanding of this unique international competition.

In the lessons on information literacy that begin the unit, students learn how to tell the difference between primary, secondary, and tertiary sources; determine if a source is credible; and understand ethical uses of information. Having practiced these skills, students are ready to develop and sharpen their sourcing abilities in the next lessons, in which they construct their own research questions and explore the Internet for answers.

In subsequent lessons, each student is assigned a cosmonaut or astronaut from the Space Race era. They research their cosmonaut or astronaut and write entries into their space blog from their person's point of view. This lesson informs the next sub-unit, a Socratic seminar in which students rely on their research to examine the complicated issues inherent in the history of the Space Race.

As students reach the end of the unit, they synthesize all of the skills they've developed to tackle a culminating research assignment—part essay, part media project.

Essay Prompts:

Research Option 1: An Argumentative Essay

Was animal testing necessary during the Space Race?

Research and discover what the Soviets and the Americans were trying to understand when they sent animals into space. Was animal testing necessary? Was it fair or moral to send animals into space for research purposes? Could the scientists have found the answers they were looking for without sacrificing animals? If so, how?

Research Option 2: An Informative Essay

How did Katherine Johnson and the other women who worked with her at NASA impact the Space Race?

Write an informative essay about Katherine Johnson and the other key women who worked at NASA during the Space Race era. Who were the other key women who worked with Katherine Johnson and what roles did they play? What barriers did they face? How was the Space Race impacted by their work?

Information Literacy

SUB-UNIT 1 • 4 LESSONS

Scavenger Hunt and Internet Research

SUB-UNIT 2 • 4 LESSONS

Space Blogs and Collection Research

SUB-UNIT 3 • 4 LESSONS

Socratic Seminar and Internet Research

SUB-UNIT 4 • 4 LESSONS

Write an Essay

SUB-UNIT 5 • 8 LESSONS

Information Literacy

In the Information Literacy sub-unit, students encounter the challenges inherent in online research. They explore a hoax website and learn how to use sourcing criteria to determine whether or not the information on the website is credible and more generally how to identify a trustworthy source. Finally, students are introduced to the concept of plagiarism and learn how to quote, cite, and paraphrase information.

Sub-Unit 1

Lesson 1:

Evaluating Sources: Part 1

Lesson 2:

Evaluating Sources: Part 2

Lesson 3:

Avoiding Plagiarism

Lesson 4:

Flex Day 1

Sub-Unit 1 at a Glance

Lesson Objective

Lesson 1: Evaluating Sources: Part 1

Research: Students will work collaboratively to assess the credibility of a variety of provided sources, distinguishing sources that are credible from sources that are not.

Lesson 2: Evaluating Sources: Part 2

Research: Students will review several Internet sources and common domain names, working collaboratively to assess their trustworthiness with a credibility checklist.

Writing: Students will use evidence from the reviewed sources to explain which sources are the most and least credible.

Lesson 2 involves Internet research and should be saved for a class period when students have access to the Internet.

Lesson 3: Avoiding Plagiarism

Research: Students will learn how to frame direct quotes, provide basic bibliographic information as references, and paraphrase source information in order to avoid plagiarism.

Lesson 4: Flex Day 1

The teacher selects from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts.

Reading	Writing Prompt
• NOAA website • Earth and Planetary Science, University of California, Berkeley website • Marine Life Protection Act, Wikipedia • The Ocean Foundation website • Missouri Botanical Garden website • *The Guardian*	No analytical writing prompt.
• NASA website • MIT News website • CNN • Terravivos website	Which of the four sources (discussed in class) do you think is the most credible? Which source do you think is the least credible? Support your thinking using evidence from one or more of the websites.
	No analytical writing prompt.

Sub-Unit 1 Preparation Checklist

Lesson 1

A B C

Pages 10–12

- ☐ Find a hoax website that is convincing but suspicious for students to explore in this lesson. Keep an eye out for: factual information that seems suspicious, embedded links that connect to credible websites, or an "About" page that provides information about the author.

Lesson 2

This lesson involves Internet research and should be saved for a class period when students have access to the Internet.

Lesson 3

D E F G H I

Pages 13–15

- ☐ Prepare to project the Paraphrase Chart.
- ☐ Plan how you will assign pairs for part of this lesson.
- ☐ If you plan to complete the optional teacher activity, research real-life examples of plagiarism online.

Lesson 4: Flex Day

- ☐ Review each lesson activity to identify which one(s) will best support your students' skill progress.
- ☐ Each activity requires distinct preparation. Review the Instructional Guide for each activity you will assign.
- ☐ Prepare any texts, materials, or directions you may need to project or distribute.

Note: The Information Literacy lessons are offered as sub-units for each of the Collection research units. These lessons provide instruction on how to validate Internet sources, avoid plagiarism, and properly cite sources. If your students have already learned these skills, you may decide to skip ahead to the next sub-unit.

There may be activities in these lessons that students will revise or refer to in a subsequent lesson. By keeping track of lessons that students complete in a print format, you can have students refer to their print work when they reach these activities. In addition, your students will need to copy any Writing Prompts completed in a print lesson into the corresponding digital writing space if you want that writing to be included in Productivity and other reports.

Before You Begin Lesson 1:

Before class, find a hoax website for your students to explore as they learn about sources that are credible and sources that are not. The site should be convincing but suspicious. Keep an eye out for...

- **factual information that seems suspicious.**
- **embedded links that connect to credible websites.**
- **an "About" page that provides information about the author.**

A Lesson 1: Evaluating Sources: Part 1

Read: Students explore a website as a first step in determining its credibility.

5 min

- Direct students to page 560 in the Student Edition.
- **Project:** The hoax site.
- Tell students that they need to examine the site as a first step in an upcoming research paper. Be careful not to give away that the site is a hoax—students will figure that out for themselves.
- Ask students to look for and write down three new things that they learned from this website as you click through.
- **Writing Journal:** Students complete Activities 1–3 on page 8.

Sub-Unit 1
Information Literacy

Information Literacy

560

Overview

You can find amazing information online. Sometimes the stories are so amazing that they seem unbelievable. Don't you agree?

Suggested Reading

Is your curiosity sparked? Want to dive deeper into this topic? Check out the list of websites below for a wealth of reference materials. And remember, your school and local libraries are great places to continue exploring your interests.

- Internet Archive
- Library of Congress
- OCLC WorldCat
- Google Books
- HathiTrust Digital Library
- Project Gutenberg
- Digital Public Library of America

A

Explore the website your teacher provides.

Complete 1–3 on page 8 of your Writing Journal.

Lesson 1 Materials

- Discussion Points

Ensure that headphones are available for students to hear the audio of the text in order to provide accessibility.

Differentiation: Step A

Students who need more support with reading may benefit from exploring this website with a partner.

B

Lesson 1—Evaluating Sources, Part 1

How do you know a source is credible? Use the discussion points and discuss each of the four sources your teacher projects with your partner.

Work with your partner to discuss the following points:

- Who is the author?
- Is the author an expert on this subject?
- Might this author be prejudiced about this subject?
- Is it a well-known and respected organization or website?
- Would a source like this contain facts or opinions?
- How recently was this source written or updated?
- How does not knowing a source's identity affect its believability and trustworthiness?

Use page 9 of your Writing Journal to take notes on these points. Be prepared to talk about your answers during a class discussion.

B Lesson 1 (continued)

Discuss: Students discuss the hoax website with a partner.

20 min

Project: Source Credibility Checklist.

Review the criteria and answer questions.

Keep the criteria projected as students move through the activity.

Divide students into pairs.

Explain that they will discuss whether the hoax website provided the information listed in the checklist.

Project: Sources listed below. Discuss whether each would be a credible source.

- A 2017 U.S. Fish and Wildlife Service official report on the effects of pollution on marine life
- A pet owner's blog about her sick fish
- A current article about illegal waste disposal, published by a middle school newspaper
- An article in a recent issue of *The New York Times* about oil spills and bird life

Writing Journal: Students use page 9 to take notes.

Differentiation: Step B

- *ELL(Dev):* If you have several ELL students in your class, you may want to take some time to discuss and explain the meaning of "credible" to ensure understanding before assessing the credibility of the website.
- *ELL(Dev):* Plan how you will assign pairs for this activity. ELL students should be assigned to work with non-ELL students or ELL students at a different level.

C Lesson 1 (continued)

Present Domain Extensions: Students identify different domain extensions and their credibility.

15 min

Project: Each website listed for the activity in the digital lesson and briefly review with the class.

Discuss the credibility of domain extensions, projecting an example of each (found on the student card of this activity on the digital platform) and briefly reviewing each example as you go.

- **.edu:** academic institution (college, university)
- **.gov:** official U.S. government agency
- **.com:** commercial/company
- **.org:** organization (often nonprofit organizations, but can be commercial)
- **.net:** network (often Internet service providers, but can be commercial)

URLs (or Universal Resource Locators) can have a variety of different extensions, or endings, and some are more credible than others. In general, any URL ending in .edu or .gov is likely to be credible. URLs ending in .com, .org, or .net are ones that need validating by corroborating information. Of course, you should corroborate information from the .edu and .gov sites as well.

Writing Journal: Students complete page 10.

Project: The hoax website again.

Reassess it as a whole class using the points discussed in this lesson.

Exit Ticket: Project.

End of Lesson 1

C

Lesson 1—Evaluating Sources, Part 1 (continued)

Assess different domain extensions to determine their meaning and credibility.

URLs (or Universal Resource Locators) can have a variety of endings. Some are more credible than others.

- **.edu:** academic institution (college, university)
- **.gov:** official U.S. government agency
- **.com:** commercial/company
- **.org:** organization (often nonprofit organizations, but can be commercial)
- **.net:** network (often Internet service providers, but can be commercial)

Fill in page 10 of your Writing Journal. Be prepared to share your answers.

Differentiation: Step C

Students who need more support with reading may benefit from exploring these websites in pairs.

Before You Begin Lesson 2:

In Lesson 2, use the complete digital lesson so students have access to the Internet to gain a greater understanding of how to choose appropriate research sources as they develop and sharpen their information literacy skills.

D

Lesson 3—Avoiding Plagiarism

Plagiarism is stealing someone's words or ideas without crediting the source.

E

To avoid plagiarism, you'll learn how to properly frame a quote. A completed, framed quote has three parts:

1. Introduction to the quote (for example, According to the text...or Studies have found that...)
2. The borrowed words (the quote) in quotation marks
3. The citation in parentheses: the author's last name or the source title, followed by the page or paragraph number

Examples of completed, framed quotes

Example 1: Using a source that has the author's name and uses paragraph numbers (for example, an article from The Chocolate Collection):
According to the text, "dark chocolate relieves stress and lowers blood pressure" (Smith 5).

Example 2: Using a source that has the author's name and uses page numbers (for example, a book):
According to the text, "dark chocolate relieves stress and lowers blood pressure" (Smith 23).

Example 3: Using a source with no author or title listed (for example, a website's homepage):
Studies have found that "dark chocolate reduces cholesterol in 53% of adults" (scientificamerican.com).

Lesson 3 Materials

- Paraphrase Chart
- Guidelines for Citing and Punctuating a Direct Quote

Differentiation: Step D

● *ELL(Dev):* When working with English language learners, it may be helpful to note the following:

1. The use and methods of source writing and paraphrasing can vary by culture. ELLs will likely need additional explicit instruction in order to accurately frame quotes and paraphrase.
2. English language learners are sometimes taught to practice language by rewording short texts phrase by phrase. If this is the case, you may want to discuss the difference between the two further.

D Lesson 3: Avoiding Plagiarism

Discuss: Students discuss the meaning of plagiarism.

5 min

- Direct students to page 563 in the Student Edition.
- Write the definition of "plagiarism" on the board: "Plagiarism is stealing someone's words or ideas without crediting the source."
- Conversation starters:
  - What is an example of plagiarism?
  - Do you know anyone who has ever plagiarized?
- **Optional:** Teacher activity in digital lesson for examples and consequences of plagiarism.

E Lesson 3 (continued)

Introduce: Students learn how to frame a direct quote to avoid plagiarism.

7 min

- It is acceptable to use other people's words and ideas when you're conducting research, as long as you alert the reader that you are sharing someone else's words and ideas and give credit to the original author.
- Think of the borrowed words as a picture or photograph and always surround them with a "frame."
- Ask a student to read aloud the 3 parts of a frame on page 563 of the Student Edition.
- Then call on 3 students to point out the parts of the frame for each of the 3 examples given.
- Not every idea has to be cited, but when you aren't sure, always cite!

F Lesson 3 (continued)

Framing a Quote: Students learn how to frame a direct quote from a text to avoid plagiarism.

5 min

- Review the properly framed quote alongside the original text on page 564 of the Student Edition.
- Ask students to identify the source, opening frame, and direct quote from the example as a class.

G Lesson 3 (continued)

Try It On: Students work in pairs to correctly frame a direct quote.

5 min

- Assign pairs.
- Partners complete Activities 1 and 2 on page 564 in the Student Edition.
- **Writing Journal:** Students complete Activities 1 and 2 on page 11.
- Share answers. Invite 2 students to write their answers on the board.

H Lesson 3 (continued)

Introduce Paraphrasing: Students learn about paraphrasing text to avoid plagiarism.

12 min

- **Framing a direct quote** shares someone else's words in your writing. However, you may also wish to share someone else's ideas without quoting their exact words. To do this, you must paraphrase the original text.
- Read aloud the definition of "paraphrasing" on page 564 of the Student Edition.
- Watch out for **"patchwork plagiarism."** That's when you piece together your own words with some of the author's words without quoting the author, giving the reader the impression that you wrote the whole paragraph.
- The term "patchwork plagiarism"comes from the way patchwork quilts look. In the past, these quilts were made from many pieces of old clothes.

F

Lesson 3—Avoiding Plagiarism (continued)

Original quote or text:
"As a result of Halvorsen's initiative, America's legions of candy bombers dropped about a quarter million tiny parachutes over Berlin with millions of pounds of candy."

Properly framed quote:
According to the article, "candy bombers dropped about a quarter million tiny parachutes over Berlin with millions of pounds of candy" (ABC News).

G

Read the sentence from the article "Prehistoric Americans Traded Chocolate for Turquoise?" by Christine Dell'Amore:

Visiting Mesoamericans may have bartered cacao beans for gems unique to the Southwest, such as turquoise, which is known to have been mined by Puebloans in what's now New Mexico.

1. Select a brief direct quote from the sentence and rewrite it using the frame technique.
2. Share your response with your partner. Determine if each quote is correctly framed, and explain your thinking.

Go to page 11 of your Writing Journal to complete questions 1 and 2.

H

Paraphrasing
Paraphrasing is rewriting text in your own words, expressing the author's meaning without adding anything new or leaving anything out.

Differentiation: Step G

- *ELL(Dev)*: Plan how you will assign pairs for this activity. ELL students should be assigned to work with non-ELL students or ELL students at a different level.

Example of Patchwork Plagiarism

Direct Quote	Patchwork Plagiarism
Nearly everyone loves chocolate, creating a high demand for cacao beans. With that popularity comes a high cost to the environment.	Just about everyone loves chocolate, which creates a high demand for cacao beans. With that popularity, there is a high cost to the environment.

Complete the paraphrase chart on page 12 of the Writing Journal.

I

Follow along as your teacher compares paraphrases of the two sentences on page 6 of your Writing Journal.

You may volunteer to share one of your paraphrases with the class.

Let's look at this example, in which the underlined text is a direct quote from the text.

Direct students to examine the example of patchwork plagiarism on page 565.

As with direct quotes, you should credit the source in parentheses.

Writing Journal: Students complete the chart on page 12.

I Lesson 3 (continued)

Compare Paraphrases: Class compares and discusses paraphrases of 2 different texts.

7 min

Project: Paraphrase Chart.

Lead a discussion to compare the paraphrases to understand the original text.

Which paraphrase (1 or 2) seems closer to the original? Why?

Which word choice in the paraphrased text helps it get closer to the author's original meaning in the text?

Note that the order of the words in the main clause was changed in both paraphrases: the subject, the Spanish king and his court, was placed first in the clause instead of at the end. Explain that changing the order of words can be helpful when paraphrasing.

Repeat this process for the second piece of text, writing paraphrases from 2 different students on the chart.

9 min

Wrap-Up: Project.

Exit Ticket: Project.

End of Lesson 3

Before You Begin Flex Day:

Lesson 4 is a Flex Day. Select from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts. Please see instructions in the digital lesson.

Scavenger Hunt and Internet Research

In the scavenger hunt lessons, students race to find the answer to the hunt question in one of The Space Race Collection's texts or images. Once located, students read the asset with the guidance of close reading questions. Particularly challenging primary source documents are selectively edited to provide scaffolded versions for students who are struggling with archaic language, complex syntax, odd punctuation, and unfamiliar phrases. We have created adapted, paraphrased, and Spanish versions to differentiate the reading experience for all learners.

The last lesson in this sub-unit requires students to conduct research on the Internet. This lesson allows students to put their new research and close reading skills to the test as they use a criteria checklist to distinguish sources that are credible from sources that are not.

Sub-Unit 2

Lesson 1:

Scavenger Hunt: Introducing the Collection

Lesson 2:

Scavenger Hunt: Exploring the Collection

Lesson 3:

Internet Research

Lesson 4:

Flex Day 2

Sub-Unit 2 at a Glance

Lesson Objective

Lesson 1: Scavenger Hunt: Introducing the Collection

Reading: Students will explore a selection of texts and images in The Space Race Collection, practicing skimming a source for relevance and close reading a source for key information.

Video:

The Space Race, created by Travis Grenier

Lesson 2: Scavenger Hunt: Exploring the Collection

Reading: Students will explore a selection of texts and images in The Space Race Collection, practicing skimming a source for relevance and close reading a source for key information.

Lesson 3: Internet Research

Research: Students will generate a research question about the Space Race, identify credible Internet sources, and conduct Internet research to find the answer.

Writing: Students will use evidence from multiple credible sources and use framed quotes to describe key information about their research topic.

Lesson 3 involves Internet research and should be saved for a class period when students have access to the Internet.

Lesson 4: Flex Day 2

The teacher selects from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts.

Reading	Writing Prompt
The Space Race Collection: • "The Space Race: An Introduction" • "Sputnik" from *Rocket Boys* • "And a Dog Shall Lead Them" from *A Ball, A Dog, and a Monkey* • Memorandum for the Vice President • President Kennedy's Address at Rice University, September 12, 1962 • "A Seagull in Flight" from *Into That Silent Sea* • "First to Fly" from *Into That Silent Sea* • "In Event of Moon Disaster" • Preface from *Flight: My Life in Mission Control* • "Buzz Aldrin on His Lunar Home, the Eagle" from *The Wall Street Journal*	No analytical writing prompt.
The Space Race Collection: • "Dreaming of a Moonage" from *Moondust* • "Smooth as a Peeled Egg" from *Two Sides of the Moon: Our Story of the Cold War Space Race* • "Life on Mars to Become a Reality in 2023, Dutch Firm Claims" from *The Guardian* • "What the Moon Rocks Tell Us" from *National Geographic* • "You Are Here" from *Pale Blue Dot* • "Remarks by the President at Medal of Freedom Ceremony" • "The nearly forgotten story of the black women who helped land a man on the moon" from *The Washington Post*	No analytical writing prompt.
	Write one or two paragraphs providing key information you discovered about your topic. Make sure to include two framed quotes from at least two sources.

Sub-Unit 2 Preparation Checklist

Lesson 1

A B C D E

Pages 94–97

- ☐ Be prepared to project or to write on chart paper.
- ☐ Optional: Prepare/plan rewards for students who win the scavenger hunts.
- ☐ While all Scavenger Hunt images are found in the Student Edition, you may choose to project them during the Scavenger Hunt as well.

Lesson 2

F G H I

Pages 98–101

- ☐ Be prepared to project or to write on chart paper.
- ☐ Optional: Prepare/plan rewards for students who win the scavenger hunts.

Lesson 3

This lesson involves Internet research and should be saved for a class period when students have access to the Internet.

Lesson 4: Flex Day

- ☐ Review each lesson activity to identify which one(s) will best support your students' skill progress.
- ☐ Each activity requires distinct preparation. Review the Instructional Guide for each activity you will assign.
- ☐ Prepare any texts, materials, or directions you may need to project or distribute.

Note: There may be activities in these lessons that students will revise or refer to in a subsequent lesson. By keeping track of lessons that students complete in a print format, you can have students refer to their print work when they reach these activities. In addition, your students will need to copy any Writing Prompts completed in a print lesson into the corresponding digital writing space if you want that writing to be included in Productivity and other reports.

Scavenger Hunt and Internet Research

566

Overview

On October 4, 1957, the Soviet Union launched *Sputnik* into orbit. This small satellite circled the earth every 92 minutes at a speed of 18,000 miles per hour. The Soviets were estatic. The Americans were not. They were shocked and humiliated that the Soviets had beaten them into space. *Sputnik* ignited the "Space Race," a fierce competition between the world's two superpowers that would continue for nearly 18 years. It's a story of heroic accomplishments on a grand scale. Prepare to be amazed...

Suggested Reading

Is your curiosity sparked? Want to dive deeper into this topic? Check out the list of websites below for a wealth of reference materials. And remember, your school and local libraries are great places to continue exploring your interests.

- Internet Archive
- Library of Congress
- OCLC WorldCat
- Google Books
- HathiTrust Digital Library
- Project Gutenberg
- Digital Public Library of America

The Space Race Collection

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text 1

Find out how the Space Race started and what relations were like between the United States and the Soviet Union during this period.

The Space Race: An Introduction

1 *Author:* ***Lapham's Quarterly*** *editors (2014)*

2 For decades, the United States and the Soviet Union were locked in a tense race against time where only one question mattered: Who would be the first to dominate space exploration? This competition would become known as the "Space Race."

3 While this monumental struggle played out most visibly in the late-1950s to the mid-1970s, the origins of the Space Race reach all the way back to World War II. On October 3, 1942, Nazi Germany launched the V-2 rocket, developed by German engineer Wernher von Braun. Flying faster than 3,500 miles per hour, the V-2 shot upward for 60 miles, escaped the Earth's **atmosphere** and became the first man-made object to successfully reach the edge of space. While this achievement should have been cause for worldwide celebration, the Nazis turned the V-2 rocket into a weapon and used it to rain explosives on the city of London, killing more than nine thousand civilians.

4 In the spring of 1945, the United States, Great Britain, and the Soviet Union formed an alliance against Nazi Germany and successfully ended the war. But, in the wake of victory, the United States and the Soviet Union became outright enemies. Immediately after World War II, both nations scrambled to bring Germans with knowledge of the V-2 technology to their own country. Von Braun and five hundred of his top German scientists surrendered to the U.S. Army. The Soviets took nearly five hundred other engineers.

5 The Space Race roared to life on October 4, 1957, when the Soviets mounted a satellite onto a rocket and launched it into orbit. It was named *Sputnik*, meaning "fellow traveler of Earth," and it circled the globe every 92 minutes at a speed of 18,000 miles per hour. The world was stunned, and the Americans were embarrassed and worried. How could the Soviets have beaten them into orbit?

6 **Compounding** these fears, between 1957 and 1975, the Soviet Union finished first at almost everything in the Space Race! They sent the first

atmosphere: air space

compounding: adding to

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animal (a dog called Laika) and the first human (Yuri Gagarin) into orbit. They launched the first multi-person crew. They made the first space walk. They were the first to achieve unmanned orbit of the moon. They were even the first to land an unmanned capsule on the moon!

7 But in 1968, the Americans staged a spectacular surprise victory. The astronauts of *Apollo 8* became the first humans to orbit the moon. And, in 1969, Americans Neil Armstrong and Buzz Aldrin of the *Apollo 11* mission became the first humans to pilot a craft to the moon, land, and step onto its surface.

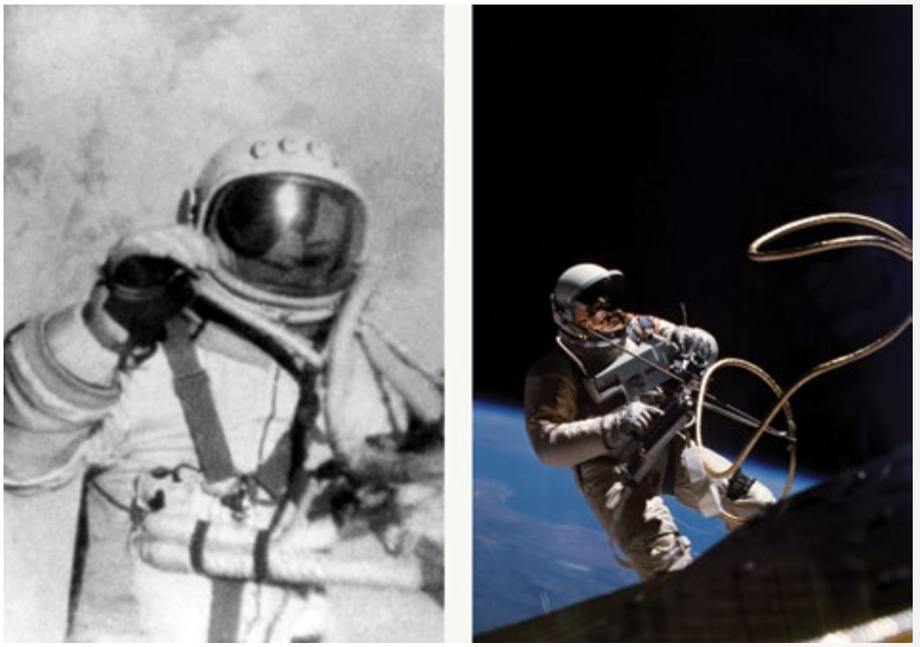
8 Around this time, tensions between the two countries began to ease. This period was known as *Détente*, which is French for "easing" or "relaxing." It began with a treaty in which the two countries agreed to help prevent the spread of nuclear technology. In 1972, President Nixon and **Soviet Premier** Alexei Kosygin signed the "Agreement Concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes." This was a pact that promised a joint American-Soviet mission to space. Finally, in 1975, after years of careful **diplomatic negotiations**, the two countries launched the Apollo-Soyuz Test Project. On July 17, 1975, the American *Apollo* and the Soviet *Soyuz* spacecrafts met high above the Earth and docked. Floating in space, an American astronaut and a Soviet cosmonaut reached through the open hatches of their joined ships and shook hands. While it would still take another decade for U.S. and Soviet tensions to truly relax, this historic gesture signaled the end of the epic competition known as the Space Race.

Soviet Premier: president

diplomatic negotiations: skilled and considerate discussions between countries

image 2

1965: Cosmonaut Alexei Leonov becomes the first man to walk in space on March 18. Ed White performs first US spacewalk on June 3.



Leonov during first spacewalk (left). White during first US spacewalk (right).
Credits: Sovfoto/UIG/Getty Images; NASA

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text 3

1 *In October 1957, the world's first artificial satellite,* Sputnik 1*, was launched into orbit by the Soviets. Americans were shocked and confused. Would the satellite be used to spy on us? Were we in danger? What, exactly, did it mean?*

Excerpt: "Sputnik" from *Rocket Boys*

Author: Homer Hickam
Publisher: Random House
2 *Published: 1998*

3 I guess it's fair to say there were two distinct phases to my life in West Virginia: everything that happened before October 5, 1957 and everything that happened afterward. My mother woke me early that morning, a Saturday, and said I had better get downstairs and listen to the radio. "What is it?" I mumbled from beneath the warm covers. High in the mountains, Coalwood could be a damp, cold place even in the early fall, and I would have been happy to stay there for another couple of hours, at least.

4 "Come listen," she said with some urgency in her voice. I peeked at her from beneath the covers. One look at her worried frown and I knew I'd better do what she said, and fast.

5 I threw on my clothes and went downstairs to the kitchen, where hot chocolate and buttered toast waited for me on the counter. There was only one radio station we could pick up in the morning, WELC in Welch. Usually, the only thing WELC played that early was one record dedication after the other for us high-school kids. Jim, a year ahead of me and a football star, usually got several dedications every day from admiring girls. But instead of rock and roll, what I heard on the radio was a steady *beep-beep-beep* sound. Then the announcer said the tone was coming from something called *Sputnik*. It was Russian and it was in space. Mom looked from the radio to me. "What is this thing, Sonny?"

6 I knew exactly what it was. All the science-fiction books and Dad's magazines I'd read over the years put me in good stead to answer. "It's a space satellite," I explained. "We were supposed to launch one this year too. I can't believe the Russians beat us to it!"

7 She looked at me over the rim of her coffee cup. "What does it do?"

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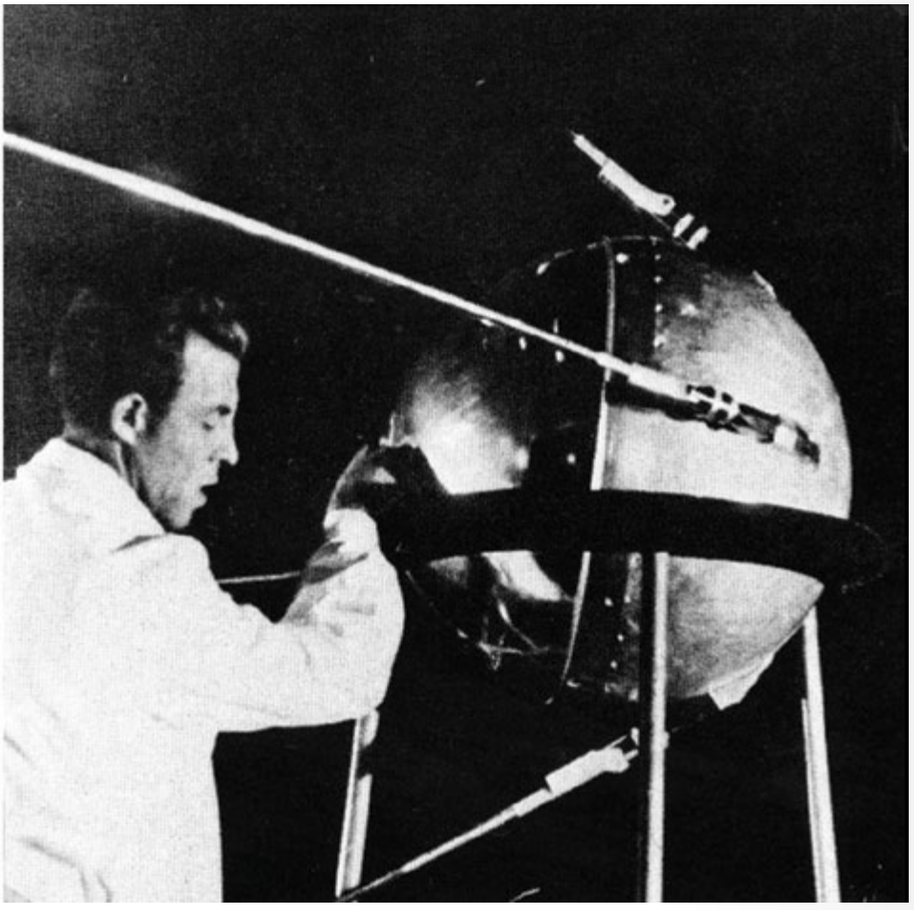

A scientist examines *Sputnik*, the Soviet satellite that jump-started the Space Race.

8 "It orbits around the world. Like the moon, only closer. It's got science stuff in it, measures things like how cold or hot it is in space. That's what ours was supposed to do, anyway."

9 "Will it fly over America?"

10 I wasn't certain about that. "I guess," I said.

11 Mom shook her head. "If it does, it's going to upset your dad, no end."

12 I knew that was the truth. As **rock-ribbed** a Republican as ever was allowed to take a breath in West Virginia, my father detested the Russian Communists, although, it should be said, not quite as much as certain American politicians. For Dad, Franklin Delano Roosevelt was the Antichrist, Harry Truman the vice-Antichrist, and **UMWA** chief John L. Lewis was Lucifer himself. I'd heard Dad list all their deficiencies as human beings whenever my Uncle Ken—Mom's brother—came to

rock-ribbed: stubborn, inflexible

UMWA: United Mine Workers of America; a group for people who work in mines

visit. Uncle Ken was a big Democrat, like his father. Uncle Ken said his daddy would've voted for our dog Dandy before he'd have voted for a Republican. Dad said he'd do the same before casting a ballot for a Democrat. Dandy was a pretty popular politician in our house.

13 All day Saturday, the radio announcements continued about the Russian *Sputnik*. It seemed like each time there was news, the announcer was more excited and worried about it. There was some talk as to whether there were cameras on board, looking down at the United States, and I heard one newscaster wonder out loud if maybe an atomic bomb might be aboard. Dad was working at the mine all day, so I didn't get to hear his opinion on what was happening. I was already in bed by the time he got home, and on Sunday, he was up and gone to the mine before the sun was up. According to Mom, there was some kind of problem with one of the **continuous miners**. Some big rock had fallen on it. At church, Reverend Lanier had nothing to say about the Russians or *Sputnik* during his sermon. Talk on the church steps afterward was mostly about the football team and its undefeated season. It was taking awhile for Sputnik to sink in, at least in Coalwood.

14 By Monday morning, almost every word on the radio was about *Sputnik*. Johnny Villani kept playing the beeping sound over and over. He talked directly to students "across McDowell County" about how we'd better study harder to "catch up with the Russians." It seemed as if he thought if he played us his usual rock and roll, we might get even farther behind the Russian kids. ...

continuous miners: machines for removing coal

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image 4

1969: Cars and tents lined up, waiting for the launch of *Apollo 11*

NASA

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text 5

The first animal ever sent into orbit around the Earth was a dog named Laika—launched on November 3, 1957, by the Soviet Union. Her flight was a significant victory for the Soviets, coming just one month after the successful launch of Sputnik 1*, the world's first artificial satellite: It was two big wins in a row for the Soviet Union. But for Laika, the journey was anything but a success.*

Excerpt: "And a Dog Shall Lead Them" from *A Ball, a Dog, and a Monkey*

Author: Michael D'Antonio
Publisher: Simon & Schuster
1 *Published: 2007*

2 Found on the streets of Moscow, Laika possessed all the qualities that make a mutt a perfect pet. She was intelligent, calm, and easily trained. In shape and color she was a bit like a tiny German shepherd. Her long muzzle was mainly black, as was her face. However, a narrow line of tan fur ran from the tip of her nose, between her eyes, to her forehead. And over each eye, a tan patch the size of a quarter made it look like her brows were always arched in surprise. Gentle but playful, Laika was the kind of dog that children loved. Before her trip to **Baykonur**, one of her minders had brought her home to see his own children. The time Laika spent playing with them was a reward for the duty to come.

3 Laika was placed in the padded capsule of *Sputnik II* at midday on October 31. Leather straps kept her from turning around, but she was able to eat some of the special jelled food prepared for her journey. Hours later the satellite, which included a silvery ball similar to the first *Sputnik*, was stacked on top of the **R-7**. Preparation for the launch went on continuously. The fuel tanks were filled with kerosene and liquid oxygen. The large steel supports that held the R-7 upright were pulled back. Finally at 7:30 A.M. on November 3, the countdown reached zero and the rocket's engines ignited on schedule.

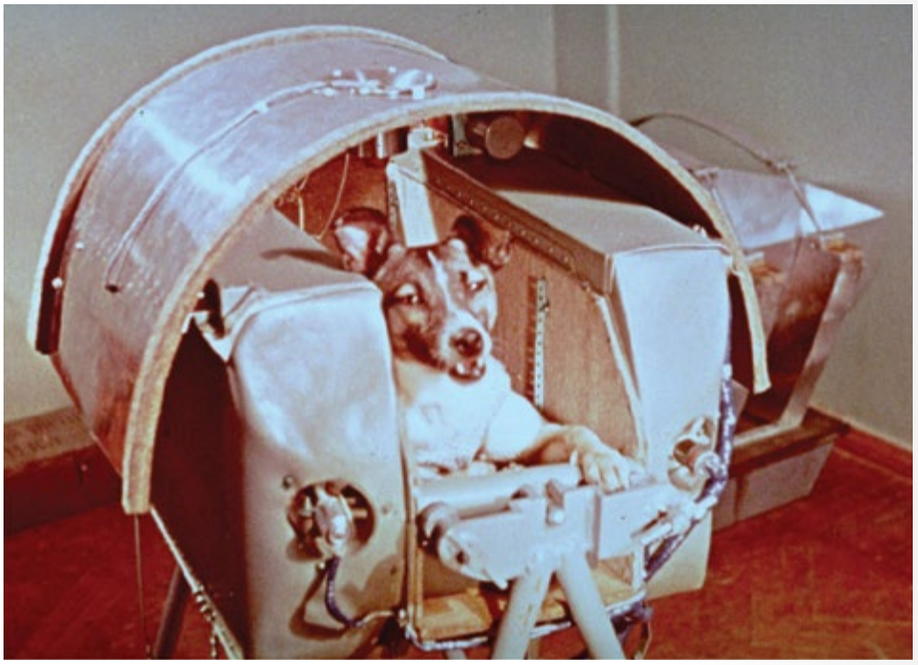
4 Shaken by ignition and rattled as the rocket lifted off, Laika was subjected to a truly deafening roar as the R-7 climbed into the **Kazak sky**. She panted furiously and her heartbeat raced to triple its resting rate

Baykonur: city in Kazakhstan housing Soviet spaceport

R-7: Soviet rocket

Kazak sky: sky over Kazakhstan

575



Laika

as the acceleration created pressures several times greater than the **force of gravity**. The force on Laika's body subsided as the satellite reached weightless orbit, but she had trouble recovering from the stress of the launch. Tests conducted in a **centrifuge** on Earth had shown that Laika's heartbeat could return to normal soon after excessive **g-force** was reduced. But in the isolation of the capsule, with no reassuring handlers around, she needed much longer to calm down.

5 Unlike the first *Sputnik*, which separated from its entire launch vehicle, *Sputnik II* went into orbit with its second stage attached. All this hardware—six tons of stuff worth half a billion **rubles**—flew along an **elliptical** path that was about 530 miles high, on average. The rocket-capsule-dog combination circled the Earth once every 104 minutes, passing 160 miles above the orbit of *Sputnik I*...

6 ... Early reports stressed Laika's healthy condition, describing her as "calm" and in "generally satisfactory condition." In America, experts debated the possibility that Laika might return to Earth safely.

force of gravity: force pulling objects towards Earth

centrifuge: machine that spins things very fast

g-force: pressure pushing against something moving very fast; resistance

rubles: Soviet money

elliptical: circular, curved

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Vanguard program scientists discussed the techniques required and theorized that a rocket engine might be used as a brake to slow **reentry**. But Wernher von Braun's colleague Willy Ley dismissed this prospect, saying he was almost certain the Soviets were not capable, adding that even if they could get Laika safely to ground, locating the capsule once it landed would be extremely difficult.

7 With expert opinion quickly **coalescing** around the notion that Laika was doomed, national humane societies in America, Great Britain, and many other countries lodged formal protests with the Soviet government. They were joined by many angry pro-animal activists, including Mary Riddell, president of the Bide-a-Wee Home Association of Manhattan. She was among the first to note the obvious, that returning Laika to **terra firma** was impossible. "Your Government," she wrote in a letter to the Soviet embassy, "once again proved its inhumanity."

8 Things were actually much worse than Mrs. Riddell imagined. The truth of the matter, which wouldn't be revealed for decades, was that Laika probably died from **heat exhaustion**, and perhaps stress, within hours of beginning her mission. As *Sputnik II* soared over the Soviet Union for the fourth time, the instruments that checked her vital signs showed Laika had died as both the temperature and humidity in the capsule had steadily increased. (It turned out that the Chief Designer's team had failed to create an adequate cooling system for the capsule.)

9 Many days would pass before Laika's demise would be reported officially. In the meantime Laika's inevitable fate was, for most people, **obscured** by the playful spectacle of a dog in space. Photos and drawings of the dog appeared in the press for weeks. In the Riviera town of Rapallo, Italy, officials announced they would erect a statue in Laika's honor. In the Soviet Union, packs of Laika cigarettes went on sale to **commemorate** her achievement.

10 American officials said nothing about the ethical implications of killing a dog in space. This silence was probably due, in part, to the fact that the United States itself was relying on a **menagerie** of animal test subjects in its own space research. As Laika was circling the globe, the U.S. Air Force was settling four black bears from Catskill, New York, into their new home at Holloman Air Force Base in New Mexico. Officials first denied the bears would be used in high-speed sled tests. A week later

Vanguard program scientists: scientists for the U.S. space program

reentry: return to Earth from space

coalescing: coming together, agreeing

terra firma: Earth, solid ground

heat exhaustion: overheating

obscured: hidden

commemorate: remember, honor

menagerie: varied group

a bear named Oscar was knocked out with **anesthetics**, strapped into the chair of a high-speed sled, and sent on a ride that subjected him to twenty times the force of gravity. "We wanted to prove that a person could withstand **rapid deceleration** with no ill effects," said a military spokesman. A thorough examination being necessary to prove the absence of ill effects, Oscar was killed and then **autopsied**.[3]

Farnsworth, Fowle, "Humane Societies Protest Use of Dog," *New York Times*, Nov. 4, 1957, p. 1. Whitehouse, "First Dog in Space Died Within Hours." "Space Dog to Get Monument," *New York Times*, Nov. 30, 1957, p. 7. "Air Force Kills a Test Bear," *New York Times,* Nov. 16, 1957, p. 3. "Air Force Stops a Bear to Test Safety Devices," *New York Times*, Nov. 14, 1957, p. 14.

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anesthetics: medicine that lessens pain or puts the subject to sleep

rapid deceleration: a quick drop in speed

autopsied: cut open to look inside

578

1969: *Apollo 11/Saturn V* space vehicle climbs toward orbit

image 6

NASA

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text 7

Eight days after Soviet cosmonaut Yuri Gagarin became the first human to orbit the Earth, President Kennedy wrote this memo. It was time to ramp up American efforts in space. We needed to win the Space Race—the question was how we were going to do it.

Memorandum for the Vice President

Author: John F. Kennedy

(public domain)

THE WHITE HOUSE

WASHINGTON

April 20, 1961

MEMORANDUM FOR VICE PRESIDENT

In **accordance** with our conversation I would like for you as Chairman of the Space Council to be in charge of making an overall survey of where we stand in space.

1. Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip around the moon, or by a rocket to land on the moon, or by a rocket to go to the moon and back with a man? Is there any other space program which promises dramatic results in which we could win?
2. How much additional would it cost?
3. Are we working 24 hours a day on existing programs? If not, why not? If not, will you make recommendations to me as to how work can be speeded up.
4. In building large **boosters** should we put our emphasis on nuclear, chemical or liquid fuel, or a combination of these three?
5. Are we making maximum effort? Are we achieving necessary results?

I have asked Jim Webb, Dr. Weisner, Secretary McNamara and other responsible officials to cooperate with you fully. I would appreciate a report on this at the earliest possible moment.

(President Kennedy's signature)

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accordance: agreement, harmony

boosters: engines

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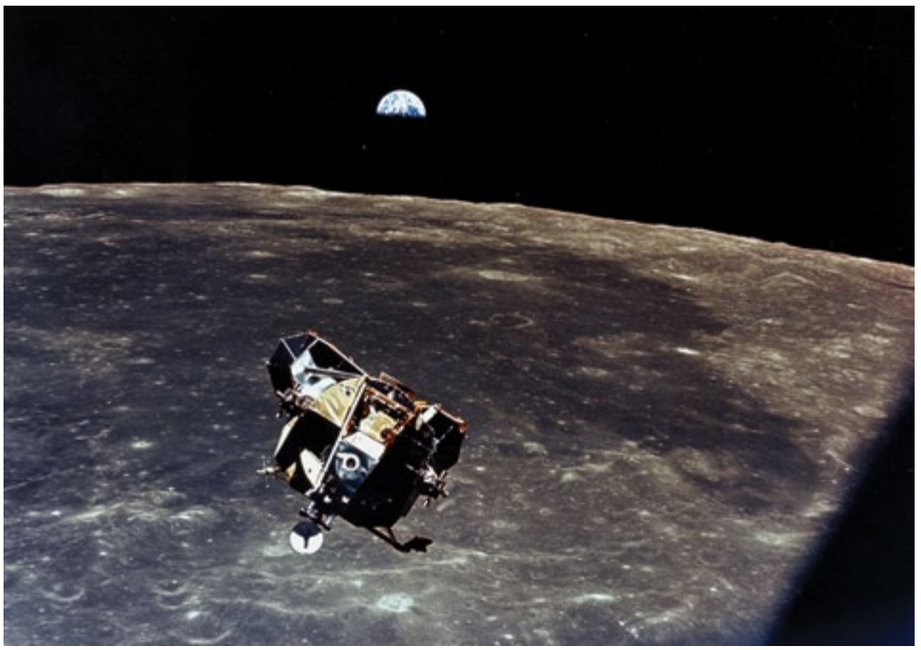
The command module served as the living quarters for the Apollo 11 *astronauts, and it was this craft that astronaut Michael Collins piloted around the moon while Neil Armstrong and Buzz Aldrin walked on the surface.*

image 8

1969: *Columbia* command module from *Apollo 11*, over the moon's surface



APIC

581

text 9

In September 1962, about a year after Soviet cosmonaut Yuri Gagarin became the first person ever to orbit the Earth, President Kennedy addressed nearly 40,000 people in a football stadium at Rice University in Houston, Texas. It was time for the United States to take control of the Space Race, and the president had a plan.

Excerpt: President Kennedy's Address at Rice University, September 12, 1962

Author: John F. Kennedy

1 *(public domain)*

2 President Pitzer, Mr. Vice President, Governor, Congressman Thomas, Senator Wiley, and Congressman Miller, Mr. Webb, Mr. Bell, scientists, distinguished guests, and ladies and gentleman:

3 I appreciate your president having made me an **honorary** visiting professor, and I will assure you that my first lecture will be very brief.

4 I am delighted to be here, and I'm particularly delighted to be here on this occasion. . . .

5 Those who came before us made certain that this country **rode the first waves of** the **industrial revolutions**, the first waves of modern invention, and the first wave of nuclear power, and this generation does not intend to **founder in the backwash** of the coming age of space. We mean to be a part of it—we mean to lead it. For the eyes of the world now look into space, to the moon and to the planets beyond, and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace. We have vowed that we shall not see space filled with weapons of mass destruction, but with instruments of knowledge and understanding.

6 Yet the vows of this Nation can only be fulfilled if we in this Nation are first, and, therefore, we intend to be first. In short, our leadership in science and in industry, our hopes for peace and security, our obligations to ourselves as well as others, all require us to make this effort, to solve these mysteries, to solve them for the good of all men, and to become the world's leading **space-faring** nation.

honorary: in name only, not in practice; symbolic

rode the first waves of: were the first to join

industrial revolutions: the rapid invention of many new machines

founder in the backwash: get stuck in last place, fall to the back

space-faring: space traveling

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7 We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and only if the United States occupies a position of **pre-eminence** can we help decide whether this new ocean will be a sea of peace or a new terrifying theater of war. I do not say that we should or will go unprotected against the hostile misuse of space any more than we go unprotected against the hostile use of land or sea, but I do say that space can be explored and mastered without **feeding the fires of** war, without repeating the mistakes that man has made in extending his writ around this globe of ours.

8 There is no strife, no prejudice, no national conflict in outer space as yet. Its hazards are hostile to us all. Its conquest deserves the best of all mankind, and its opportunity for peaceful cooperation many never come again. But why, some say, the moon? Why choose this as our goal? And they may well ask why climb the highest mountain? Why, 35 years ago, fly the Atlantic? Why does Rice play Texas?

9 We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.

10 It is for these reasons that I regard the decision last year to shift our efforts in space from low to high gear as among the most important decisions that will be made during my **incumbency** in the office of the Presidency.

11 In the last 24 hours we have seen facilities now being created for the greatest and most complex exploration in man's history. We have felt the ground shake and the air shattered by the testing of a Saturn C-1 booster rocket, many times as powerful as the **Atlas** which launched John Glenn, generating power equivalent to 10,000 automobiles with their accelerators on the floor. We have seen the site where the F-1 rocket engines, each one as powerful as all eight engines of the Saturn combined, will be clustered together to make the advanced Saturn missile, assembled in a new building to be built at Cape Canaveral as tall as a 48 story structure, as wide as a city block, and as long as two lengths of this field.

pre-eminence: excellence; doing better than our competitors

feeding the fires of: fueling, encouraging

writ: power, authority

incumbency: time

Atlas: space launch vehicle

583

12 Within these last 19 months at least 45 satellites have circled the earth. Some 40 of them were "made in the United States of America" and they were far more sophisticated and supplied far more knowledge to the people of the world than those of the Soviet Union.

13 The Mariner spacecraft now on its way to Venus is the most intricate instrument in the history of space science. The accuracy of that shot is comparable to firing a missile from Cape Canaveral and dropping it in this stadium between the the **[sic]** 40-yard lines.

14 Transit satellites are helping our ships at sea to steer a safer course. **Tiros satellites** have given us **unprecedented** warnings of hurricanes and storms, and will do the same for forest fires and icebergs.

15 We have had our failures, but so have others, even if they do not admit them. And they may be less public.

16 To be sure, we are behind, and will be behind for some time in manned flight. But we do not intend to stay behind, and in this decade, we shall make up and move ahead.

17 The growth of our science and education will be enriched by new knowledge of our universe and environment, by new techniques of learning and mapping and observation, by new tools and computers for industry, medicine, the home as well as the school. Technical institutions, such as Rice, will **reap the harvest** of these gains. . . .

18 But if I were to say, my fellow citizens, that we shall send to the moon, 240,000 miles away from the control station in Houston, a giant rocket more than 300 feet tall, the length of this football field, made of new metal **alloys**, some of which have not yet been invented, capable of standing heat and stresses several times more than have ever been experienced, fitted together with a precision better than the finest watch, carrying all the equipment needed for **propulsion**, guidance, control, communications, food and survival, on an untried mission, to an unknown **celestial body**, and then return it safely to earth, re-entering the atmosphere at speeds of over 25,000 miles per hour, causing heat about half that of the temperature of the sun—almost as hot as it is here today—and do all this, and do it right, and do it first before this decade is out—then we must be bold. ...

[sic]: appearing exactly as the original; error is part of original

Tiros satellites: weather and television satellites

unprecedented: brand-new, never before seen

reap the harvest: collect the benefits or winnings

alloys: mixtures

propulsion: forward motion

celestial body: planet in space

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19 Many years ago the great British explorer George Mallory, who was to die on Mount Everest, was asked why did he want to climb it. He said, "Because it is there."

20 Well, space is there, and we're going to climb it, and the moon and the planets are there, and new hopes for knowledge and peace are there. And, therefore, as we set sail we ask God's blessing on the most hazardous and dangerous and greatest adventure on which man has ever embarked.

21 Thank you.

1969: Buzz Aldrin's footprint, a photograph of one of the first steps ever taken on the moon

image 10

APIC

585

text 11

In 1963, after highly secretive preparation and training, Soviet cosmonaut Valentina Tereshkova became the first woman ever to travel into space. In one trip, she circled the Earth 48 times and logged more hours outside of Earth's atmosphere than all the American male astronauts combined.

Excerpt: "A Seagull in Flight" from *Into That Silent Sea*

Authors: Francis French and Colin Burgess
Publisher: University of Nebraska Press
Published: 2007

Vostok 6 lifted off at 12:29 p.m. For the first time a woman was on her way into space. Almost to herself, Valya cried out, "I'm off!" She later reflected in her memoirs that "The music of launch begins with the low sounds. I hear the roar that reminds me of the sound of thunder. The rocket is shaking like a thin tree under the wind. The roar grows, becomes wider, more upper notes are distinguished in it. The spaceship is shivering." As *Vostok 6* climbed ever higher in the sky, dwindling into an intense, starlike dot for spectators below, Tereshkova felt the trembling vibration associated with launch and a steadily increasing heaviness in her arms and legs. She also experienced an unseen weight pressing down on her chest. "It becomes hard to breathe," she reported. "I can't move a single finger." Every time she thought the pressure had reached its limit it continued to mount, but she remained focused on the task ahead. "Somewhere in the star-filled height flies the lonely spaceship controlled by Valery Bykovsky," she later reflected in her memoirs. Then, she heard some reassuring words: "'Chaika, Chaika, everything is excellent, the machine is working well.' I shake with surprise. The voice of Yuri Gagarin sounds right near, as if he's sitting next to me, as an instructor in the right seat of the plane. I answer not at once; maybe because of the cheering words of my friend; maybe the flight to orbit is over, and the pressure disappeared, as it melted under the warm wave spreading in my body. Breathing became easy."

Soon an excited voice was broadcast from the orbiting spacecraft: "Ya Chaika, Ya Chaika [I am Seagull]! I see the horizon—a light blue strip, a blue band. This is the Earth; how beautiful it is. Everything goes well." She later told a group of reporters that her first sight of Earth from space was "overwhelming": "It was breathtakingly beautiful, like something out of a fairy tale. There is no way to describe the joy of seeing the Earth. It is

586

blue, and more beautiful than any other planet. Every continent, every ocean, had its own distinct beauty. The Earth was visible very clearly, even though the craft was traveling at [five miles] a second. Africa shone out in yellow and green, Australia was fringed in an opal color. Unfortunately, every time I went over Europe it was **sheathed** in cloud."

4 By three o'clock that afternoon the two **cosmonauts** had established radio contact. Dubbed the "cosmic couple" by the press, they were soon exchanging comments and information about conditions aboard their craft, as well as communicating with ground controllers. The same equipment that had allowed Soviet scientists to study Bykovsky in orbit was now brought into play for Tereshkova. Television images of her were beamed to the world, smiling happily as a pencil and small logbook drifted in front of her helmet. **Telemetry data** was good, and Tereshkova seemed to be adapting easily to weightlessness. . . .

5 On her fourth orbit Tereshkova enjoyed a light-hearted chat with Premier Khrushchev. In concluding he told her to be of good cheer, that the Soviet people were proud of her feat, and expressed wishes for a successful completion of her flight. In response, she said she was deeply moved by his attention and fatherly concern.

6 Despite the sounds of communications and *Vostok 6*'s operating noises, Tereshkova knew her spacecraft was surrounded by a profound silence. It created in her a distinct longing for the familiar things of life back on Earth. "The further away a spacecraft drifts," she once reflected, "the more you start to miss the sounds of nature—rainfall, for instance." Following her conversation with Khrushchev, Tereshkova made preparations to sleep—this time according to the flight schedule. By ten o'clock that night Bykovsky had completed fifty-four orbits and Tereshkova twenty-three. She had flown one more orbit than America's most-traveled astronaut at that time, Gordon Cooper. Tereshkova woke early the next morning, Moscow time, and spent fifteen minutes performing some light physical exercise. She then washed her face and hands using a dampened cloth and ate breakfast.

7 In a later interview with Kerrie Dougherty, Tereshkova disclosed that her flight unavoidably allowed her mother to discover the truth about her activities. "It was top secret. My mother, [like] the mother of Yuri Gagarin, first knew about it with the rest of the country. It was a very big surprise. One can understand what a mother feels like in this kind of situation." She had explained her lengthy absence from **Yaroslavl** by telling her

sheathed: covered

cosmonauts: Russian astronauts

telemetry data: information monitored from the ground

Yaroslavl: city in Russia

mother that she had to complete advanced parachute training in Moscow. Yelena had accepted this. Though uncomfortable with the danger, she was nevertheless proud and wanted her to do well. Her daughter wrote home regularly, and on two occasions made brief visits to Yaroslavl to see everyone. Tereshkova hated being untruthful about what she was really doing in Moscow. Before the flight she had written ten letters saying she was very busy but well and happy. A friend had promised to post one each day to her mother; however, one of the later letters was delayed, only arriving in Yaroslavl on the day of the flight.

8 As Tereshkova revealed to Dougherty, friends told her mother that on television they had seen a woman in space who greatly resembled her daughter. Yelena dismissed this as idle gossip. "She said, 'No, my daughter is just a parachute jumper. She could not be aboard this spaceship!'" Tereshkova related. "My mother was absolutely certain that I could not hide anything from her, but then she saw my photo, and when she heard my message to her—because I had a special message I transmitted to her—then she recognized her daughter on the television screen!" Though proud of this remarkable achievement, Yelena is said to have been deeply hurt by the deception. It would be some time before she finally forgave her Valya for what she considered to be her lack of faith in her own mother. . . .

9 As *Vostok 6* began its forty-eighth orbit, the spacecraft was oriented for reentry by means of a **solar sensor** located in the **service module**. Tereshkova was supposed to describe the operation of this sensor to the ground as well as the sensations of reentry. She did neither, to the frustration of the ground controllers. The braking rocket fired as scheduled, slowing the spacecraft, which was then separated explosively from the service module. The **spherical** *Vostok 6* craft now began a fiery **ballistic** return to Earth, shielded from the immense heat of reentry by a protective **ablative coating**. As Tereshkova recalled in *Stars Are Calling*, the pressure pushed her back in her couch, and though it was difficult to keep her eyes open she took note of what was happening to her space capsule: "I notice the dark red tongues of the flame outside the windows. I'm trying to memorize, fix all the feelings, all peculiarities of this descending, to tell those who will be conquering space after me. My mind is working calmly and logically. With a loud roar, the spaceship bumps into the dense atmosphere. The noise grows with every second; it already reminds me of the thunder of hundreds of drums, the final part of some outrageous heroic symphony."

solar sensor: device that senses the position of the sun relative to the craft

service module: section of craft carrying supplies

spherical: round

ballistic: gravity-pulled

ablative coating: layer that absorbs fire to shield what is underneath

588

10 Four miles above the ground, bolts securing the pilot's hatch were severed explosively and the hatch, situated above her head, was **jettisoned**. Two seconds later **ejection rockets** fired, catapulting Tereshkova and her contoured seat out of the craft. After a parachute descent to thirteen thousand feet the seat was also discarded, and Tereshkova continued her descent under a separate parachute. The abandoned spacecraft's parachutes also deployed at that altitude bringing it to the expected heavy landing—one deemed too heavy for the *Vostok* pilots to safely sustain. As she descended, Tereshkova raised her faceplate for a better view of the landing area. Below her was a large field, with a lake nearby; she became concerned that she might actually land in the water. However, there was a strong wind blowing, and it carried her away from the lake. Then, despite orders not to do so, she looked up at her red-and-white parachute and was struck in the face by a small piece of falling metal, leaving a small cut and bruise on her nose.

11 Soon after, at 11:20 a.m., Moscow time, Tereshkova touched down in a wheat field in the northern **Urals**, 390 miles northeast of Karaganda in the Altai region. The first spacewoman had clocked up seventy hours and forty-one minutes in orbit and had flown one-and-a-quarter million miles. On the ground, workers on a collective farm had watched in fascination at the sight of the spacecraft, the ejection seat, and an orange-clad figure descending beneath large parachutes. They cautiously made their way to the site, joined soon after by other workers who had been building a bridge over a nearby river. Meanwhile, Tereshkova was removing her spacesuit and changing into a more comfortable tracksuit. She then began gathering everything together—her spacesuit, parachute, and ejection seat—and tried to carry the accumulated weight to the capsule over a thousand feet away. Soon the people who had been working in the field arrived and helped her carry the seat, which she could not manage single-handed. . . .

12 Tereshkova was in fine spirits. She had even eaten a traditional gift of black bread and salt, as well as some **fermented** cheese, cakes, and milk given to her by the workers. By way of thanks she gave all her remaining space food to these people. Both acts would later anger doctors who had planned to check her food consumption against her physical condition.

jettisoned: pulled away, thrown off

ejection rockets: engines that propel the pilot from a craft

Urals: mountains of Russia

fermented: aged

image 12

1969: *Apollo 11* ticker-tape parade in New York City with Buzz Aldrin, Neil Armstrong, and Michael Collins

NASA

590

This passage describes what life was like for Yuri Gagarin during his April 1961 Vostok mission. It also details observations he made about what the Earth looks like from space.

text 13

Excerpt: "First to Fly" from *Into That Silent Sea*

Authors: Francis French and Colin Burgess
Publisher: University of Nebraska Press
1 *Published: 2007*

2 Vladimir Suvorov, in charge of filming the launch that day and dangerously close to the launch pad at the moment of ignition, recorded his impressions of the liftoff in his secret diary:

3 "Now the powerful engines come to life, the rocket is trembling and the white frost wraps it in a thin haze. There are reflections of the flame of the engines on the rocket body. At last after the final jerk it starts moving as if awakened from a long sleep." Inside the spacecraft, Gagarin found it hard to identify the exact moment when the rocket left the ground. He had felt the rocket sway slightly a minute before launch as the **valves** began to operate, but the difference in the rocket's shaking and noise at launch had been too subtle to pinpoint. In fact, the rocket seemed relatively slow and quiet as he began his mission, to the point where he did not feel like he was moving at all. Over the faint roar he heard Korolev wish him a good flight as he ascended, and he responded with a cheery "Poyekhali!" (Off we go!).

4 Prepared to eject if he needed to, Gagarin felt the shaking increase just over a minute after liftoff, then slowly decrease as the **amplitude** and frequency of the vibrations changed. As the rocket accelerated, the g-forces rose steadily, interrupted only by the first-stage booster engines falling away. It soon became hard for him to speak as his face muscles tightened, but following his extensive training handling the g's was no problem. When the second stage shut down, Gagarin was pushed forward against his seat straps with a jolt and a bang, making him fear for a moment that a piece had broken off the spacecraft. He became aware that the noise of the engines had suddenly ceased, and the sudden reduction in acceleration gave him the false sensation that he was weightless. Ignition of the third stage pushed him back into the seat again, but this booster

valves: gates controlling passage of fuel

amplitude: motion

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stage was a quieter one. The bullet-shaped **aerodynamic** shield covering the spacecraft soon separated with another bang and sharp jolt. When the third stage also shut down, *Vostok* separated from it and began a slow spin. Nine minutes after launch, Gagarin was in orbit.

5 As his spacecraft slowly rotated, Gagarin looked at the Earth below him. His first view was of a mountain area with rivers, forests, and ravines, which he later believed to be the Ob or Irtush River area. As he continued to look at the revolving scene, he was struck by the beauty of it—a curved horizon above an Earth of surprisingly intense blue, the deep black of space, and a sun too bright to look at. It was not lost on him that he was seeing the Earth as spherical, with his own eyes—the first time any human had been able to do so. The horizon looked particularly beautiful to him, and he was entranced by the smooth change from the brilliance of Earth to the darkness of space, a **myriad** of colors filling the thin, filmlike layer that separated the two. He had never seen a blackness as deep as the infinity of space he stared into.

6 Looking down at the Earth again, Gagarin saw seas, cities, the coasts of continents, islands, and other sights never before seen by a human being from this vantage point. As the features slipped by, the speed of his journey around the world was vividly evident. As he observed a coastline change to ocean, he noticed how surprisingly gray the water looked, appearing "darkish, with faintly gleaming spots." From orbital height, the ocean's ripples reminded him of sand dunes. He was also fascinated by the sharp shadows of the clouds over the Earth's surface.

7 Over land, he observed the squares of fields, and could easily distinguish meadows from ploughed areas. Through gaps in the cloud, he saw the forested islands of Japan. For the first time in his life, whether on the ground or in space, he was looking at a foreign country. At times the view reminded him of the vista from a high-altitude jet, but there was so much more to it.

8 Back in Gzhatsk, his mother wept as she listened to the breaking news over the radio. "What has he gone and done?" she kept repeating, as if still talking about the mischievous childhood Yuri.

9 Gagarin kept his thoughts concentrated on the flight program; he wanted to carry out his assignments to the best of his abilities. He checked the spacecraft systems and saw that everything was functioning perfectly. He

aerodynamic: wind-resistant

myriad: large amount

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also reflected on how he was feeling; he was having no problems with the prolonged weightlessness. "It was an unusual sensation," he later reported. "Weightlessness is a strange **phenomenon**, and at first I felt uncomfortable, but I soon got used to it." The lack of up or down made him feel like he was hanging from the spacecraft ceiling by his straps. "It seemed as if my hands and legs and my whole body did not belong to me," he reported. Yet he was feeling no discomfort, and in fact found it easier to work in the cabin because of the lack of weight. He noted that he did not feel hungry or thirsty, but he ate and drank as part of the mission plan, with no problems. "On *Vostok* the water supply was kept in a **polyethylene**-lined container fitted with a tube with a special mouthpiece," he would later describe. "To get a drink I had to take the mouthpiece, press the button of a special looking mechanism, and then suck the water out." Some water leaked from the end of the tube and slowly floated around the cabin as he watched, fascinated by the tiny, gleaming sphere of fluid. . . .

10 Half an orbit after launch, over the vast Pacific Ocean, *Vostok* glided serenely into the shadowed side of the planet following a beautiful sunset. Gagarin was surprised by how quickly darkness came on, a huge difference from the blindingly bright sunlight. He looked down at the Earth's surface but could see no lights, so surmised he must be traveling over water. As he looked to the horizon, more stars appeared than he had ever seen before, brighter and sharper than when observed from Earth. "Of all the nights I had seen in my lifetime," Gagarin recounted, "none was remotely comparable to night in space. I have never forgotten it. The sky was blacker than it ever appears from the Earth, with the real, slate-blackness of space." It would be the shortest night of his life, however. All too soon, Gagarin saw a vivid orange curve on the horizon, "a very beautiful sort of halo," which gradually changed to a multitude of colors, then blue as the blinding sun rose again, faster than he had imagined it would.

11 The spacecraft's automatic systems were functioning well, so much so that Gagarin never needed to touch the controls, only monitoring the systems to ensure that *Vostok* was doing everything correctly. Far from feeling isolated and alone in space, he felt like there was more attention focused on him than at any other time in his life.

12 For this first mission, only one orbit was planned. As scheduled, seventy-nine minutes into the flight, the **retrorockets** made a forty-second automatic burn, slowing the spacecraft. Gagarin closed his helmet,

phenomenon: happening, occurrence

polyethylene: plastic

tightened his straps, and felt the bang and deceleration force as the rockets fired to bring him home. He was feeling great and would have been happy to continue the flight, but knew that wasn't within the scope of this mission. . . .

13 To reenter Earth's atmosphere, the spherical cabin was supposed to separate cleanly from the equipment module that had provided the essential power and telemetry. No longer needed, the module was designed to be cast off and burn up in the atmosphere, leaving the ball-shaped cabin to descend safely. However, all was not going to plan. A cable between the two spacecraft parts had not detached, and Yuri found himself rapidly tumbling as the crew cabin and its unwanted **encumbrance** made a spinning, dangerous plunge into the atmosphere. "Through the windows I saw Earth and sky, from time to time the blinding rays of the sun," he recalled. "I waited for separation, but separation did not occur. The wait was terrible. It was as if time had stopped. Seconds felt like long minutes." . . . .

14 After ten dangerous and uncomfortable minutes, the cable holding the modules together finally **sheared** and burned through under the intense forces with an audible bang, and the two spacecraft parts were whipped away from each other like spinning tops. . . . Through the borders of the now-closed blinds, he could still see the bright red fire of reentry and could hear and feel the crackling **thermal** coating. He assumed the position for ejection, and waited. . . .

15 At twenty-three thousand feet the spacecraft hatch automatically blew off with a loud bang, and the cosmonaut tensed, waiting for the ejection process to begin. "I sat there, thinking, what about me?" Gagarin recalled. "I slowly turned my head upwards, and at that moment the charge fired and I was ejected. I flew out with the seat." His parachute opened, and he steadily drifted down toward the ground. His emergency parachute suddenly and dangerously opened in addition to his main chute. Luckily for Gagarin, it hung limply below him and did not tangle with the other shroud. After the **perils** of reentry, he was safe at last, and as he descended he began singing to himself happily.

16 Gagarin landed near a village called Smelovka, in the Saratov region of the Soviet Union, not far from the air club where he had first taken to the skies. "It was like a good novel," he recounted. "As I returned from outer

retrorockets: engines that cause deceleration

encumbrance: load, burden

sheared: broke off

thermal: heat-resistant

perils: dangers

space, I landed in the area where I had started flying. How much time had passed since then? Not more than six years. But how the yardstick had changed!" As his feet hit the ground, he found that he could stand upright without difficulties. The spacecraft landed under a separate parachute about two miles away. Some local children had been surprised to suddenly spot the charred, unearthly looking ball falling from the sky, and they managed to climb inside through the landed craft's open hatch, helping themselves to some uneaten tubes of food. The villagers who greeted the cosmonaut were similarly baffled, thinking at first he might be some kind of foreign spy. Gagarin, however, was elated. He introduced himself to them as the world's first spaceman.

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image 14

1963: Hail the Soviet People—the Pioneers of Space!

1969: *Apollo 11* commemorative button

Hail the Soviet People: Gamborg Collection/The Bridgeman Art Library. *Apollo 11* commemorative button: APIC.

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text 15

This statement was written by a White House speechwriter in case the Apollo 11 *mission to the moon were to go horribly wrong. The speech was to be delivered by the president if astronauts Neil Armstrong and Buzz Aldrin became stranded on the moon's surface, unable to return.*

In Event of Moon Disaster

Author: William Safire

1 *(public domain)*

To: H. R. Haldeman
From: Bill Safire July 18, 1969.

IN EVENT OF MOON DISASTER:

2 Fate has ordained that the men who went to the moon to explore in peace will stay on the moon to rest in peace.

3 These brave men, Neil Armstrong and Edwin Aldrin, know that there is no hope for their recovery. But they also know that there is hope for mankind in their sacrifice.

4 These two men are laying down their lives in mankind's most noble goal: the search for truth and understanding.

5 They will be mourned by their families and friends; they will be mourned by their nation; they will be mourned by the people of the world; they will be mourned by a Mother Earth that dared send two of her sons into the unknown.

6 In their exploration, they stirred the people of the world to feel as one; in their sacrifice, they bind more tightly the brotherhood of man.

7 In ancient days, men looked at stars and saw their heroes in the constellations. In modern times, we do much the same, but our heroes are epic men of flesh and blood.

8 Others will follow, and surely find their way home. Man's search will not be denied. But these men were the first, and they will remain the foremost in our hearts.

9 For every human being who looks up at the moon in the nights to come will know that there is some corner of another world that is forever mankind.

PRIOR TO THE PRESIDENT'S STATEMENT:

10 The President should telephone each of the widows-to-be.

AFTER THE PRESIDENT'S STATEMENT, AT THE POINT WHEN NASA ENDS COMMUNICATIONS WITH THE MEN:

11 A clergyman should adopt the same procedure as a burial at sea, commending their souls to "the deepest of the deep," concluding with the Lord's Prayer.

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image 16

Navy divers approach the module. They are wearing Biological Isolation Garments (BIGs) to protect them from possible pathogens, or diseases, brought back from the moon. Their job is to help the astronauts exit the Columbia *and board a waiting Navy ship. The astronauts were washed down with sodium hypochlorite and placed in quarantine for 21 days to ensure they weren't infected with any germs. It was soon discovered that the moon contained no life, not even germs.*

July 24, 1969: *Columbia* command module from *Apollo 11*, splashdown in Pacific Ocean

APIC

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On July 20, 1969, the Apollo 11 *mission put the first men on the moon. The moon landing was broadcast worldwide, to the largest television audience in history.*

text 17

Excerpt: "Dreaming of a Moonage" from *Moondust*

Author: Andrew Smith
Publisher: HarperCollins
Published: 2005

When you've shared a moment with the whole world, it can be hard to know precisely where your memories end and everyone else's begin. . . .

They're going to the moon. My dad took me into the garden to look at it last night. I saw him frown as it reflected watery gold on his upturned face, as if someone had stepped over his grave or shone a bright light in his eyes. It was one thing to land a man on the Moon, quite another to bring him back afterward. But to have stood there in the first place ... the thought alone made you tingle. . . .

... It's 1:15 PM. My parents' friends the Reuhls and the sweet and elderly Fishes from across the road are leaning forward on couches and chairs, forward over the gold and orange **shag carpet**, clutching beers or cups of coffee tightly with varying mixtures of anxiety and disbelief on their faces. A familiar singsong southern drawl is floating from the TV, decorated with static and peculiar little squeaks and pings which sound like someone flicking the lip of a giant wineglass with their finger. We know this as the voice of Mission Control. His name is Charles Duke, but the astronauts just call him "Houston." There are other voices, too, but they all sound distant and intermingled and it's hard to get hold of what they're saying. An air of expectancy hangs in the room.

Now we hear:

"Thirty seconds."

Silence.

"Contact light."

"Shutdown."

shag carpet: rug with long fibers

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10 "Descent engine command override. Engine arm, off, 413 is in."

11 A pause.

12 Silence.

13 More silence.

14 "Houston, Tranquillity Base here ... the *Eagle* has landed."

15 No one in the room seems to get it straightaway. The adults look at each other. Then cheering in the background somewhere and the drawl, like a sigh, the first hint of emotion from inside the box.

16 "Roger, Tranquillity, we copy you on the ground. You got a bunch of guys about to turn blue. We're breathing again. Thanks a lot."

17 The room erupts. We erupt, too. My dad ruffles my hair and slaps David on the back. All the little kids run in.

18 "Boys—they're on the Moon!"

19 Dad has tears in his eyes. It's the first time I've ever seen him with tears in his eyes, and it will only happen once more.

20 None of us have any idea what has been going on behind the scenes during those final moments, although the evidence was there in the coded **monotone** exchanges if you knew how to read them.

21 THE CREW NASA chose for this landmark mission consists of Neil Armstrong, Buzz Aldrin and Mike Collins, and they're a peculiar trio. The flight plan called for Collins to orbit the Moon in **exalted** frustration, tending to the ship that would provide their ride home, the Command Module *Columbia*, while his colleagues dropped to the surface in the *Eagle* lander. He is a communicative character; enjoys fine wines and good books; paints and grows roses. But Armstrong is remote and self-reliant—Collins likes him, but can't find a way though the defenses—while the **live-wire** Aldrin just strikes him as dangerous. . . .

22 It's coming up to 7:30 PM and dusk is falling. I can hear crickets and birds in the back garden, and the burble of the creek. The Moon's in the sky, a big silver full Moon, and I've been on the porch in my pajamas, which have little blue spaceships on them, just drinking the sight in. They're up there. Up there. *There*. We've been watching the screen for an hour, because Neil

monotone: unvaried, dull

exalted: joyful, celebrated

live-wire: energetic

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Armstrong was due out at 7:00 PM after he told NASA that he couldn't bear to hang around until midnight, much less sleep. The TV anchor and various experts have been assuring us that everything is fine, though. It takes a while to get those big Michelin Man suits on.

23 Armstrong is late because stowing the dishes after dinner was never part of the practice routine and it's taken longer than anyone expected. The first men on the Moon are being delayed by dirty dishes: there's something wonderful about that. The *Eagle* is on a bright, rolling, crater-pocked plain. When they had a chance to take the scene in through the lunar module's tiny, triangular portholes, Aldrin **exulted** at the unreal clarity in this **atmosphereless** environment, with features on the distant horizon appearing close by, contrasting beautifully against the boundless black backdrop of infinity. Armstrong wondered at the peculiar play of light and color on the tan surface. He thought it looked more inviting than hostile. He knows this will be his home for only twenty-one hours.

24 Now, what *do* you say as you become the first human being to set foot on the Moon? Neil Armstrong is an astronaut, not a poet, and certainly not a **PR** man. He wouldn't have bothered about it much, but people have been writing to him with all kinds of suggestions—the Bible and Shakespeare being the most popular sources of inspiration—and everyone he meets seems to have an opinion. The pressure is on. It's irritating, because, for him, the landing was the poetry and taking off again his next major work. Still, as he thinks about it, he considers the **paradox** that it is such a small step, and yet … the **laconic** career pilot comes up with one of the most memorable lines ever offered the English language.

25 The door won't budge and they don't want to force it, because you could poke a hole through *Eagle* at almost any point. The air pressure inside the cabin is holding it closed, so Armstrong peels a corner back gently and the last of the craft's oxygen screams into space as a rainbow of ice crystals. Aldrin holds the hatch open as the other man sinks to his knees and crawls through, until he is standing on *Eagle*'s porch, surrounded only by Moon and space and the Earth which hangs above him.

26 He pulls a ring and a small TV camera lowers on a tray from the undercarriage and begins transmitting pictures home. A voice from Earth exclaims, "We're getting pictures on the TV!" And so we are: grainy and unearthly. Upside down at first, then flipped over. Wow. Armstrong tests

exulted: showed excitement

atmosphereless: without a layer of atmosphere between the planet and space

PR: public relations

paradox: contradiction

laconic: concise, terse

his weight in one-sixth gravity and launches himself onto LM's giant landing pad. He describes the surface as "very, very fine-grained as you get close to it . . . almost like a powder." Then:

27 "Okay, I'm going to step off the LM [lunar module] now."

28 There's still time for the **rapacious** Moon-bugs to grab him, but they don't. He tests the ground to make sure it will take his weight, then steps off the LM.

29 "That's one small step for man, one giant leap for mankind. . . ."

30 He bounces, paws at the dust once more with his boot and finally lets go of *Eagle*, to be free of the Earth and all its creations. He walks hesitantly, unsteadily at first, like a toddler searching for the secret of balance. He feels his way into the rolling gait that Moonwalking demands and takes some photos, until Mission Control reminds him about the "**contingency**" soil sample he's supposed to get in case of an emergency takeoff. At that moment, Aldrin chips in, too, and the commander snaps, "Right," as the press room back in Houston erupts with laughter—because it seems that nagging is nagging, even on the Moon. Fourteen minutes later, Aldrin joins him, cracking a joke about being careful not to lock the hatch on the way out—but all the same, he's covered in goose bumps as he steps away from the *Eagle*. He likes the reduced gravity, is glad of its attention after the weightlessness of space, which feels lonesome to him, as though he's nowhere. He looks up at the half-dark Earth and can make out the slowly rotating shapes of North Africa and the Middle East, then returns his eyes to the Moon and realizes that the soil next to his boots has lain undisturbed since before those continents existed.

31 I run out into the garden to bathe in the silky Moonlight and the blood seems to rush to my head. They're standing there now. They're walking on the Moon. I go back inside and President Nixon is on the phone to the astronauts.

32 "Hello, Neil and Buzz, I'm talking to you by telephone from the Oval Room at the White House. And this certainly has to be the most historic telephone call ever made from the White House. . . ."

33 Throughout the Moonwalk, Aldrin has been wrestling with a strange mixture of emotions, coalescing in an eerie sense that he is part of something that reaches way beyond himself. He's here and there is Moon under his feet, but he feels strangely detached from the proceedings, as

rapacious: hungry, greedy

contingency: required, essential

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though he is simultaneously back home on the sofa, watching himself being watched. Inside *Eagle*, he felt alone with Neil, but now he imagines the presence of the whole of humanity. He wonders what to say in response to the president and decides that it might be best to say nothing at all.

34 Nixon's still going on.

35 ". . . For one priceless moment, in the whole history of Man, all the people on this Earth are truly one. One in their pride in what you have done. And one in our prayers that you will return home safely to Earth."

36 Nixon *does* have speech writers.

37 There is an awkward silence, such as might be encountered in conversation with an elderly uncle who can't quite remember your name. Then Armstrong speaks.

38 "Thank you, Mr. President. It's a great honor and privilege for us to be here, representing not only the United States but men of peace of all nations. . . . men with a vision for the future. . . ."

39 It's the 1960s: women still count as men. To some viewers, the astronaut's halting voice sounds thick with emotion, although he will later insist that, with perhaps a thousand million people watching and listening, his thoughts are mostly concentrated on trying not to say anything stupid. He turns his attention back to inspecting and gathering samples of the Moon. It's already proving a far more interesting place than he'd expected. Especially odd is the visible curvature toward the horizon on this relatively small sphere, which lends a kind of intimacy to the landscape. He and his partner struggle to plant an American flag in the lunar soil, and then have difficulty in persuading it to stand up. When the *Eagle* takes off, it blows over.

40 They're still out there when I lose my battle with tiredness and Dad carries me off to bed. . . .

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image 18

On July 26, 1971, NASA launched Apollo 15*: the fourth manned lunar-landing mission. It was also the first of what were called the "J" missions; these were longer stays on the moon focused on the gathering of scientific data and lunar samples. During three days on the moon, the* Apollo 15 *astronauts collected hundreds of pounds of lunar rock and dust. They also traveled farther from their craft than any astronaut ever had before, thanks to the lunar rover.*

1971: James Irwin, American flag, lunar module, and lunar rover

NASA

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Buzz Aldrin talks about the Apollo 11 *mission's high points and hazards.*

text 19

"Buzz Aldrin on His Lunar Home, the Eagle" from *The Wall Street Journal*

Author: Marc Myers

1 *Published: May 16, 2013*

2 For 21½ hours, two astronauts lived aboard a cold, cramped lunar module with a **balky circuit breaker**.

3 —Buzz Aldrin, 83, was a member of the Apollo 11 moon mission and one of the first men to walk on the lunar surface. He is author of "Mission to Mars: My Vision for Space Exploration" (National Geographic). Mr. Aldrin was interviewed by reporter Marc Myers.

4 I can't see the moon from my bedroom window. But I do like to go onto my patio to watch it rise majestically over Los Angeles. When I see the moon up there, I don't say to myself, "Hey, I walked on your face," or "Thanks for disrupting my life." I just feel grateful it let us land safely in 1969 and let us take off.

5 Believe it or not, my mother's maiden name was Moon. Her family came from Britain, and she suffered terribly from depression. Like my grandfather and cousins on her side of the family, she took her own life. It happened in 1968—a year before the Apollo 11 launch. It was tough, but I blocked it out by focusing on all the years she supported me—as did my father, who was an **aviation pioneer** and had known Orville Wright.

6 After Apollo 11 lifted off in Florida [on July 16, 1969], the three of us—me, Neil Armstrong and Mike Collins—traveled in space for three days to reach the moon's orbit.

7 The next day, Neil and I climbed into the lunar module and detached from [command module] *Columbia* to begin our descent to the moon. We had to stand in the craft—the design didn't allow for seats. Our feet were held down on the floor by elastic cords to keep us from floating around.

balky: uncooperative, not acting as it should

circuit breaker: device for safely stopping the flow of electricity

aviation pioneer: among the first to fly planes

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8 Landing on the moon—with all of the risks—sounds scary. But our training prepared us by concentrating on failures and solving big problems under extreme pressure.

9 Once we touched down at the **Sea of Tranquillity** [on July 20], the Eagle was our home for the next 21½ hours. When I was a kid, my first airplane ride was in a propeller aircraft painted to look like an eagle and piloted by my father. The lunar module was named Eagle—and an eagle **insignia** was on our arm patch—so I felt safe.

10 On the moon, we had one-sixth of Earth's gravity, allowing Neil and me to move around easily in the Eagle to put on equipment for our walk. The module's color scheme wasn't much—the interior was gray and industrial, and there were lots of labels with white and black text. Some handles were yellow, and there was a yellow guard around our telescope.

11 We ate freeze-dried packaged food and had a mix that became an orange-grapefruit drink when water was added. There was no coffee. The *Columbia* orbiting above had hot water, but not the Eagle.

12 Four hours after we touched down, Neil went out of the craft first to set up a TV camera pointed at Earth and take photos. I followed 20 minutes later. When I stepped onto the moon's surface, it felt cushiony, not gravelly—thanks to all the dust. There was no crunchy sound under my boot.

13 The strangest feeling was standing on the surface and looking back home at Earth—where every other human being was except the three of us. One of the most famous pictures from the mission was taken by Neil of my gold helmet visor—with Neil and the Eagle reflected in it. If you look carefully, you'll see smudges on both legs of my spacesuit.

14 When Neil had come down the ladder, he had to jump a little to drop to the next rung. His boots left moon dust on the last rung. So when I jumped a little coming down to the pad, I underestimated the leap and my shins brushed the last rung, picking up the dust.

15 Returning to the Eagle about two hours later, we had a problem. I noticed the engine arm's circuit breaker on my side had detached. It had to be **engaged** somehow if the ascent engine was to fire and lift us off the surface.

Sea of Tranquiility: site of Apollo 11 landing; not an actual sea, but a large plain on Earth's moon

insignia: badge

engaged: reattached

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16 Houston wanted us to sleep while they learned as much as possible about the breaker problem. But the module was freezing cold, so Neil and I put on our helmets, and I turned the heat full-up. I curled up on the floor, and Neil tried to sleep sitting on top of the asset engine cover. But he told me later that Earth's bright blue light was shining through the Eagle's telescope and into his eyes, keeping him awake. Not very homey—but we managed.

17 When Houston woke us several hours later, they told me what to do to fix the circuit breaker. I engaged it with a felt-tip pen. Since the pen was made of plastic, there wasn't a risk of encountering electrical **voltage** when I pushed in the remainder of the disengaged breaker.

18 Once Houston concluded the problem was fixed, relief replaced concern. I felt we might make it home instead of perishing there. A short time later, Houston gave us the go-ahead: "Apollo 11 at Tranquillity Base, you're cleared for liftoff." I responded, "Roger, Houston. We're No. 1 on the runway." Those were two absurdities, of course. There was no runway and no one else was behind us. A little space humor.

19 The Eagle was like home on the moon—only we didn't have two wives telling us to clean up. We were the chief cooks and bottle-washers. So before we left, we put out the trash, just as we did back home. It's all still sitting there on the lunar surface waiting for the trash collector.

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voltage: charge

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image 20

Robert Rauschenberg, a celebrated modern painter and visual artist who rose to fame in the 1960s, was invited by NASA to observe the Apollo 11 *launch at Cape Kennedy in 1969. In response to the historic liftoff, Rauschenberg created a series of 34 prints. They were collages—or were made up of images of the natural world, early human flight, NASA photographs, and other subjects. This print depicted here is nearly seven feet tall.*

1969: *Sky Garden (Stoned Moon)* by Robert Rauschenberg

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text 21

In 1975, after nearly 20 years of competition in space and, behind the scenes, years of careful diplomatic negotiation and scientific cooperation, the United States and the Soviet Union carried out their first joint mission: the Apollo-Soyuz Test Project.

Excerpt: "Smooth as a Peeled Egg" from *Two Sides of the Moon: Our Story of the Cold War Space Race*

Authors: David Scott and Alexei Leonov with Christine Toomey
Publisher: St. Martin's Press
1 *Published: 2004*

2 The **cosmodrome** at Baikonur was a very different place in 1975 from what it had been ten years before. A new hotel had been built there with a swimming pool and tennis courts. There was a theater in the town, too, many new shops and a fleet of air-conditioned buses available for crews in training. At the end of April that year, less than three months before the Apollo-Soyuz launch, we invited the American astronauts to visit Baikonur.

3 Before showing the Americans the launch facility we took them on a brief tour of the Soviet Uzbek cities of Tashkent, Bukhara and Samarkand. When we arrived at Baikonur a big party had been arranged to welcome the Americans. Some local people of this remote region of Kazakhstan arrived by camel, weighed down with regional dishes and specialities. Sitting cross-legged in a traditional Kazakh tent we drank toast after toast to the success of our joint mission.

4 This was the last opportunity our two crews would have to spend any time together before the start of the mission. The next time we would shake hands and propose a toast to each other's good health would be while orbiting the Earth at 30,000 kph.

5 During the two months that followed I sometimes spoke to Tom Stafford on the phone. The evening before the launch he called me to ask how everything was.

cosmodrome: space airport

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6 "Everything is going as smoothly as a peeled egg," I told him. "How about you?"

7 "As smoothly as three peeled eggs," Tom replied in his broad Oklahoma twang. "See you in space."

8 Some of our team had already been **dispatched** to Mission Control in Houston for the duration of the mission, while members of the American team had arrived at a new Mission Control center we had by then developed at Kaliningrad on the northern outskirts of Moscow. All had undertaken foreign language instruction, as we had. Everything was set. . . .

9 . . . Our launch was scheduled for mid-afternoon on 15 July. Apollo would also launch mid-afternoon local time in Houston. Orbital **dynamics** and the rotation of the Earth determined this would bring us into **parallel trajectories**.

10 It was hot, with clear skies and light winds, when we blasted away from the launchpad at Baikonur that Tuesday afternoon. It was the first launch of any space mission broadcast live on television in the Soviet Union. Fortunately, it was flawless: no hiccups at all. The only hitch in the first hours was a technical problem with the system of television cameras aboard Soyuz. No signal from our module was being received back on Earth.

11 For a mission whose significance was to demonstrate to a watching world that cooperation in space was possible, this was a problem that had to be solved quickly.

12 We had no choice but to dismantle a major part of our orbital section in order to gain access to the wiring for the system of five cameras connected to the **switchboard**, and fix the problem by disconnecting the switchboard from the **circuit**. It was a long and painstaking task. It took us many hours, during which we had been scheduled to sleep.

13 During our joint training sessions with the American crew, my crewmate Valery Kubasov had earned a reputation as an expert "handy-man." "If anything breaks down, Kubasov can **weld** it together," they used to joke. And it was true. During the Soyuz 6 mission with Gyorgy Shonin in 1969, Valery, as flight engineer, had done the first ever welding in space.

dispatched: sent

dynamics: measures of motion

parallel trajectories: side-by-side paths

switchboard: control panel

circuit: electrical current

weld: join pieces of metal using heat

Astronaut Tom Stafford (right) and Cosmonaut Alexei Leonov (left) shake hands.

14 Our gradual progress in solving the problem was followed in live transmissions broadcast on Soviet radio. On our return to Earth this prompted a hilarious mailbag of requests from fellow Soviet citizens wanting Kubasov and me to come and fix their television sets.

15 As we were finishing off this complicated task we picked up our first radio transmission from the Apollo spacecraft after it launched. It was Tom speaking in Russian. "*Vyo normalno* [Everything is OK]."

16 And then we heard Vance Brand's voice. "*Miy nakhoditsya na orbite* [We are in orbit]."

17 They were on their way. Everything was going according to plan. It was an exhilarating feeling.

18 We were not due to **rendezvous** until our second day in space; at the moment our two vehicles were still on opposite sides of the Earth. During this time the American crew had their own technical hitch to deal with. Listening in to their transmissions with Houston we understood that, at the end of their first day in space, they were having some difficulty in opening the hatch leading from the orbital section of the Apollo spacecraft to its **docking** module.

rendezvous: meet up

docking: connection

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19 After a few hours' rest we followed events aboard Apollo carefully and realized that, like us, they had ironed out their initial difficulty. Vance Brand, "Vanya," had managed to disassemble the docking probe, and Deke had been able to move into the docking module to check that everything was working as it should.

20 By the morning of 17 July it was time to move toward each other. Until that point Apollo had been circling the Earth in a higher orbit. We could hear the voices of its crew in our headsets, but could not see it. By lowering their **apogee**, and so increasing their speed, Apollo moved closer to us.

21 As our orbit took both vehicles high above the European continent, I suddenly caught sight of the American spacecraft's **beacon** out of my viewing porthole. There it was, right in front of us. At first, from a distance of about 25 km, it looked like a bright star. Then, as it came closer, I could see the clear outline of the silver spacecraft.

22 "Apollo, Soyuz. How do you read me?" I transmitted when I heard Deke Slayton wishing us "*Dobroye utro* [Good morning]."

23 "Alexei," said Deke, "I hear you excellently. How do you read me?"

24 "I read you loud and clear," I replied.

25 The maneuvers that followed, bringing the vehicles closer and closer, though conducted at speeds of over 30,000 kph, seemed like **choreography** from a graceful **celestial** ballet. Eventually, as the two spacecraft drew to within a few meters of each other I could make out a face in one of Apollo's windows. It was Tom. He was smiling.

26 Fifty-two hours after we had lifted away from the launchpad at Baikonur, our spacecraft were given the go-ahead by Houston and Moscow to move together for final contact. The new **androgynous** docking mechanism that had been specially designed to allow Apollo and Soyuz to join and lock together glided smoothly into place.

27 "We have capture," Tom reported.

28 "Soyuz and Apollo are shaking hands now," I replied.

29 It would be several hours before we could open the hatches of the docking mechanism and see each other face to face. The difference in pressure between the two craft had to be equalized first, in order to prepare the vehicle for the transfer of crews. We had been slowly lowering the

apogee: distance from the earth

beacon: light

choreography: a dance routine

celestial: heavenly, planetary

androgynous: versatile, multipurpose; usable by both spaceships

pressure inside Soyuz for some time. Now the American crew had to increase the pressure inside their docking module by adding nitrogen to its almost pure oxygen atmosphere.

30 During this time we received a message of congratulations from the **Politburo**. It was the second time Leonid Brezhnev had addressed me while I was orbiting the Earth. This time I was more prepared to conduct a conversation with the general secretary from space. This time I was not walking in open space at the time but sitting more comfortably inside the spacecraft.

31 "The whole world is watching with **rapt** attention and admiration your joint activities," said Brezhnev. "**Détente** and positive changes in Soviet-American relations have made possible the first international spaceflight."

32 Then he spoke of his hopes that such cooperation between our two countries would continue once we had returned to Earth. It was something I believed in and wished for very profoundly.

33 Once the pressure between our two craft was equalized, we were ready to open the hatches separating Soyuz from Apollo. First I opened the hatch of Soyuz and eased myself into the joint docking module, surrounded by a tangle of life-support cables. Then, watched by millions around the world, the Apollo hatch opened and, for the first time in history, a Soviet cosmonaut and an American astronaut came face to face in space. Tom gave me a big smile.

34 "Very, very happy to see you," I told him as I stretched out my hand and started pulling him across the dividing line between our two craft to give him a big bear hug.

35 "*Tovarich!* [Friend!]" Tom replied, grabbing me by the arms.

36 At that moment I felt that everything I had been through in my career as a cosmonaut—all the disappointments and very difficult years—had been worth it. This was the highlight of the mission. Few experiences before or after have been able to touch the elation I felt then.

Politburo: Soviet government

rapt: focused, complete

Détente: A reduction of tension

text 22

Before sending a human into space, American scientists wanted to know what space travel might do to an animal that was similar to us. On January 31, 1961, the US rocketed a chimpanzee into space.

Excerpt: Preface from *Flight: My Life in Mission Control*

Authors: Christopher C. Kraft, Jr., and James L. Schefter
Publisher: Penguin
Published: 2001

My name is Christopher Columbus Kraft Jr. My gut's got a knot in it, but for the next few minutes there's nothing I can do. I'm in a room that I conceived in my mind, then invented, it seems, almost overnight. Some of the men who helped me are here now, as quiet and grave as I am.

We're waiting for news.

I'm thirty-six years old on this day, January 31, 1961. Exactly three years ago other men worked in a dingy room only a few miles from here, and in the dark before midnight, they made history. One of them flipped a toggle switch. Not far from that firing room, a Jupiter-C rocket spit flame and soared into the night sky. It carried a little thirty-one-pound package of instruments with the grand name of Explorer. A few minutes later, *Explorer 1* was a new satellite in orbit around the earth.

America, frightened and confused by the two Sputniks sent into orbit by our Cold War enemy the Soviet Union, had finally joined the space race.

Now I'm standing here mute in Mercury mission control, wanting to curse the silence in my headset, wanting to curse the Redstone rocket that was a Jupiter-C's closest relative, wanting to curse the damned arrogant German who promised this wouldn't happen. *I should have punched him when I had the chance,* I grumble to myself.

But if I had, I probably wouldn't be here today. And somebody else would be making the decisions that could mean life or death to an astronaut in space.

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"Ham," the chimpanzee, prepares for flight.

8 It isn't an astronaut out there today. It's a chimpanzee named Ham. No matter. We've all learned something today, beyond the lessons laid out so carefully in our mission plan. We learned on this flight, and will repeat the lesson on the many flights yet to come, that our first concern is for the crew. We've known this instinctively, of course, from the beginning of America's program to put men into space. The crew comes first. But today, when things were going wrong, we learned just how **visceral** those instincts are.

9 I'm the flight director for this mission, Mercury-Redstone 2, the first mission in Project Mercury to put a living thing into space. Ham was the living thing, but we never thought of him as anything but *crew*.

10 We all have **monikers**. They call me Flight on the mission control intercom loop. The doctor—he and his brethren have given us fits for years—is Surgeon. The engineer responsible for getting the capsule down, for monitoring and calculating its **retrofire** systems, is Retro. Flight dynamics, the infant science of trajectories and propulsion, is the domain of FIDO. There are others, too. The voice link between mission control and the capsule is Capcom, short for "capsule communicator."

visceral: real, physical

monikers: nicknames

retrofire: brake, slow-down

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11 Eventually, an astronaut would be Capcom, but today the console is manned by an engineer. Alan Shepard is nearby, in the launch **blockhouse**. He has a personal interest in today's events. If the Redstone rocket and the Mercury capsule work well, and if Ham does his job on board that capsule, and if we do ours on the ground, Al will be next. He'll be the world's first man in space.

12 There's only one flight director. From the moment the mission starts until the moment the crew is safe on board a recovery ship, I'm in charge. I ask. I listen. I make decisions. No one can overrule me. Not my immediate boss in the still-young National Aeronautics and Space Administration, the mission director, Walt Williams. Not his boss, a man I respect and revere, the guiding light of America's manned space program, Bob Gilruth. Not even Jack Kennedy, the president of the United States, who's only had his job for ten days or so. They can fire me after it's over. But while the mission is under way, I'm Flight. And Flight is God.

13 I don't feel so godly right now, I muse.

14 The problems on the launch pad weren't so bad. I'd held the countdown when an electrical unit overheated and Ham started to get warm. He was strapped into a form-fitted couch and sealed in a small pressurized capsule where an astronaut would normally sit. If it had been Al up there, I could have asked the Capcom to inquire about his comfort. Knowing Al, he would have said something like "No sweat," making a joke of the heating problem. And he would have changed settings on his environmental control unit to cool down a bit.

15 Ham and I didn't have that option. Outer space was new territory for exploration, and nobody knew much about it. A lot of doctors were predicting that zero gravity would have dire consequences for the human body. Most of us, including test pilots and astronauts, didn't believe them. But the only way to make our point was to substitute monkeys or chimpanzees for men, then see what happened. Al would gladly have traded places with Ham on that January day. He had supreme confidence in what rigors the human body—especially his own—could handle. The decision wasn't his to make, so a trained chimp was out there on the pad.

16 Instead of passing an order to an astronaut, I told EECOM, on the environment, electrical, and communications console, to turn off Ham's unit. While we waited for it to cool down, I asked Surgeon to evaluate Ham's comfort level.

blockhouse:
secure building

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17 "He's go, Flight."

18 I took Surgeon at his word. In mission control, nobody lies to Flight. They tell what they know, or they tell me their best informed guess. There's only one other option: "I don't know, Flight." Anybody who gives me that answer more than a few times will be looking for a new job.

19 We picked up the count and had the same problem. I held us for an hour this time, letting the electrical unit and Ham get comfortable again. But it was getting late; we wanted as much daylight as possible in the recovery area in case things went wrong. We should have launched at 9:30 A.M. Now it was after eleven. Then the elevator at the pad stuck. Another hold while a technician fixed the problem, and then the pad was clear.

20 By now, I'd stopped thinking of Ham as a monkey. Some of the jokesters were calling this a monkey flight, and the phrase had been picked up by the press. So had a one-liner from some nightclub comic who was pointing out that Ham was paving the way for Al Shepard. "First the chimp, then the chump," that's what some of them were saying. Al wasn't amused, and neither was I.

21 In my mind as the countdown headed toward zero, Ham was a real astronaut, he was crew, and we were treating every moment just the way we would when it was Al up there on that skinny little, black-and-white rocket built by Wernher von Braun and the same Germans who'd bombed London. I heard the numbers in my headset.

22 ". . . three, two, one. . . lift off. . . ."

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text 23

When Apollo 11 *landed on the moon in 1969, scientists back on Earth waited in rapt anticipation for samples of moon soil and rock. No one knew what the lunar samples would tell us about the moon and its history.*

"What the Moon Rocks Tell Us" from *National Geographic*

Author: Kenneth F. Weaver

1 *Published: December 1969*

2 "When we opened that first box of moon rocks, the hushed, expectant atmosphere in the Lunar Receiving Laboratory was, I imagine, like that in a medieval monastery as the monks awaited the arrival of a fragment of the True Cross."

3 Such keen anticipation, as described by Dr. Robin Brett, a NASA geologist on the team that first examined the lunar samples, is understandable. These were the most sought after, the most eagerly awaited, of all specimens in the history of science. Moreover, as some 500 scientists have labored in recent months to make every conceivable kind of test on them, the moon rocks and soil have become the most intensely studied of all scientific specimens.

4 At first glance, when the box was opened, the excitement hardly seemed warranted. On that historic moment on July 26, scientists clad in surgeons' gowns and caps, and carrying gas masks for use in case they should be exposed to any moon dust, crowded together to peer intently through a glass port in the lab's **high-vacuum chamber**. From the opposite side of the stainless-steel chamber, a technician working through stiff gloves raised the lid of the sample box and laid back the Teflon bag inside.

5 "What we saw," **wryly** recalls one observer, "was not much different from a bag of charcoal. The rocks were so covered with dark-gray dust that no one could tell a thing about them."

6 But later, when the dust was cleaned off and the minerals could be clearly seen, the rocks began to tell their story. It was a story full of surprises. It revealed that no one had been totally right in his ideas of the moon, and it raised more questions than it answered.

high-vacuum chamber: chamber or compartment that has had the air removed from it

wryly: mockingly, humorously

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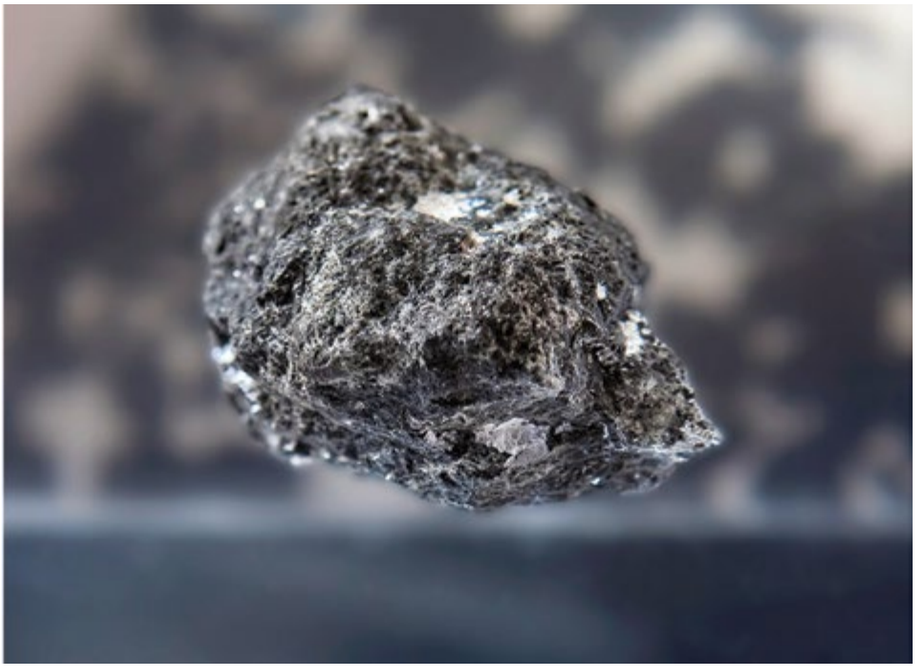

Moon rock found during the 1971 *Apollo 14* mission

7 Sometime in January, the lunar scientists will gather to report the story of the first moon samples in formal detail. Meanwhile, here are the preliminary highlights, based on interviews with a number of scientists:

- Moon dust holds no threat to life on earth. The samples show no fossil life, no living organisms, and no organic material (except minute traces believed to be almost entirely **contamination** from the rock boxes or the lunar laboratory). To test for pathogens, or disease-causing agents, biologists **inoculated** 200 germ-free mice with finely ground particles of lunar material. These mice had been bred in a completely sterile environment and lacked almost all immunity to disease. Yet they showed no ill effects whatever. This and other experiments indicate that the rock sample containers were no **Pandora's boxes** after all, despite early qualms.

- The age of the Sea of Tranquillity appears to be extremely great—almost as old as the moon itself—to the surprise of many geologists. These rocks, dated by the rate at which radioactive potassium has been converted into argon, seem to have **crystallized** in their present form about three billion years ago. (The moon, like the rest of the solar system, is estimated to have been formed about 4.6 billion years ago.)

- High temperatures—higher than 2,200 degrees F.—attended the birth of these rocks. The material filling the Sea of Tranquillity is igneous

contamination: non-lunar material

inoculated: infected, gave shots to

Pandora's boxes: collections of increasingly complicated problems

crystallized: hardened

(fire-formed), and was once molten, but whether it erupted from volcanic fires below the surface or was melted by **cataclysmic** impacts of meteorites is not settled.

- The moon is virtually paved with bits of glass, much of it in irregular fragments. Glass makes up fully half of the moon-soil sample brought back to earth. About 5 percent of the glass consists of delicate globules and teardrops that show beautiful shades of brown, green, wine-red, and lemon.

- Erosion processes that may be like **sandblasting** have rounded and smoothed the surfaces of rocks. Most of the specimens show tiny glass-rimmed pits or glassy splotches. Is this from a continual rain of meteorites? The explanation is still not clear, says Dr. Paul W. Gast of the Lamont-Doherty Geological Observatory, chairman of the group of scientists in charge of distribution of the moon samples. But the rocks and soil show abundant evidence of impact shock.

- Any question of surface water in the Sea of Tranquillity at any time since the rocks were first exposed may be dismissed. The rocks are now extremely dry and show no evidence of rounding by water. Moreover, their mineral makeup indicates that the liquid from which the rocks crystallized had negligible amounts of water chemically bound within it.

- Moon stuff from the Sea of Tranquillity resembles earthly basalt, yet there are no earth rocks just like it. It does have the same constituents—notably oxygen, silicon, iron, aluminum, titanium, calcium, and magnesium—but the proportions are different. For example, Dr. S. Ross Taylor of the Australian National University burned bits of the lunar dust in an electric arc; a white halo around the flame immediately betrayed the presence of titanium. Lunar basalt seems to be rich in this and other refractory elements—those with high melting points—and is at the same time relatively poor in the more volatile elements with low melting points, such as sodium and potassium.

8 As new samples come back from succeeding Apollo flights—eight more are scheduled after Apollo 12—scientists will have their hands full comparing the **maria** with one another, and the maria materials with those from the highlands.

9 Even the historic Apollo 11 samples will probably not all go on museum shelves for a long time. As Dr. Taylor says, "The moon rocks are different enough from earth rocks to keep us busy for years."

Photo: NASA/Sean Smith. Text: Kenneth Weaver/National Geographic Creative.

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cataclysmic: violent and natural

sandblasting: blowing a stream of rough material against a surface to smooth it

maria: lunar basalt fields

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text 24

On December 7, 1972, the crew of the Apollo 17 *mission took a picture of the Earth from 28,000 miles away. Showing the planet fully illuminated and in full color for the first time, the image became known as "Blue Marble." In the midst of Cold War struggles over the Space Race and nuclear armament, the photograph was a revelation: a powerful reminder that all the Earth was one small planet, and that its inhabitants were united in their fate.*

Excerpt: "You Are Here" from *Pale Blue Dot*

Author: Carl Sagan
Publisher: Random House
1 *Published: December 1994*

2 Mariners had painstakingly mapped the coastlines of the continents. Geographers had translated these findings into charts and globes. Photographs of tiny patches of the Earth had been obtained first by balloons and aircraft, then by rockets in brief ballistic flight, and at last by orbiting spacecraft—giving a perspective like the one you achieve by positioning your eyeball about an inch above a large globe. While almost everyone is taught that the Earth is a sphere with all of us somehow glued to it by gravity, the reality of our circumstance did not really begin to sink in until the famous frame-filling *Apollo* photograph of the whole Earth—the one taken by the *Apollo 17* astronauts on the last journey of humans to the Moon.

3 It has become a kind of icon of our age. There's Antarctica at what Americans and Europeans so readily regard as the bottom, and then all of Africa stretching up above it: You can see Ethiopia, Tanzania, and Kenya, where the earliest humans lived. At top right are Saudi Arabia and what Europeans call the Near East. Just barely peeking out at the top is the Mediterranean Sea, around which so much of our global civilization emerged. You can make out the blue of the ocean, the yellow-red of the Sahara and the Arabian desert, the brown-green of forest and grassland.

4 And yet there is no sign of humans in this picture, not our reworking of the Earth's surface, not our machines, not ourselves: We are too small and our statecraft is too feeble to be seen by a spacecraft between the Earth and the Moon. From this vantage point, our obsession with nationalism is nowhere in evidence. The *Apollo* pictures of the whole Earth conveyed to multitudes something well known to astronomers: On the scale of worlds—to say

View of the Earth from *Apollo 17*

nothing of stars or galaxies—humans are inconsequential, a thin film of life on an **obscure** and solitary lump of rock and metal.

5 It seemed to me that another picture of the Earth, this one taken from a hundred thousand times farther away, might help in the continuing process of revealing to ourselves our true circumstance and condition. It had been well understood by the scientists and philosophers of classical antiquity that the Earth was a mere point in a vast encompassing Cosmos, but no one had ever seen it as such. Here was our first chance (and perhaps also our last for decades to come).

obscure: remote, undistinguished

622

A reality TV show will send volunteers to colonize Mars.

text 25

Excerpt: "Life on Mars to Become a Reality in 2023, Dutch Firm Claims" from *The Guardian*

Author: Karen McVeigh

1 *Published: April 22, 2013*

2 A few months before he died, Carl Sagan recorded a message of hope to would-be Mars explorers, telling them: "Whatever the reason you're on Mars is, I'm glad you're there. And I wish I was with you."

3 On Monday, 17 years after the pioneering astronomer set out his hopeful vision of the future in 1996, a company from the Netherlands is proposing to turn Sagan's dreams of reaching Mars into reality. The company, Mars One, plans to send four astronauts on a trip to the Red Planet to set up a human colony in 2023. But there are a couple of serious snags.

4 Firstly, when on Mars their bodies will have to adapt to surface gravity that is 38% of that on Earth. It is thought that this would cause such a total **physiological** change in their bone **density**, muscle strength and circulation that voyagers would no longer be able to survive in Earth's conditions. Secondly, and directly related to the first, they will have to say goodbye to all their family and friends, as the deal doesn't include a return ticket.

5 The Mars One website states that a return "cannot be anticipated nor expected". To return, they would need a fully assembled and fuelled rocket capable of escaping the gravitational field of Mars, on-board life support systems capable of up to a seven-month voyage and the capacity either to dock with a space station orbiting Earth or perform a safe re-entry and landing.

6 "Not one of these is a small endeavour" the site notes, requiring "substantial technical capacity, weight and cost". . . .

7 The prime attributes Mars One is looking for in astronaut-settlers is **resilience**, **adaptability**, curiosity, ability to trust and **resourcefulness**, according to Kraft. They must also be over 18.

physiological: biological, bodily

density: thickness, solidity

resilience: ability to recover from hardship

adaptability: ability to adjust to new situations

resourcefulness: ability to find creative solutions to problems

623

8 Professor Gerard 't Hooft, winner of the Nobel prize for **theoretical physics** in 1999 and lecturer of theoretical physics at the University of Utrecht, Holland, is an ambassador for the project. 'T Hooft admits there are unknown health risks. The radiation is "of quite a different nature" than anything that has been tested on Earth, he told the BBC.

9 Founded in 2010 by Bas Lansdorp, an engineer, Mars One says it has developed a realistic road map and financing plan for the project based on existing technologies and that the mission is perfectly feasible. The website states that the basic elements required for life are already present on the planet. For instance, water can be extracted from ice in the soil and Mars has sources of nitrogen, the primary element in the air we breathe. The colony will be powered by specially adapted solar panels, it says.

10 In March, Mars One said it had signed a contract with the American firm Paragon Space Development Corporation to take the first steps in developing the life support system and spacesuits fit for the mission.

11 The project will cost a reported $6bn (£4bn), a sum Lansdorp has said he hopes will be met partly by selling broadcasting rights. "The revenue garnered by the London Olympics was almost enough to finance a mission to Mars," Lansdorp said, in an interview with ABC News in March.

12 Another ambassador to the project is Paul Römer, the co-creator of Big Brother, one of the first reality TV shows and one of the most successful... .

13 The aim is to establish a permanent human colony, according to the company's website. The first team would land on the surface of Mars in 2023 to begin constructing the colony, with a team of four astronauts every two years after that.

14 The project is not without its sceptics, however, and concerns have been raised about how astronauts might get to the surface and establish a colony with all the life support and other requirements needed. There were also concerns over the health implications for the applicants.

15 Dr Veronica Bray, from the University of Arizona's lunar and planetary laboratory, told BBC News that Earth was protected from solar winds by a strong **magnetic field**, without which it would be difficult to survive. The Martian surface is very hostile to life. There is no liquid water, the **atmospheric pressure** is "practically a vacuum", radiation levels are higher and temperatures vary wildly. High radiation levels can lead to

theoretical physics: the science of using models to explain or predict natural events

magnetic field: barrier; area in which the Earth's forces keep things from entering our atmosphere

atmospheric pressure: weight of the air/atmosphere

increased cancer risk, a lowered immune system and possibly **infertility**, she said.

16 To minimise radiation, the project team will cover the domes they plan to build with several metres of soil, which the colonists will have to dig up.

17 The mission hopes to inspire generations to "believe that all things are possible, that anything can be achieved" much like the *Apollo* moon landings.

18 "Mars One believes it is not only possible, but imperative that we establish a permanent settlement on Mars in order to accelerate our understanding of the formation of the solar system, the origins of life, and of equal importance, our place in the universe" it says.

19 The longest anyone has ever spent in space is 438 days, achieved by Valeri Polyakov, of Russia, in a manned space flight in 1994.

20 But the Mars One website states: "While a cosmonaut on board the Mir was able to walk upon return to Earth after 13 months in a weightless environment, after a prolonged stay on Mars the human body will not be able to adjust to the higher gravity of Earth upon return.

21 "There is a point in time after which the human body will have adjusted to the 38% gravitation field of Mars, and be incapable of returning to the Earth's much stronger gravity. This is due to the total physiological change in the human body, which includes reduction in bone density, muscle strength, and circulatory system capacity."

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infertility: the inability to have children

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text 26

Katherine Johnson: Trailblazer and Brilliant Mathematician

Katherine Johnson sits at her desk with a globe, or "Celestial Training Device."

Excerpt: Remarks by the President at Medal of Freedom Ceremony
The White House
November 24, 2015

1 ***President Barack Obama:*** *Well, welcome to the White House, everybody. … Today, we celebrate some extraordinary people—innovators, artists, and leaders—who contribute to America's strength as a nation. And we offer them our highest civilian honor—the Presidential Medal of Freedom. …*

2 *Growing up in West Virginia, Katherine Johnson counted everything. She counted steps. She counted dishes. She counted the distance to the church. By 10 years old, she was in high school. By 18, she had graduated from college with degrees in math and French. As an African-American woman, job options were limited—but she was eventually hired as one of several female mathematicians for the agency that would become NASA.*

3 *Katherine calculated the flight path for America's first mission in space, and the path that put Neil Armstrong on the moon. She was even asked to double-check the computer's math on John Glenn's orbit around the Earth. So if you think your job is pressure-packed—hers meant that forgetting to carry the one might send somebody floating off into the Solar System. In her 33 years at NASA,*

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Katherine was a pioneer who broke the barriers of race and gender, showing generations of young people that everyone can excel in math and science, and reach for the stars.

Excerpt: The nearly forgotten story of the black women who helped land a man on the moon

Author: Stephanie Merry
Publisher: The Washington Post
Published: September 13, 2016

4 It all started with a mysterious photograph.

5 In 2011, Mary Gainer worked as a historic preservationist for NASA, and she stumbled on a 1943 picture of a thousand people standing in a huge building. Gainer figured that the black men posing in the front were probably machinists, and the rest of the group was mostly white men in suits and ties.

6 But scattered here and there was something unexpected: Women, some white and some black, in **conspicuous** knee-length skirts and pompadour hairdos.

7 Gainer, who worked at Langley Research Center in Hampton, Va., tasked her new intern, Sarah McLennan, with getting to the bottom of it. There were too many to be the few secretaries employed then, so who were they, she wanted to know.

8 Unbeknown to Gainer, another person was on a similar hunt—only Margot Lee Shetterly was a step ahead. Shetterly's father was a scientist who worked at Langley, so growing up in the 1970s and '80s, she was aware of the history of black women at NASA.

9 "There are these women and I knew them, and my dad worked with them and they went to our church and their kids were in my school," she said recently over the phone from her home in Charlottesville. "It was my husband who was like, 'What is this story? How come I've never heard about it?'"

10 This was a special story, she suddenly realized: black women living in Jim Crow-era Virginia hired by NASA to do math and research that would launch men into space.

conspicuous: attracting attention

627

11 Shetterly started poking around and linked up with Gainer, whose intern was compiling oral histories from former employees and their families. Shetterly's book about those math whizzes, "Hidden Figures," came out earlier this month. In January, a movie version will hit multiplexes with a cast that includes Taraji P. Henson, Octavia Spencer and Janelle Monáe.

12 And just like that, a piece of history that was nearly lost could become common knowledge.

13 Shetterly and her neighbors all knew the stories of these women. "Growing up in Hampton, the face of science was brown like mine," Shetterly writes in her book.

14 But at the very place where these prodigies were employed, the history was fading.

15 Everyone knows what a computer looks like: the hard drive, the monitor, the keyboard, the mouse. But in the middle of the last century at Langley (which was until 1958 part of NASA's precursor, the National Advisory Committee for Aeronautics, or NACA), it looked different. Women who used pencils and paper to calculate data from wind tunnel tests, among other research, were called computers. The first of their kind were hired in 1935, and their ranks swelled during the labor shortage of World War II. In other fields, as men trickled back from overseas, women returned to more traditional roles at home, but not at Langley. The female computers became invaluable as the needs for aircraft advancements gave way to a different kind of battle: beating, Russia to the moon.

16 The women who had these jobs may not have felt remarkable. They were just happy to have work that paid better than the alternatives—teaching and nursing. The jobs were classified as "subprofessional," even though they entailed specialized math skills.

17 One such woman was Katherine G. Johnson. At 98, she still lives in Hampton, and she has emerged as the most high-profile of the computers. In the past year, she's won the Presidential Medal of Freedom, saw a building named after her and had a bench dedicated in her honor. On her birthday, in late August, #HappyBirthdayKatherineJohnson started trending on Twitter. In a few months, Henson, an Oscar nominee, will play her on-screen.

18 Like a lot of the other computers, Johnson studied math in college. She was also one of three graduate students to desegregate West Virginia

This photo—unearthed by NASA historic preservationist Mary Gainer in 2011—was taken at the NACA Langley Memorial Aeronautical Laboratory (now NASA Langley Research Center) on Nov. 4, 1943, during a visit by Frank Knox, secretary of the Navy. (NASA Langley Research Center)

University in 1940, but marriage and a family derailed her plans for an advanced degree. At NASA, she worked on the life-or-death task of determining launch timing. Her calculations helped propel Alan Shepard into space and guided him successfully back to Earth; they landed Neil Armstrong on the moon and brought him home.

19 She never talked about work much, her daughter Joylette Hylick said recently.

20 "To come home and start talking about complex equations wouldn't go over with teenagers," Hylick explained. Plus, "we had activities — church, sports, music lessons, the whole nine, so it was quite a full life. She was not a stay-at-home but she also was not a workaholic in the sense that everything revolved around that."

21 When asked about her accomplishments, Johnson, a prodigy who graduated high school at 14, tends to **deflect** in every interview. Shetterly says Johnson told her again and again, "I was just doing my job." (Johnson was unavailable to comment for this story.)

22 It wasn't until well into adulthood that Hylick realized the importance of it.

deflect: avoid answering

629

23 After all, her mother was a trailblazer amid **rampant** discrimination. The earliest group of black women who worked at NACA were segregated from another computing pool of white women, and they had to use different bathrooms. At lunch in the cafeteria, they were relegated to a table with a white cardboard sign that read "colored computers." One woman, Miriam Daniel Mann, snatched the sign off the table and hid it in her purse, depositing it at home. At first, replacements would materialize, but when Mann kept taking them, they eventually stopped appearing. It was the first of many victories… .

Photos: NASA; NASA Langley Research Center. "Remarks by the President…": Public domain. "The nearly forgotten story…": copyright *The Washington Post 2016.*

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rampant: uncontrolled and excessive

630

•

outright: complete

engineer: designer, builder

mounted: attached

launched: shot

orbit: rotation in space

fellow: companion, another

orbit: go all the way around

tensions: fighting, diagreements

pact: agreement

epic: grand, important

distinct: separate

Republican: follower of a political party that favors limited government

Democrat: follower of a political party that favors involved government

mine: underground passageway dug to access natural resources

sermon: religious speech (Christian)

Moscow: the capital city of the Soviet Union

deafening: extremely loud

isolation: loneliness, solitude

hardware: machinery, equipment

colleague: coworker, peer

notion: idea

lodged: sent

hostile: unfriendly

industry: manufacturing, making things

clustered: grouped

icebergs: large pieces of ice floating in open water

hazardous: risky

dwindling: shrinking

the horizon: where earth and sky meet

dubbed: named

logbook: record of daily activities

resembled: looked like

heroic: bold, triumphant

bolts: metal fasteners

contoured: molded, shaped to fit

faceplate: clear helmet window

accumulated: gathered, collected

pinpont: see, detect

ascended: went up

ravines: narrow valleys

filmlike: misty, partly see-through

evident: obvious, apparent

sand dunes: hills made of loose sand

ploughed areas: land worked by farmers

limply: loosely, freely

yardstick: standard

charred: burnt

noble: righteous, honorable

widows: wives of deceased spouses

drawl: slow way of speaking

intermingled: mixed

coded: secret, hard to understand

communicative: open, talkative

portholes: windows

boundless: without end

grainy: not clear or sharp

nagging: finding fault, irritating with constant instructions

eerie: strange, mysterious

intimacy: coziness, familiarity

lunar: moon

underestimated: was wrong about; incorrectly measured the distance of

dingy: dull, dreary

toggle switch: device for moving between settings

Reveal Words

• (continued)

mute: silent

chimpanzee: monkey

overrule: decide against

muse: think

dire: grim, awful

monastery: community of religious men

keen: eager, impatient

geologist: scientist who studies rocks

specimens: samples

minute: very small

paved: covered

illuminated: lit up

icon: symbol

our global civilization: Earth's culture and society

nationalism: patriotism, pride in one's land

Cosmos: universe

colony: settlement, community

snags: problems, hold-ups

financing: payment

solar panels: device that changes sunlight into electric energy

broadcasting rights: the right to show the event on TV

permanent: constant, unending

constructing: building

propel: send (in a particular direction)

whole nine: (short for "whole nine yards") everything possible

••

the Soviet Union: Socialist Russia and nearby countries from 1922–1991

monumental: great, important

explosives: bombs

alliance: partnership, agreement to work together

Nazi Germany: Germany under Adolf Hitler's rule (1933–1945)

in the wake of: after

scrambled: worked quickly

unmanned orbit: orbit without a crew on board

capsule: space vehicle

treaty: agreement, deal

nuclear technology: new science used to create powerful bombs

docked: attached to each other

hatches: small openings/doors

record: song

dedication: tribute

stead: place

detested: strongly disliked, hated

communists: followers of a political party that favors equal wealth for all

politicians: people elected to public office

Antichrist: the opposite of Christ; evil

Lucifer: the devil

deficiencies: flaws

atomic bomb: highly destructive explosive

mutt: mixed-breed dog

muzzle: nose and mouth

minders: handlers, caretakers

•• (continued)

kerosene: jet engine fuel

ignited: fired

panted furiously: breathed hard

acceleration: increased speed

subsided: lessened

theorized: made an educated guess

prospect: possibility, chance

humane societies: groups that fight for animal rights

activists: people trying to create change

inhumanity: cruelty

humidity: moisture

adequate: good enough

demise: death

inevitable: unavoidable, unstoppable

erect: build

ethical: moral

recommendations: suggestions

distinguished: well-known, important

conquest: control, takeover

weapons of mass destruction: large-scale weapons

obligations: duties, responsibilities

strife: bitter fighting

prejudice: negative or hasty opinions; misinformed conclusions

equivalent: equal

sophisticated: advanced, complex

technical institutions: colleges that specialize in science, engineering, or technology

precision: accuracy, exactness

memoirs: autobiographies, writings about herself

opal: pearly white gemstone

profound: complete

idle gossip: rumor

peculiarities: oddities, unusual characteristics

catapulting: launching, sending

sustain: withstand, endure

collective: cooperative, group

frequency: rate

vantage point: point of view

vividly: clearly

gleaming: shining, glittering

serenely: quietly, peacefully

multitude: large number

shroud: parachute

elated: in high spirits, very happy

clergyman: religious leader

anxiety: worry

landmark: of great historical or cultural importance

remote: distant, quiet

Michelin Man: large, puffy mascot for American tire company Michelin

stowing: putting away

crater-pocked: covered in large holes

lunar module's: landing portion of the spaceship

undercarriage: underside of spaceship

halting: unsure, slow

curvature: bend

majestically: impressively, beautifully

ascent: takeoff

perishing: dying

reputation: name, status

transmissions: messages

exhilarating: thrilling

ironed out: smoothed, solved

disassemble: take apart

Reveal Words

•• (continued)

probe: device used to connect the two spaceships

arrogant: overly confident

instinctively: without thought, naturally

brethren: coworkers, colleagues

trajectories: paths of motion

revere: look up to

rigors: challenges, hardships

chump: foolish or unintelligent person

conceivable: imaginable, possible

warranted: worth it

clad: dressed

Teflon: sealant

preliminary: initial, introductory

sterile: clean, germ-free

immunity: natural resistance

qualms: concerns, worries

virtually: nearly, practically

globules: drops, beads

erosion: wind

negligible: minor, unimportant

basalt: dark volcanic rock

betrayed: showed, revealed

armament: weapons

mariners: sailors

painstakingly: carefully

feeble: faint, slight

conveyed: showed

inconsequential: not important

antiquity: ancient history

encompassing: surrounding

pioneering: groundbreaking, innovating

circulation: blood flow

endeavour: undertaking, effort

attributes: traits

ambassador: representative, messenger

radiation: electric/magnetic energy

feasible: possible

revenue: money

garnered: earned

sceptics: disbelievers, doubters

implications: effects, likely consequences

imperative: necessary, crucial

intern: assistant

compiling: putting together

unbeknown: unknown

prodigies: extremely talented individuals

invaluable: very valuable

ranks: people belonging to a group

entailed: involved

emerged: become known

high-profile: famous

desegregate: end separation of blacks and whites

derailed: interfered with; threw off course

relegated: forced away from others/sent to another (worse) place

materialize: appear

•••

atmosphere: air space

compounding: adding to

Soviet Premier: president

diplomatic negotiations: skilled and considerate discussions between countries

rock-ribbed: stubborn, inflexible

UMWA: United Mine Workers of America; a group for people who work in mines

continuous miners: machines for removing coal

Baykonur: city in Kazakhstan housing Soviet spaceport

R-7: Soviet rocket

Kazak sky: sky over Kazakhstan

force of gravity: force pulling objects towards Earth

centrifuge: machine that spins things very fast

g-force: pressure pushing against something moving very fast; resistance

rubles: Soviet money

elliptical: circular, curved

Vanguard program scientists: scientists for the U.S. space program

reentry: return to Earth from space

coalescing: coming together, agreeing

terra firma: Earth, solid ground

heat exhaustion: overheating

obscured: hidden

commemorate: remember, honor

menagerie: varied group

anesthetics: medicine that lessens pain or puts the subject to sleep

rapid deceleration: a quick drop in speed

autopsied: cut open to look inside

accordance: agreement, harmony

boosters: engines

honorary: in name only, not in practice; symbolic

rode the first waves of: were the first to join

industrial revolutions: the rapid invention of many new machines

founder in the backwash: get stuck in last place, fall to the back

space-faring: space traveling

pre-eminence: excellence; doing better than our competitors

feeding the fires of: fueling, encouraging

writ: power, authority

incumbency: time

Atlas: space launch vehicle

[sic]: appearing exactly as the original; error is part of original

Tiros satellites: weather and television satellites

unprecedented: brand-new, never before seen

reap the harvest: collect the benefits or winnings

alloys: mixtures

propulsion: forward motion

celestial body: planet in space

sheathed: covered

cosmonauts: Russian astronauts

telemetry data: information monitored from the ground

Yaroslavl: city in Russia

solar sensor: device that senses the position of the sun relative to the craft

service module: section of craft carrying supplies

spherical: round

ballistic: gravity-pulled

••• (continued)

ablative coating: layer that absorbs fire to shield what is underneath

jettisoned: pulled away, thrown off

ejection rockets: engines that propel the pilot from a craft

Urals: mountains of Russia

fermented: aged

valves: gates controlling passage of fuel

amplitude: motion

aerodynamic: wind-resistant

myriad: large amount

phenomenon: happening, occurrence

polyethylene: plastic

retrorockets: engines that cause deceleration

encumbrance: load, burden

sheared: broke off

thermal: heat-resistant

perils: dangers

shag carpet: rug with long fibers

monotone: unvaried, dull

exalted: joyful, celebrated

live-wire: energetic

exulted: showed excitement

atmosphereless: without a layer of atmosphere between the planet and space

PR: public relations

paradox: contradiction

laconic: concise, terse

rapacious: hungry, greedy

contingency: required, essential

balky: uncooperative, not acting as it should

circuit breaker: device for safely stopping the flow of electricity

aviation pioneer: among the first to fly planes

Sea of Tranquiility: site of Apollo 11 landing; not an actual sea, but a large plain on Earth's moon

insignia: badge

engaged: reattached

voltage: charge

cosmodrome: space airport

dispatched: sent

dynamics: measures of motion

parallel trajectories: side-by-side paths

switchboard: control panel

circuit: electrical current

weld: join pieces of metal using heat

rendezvous: meet up

docking: connection

apogee: distance from the earth

beacon: light

choreography: a dance routine

celestial: heavenly, planetary

androgynous: versatile, multipurpose; usable by both spaceships

Politburo: Soviet government

rapt: focused, complete

Détente: A reduction of tension

visceral: real, physical

monikers: nicknames

retrofire: brake, slow-down

blockhouse: secure building

high-vacuum chamber: chamber or compartment that has had the air removed from it

wryly: mockingly, humorously

contamination: non-lunar material

inoculated: infected, gave shots to

••• (continued)

Pandora's boxes: collections of increasingly complicated problems

crystallized: hardened

cataclysmic: violent and natural

sandblasting: blowing a stream of rough material against a surface to smooth it

maria: lunar basalt fields

obscure: remote, undistinguished

physiological: biological, bodily

density: thickness, solidity

resilience: ability to recover from hardship

adaptability: ability to adjust to new situations

resourcefulness: ability to find creative solutions to problems

theoretical physics: the science of using models to explain or predict natural events

magnetic field: barrier; area in which the Earth's forces keep things from entering our atmosphere

atmospheric pressure: weight of the air/atmosphere

infertility: the inability to have children

conspicuous: attracting attention

deflect: avoid answering

rampant: uncontrolled and excessive

Use the Vocab App to play mini games related to the words in this lesson.

A **Lesson 1:** Scavenger Hunt: Introducing the Collection

Discuss: Students identify what they know and want to learn about the Space Race.

7 min

- Today we're going to begin a unit about the Space Race. Let's watch a video to learn a little about it.
- **Project and Play:** The Space Race Video.
- What was the Space Race? Who was in the race? Who won?
- In this lesson, we're going to begin a unit about the Space Race, but first you're going to make a list of everything you already know about the Space Race.
- **Writing Journal:** Direct students to page 16.
- What would you like to learn about the Space Race?
- List student responses on chart paper and set aside as possible research topics for Lesson 3.

A

Lesson 1—Scavenger Hunt and Internet Research

Watch the video your teacher plays and discuss it with your class.

The Space Race, created by Travis Grenier for Project Ed

Make a list of everything you know about the Space Race on page 16 of your Writing Journal.

Lesson 1 Materials

- The Space Race, created by Travis Grenier
- Leonov during first spacewalk (left); White during first US spacewalk (right)
- 1969: Cars and tents lined up, waiting for the launch of *Apollo 11*
- 1969: *Apollo 11/Saturn V* space vehicle climbs toward orbit
- 1969: *Columbia* command module, *Apollo 11*, over the moon's surface
- 1963: Hail the Soviet People—the Pioneers of Space! (left); 1969: *Apollo 11* commemorative button (right)

B

Welcome to the Space Race scavenger hunt. To find the answers to the scavenger hunt questions, you'll have to explore texts and images in The Space Race Collection. Remember to read the captions of the images to find additional clues.

Image Scavenger Hunt Question 1: What was one way in which the Soviets promoted their space program?

Scan each image to find the one that contains the answer to the scavenger hunt question.

2. Leonov during first spacewalk (left); White during first US spacewalk (right) (page 570)
4. 1969: Cars and tents lined up, waiting for the launch of *Apollo 11* (page 574)
6. 1969: *Apollo 11/Saturn V* space vehicle climbs toward orbit (page 579)
8. 1969: *Columbia* command module, *Apollo 11*, over the moon's surface (page 581)
14. 1963: *Hail the Soviet People—the Pioneers of Space!* (left); 1969: *Apollo 11* commemorative button (right) (page 596)

Complete the image scavenger hunt close reading questions that correspond to the correct photo set.

B Lesson 1 (continued)

Work Visually: Students explore images from The Space Race Collection to find the answer to a scavenger hunt question, then answer questions to show their understanding of the image.

6 min

- Direct students to page 639 in the Student Edition.
- Introduce the scavenger hunt question: **What was one way in which the Soviets promoted their space program?**
- Students complete the activity in the Student Edition.
- Instruct students to raise their hands when they've found the answer.
- When everyone has raised their hand, share the correct answer: **With posters. (found in image 14: 1963: *Hail the Soviet People—the Pioneers of Space!*; 1969: *Apollo 11* commemorative button)**
- Allow all students to find the image or images that answer the question.
- **Writing Journal:** Direct students to pages 17 to answer the close reading questions that accompany the correct image(s).
- Share responses and discuss the close reading answers.

Differentiation: Step A

- *ELL(Dev)*: You may choose to play the video more than once to support students reading below grade level with comprehension and ELL students with language acquisition.
- *ELL(Dev)*: ELL students, students who are extremely shy, or students who hesitate to participate in group discussions will benefit from discussing their responses with a partner first, then sharing their thoughts with the whole group.

Differentiation: Step B

If students are unsure about the meaning of "orbit," explain that "orbit" means the curved path that something (such as a moon or satellite) follows as it goes around something else (such as a planet).

If students don't know what a command module is, explain that a command module is the main part of a spacecraft.

C Lesson 1 (continued)

Read: Students explore texts from The Space Race Collection to find the answer to the scavenger hunt question, then answer questions to show their understanding of the text.

11 min

- Direct students to page 640 in the Student Edition.
- Introduce the scavenger hunt question: **Who developed the V-2 rocket?**
- Students complete the activity in the Student Edition.
- Instruct students to raise their hand when they've found the answer.
- Tell students that they will find the answer toward the beginning of the text; if they don't see it quickly, they should move on to the next text. When everyone has raised their hand, share the correct answer: **Wernher von Braun. (from Text 1: "The Space Race: An Introduction")**
- Direct all students to go to the correct passage. Read the text aloud or have students take turns.
- **Writing Journal:** Once all students have found the text that answers the question, direct them to page 23 to answer the close reading questions that accompany that text.

C

Lesson 1—Scavenger Hunt and Internet Research (continued)

Text Scavenger Hunt Question 1: Who developed the V-2 rocket?

Scan each text to find the one that contains the answer to the scavenger hunt question.

1. "The Space Race: An Introduction" (page 568)
3. "Sputnik" (page 571)
5. "And a Dog Shall Lead Them" (page 575)
7. "Memorandum for the Vice President" (page 580)
9. President Kennedy's Address at Rice University (page 582)

After reading your chosen text, answer the close reading questions that correspond to it, located on pages 23–27 of your Writing Journal.

Tip: You will find the answer at the beginning of the text.

Differentiation: Step C

You may choose to read all passages aloud or play the audio before students complete the scavenger hunt or the close reading questions.

D

Text Scavenger Hunt Question 2: What did Valentina Tereshkova think the Vostok 6 sounded like as it took off?

Scan each text to find the one that contains the answer to the scavenger hunt question.

- 11 "A Seagull in Flight" (page 586)
- 13 "First to Fly" (page 591)
- 15 "In the Event of a Moon Disaster" (page 597)
- 19 "Buzz Aldrin on His Lunar Home, the Eagle" (page 605)
- 22 "My Life in Mission Control" (page 614)

After reading your chosen text, answer the close reading questions that correspond to it, located on pages 29–33 of your Writing Journal.

E

Think about what you learned from reading or viewing additional texts and images in The Space Race Collection.

Write two or three things you learned on page 34 of your Writing Journal.

Differentiation: Step D

You may choose to read all passages aloud or play the audio before students complete the scavenger hunt or the close reading questions.

D Lesson 1 (continued)

Read: Students explore texts from The Space Race Collection to search for the answer to a scavenger hunt question, then answer questions to show their understanding of the text.

11 min

- Direct students to page 641 in the Student Edition.
- Introduce the scavenger hunt question: **What did Valentina Tereshkova think the *Vostok 6* sounded like as it took off?**
- Students complete the activity in the Student Edition.
- Instruct students to raise their hand when they've found the answer.
- Remind students that they will find the answer toward the beginning of the text; if they don't see it quickly, they should move on to the next text. When everyone has raised their hand, share the correct answer: **Thunder. (from Text 11, "A Seagull in Flight")**
- Direct all students to go to the correct passage. Read the text aloud or have students take turns.
- **Writing Journal:** Once all students have found the text that answers the question, direct them to page 29 to answer the close reading questions that accompany that text.

E Lesson 1 (continued)

Share: Students share what they learned from reading and viewing additional texts and images from the Collection.

10 min

- Direct students to page 641 in the Student Edition.
- **Writing Journal:** Students complete the activity on page 34.
- Prompt students who finish early to explain why the fact is important/interesting.
- When students are finished, call on 1 or 2 to share their responses with the class.
- **Exit Ticket:** Project.

End of Lesson 1

F Lesson 2: Scavenger Hunt: Exploring the Collection

Share: Students share what they've learned about the Space Race.

5 min

- Direct students to page 642 in the Student Edition.
- Assign pairs.
- Tell students they will continue reviewing the texts and images from The Space Race Collection.
- Partners complete the activity in the Student Edition.
- **Writing Journal:** Students complete the activity on page 35 with their partners.

G Lesson 2 (continued)

Read: Students explore texts from The Space Race Collection to search for the answer to a scavenger hunt question, then answer questions to show their understanding of the text.

15 min

- Direct students to page 642 in the Student Edition.
- Instruct students to search through the texts from The Space Race Collection independently to find the answer to the scavenger hunt question: **Who calculated the flight path for America's first mission in space?**
- Instruct students to raise their hand when they've found the answer.
- Remind students that they will find the answer toward the beginning of the text; if they don't see it quickly, they should move on to the next text. When everyone has raised their hand, share the correct answer: **Katherine Johnson. (from Text 26: "Katherine Johnson: Trailblazer and Brilliant Mathematician")**
- Direct all students to go to the correct passage. Read the text aloud or have students take turns.
- **Writing Journal:** Once all students have found the text that answers the question, direct them to page 4136 to answer the close reading questions that accompany that text.

F

Lesson 2—Scavenger Hunt: Exploring the Collection

Discuss any new facts you've learned from this lesson with your partner.

Work with a partner to complete the activity on page 35 of your Writing Journal.

G

Text Scavenger Hunt Question 3: Who calculated the flight path for America's first mission in space?

Scan each text to find the one that contains the answer to the scavenger hunt question.

17 "Dreaming of a Moonage" (page 599)
21 "Smooth as a Peeled Egg" (page 609)
23 "What the Moon Rocks Tell Us" (page 618)
24 "You Are Here" (page 621)
25 "Life on Mars to Become a Reality in 2023, Dutch Firm Claims" (page 623)
26 "Katherine Johnson: Trailblazer and Brilliant Mathematician" (page 626)

After reading your chosen text, answer the close reading questions that correspond to it, located on pages 36–41 of your Writing Journal.

Tip: You will find the answer at the beginning of the text.

Lesson 2 Materials

- 1969: Buzz Aldrin's footprint, a photograph of one of the first steps ever taken on the moon
- 1969: *Apollo 11* ticker-tape parade in New York City with Buzz Aldrin, Neil Armstrong, and Michael Collins
- July 24, 1969: *Columbia* command module from *Apollo 11* splashdown in Pacific Ocean
- 1971: James Irwin, American flag, lunar module, and lunar rover
- 1969: *Sky Garden (Stoned Moon)* by Robert Rauschenberg

H

Image Scavenger Hunt Question 2: Which astronaut is seen on the moon with a lunar rover and lunar module?

Scan each image to find the one that contains the answer to the scavenger hunt question.

- 10 1969: Buzz Aldrin's footprint, a photograph of one of the first steps ever taken on the moon (page 585)
- 12 1969: *Apollo 11* ticker-tape parade in New York City with Buzz Aldrin, Neil Armstrong, and Michael Collins (page 590)
- 16 July 24, 1969: *Columbia* command module from *Apollo 11* splashdown in Pacific Ocean (page 598)
- 18 1971: James Irwin, American flag, lunar module, and lunar rover (page 604)
- 20 1969: *Sky Garden (Stoned Moon)* by Robert Rauschenberg (page 608)

Complete the image scavenger hunt close reading questions that correspond to the correct photo set, located on pages 42–46 of your Writing Journal.

H Lesson 2 (continued)

Work Visually: Students explore images from The Space Race Collection to find the answer to a scavenger hunt question, then answer questions to show their understanding of the image.

10 min

- S Direct students to page 643 in the Student Edition.
- Introduce the scavenger hunt question: **Which astronaut is seen on the moon with a lunar rover and lunar module?**
- S Students complete the activity in the Student Edition.
- Instruct students to raise their hand when they've found the answer.
- When everyone has raised their hand, share the correct answer: **James Irwin. (found in image 18: 1971: James Irwin, American flag, lunar module, and lunar rover).**
- **Writing Journal:** Once all students have found the image or images that answer the question, direct them to page 45 42 to answer the close reading questions that accompany the correct image(s).

Differentiation: Step F

● *ELL(Dev)*: Plan how you will assign pairs for this activity. ELL students should be assigned to work with non-ELL students or ELL students at a different level.

You may choose to read all passages aloud before students complete the scavenger hunt or the close reading questions.

Differentiation: Step H

Some of the vocabulary in the caption for the image 18 (1971: James Irwin, American flag, lunar module, and lunar rover) may be unfamiliar to students. Explain that a lunar module is a space vehicle used to land on the moon and a lunar rover is a vehicle used for exploring the surface of a moon or planet.

I Lesson 2 (continued)

Discuss: Students compare the similar themes in two texts and an image from the scavenger hunts.

15 min

- Direct students to page 644 in the Student Edition.
- Group students into pairs.
- Partners complete Activity 1 in the Student Edition.
- **Writing Journal:** Students complete the activity on page 47.
- Discuss responses.
- Partners complete Activities 2 and 3 in the Student Edition.
- Discuss responses.
- **Exit Ticket:** Project.

End of Lesson 2

I

Lesson 2—Scavenger Hunt: Exploring the Collection (continued)

This activity revisits some of the materials in the scavenger hunt. You will need to refer to the following image and texts to find the items needed to answer question 1.

4 1969: Cars and tents lined up, waiting for the launch of *Apollo 11* (page 574)

17 "Dreaming of a Moonage" (page 599)

1. What is the one common theme (overall idea) that BEST applies to BOTH text 17 "Dreaming of a Moonage" and image 4 "1969: Cars and tents lined up, waiting for the launch of *Apollo 11*"? Circle the correct answer.

   A. America achieved greater success than the Soviets in the manned moon landing.

   B. Space exploration leads to humans realizing their "small" place in the universe.

   C. Sending Americans to the moon was a historical event that people prepared to witness with great anticipation.

   D. Space exploration is too dangerous to pursue in the near future.

Complete the activity on page 47 of your Writing Journal.

I

2. With your partner, discuss the similarities and differences in the ways these two passages address the topic of space exploration:
   - (5) "And a Dog Shall Lead Them" (page 575)
   - (22) "My Life in Mission Control" (page 614)

   What is similar about both passages? Circle the correct answer.
   - A. Animals were sent to space to comfort human astronauts while they dealt with difficult conditions.
   - B. Animals were sent to space for research purposes; specifically, to test the conditions humans might experience.
   - C. All animals who were sent to space survived the difficult journey, though they experienced minor injuries.
   - D. Only the American astronauts treated animal test subjects inhumanely.

3. Choose one quote from each passage that *best* supports your answer. Underline the quotes and be prepared to share your answers.

Before You Begin Lesson 3:

In Lesson 3, use the complete digital lesson so students have access to the Internet to gain a greater understanding of how to choose appropriate research sources as they develop and sharpen their information literacy skills.

Before You Begin Lesson 4:

Lesson 4 is a Flex Day. Select from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts. Please see instructions in the digital lesson.

Space Blogs and Collection Research

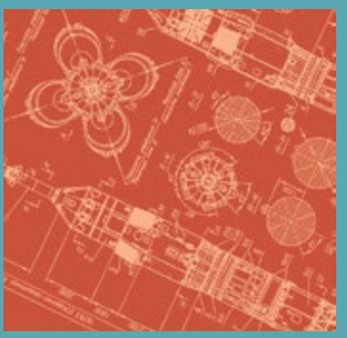
The Space Blogs and Collection Research sub-unit requires students to research one cosmonaut or astronaut from the Space Race era. Students examine primary and secondary source documents for the information they need to write blog entries from their cosmonaut or astronaut's point of view. After completing their writing, students sharpen their close reading skills as they explore the texts in The Space Race Collection.

Sub-Unit 3

Lesson 1:
Space Blogs 1

Lesson 2:
Space Blogs 2

Lesson 3:
Collection Research



Lesson 4:
Flex Day 3

Sub-Unit 3 at a Glance

Lesson Objective

Lesson 1: Space Blogs 1

Research: Students will analyze key details from a profile of their assigned astronaut or cosmonaut, then research primary and secondary source materials to find additional relevant information.

Lesson 2: Space Blogs 2

Writing: Students will use their primary and secondary source research findings to write three blog entries from the perspective of their assigned astronaut or cosmonaut, describing their experiences and feelings during the mission.

Lesson 3: Collection Research

Reading: Students will independently read one text and examine one image for understanding, then work with a group to identify and summarize key findings from the text.

Lesson 4: Flex Day 3

The teacher selects from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts.

Reading	Writing Prompt
• The Space Race Collection • **Solo:** Students review self-selected images and texts from The Space Race Collection.	No analytical writing prompt.
• The Space Race Collection	In character, write at least three blog entries describing your experiences and feelings during your mission. Use the information on your Space Card and your Research Chart to help craft your writing.
• The Space Race Collection • **Solo:** Students review self-selected images and texts from The Space Race Collection.	No analytical writing prompt.

Sub-Unit 3 Preparation Checklist

Lesson 1

A B C

Pages 109–121

- ☐ Assign cosmonauts/astronauts to students. Print out the list with their names and cut a slip with each name to give to students at the start of class.
- ☐ Be prepared for students to use the Internet later in this lesson.

Lesson 2

D E

Pages 122–124

No additional prep.

Lesson 3

F G H

Pages 125–126

No additional prep.

Lesson 4: Flex Day

- ☐ Review each lesson activity to identify which one(s) will best support your students' skill progress.
- ☐ Each activity requires distinct preparation. Review the Instructional Guide for each activity you will assign.
- ☐ Prepare any texts, materials, or directions you may need to project or distribute.

Note: There may be activities in these lessons that students will revise or refer to in a subsequent lesson. By keeping track of lessons that students complete in a print format, you can have students refer to their print work when they reach these activities. In addition, your students will need to copy any Writing Prompts completed in a print lesson into the corresponding digital writing space if you want that writing to be included in Productivity and other reports.

Space Blogs and Collection Research

646

Overview

Get ready to become an astronaut or cosmonaut. How does it feel to hurtle through space in a tiny capsule?

Suggested Reading

Is your curiosity sparked? Want to dive deeper into this topic? Check out the list of websites below for a wealth of reference materials. And remember, your school and local libraries are great places to continue exploring your interests.

- Internet Archive
- Library of Congress
- OCLC WorldCat
- Google Books
- HathiTrust Digital Library
- Project Gutenberg
- Digital Public Library of America

A

Lesson 1—Space Blogs 1

1. Look through the Space Cards on pages 648–657 to get to know the cosmonauts and astronauts that participated in the Space Race. You will be assigned either a cosmonaut or an astronaut to focus on for the next few lessons.

Soviet Cosmonauts

- **1.** Yuri Gagarin
- **2.** Valentina Tereshkova
- **3.** Andriyan Nikolayev
- **4.** Alexei Leonov
- **5.** Vladimir Komarov
- **6.** Konstantin Feoktistov
- **7.** Boris Yegorov
- **8.** Gherman Titov
- **9.** Pavel Popovich
- **10.** Valery Bykovsky

American Astronauts

- **11.** Neil Armstrong
- **12.** Edwin "Buzz" Aldrin, Jr.
- **13.** Michael Collins
- **14.** Alan Shepard, Jr.
- **15.** John Glenn, Jr.
- **16.** Virgil Ivan "Gus" Grissom
- **17.** Walter Marty Schirra, Jr.
- **18.** Donald Kent Slayton
- **19.** Edward White
- **20.** Harrison Schmitt

Fill out your cosmonaut/astronaut profile on page 50.

2. Introduce yourself to your group. Share your name, country of origin, and one interesting fact about yourself or your mission.
3. Then, introduce yourself to someone in the other group. Again, share your name, country of origin, and one interesting fact about yourself or your mission.

A Lesson 1: Space Blogs 1

Introduce, Select, & Share Space Profiles: Students explore the Space Cards, then assume the identity of a cosmonaut or astronaut to record basic facts about themselves and interact with each other.

27 min

- Direct students to Activity 1 on page 647 in the Student Edition.
- Tell students that they will look through the Space Cards on pages 648–657 of the Student Edition to get to know the cosmonauts and astronauts who participated in the Space Race.
- Tell students that they will each take on the identity of one cosmonaut or astronaut. They will be writing blogs from space from the point of view of this specific person. But first, they will have to conduct research.
- Assign one cosmonaut/astronaut to each student by handing out the names on the slips of paper you prepared before class.
- **Writing Journal:** Students complete the profile of their person on page 50.
- Circulate and make sure students are able to find the Space Card for the person they were assigned.
- When students have completed their profiles, instruct them to form 2 groups based on whether they are cosmonauts or astronauts.
- Tell students that they are to introduce themselves to the members of their group as the cosmonaut or astronaut they were assigned.
- Students complete Activities 2 and 3 in the Student Edition.

Lesson 1 Materials

- List of Cosmonauts/ Astronauts

Differentiation: Step A

- *ELL(Dev):* Read the Space Cards aloud or ask for student volunteers to read. If students struggle with reading comprehension or are ELL students, they will benefit from discussing each card with a partner as they read to ensure understanding.

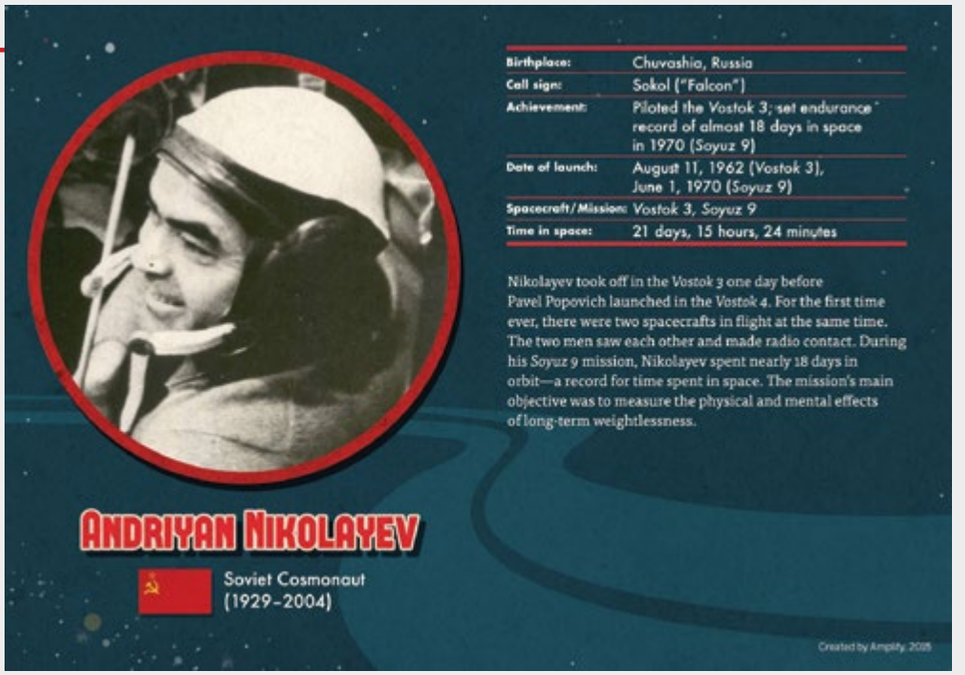
If students, especially students below grade level in reading, have a cosmonaut or astronaut they would like to be, allow students to self-select as opposed to assigning one to them.

- *ELL(Dev)*: Allow students to work in pairs with another student who has been assigned the same astronaut or cosmonaut to assist with language and understanding. ELL students who are at a lower level can focus on answering the first 4 questions with information from the astronaut profile, and their partners can focus on the last 2 questions, summarizing the most notable achievement and 1 or 2 noteworthy facts.

1

2

3



NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Andriyan Nikolayev Card (Soviet Cosmonauts))

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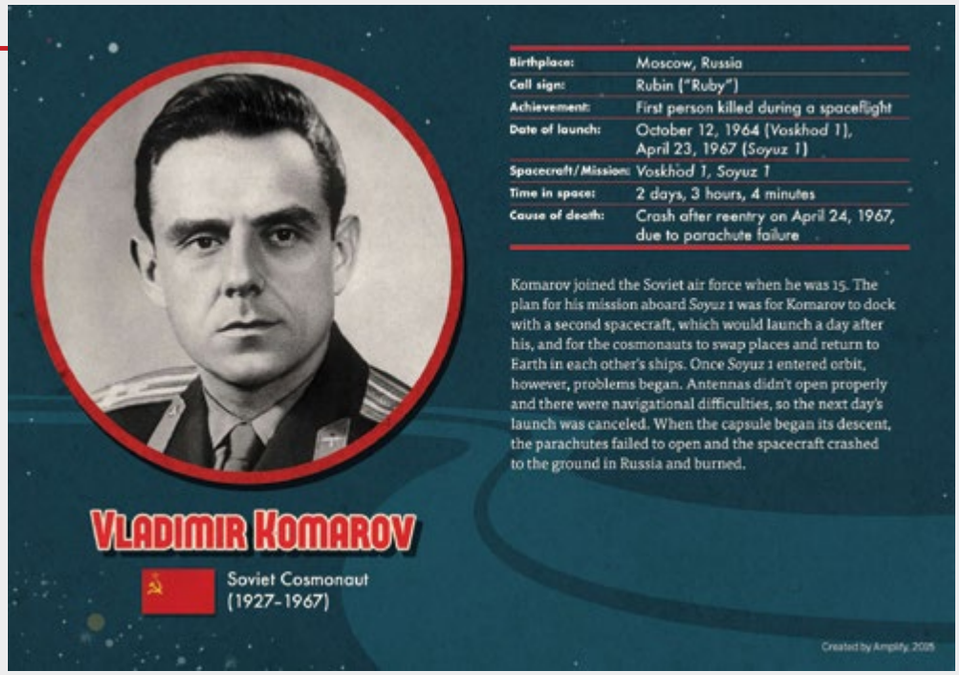
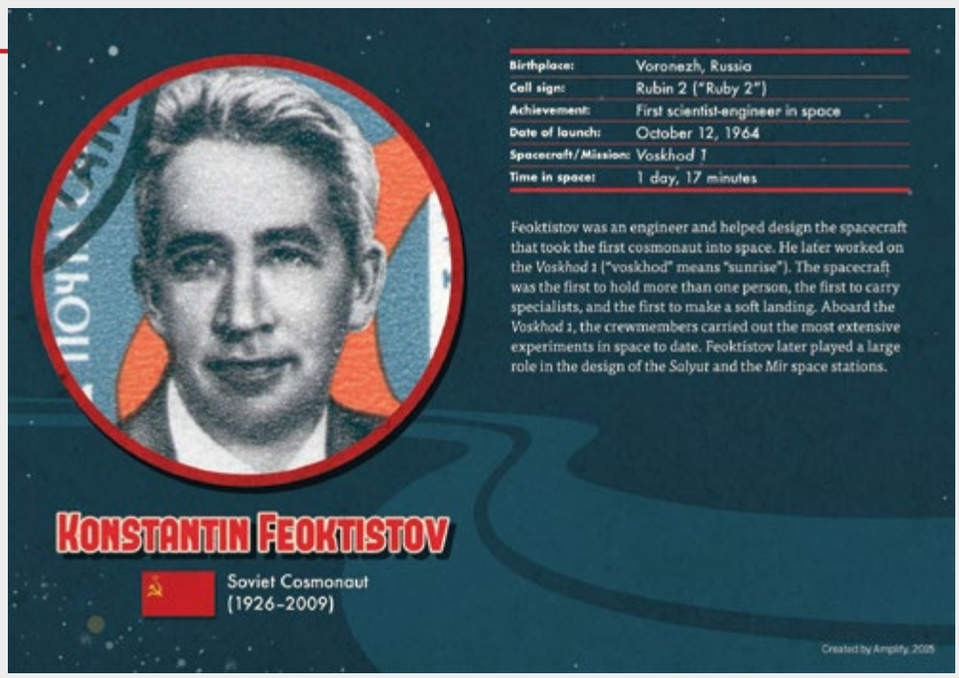
Sovfoto/UIG/Getty Images; najin/iStockphoto; Tup Wanders via CC by 2.0 (Alexei Leonov Card (Soviet Cosmonauts))

5



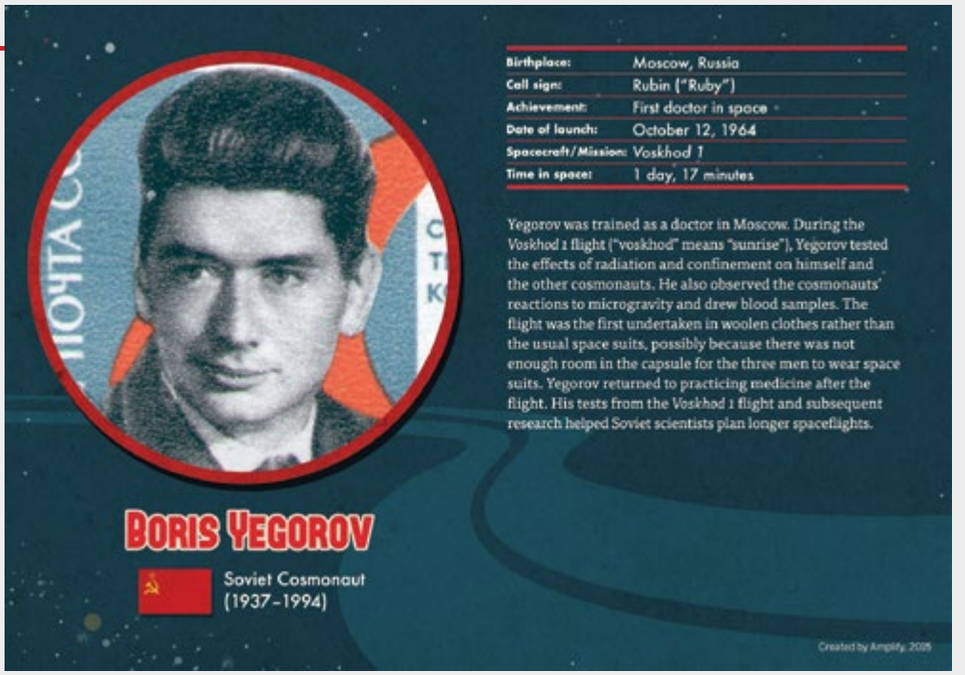
AFP/Getty Images; najin/iStockphoto; Tup Wanders via CC by 2.0 (Vladimir Komarov Card (Soviet Cosmonauts))

6



najin/iStockphoto; Tup Wanders via CC by 2.0 (Konstantin Feoktistov Card (Soviet Cosmonauts))

7



najin/iStockphoto; Tup Wanders via CC by 2.0 (Boris Yegorov Card (Soviet Cosmonauts))

8

RIA Novosti/Science Source; najin/iStockphoto; Tup Wanders via CC by 2.0 (Gherman Titov Card (Soviet Cosmonauts))

9

Sovfoto/UIG/Getty Images; najin/iStockphoto; Tup Wanders via CC by 2.0 (Pavel Popovich Card (Soviet Cosmonauts))

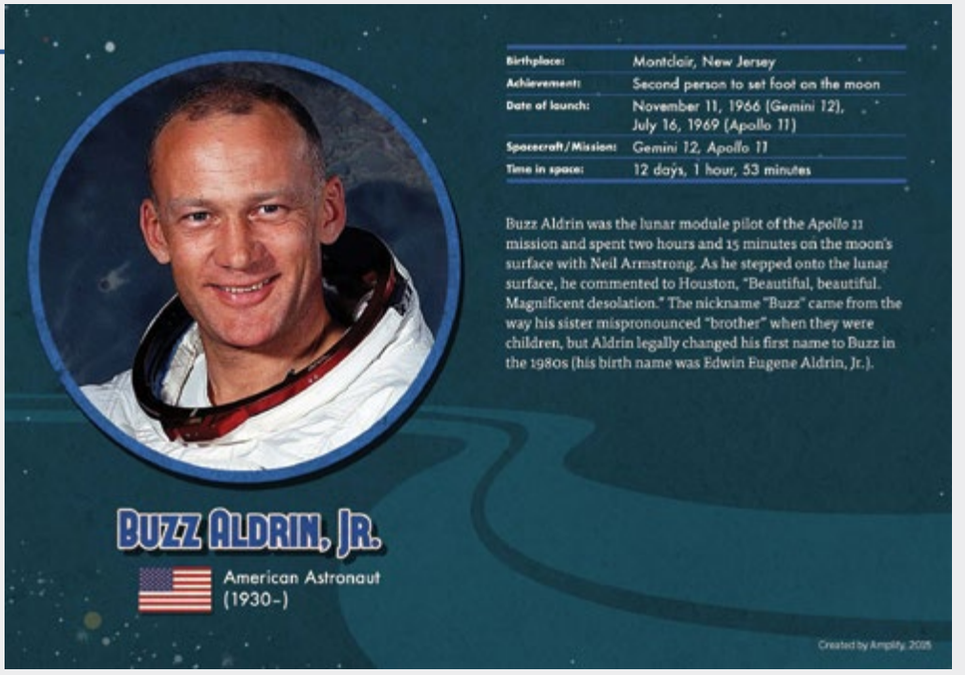
10

AP Photo; najin/iStockphoto; Tup Wanders via CC by 2.0 (Valery Bykovsky Card (Soviet Cosmonauts))

11

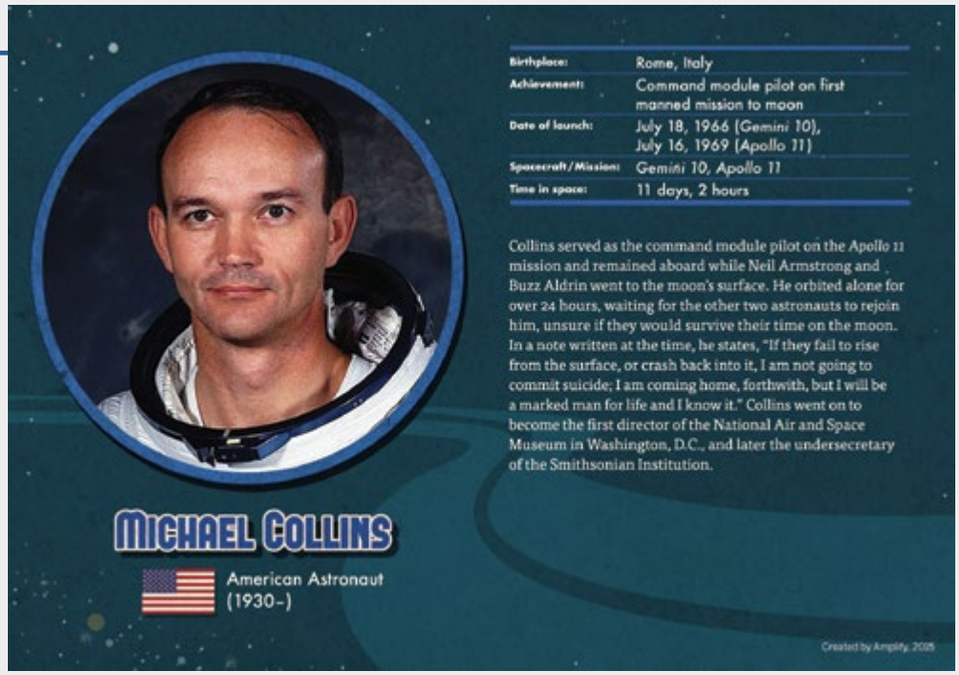
NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Neil Armstrong Card (American Astronauts))

12



NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Edwin "Buzz" Aldrin, Jr. Card (American Astronauts))

13



NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Michael Collins Card (American Astronauts))

14

NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Alan Shepard, Jr. Card (American Astronauts))

15

NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (John Glenn, Jr. Card (American Astronauts))

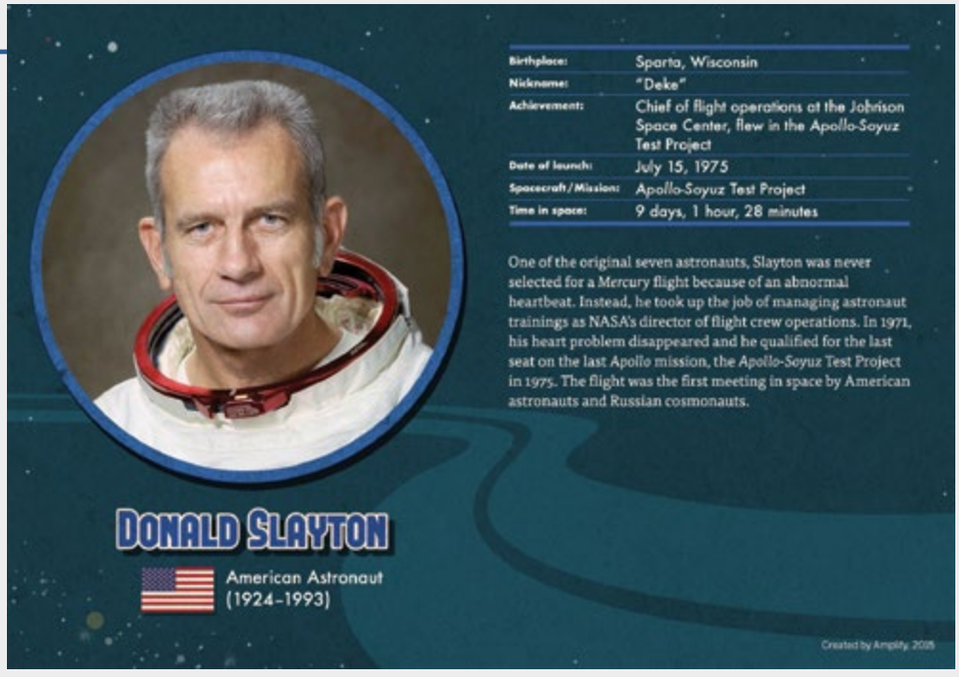
16

NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Virgil Ivan "Gus" Grissom Card (American Astronauts))

17

NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Walter Marty Schirra, Jr. Card (American Astronauts))

18



NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Donald Kent Slayton Card (American Astronauts))

19

NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Edward White Card (American Astronauts))

20

NASA; najin/iStockphoto; Tup Wanders via CC by 2.0 (Harrison Schmitt Card (American Astronauts))

B Lesson 1 (continued)

Select Text: Students prepare to conduct research on their assigned cosmonaut or astronaut by practicing how to cite textual evidence that supports an analysis of what the text says.

10 min

- Direct students to Activity 1 on page 658 in the Student Edition.
- Tell students that while researching their cosmonaut or astronaut, they will need to select relevant evidence that they could use to write a space blog about that person.
- Direct students to follow along on page 606 of their Student Editions as you read aloud paragraphs 8–13 of "Buzz Aldrin on His Lunar Home, the Eagle.").
- Is this a primary or secondary source?
- Use Activity 2 in the Student Edition to clarify the type of content students will be writing in their space blogs.
- Facilitate a class discussion of the image of space food in the Student Edition.
- Discuss the image with students to provide them with a visual of the type of food available to astronauts.
- Students complete Activity 3 in the Student Edition.
- Share responses.
- **Writing Journal:** Students complete the activity on page 51.

B

Lesson 1—Space Blogs 1 (continued)

1. Read the following text on page 605: "Buzz Aldrin on His Lunar Home, the Eagle," paragraphs 9–11.
2. Think about what evidence you would use to write Buzz Aldrin's space blog. The space blog can include answers to questions such as:
   - What activities were you engaged in on your mission?
   - What could you see from the window of your spacecraft?
   - What was it like to experience weightlessness? G-forces?
   - What emotions did you experience during and after the mission?
   - What happened to you once the mission was over?
   - What was the highlight of the mission for you?
3. In the passage, Buzz Aldrin provides factual information related to which of the following? Circle your answer.
   A. How terrible the food and drink on board the *Columbia* tasted.
   B. How the moon's surface felt as he stepped onto it.
   C. How uncomfortable he felt inside the small, dull module.
   D. What he thought and felt while Neil set up the TV camera.

Cite the textual evidence that supports your answer to Activity 3 on page 51 of your Writing Journal.

Differentiation: Step B

- *ELL(Dev):* For your ELL students, you may need to explain terms such as "lunar," "module," "interior," "freeze-dried," "packaged," "touch down," "cushiony," "gravelly," dust," and "crunchy" in the reading passage.

C

Research your assigned cosmonaut or astronaut to find at least three interesting facts not shown on the Space Cards, using the Collection texts on pages 568–630 of this book.

Some possible topics to research:

- What activities were you engaged in on your mission?
- Were there any interesting, unusual, or scary events that happened on your mission?
- What was it like to experience weightlessness? G-forces?
- What happened to you once the mission was over?
- What was the highlight of the mission for you?

Record any interesting information you discover on page 52 of your Writing Journal.

C Lesson 1 (continued)

Research: Students prepare to produce their space blog by searching within the Collection and on the Internet for more information about their assigned astronaut or cosmonaut.

18 min

- Direct students to page 659 in their Student Editions.
- Tell students they will now do research into their cosmonaut or astronaut to find more information, which they'll need later when they write that person's blog from outer space.
- Students look through Collection texts on pages 568–630 of the Student Edition.

  Note: *Some cosmonauts/astronauts are not mentioned in the Collection texts. Students who do not find any additional information in the Collection texts can extend their research by using the Internet when available.*
- **Writing Journal:** Students record information on page 52.
- At the end of class:
  - Ask for a show of hands of how many students found at least 3 new facts about their assigned cosmonaut or astronaut.
  - Encourage students to conduct more research whenever Internet or devices are available.
  - Remind them that they will use this information to write a blog from outer space in the next class.
- **Exit Ticket:** Project.

End of Lesson 1

Differentiation: Step C

Allow students to work in pairs with another student who has been assigned the same cosmonaut or astronaut to assist with language and understanding.

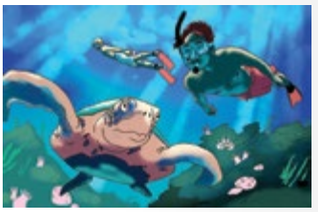
- *ELL(Dev):* ELL students who are at a lower level can focus on answering the first 4 questions with information from the astronaut profile, and their partners can focus on the last 2 questions, summarizing the most notable achievement and 1 or 2 noteworthy facts.

D Lesson 2: Space Blogs 2

Review Sample Blog: Students review the elements of a compelling blog to understand the organization and style appropriate for developing their own.

5 min

- Read aloud the sample blog entry and instruct students to follow along on page 660 of their Student Editions.
- Depending on the class's needs, you may need to review blog logistics:
  - Blog entries each have a date and title.
  - Blog entries appear in reverse chronological order.
  - Blog entries are between 250 and 1,000 words.
- Instruct students to use the Elements of a Compelling Blog list on page 661 of their Student Edition to evaluate the strength of the blog and images, if present.



D January 14, 2010

Meeting My First Sea Turtle

It's my first day snorkeling at the world-famous Hanauma Bay on the island of Oahu.

My tour guide, Kainoa, says the bay is popular with tourists and that overcrowding has caused the coral to erode. The marine life has also suffered. That's why the beach has special rules now. I won't be able to feed the fish or step on the reef.

From the shore, I see the curved reef and turquoise waters. I breathe in the salty air and scent of sunscreen. Even though it's 8 in the morning, the beach is packed with visitors. A young Japanese boy plays with his sand pail near the lifeguard stand. Luckily, palm trees shade us from the sun.

Kainoa gives me a life jacket, mask, and snorkel. When I put everything on I feel like a superhero sea creature! We walk toward the crystal-clear water and I wonder what fish I'll get to see today. Kainoa has already said that the water is shallow, but it will get deep as we swim farther out. We put our fins on, strap on our masks and snorkels, and swim through the water's surface.

The water is cool and calm, just like a pool. Kainoa is at my side, holding an underwater camera. He gives me a *shaka*, which is kind of like the Hawaiian version of a thumbs-up, and I give him one back.

I spot a school of black and yellow angelfish. In a few minutes, we reach the rocky reef. This is where the action is! I see fish of all sizes and colors. Out of the corner of my eye, I notice a moray eel darting into a hole. Just then, a stingray slides beneath me, its long gray tail swishing back and forth. Kainoa holds up the camera and gets a photo of us together.

We swim farther out, passing more snorkelers and one scuba diver. The waves are a little stronger here.

After 20 minutes, my legs are tired from kicking and I want to return to the shore. Just as I'm about to give Kainoa a sign that I'm going back, I see it—the sea turtle. It floats right past me, just a few inches from my mask, and raises a flipper like it's waving. Kainoa had told me that sea turtles, called *honu* in Hawaiian, are a sign of good luck. After this beautiful morning snorkeling in paradise, I am sure he's right!

660

Lesson 2 Materials

No materials.

Differentiation: Step D

- *ELL(Dev):* Be prepared to explain terms such as "overcrowding," "erode," "suffer," "reef," and "flipper" for ELL students.

D

Lesson 2—Space Blogs 2

Elements of a Compelling Blog

1. **Share your unique expertise.**
   For example: If you are an astronaut, people want to read about something related to space or space travel. What do you know about that makes you an expert?
2. **Tell a unique story with cool details.**
   For example: If you are an astronaut, people want to hear about any experiences that differ from those on Earth, such as your experience sleeping in space. And they want to hear riveting details!
3. **Give your audience a valuable takeaway.**
   For example: If you are an astronaut writing about sleeping in space, what is one great piece of information you want to make sure to communicate?
4. **Use language that makes readers feel like they are right there with you.**
   For example: If you are an astronaut writing about walking on the moon, include details about what you see, hear, feel, smell, and touch as you walk. Or, choose one sense to concentrate on as you provide descriptive details of your experience.

E Lesson 2 (continued)

Write & Share: Students write blog entries to describe a series of experiences and observations from the perspective of the cosmonaut or astronaut they are role-playing, then share with the class.

35 min

- Direct students to page 662 in the Student Edition.
- Remind students that they will write from the point of view of their astronaut or cosmonaut. Their goal is to help their readers feel like they are seeing things through the narrator's eyes.
- **Warm-Up:** Use the digital lesson to make sure students have language to start writing.
- **Writing Prompt:** Students write at least 3 blog entries in character, describing their experiences and feelings during their mission on page 53 of their Writing Journal.
- **Differentiation:** Digital PDF.
- **On-the-Fly:** Circulate around the room to support students.
- Explain that their blogs should use the facts they found, but they can also embellish and elaborate on those facts in order to create compelling blog entries.
- **Share:** Call on 2 or 3 volunteers to share. Each volunteer should call on 1–3 listeners to comment.
- Guide students in a discussion of the information they found about their assigned astronauts and cosmonauts.

10 min

- **Wrap-Up:** Project.
- **Exit Ticket:** Project.

End of Lesson 2

E

Lesson 2—Space Blogs 2 (continued)

Go to your Writing Journal and write at least three blog entries, in character, describing your experiences and feelings during the mission.

Write about the most important moments and events of your mission as well as small details such as...

- how you liked or disliked the food.
- how well you slept.
- what you thought about when you weren't performing your duties.

These moments might be serious or humorous.

Use the information on your Space Card and your Research Chart to help craft your writing. Refer to the Elements of a Compelling Blog as a guide while you write.

Complete your blog entries on page 53 of your Writing Journal.

Refer to your research as you participate in the class discussion about the Space Race.

Differentiation: Step E

- *ELL(Dev):* ELL students and students below grade level in writing would benefit from orally discussing their blog entries with a partner before beginning to write.
- *ELL(Dev):* Alternate Writing Prompt breaks the prompt into smaller chunks and provides sentence starters.

F

Lesson 3—Collection Research

Revisit page 570 of your Student Edition to compare the following two images:

- **Leonov during first spacewalk (left)**
- **White during first US spacewalk (right)**

Complete the close reading questions about these images on page 17 of your Writing Journal.

G

Look through the images in your Student Edition and choose one that you have not yet focused on.

Complete the close reading questions that correspond to the image(s) you chose.

F Lesson 3: Collection Research

Work Visually: Students compare 2 images and answer close reading questions.

7 min

- Direct students to complete the comparison activity on page 663 of the Student Edition.
- **Writing Journal:** Students complete the close reading questions on page 17.
- Ask students to share their answers to the close reading questions.

G Lesson 3 (continued)

Work Visually: Students explore self-selected images from The Space Race Collection and answer related questions.

5 min

- Direct students to complete the activity on page 663 of the Student Edition.
- **Writing Journal:** Students locate and respond to the close reading questions that correspond to the image(s) they chose.

Lesson 3 Materials

No materials.

H Lesson 3 (continued)

Select Text: Students choose another text to read in The Space Race Collection.

5 min

- Instruct students to go through the texts on pages 568–630 of their Student Edition and choose one to read that they haven't worked closely with yet.
- Explain to students that they will encounter different types of writing, including informational and narrative writing, a speech, and a memorandum.
- **Writing Journal:** Students go to page 55 to record their research.
- Tell students to divide into groups with others who read the same text and identify one interesting or surprising fact from the text they examined today.
- After about 5 minutes, call on a student from each group to share responses with the class. Write the name of the text being discussed on the board.
- For sentence starters, answers to close reading questions, and additional Writing Prompts and activities, refer to the digital lesson.

13 min

- **Wrap-Up:** Project.
- **Exit Ticket:** Project.

End of Lesson 3

Collection Research

H

Lesson 3—Collection Research (continued)

1. Revisit pages 568–630 of this book and select a new text to read closely.

Use the space on page 55 of your Writing Journal to record any interesting or surprising facts you learned from the text you selected. Be prepared to share your responses with the class.

2. Briefly discuss the text you reviewed today with your assigned group. Work together to identify one interesting or surprising fact.

Differentiation: Step H

If students are struggling to read these texts, you may choose to have students work in pairs with someone who is reading the same text.

- *ELL(Dev):* Plan how you will assign groups for this activity. ELL students should be assigned to work with non-ELL students or ELL students at a different level.

Before You Begin Lesson 4:

Lesson 4 is a Flex Day. Select from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts. Please see instructions in the digital lesson.

Socratic Seminar and Internet Research

Students prepare for a Socratic seminar. Class discussion focuses on the importance and power of open-ended questions when engaging in a thoughtful discussion. Students learn that a successful Socratic seminar requires an emphasis on inquiry and thoughtful discussion over debate.

The Internet Research lesson should be completed on devices. This lesson allows students to put their new research and close reading skills to the test as they conduct research online.

Sub-Unit 4

Lesson 1:

Preparing for the Socratic Seminar

Lesson 2:

Conducting the Socratic Seminar

Lesson 3:

Discuss: Internet Research

Lesson 4:

Flex Day 4

Sub-Unit 4 at a Glance

Lesson Objective

Lesson 1: Preparing for the Socratic Seminar

Speaking & Listening: Students will review the format and goals of a Socratic seminar, then collaborate to 1) develop discussion guidelines that meet goals and 2) generate open-ended questions. They will practice by posing questions and responding to others' ideas in a practice seminar.

Lesson 2: Conducting the Socratic Seminar

Speaking & Listening: Students will use the Socratic method to discuss the Space Race, with an emphasis on their use of the rules, procedures, and roles for discussion.

Research: Students will work in pairs and generate an open-ended research question about the Space Race, identify credible Internet sources, and conduct Internet research to answer the question using 2 sources.

Lesson 3: Discuss: Internet Research

Research: Students will generate a research question about the Space Race, identify credible Internet sources, and conduct Internet research to find the answer.

Writing: Students will use evidence from multiple credible sources and framed quotes to describe key information about their research topic.

Lesson 3 involves Internet research and should be saved for a class period when students have access to the Internet.

Lesson 4: Flex Day 4

The teacher selects from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts.

Reading	Writing Prompt
The Space Race Collection	No analytical writing prompt.
The Space Race Collection	No analytical writing prompt.
	Write one or two paragraphs providing key information you discovered about your topic. Make sure to include two framed quotes from at least two sources.

Sub-Unit 4 Preparation Checklist

Lesson 1

A B C D

Pages 135–137

- ☐ Plan to arrange students in small groups and assign each group a text (text options are listed in Materials).
- ☐ Have chart paper ready.

Lesson 2

E F G H

Pages 138–139

- ☐ Post the chart paper with rules for the Socratic seminar.
- ☐ Plan to put students in pairs for the second part of the lesson.
- ☐ If possible, prepare for students to use the Internet later in this lesson to conduct research. Teachers may choose to save this lesson until students have access to the Internet.

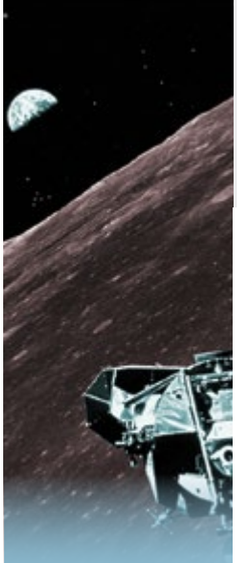
Lesson 3

This lesson involves Internet research and should be saved for a class period when students have access to the Internet.

Lesson 4: Flex Day

- ☐ Review each lesson activity to identify which one(s) will best support your students' skill progress.
- ☐ Each activity requires distinct preparation. Review the Instructional Guide for each activity you will assign.
- ☐ Prepare any texts, materials, or directions you may need to project or distribute.

Note: There may be activities in these lessons that students will revise or refer to in a subsequent lesson. By keeping track of lessons that students complete in a print format, you can have students refer to their print work when they reach these activities. In addition, your students will need to copy any Writing Prompts completed in a print lesson into the corresponding digital writing space if you want that writing to be included in Productivity and other reports.



Socratic Seminar and Internet Research

666

Overview

Socrates was a famous Greek philosopher. He was a deep thinker who believed in the power of asking questions and thoughtful discussion. In these lessons, you'll be the ones asking the questions and discussing the answers.

Suggested Reading

Is your curiosity sparked? Want to dive deeper into this topic? Check out the list of websites below for a wealth of reference materials. And remember, your school and local libraries are great places to continue exploring your interests.

- Internet Archive
- Library of Congress
- OCLC WorldCat
- Google Books
- HathiTrust Digital Library
- Project Gutenberg
- Digital Public Library of America

Differentiation: Socratic Seminar

To provide additional background on how a Socratic seminar runs, you might conduct an Internet search for a short video from another teacher's classroom. These search terms may help: middle school, Socratic seminar, ELL.

A

Lesson 1—Preparing for the Socratic Seminar

A **Socratic seminar** is a formal discussion based on a text in which students ask and answer a series of open-ended questions designed to promote critical thinking, questioning, and conversation.

Everyone is expected to answer at least one question and to generate at least one question to ask other students.

Socrates,
Greek philosopher,
470 BCE–399 BCE

1. Which rule will help during a class discussion?
   A. Send a text message to at least two friends during the seminar.
   B. Feel free to call out answers at any time.
   C. Listen carefully to the student speaking.
   D. Find a point to argue against.
2. What are the roles of language, listening, speaking and participation when having a discussion? How do you make sure the questions are clear so they allow a variety of people to respond and share ideas?
3. Use these questions as a guide to help your group create rules for the Socratic seminar.
   - How will people take turns talking?
   - What do you do if you have a question or answer to share?
   - How can we show that we're listening to each other?
   - What do we do if someone is talking too much? What if someone isn't talking?
   - How do we agree, disagree, or build on what someone else says?

Work with your group to write down three or four rules for a class discussion on page 58 of your Writing Journal.

A Lesson 1: Preparing for the Socratic Seminar

Introduce & Discuss: Students discuss the concept of the Socratic seminar, then create a list of seminar rules and procedures.

12 min

- Direct students to page 667 in their Student Editions.
- Tell students that they will participate in a Socratic seminar about the Space Race, with some questions generated by you and some by them. Emphasize that this type of discussion is not a debate.
- A debate focuses on defending your beliefs and proving others wrong. A Socratic seminar, however, is a dialogue. It focuses on building deeper meaning and understanding through a spirit of cooperation and responses that grow from the thoughts of others.
- Which of the rules in Activity 1 in the Student Edition would be appropriate behavior in a Socratic Seminar?
- Share responses.
- Lead a discussion using the questions in Activity 2 of the Student Edition.
- Divide students into groups of 4.
- Groups use the guiding questions in Activity 3 in the Student Edition to help them write possible seminar rules.
- **Writing Journal:** Students write their suggested rules on page 58.
- Call on each group to share a rule they have written.
- Work with students to create and display a class list called "Rules for Seminar." Save this for reference during the next lesson.
- Refer to the digital lesson for a complete list of suggested rules for speaking and for listening.

Lesson 1 Materials

No materials.

Differentiation: Step A

- *ELL(Dev):* Plan how you will assign groups for this activity. ELL students should be assigned to work with non-ELL students or ELL students at a different level.
- *ELL(Dev):* If you have several lower-level ELL students you may want to point out that rules are often written as commands, or with modal verbs such as "must" and "should."

B Lesson 1 (continued)

Discuss Guidelines for Seminar Questions: Students consider the difference between open- and closed-ended questions, then work in pairs to write an open-ended question.

5 min

- Define closed-ended questions (requiring only a yes/no or one-word answer) and open-ended questions (requiring an explanation) for students.
- Direct students to questions 1–6 on page 668 of the Student Edition.
- Lead a discussion using these questions.
- Discuss why open-ended questions might be better for discussion.
- **Writing Journal:** Students write an open-ended question on page 58, then share with someone in their group to check that the question is open ended.

C Lesson 1 (continued)

Brainstorm: Students collaborate to generate discussion questions about an assigned text.

20 min

- A great way to boost a discussion is to come prepared, having examined the evidence and written down some questions.
- Assign one text with page numbers to each group.
- Groups complete the activity on page 668 of the Student Edition.
- **Writing Journal:** Students record their groups' open-ended questions on page 58.
- Students share questions. Choose a few exemplar open-ended questions to write on the board.
- Refer to the digital lesson for a list of examples of open-ended questions for the Space Race.

B

Lesson 1—Preparing for the Socratic Seminar (continued)

Which questions are closed-ended? Which are open-ended? Discuss with your class.

1. Did you like the movie?
2. What did you like about the movie?
3. What were the best scenes in the movie?
4. Why do you think they were the best?
5. Who was the main character of the movie?
6. What was likable about the main character?

Write an open-ended question about a song or movie you like on 58 of your Writing Journal. Share your question with someone in your group to see if they agree that it is an open-ended question.

C

Refer to pages 568–630 of your Student Edition to find the text assigned to your group.

Work together to write 2 or 3 open-ended questions about this text to ask the class during the Socratic seminar.

Make sure your questions are thought-provoking, so that your classmates have a lot to think about and discuss.

Go to page 58 in your Writing Journal to record your group's open-ended questions.

Differentiation: Step B

- *ELL(Dev):* You may choose to write on the board and discuss a few examples of open- and closed-ended questions to support ELL students before they complete the activity on their own.

Differentiation: Step C

If students are below grade level in reading and have a favorite text or a text they would like to reread, you may choose to allow students to work with that text as opposed to assigning a text to them.

D

Practice the Seminar

1. Each group shares a question for the class to discuss.
2. Follow your class's established guidelines.

D Lesson 1 (continued)

Discuss: Students pose questions and respond to others' ideas in a practice seminar.

8 min

- Direct students to Activities 1 and 2 on page 669 of the Student Edition.
- You have reexamined the texts and revisited your ideas. You have created discussion questions with your groups. We have also discussed some of the rules, procedures, and roles we will apply in our discussion.
- Let's practice using our rules, procedures, and roles for discussion while we try out some of the interesting questions you created.
- Call on groups to share a question with the class and discuss, following the class's established Socratic seminar guidelines.
  - For example, whoever poses the current question calls on a specific student by name and invites that student to respond.
- What could be improved about the questions you asked during the discussion? How about the responses to the questions?
- What questions were especially well-written? What made them seem well-written?

6 min

- **Wrap-Up:** Project Poll 1.
- **Exit Ticket:** Project.

End of Lesson 1

E Lesson 2: Conducting the Socratic Seminar

Prepare for Socratic Seminar: Students prepare for today's seminar discussion by reviewing the rules, procedures, and roles they established in the previous lesson.

5 min

- Arrange desks in a circle, allowing students to clearly see one another during the seminar.
- In the last lesson, we worked together to come up with rules, procedures, and roles that will make our Socratic seminar strong and productive.
- Assign partners.
- Partners discuss the questions on page 670 of the Student Edition.
- Share responses.

F Lesson 2 (continued)

Discuss: Students write questions they would like to ask during the Socratic seminar and then participate in a Socratic seminar.

20 min

- Direct students to page 670 of the Student Edition to consider what questions they'd like to ask today.
- Remind students that their questions should be...
  - open-ended.
  - thought-provoking (making people think seriously about something).
  - easy to understand.
- **Writing Journal:** Students write two open-ended questions on page 59.
- Pose the first guided question (or ask a volunteer to pose a question) and allow a discussion to ensue. Be mindful of keeping the discussion on topic; ask a new question when the discussion fades or digresses.
- **Writing Journal:** Students fill out the chart on page 60 during the seminar, and take additional notes on page 61.
- All students must participate, either by posing or responding to a question, or both.
- Refer to the digital lesson for a list of suggested guiding questions.

E

Lesson 2—Conducting the Socratic Seminar

Work with your partner to discuss the following questions.

- What were some of the rules, procedures, and roles we came up with to make our Socratic Seminar discussion strong and productive?
- Can you think of any other rules, procedures, roles, or other suggestions to add?

F

Before the Socratic seminar begins, consider what open-ended questions you'd like to ask during today's discussion.

Write two open-ended questions you'd like to ask during today's seminar on page 59 of your Writing Journal.

As you participate in the class discussion, fill in the chart and take notes in your Writing Journal.

Go to page 60 of your Writing Journal to fill in the chart as you participate in the discussion. Be prepared to share these thoughts and questions during the seminar. You may use page 61 to take additional notes.

Lesson 2 Materials

No materials.

Differentiation: Step F

- *ELL(Dev):* Students who are below grade level in reading or writing or ELL students may benefit from brainstorming open-ended questions with a partner before writing them down.

You can encourage participation by conducting a "lightning round," where each student is required to give a quick answer to one seminar question. Another strategy is to use a set number of chips or markers per student that they must set aside each time they speak. Students who run out of chips cannot speak until all other students use their chips.

G

1. Discuss the following questions with a partner.
   - What was one thing in our discussion process that needs improvement?
   - What was one thing in our discussion process that went really well?
2. Review your seminar notes on page 61 of your Writing Journal and choose three or four topics you'd like to explore further.

Complete Activity 1 on page 62 of your Writing Journal.

3. Compare your topics with a partner, then choose one topic that you and your partner will investigate further.
4. Together, choose a Space Race-related research question based on your chosen topic.

   Remember that a good research question...
   - is open-ended.
   - may begin with "how" or "why."
   - is arguable or open to debate.

   Example of a good research question: "What was Yuri Gagarin's contribution to the Space Race?"

   Example of a poor research question: "Where was Yuri Gagarin born?"

Complete Activity 2 on page 62 of your Writing Journal.

H

Conduct research to find the answer to the new question you composed. Use at least two sources.

Use the information literacy criteria you learned for evaluating credible research sources. Fill in the Source Credibility Checklist for both your first and second sources to make sure they are credible.

Complete the Source Credibility Checklist for each source on pages 63–64, and write the answer to your research question on 65 of your Writing Journal.

G Lesson 2 (continued)

Review & Brainstorm: Students reflect on key issues raised in the seminar and evaluate their use of the rules, procedures, and roles for discussion, then generate a research question based on the seminar.

7 min

- Assign partners.
- Partners discuss the questions in Activity 1 on page 671 in the Student Edition.
- Share responses.
- Students complete Activity 2 in the Student Edition individually.
- **Writing Journal:** Students complete Activity 1 on page 62.
- Partners complete Activities 3 and 4 in the Student Edition.
- **Writing Journal:** Students complete Activity 2 on page 62.

H Lesson 2 (continued)

Select Text: Students work in pairs to research their questions.

15 min

- Direct students to page 671 of the Student Edition.
- Students search through the Collection texts or use the Internet when devices are available to find the answers to their new questions.

  Note: *We highly recommend students have access to the Internet to conduct their research for this step.*
- **Writing Journal:** Students complete the Source Credibility Checklist on page 63 and answer their research question on page 65.

10 min

- **Wrap-Up:** Project.
- **Exit Ticket:** Project.

End of Lesson 2

Differentiation: Step G

● *ELL(Dev):* Plan how you will assign pairs for this activity. ELL students should be assigned to work with non-ELL students or ELL students at a different level.

Before You Begin Lesson 3:

This lesson involves Internet research and should be saved for a class period when students have access to the Internet.

Before You Begin Lesson 4:

Lesson 4 is a Flex Day. Select from the range of activities to guide students to work on needed skills: grammar, revising an existing piece of writing, creating a new piece of writing, practicing close reading and discussion, or working visually with complex texts. Please see instructions in the digital lesson.

Write an Essay

Students spend six lessons researching and writing a five-paragraph essay. This lesson sequence reinforces skills learned in earlier units, including writing a compelling introduction and a strong conclusion. Students also learn how to create in-text citations, frames for quotes, and a Works Cited page.

The sub-unit concludes with a media project and presentation. Students will divide into groups and create timelines that track either the US or Soviet Space Race milestones. This project requires students to revisit their research to find relevant information for their projects. It will also require them to use devices for Lesson 1 to conduct their research, and Lessons 7 and 8 to create and present their media projects.

Essay Prompt:

Research Option 1: An Argumentative Essay

Was animal testing necessary during the Space Race?

Research and discover what the Soviets and the Americans were trying to understand when they sent animals into space. Was animal testing necessary? Was it fair or moral to send animals into space for research purposes? Could the scientists have found the answers they were looking for without sacrificing animals? If so, how?

Research Option 2: An Informative Essay

How did Katherine Johnson and the other women who worked with her at NASA impact the Space Race?

Write an informative essay about Katherine Johnson and the other key women who worked at NASA during the Space Race era. Who were the other key women who worked with Katherine Johnson and what roles did they play? What barriers did they face? How was the Space Race impacted by their work?

Note:

Each Print essay sub-unit follows the same developmental path as the digital lesson, although there are digital-only activities specific to each sub-unit's Essay Prompt and text(s). We recommend you prepare and project as needed as you work through the Print essay activities to get the most out of essay lessons.

This sub-unit contains a group of digital lessons in which students are drafting a polished essay in clear stages. Therefore, if students do not have access to the digital lesson as they begin the essay, or will not have access during portions of the essay lessons, it is best to have them complete their writing for all lessons in print, rather than the digital writing space provided in the lesson.

However, as with other writing assignments, your students will need to copy their final essay into the corresponding digital writing space if you want that writing to be included in Productivity and other reports.

Sub-Unit 5

Lesson 1

Lesson 2

Lesson 3

Lesson 4

Lesson 5

Lesson 6

Lesson 7

Lesson 8

Sub-Unit 5 at a Glance & Preparation Checklist

Lesson Preparation

Lesson 1

- ☐ Prepare for students to use the Internet while working on their research.
- ☐ Review the essay rubric found in the Materials section so you are aware of the skills that will be emphasized through the essay writing process of this unit. After students finish writing their essays, you will use this rubric to assess each essay.
- ☐ Print the Essay Graphic Organizer and Sentence Starters based on how you decide students will use them during the sub-unit.

Note: *It is recommended that you cover the Information Literacy Lessons with your class prior to beginning Sub-Unit 1 Lesson 1.*

Lesson 2

- ☐ Plan to put students in pairs for part of this lesson.
- ☐ Write the claim statement for the sample research essay on the board.
- ☐ Print Sample Essay 1.

Lesson 3

- ☐ Ensure students have Sample Essay 1.

Lesson 4

- ☐ Prepare to project 2–4 Spotlights that show where students provided strong evidence to support their claims.
- ☐ Identify students who may struggle to identify places in their writing to revise and mark one place where they could do this work. (They'll use this marking as a model to find a second place to revise.)
- ☐ Ensure students have Sample Essay 1.

Lesson 5

No additional prep.

Reading	Writing Prompt
The Space Race Collection	**Essay Prompt:** **Research Option 1:** An Argumentative Essay Was animal testing necessary during the Space Race? Research and discover what the Soviets and the Americans were trying to understand when they sent animals into space. Was animal testing necessary? Was it fair or moral to send animals into space for research purposes? Could the scientists have found the answers they were looking for without sacrificing animals? If so, how? **Research Option 2:** An Informative Essay How did Katherine Johnson and the other women who worked with her at NASA impact the Space Race? Write an informative essay about Katherine Johnson and the other key women who worked at NASA during the Space Race era. Who were the other key women who worked with Katherine Johnson and what roles did they play? What barriers did they face? How was the Space Race impacted by their work?
The Space Race Collection	The essay lessons use daily revision to organize and improve writing, enabling students to build up to the final, finished essay.
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Lesson Preparation

Lesson 6

- ☐ Prepare Spotlights for four student essays as described in Before Next Lesson at the end of the previous lesson.
- ☐ When students finish writing their essays, use the rubric found in the Materials section to assess them.

Lesson 7

This lesson involves Internet research and should be saved for a class period when students have access to the Internet.

Lesson 8

This lesson involves Internet research and should be saved for a class period when students have access to the Internet.

Reading	Writing Prompt
The Space Race Collection	The essay lessons use daily revision to organize and improve writing, enabling students to build up to the final, finished essay.
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Sub-Unit 5 Essay Lessons

Lesson 1: Gathering Evidence

A **Present:** Students review the Essay Prompt and the work they will do on the essay in this lesson.

7 min

Tell students that they will be working on a research paper based on topics from the Collection.

Their essays will...

- be either argumentative or informative.
- consist of 4 paragraphs: an introduction, 2 body paragraphs, and a conclusion.
- be written about a topic they select from the 2 options.
- include a Works Cited page that lists the resources they cited in their research.

NOTE: *If some students want to research a question they generated in either of the Internet Research lessons, they may do so, as long as you judge the question worthy of researching.*

Writing Journal: Direct students to page 68 in the Writing Journal.

Read aloud the Research Options.

Review the Calendar of Essay Days and Elements of a Research Essay on pages 676 and 677 of the Student Edition.

Lesson 1 (continued)

B **Select:** Students select an option to research and write about for their essay.

3 min

Writing Journal: Students review the two research options on page 68 of their Writing Journal.

Both informational and argumentative essays require a claim to be made in the first paragraph.

C **Research:** Students conduct research on their selected topic.

35 min

If possible, students should use online resources for their research during this activity.

Have students review the Collection and the Internet if possible to choose credible sources for their essays.

Writing Journal: Students fill in the chart on page 70 for each source they find.

Wrap-Up: Project.

End of Lesson 1

Lesson 1 Materials

- Research Option 1 Projection
- Research Option 2 Projection
- Grade 8 Essay Rubric

Lesson 2: Making a Claim and Writing a Body Paragraph

D **Review:** Students review the research project options and the calendar to see what work they have completed and preview the work to do in this lesson.

5 min

- Review the Elements of a Research Essay on page 677 of the Student Edition.
- Review the calendar to preview the work students will complete in today's lesson.

E **Select Text & Share:** Students identify places in the sample essay where the writer describes and explains the evidence and makes a transition between paragraphs, then share what they found.

15 min

- You are going to use the evidence from your research to write 2 body paragraphs and a transition sentence.
- Remember to write a transition sentence at the start of the second paragraph to show how it relates to the first. Let's take a look at how this was done in the sample essay.
- **Project:** Sample Essay.
- Use the Sample Essay with Highlighted Transitions and Evidence to support the discussion.
- Give students Sample Essay Handout.
- Read the Sample Essay aloud.
- Ask volunteers to locate:
  - sentences the writer describes and explains the textual evidence in the two body paragraphs.
  - transition sentences between body paragraphs
  - the central claim sentence.
- Discuss student responses.

Lesson 2 (continued)

F **Write:** Students write claims for their essays.

10 min

- **Writing Journal:** Students complete Activities 1 and 2 on page 71.
- **On-the-Fly:** Circulate around the room to support students.

G **Write:** Students write body paragraphs for their essays.

14 min

- If you finish your first body paragraph early, you can choose another point and start your second body paragraph.
- **Writing Journal:** Students write their body paragraphs on page 72.
- **On-the-Fly:** Circulate around the room to support students.
- **Wrap-Up:** Project.

End of Lesson 2

Lesson 2 Materials

- Sample Essay with Highlighted Transitions and Evidence
- Elements of a Research Essay
- Sample Essay

Lesson 3: Writing a Body Paragraph and an Introduction

H **Check-In & Write:** Students answer questions to check the progress of their essays, then write the second body paragraph for their essays.

15 min

- **Project:** Self-Assessment activity from the digital lesson.
- **Writing Journal:** Students note which things they say "No" to.
- Circulate to review student responses to the Self-Assessment. Make a note to revisit during writing any students who answered "Yes" to question 6.
- **Project:** Elements of a Research Essay.
- Review the elements of a body paragraph so students can make sure they have all of the components.
- **Writing Journal:** Students write their second and third body paragraphs on page 73.
- **On-the-Fly:** Circulate around the room to support students.

I **Present & Select Text:** Students review the Elements of an Introduction, then identify the elements of an introduction in the sample essay to prepare for writing their own essay introductions.

7 min

- Read aloud the Elements of an Introduction on page 677 of the Student Edition.
- Let's look for the elements of an introduction in the sample essay: lead, key background or context, and claim.

Lesson 3 (continued)

7 min

- **Writing Journal:** Students complete Activities 1 and 2 on page 74 as a class, using the projected Sample Essay.
- Share responses.
- Ask students if they agree or disagree with an answer, and have them explain why.
- **Project:** Highlighted Sample Essay Introduction to allow students to check their answers.

J **Write:** Students write their introductions.

17 min

- **Writing Journal:** Students write 2 or 3 leads on pages 75.
- **On-the-Fly:** Circulate around the room to support students.
- **Writing Journal:** Students write their introductions on pages 76 and 77.
- Students who finish early have the option of adding a counterargument and a reason for disagreeing with it to their introductions if they are writing an argumentative essay.
- **Wrap-Up:** Project Polls 1 and 2.

End of Lesson 3

Lesson 3 Materials

- Elements of a Research Essay
- Highlighted Sample Essay Introduction
- Sample Essay

Lesson 4: Revising and Writing a Conclusion

K **Spotlight:** Students analyze the Spotlights showing supporting evidence for claims to prepare for their own revisions.

4 min

Project: Spotlight app and read aloud the samples prepared or the samples selected from students' Writing Journals.

Call on students to discuss how the evidence in each spotlight supports the writer's claim.

L **Select Text & Revise:** Students identify places to revise their body paragraph, then write additional evidence or describe evidence further.

13 min

Writing Journal: Students revise and rewrite their body paragraphs on pages 78 and 79.

Discuss responses.

M **Present & Select Text:** Students read the Elements of a Conclusion and identify and discuss the conclusion in the sample essay.

12 min

Read aloud the Elements of a Conclusion on page 677 of the Student Edition.

OPT Project: Digital activity for Select Text.

Use the Sample Essay for students to identify the claim and final thought.

Lesson 4 (continued)

N **Write & Share:** Students restate their claim and write a final thought to draft their essay conclusions, then share with the class.

16 min

Writing Journal: Students write their conclusions on page 80.

On-the-Fly: Circulate around the room to support students.

Share: Select 2 or 3 students to read aloud their favorite 1 or 2 conclusions.

End of Lesson 4

Lesson 4 Materials

- Sample Claim Statement and Conclusion
- Sample Essay

Lesson 5: Finishing and Editing the Essay

O **Check-In & Revise:** Students answer questions about the progress of their essays, then review the Elements of a Research Essay to help them complete all the elements of their essay.

12 min

- **Project:** Self-Assessment activity from the digital lesson.
- **Writing Journal:** Students note which things they say "No" to.
- Circulate to review student responses to the Self-Assessment. Make a note to revisit during writing any students who answered "Yes" to question 6.
- Read aloud the Elements of a Research Essay on page 677 of the Student Edition.
- You can complete whatever parts of your essay still need some work. Focus on revising your introduction, body paragraphs, or conclusion to make your essay stronger.
- **Writing Journal:** Students make improvements to their essay components, then write a complete draft on pages 81 and 82.
- If devices are available, direct students to type their revised essays into their digital workspace.

P **Revise:** Students use Editing Process guidelines to edit their essays.

20 min

- Go over the steps of the Editing Process on page 678 of the Student Edition.
- **Writing Journal:** Students use the Editing Process to edit their essays

Lesson 5 (continued)

Q **Write:** Students write a final copy of their essay.

10 min

- **Writing Journal:** Students write the final copy of the essay on pages 85 and 86.

R **Share:** Students share their writing, demonstrating command of formal English, and provide feedback to others.

10 min

- Reading your writing aloud is a great way to catch errors and look for new writing opportunities.
- Give students a few minutes to find one moment in their essay— no more than a paragraph—that they want to share.
- **Share:** Call on 2 or 3 volunteers to share. Each volunteer should call on 1–3 listeners to comment.
- As you read, pay attention to spelling, punctuation, and grammar, and note any changes you might want to make.

End of Lesson 5

Lesson 5 Materials

- Elements of a Research Essay
- Editing Process

Lesson 6: Creating Citations and a Works Cited List

S **Spotlight Intros & Conclusions:** Spotlight student writing to provide examples of strong leads in introductions and restatements of the claims in conclusions.

5 min

- Read aloud 2 strong introductions and 2 strong conclusions from student essays.
- What are the claims in these introductions?
- What are the leads? What makes them effective?
- What are the restatements of the claims in the conclusions? What makes them effective?

T **Revise:** Students write their in-text citations to show where their evidence comes from.

10 min

- Read aloud the Guidelines for In-Text Citations on page 679 of the Student Edition.
- Answer any questions students may have. Explain that when citing texts from the Collection, students should include paragraph (par.) numbers from the text in parentheses at the end of the quotation.
- **Writing Journal:** Students review and finalize the in-text citations in their essays on pages 83 and 84.

Lesson 6 (continued)

U **Write:** Students create a Works Cited page to show sources used in their essay

20 min

- Read aloud the Guidelines for a Works Cited page.
- Explain that students also need a complete list of citations titled "Works Cited" below their essay.
- **Writing Journal:** Students create their Works Cited pages on page 87.

End of Lesson 6

Lesson 6 Materials

- Guidelines for a Works Cited Page
- Essay Rubric

Before You Begin Lessons 7 & 8:

These lessons involve extensive use of a timeline-generating website and should be saved for a class period when students have access to the Internet.

Amplify ELA Staff Credits:

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