Challenger CENTER

In Partnership with

MINECRAFT EDUCATION

Apollo to Artemis and Beyond

An Introduction to the United States History of Moon Exploration

Student Ages
8-13

Subjects
History and Culture
Science

Skills
Collaboration
Communication
Critical Thinking

Estimated Time
45-55 minutes

Educational Settings
Classroom
Informal *(museums, science centers, and camps)*

LESSON OVERVIEW

Students will be introduced to NASA's Moon exploration program to learn why NASA is returning with the Artemis missions and what that means for the future of space exploration.

LEARNING OBJECTIVES

Students will . . .

- understand the history of NASA's Moon exploration programs, and
- understand the importance of the Artemis program and its goals.

TEACHER NOTES AND PREP

Background

The United States' journey to the Moon started in 1962 and was prompted by the Soviet Union's launch of Sputnik, an artificial satellite, into space. The United States had been engaged in the Cold War with the Soviet Union. The Soviet Union had already achieved many firsts in space exploration.

The United States wanted to establish itself more firmly as a leader in technology and space exploration, so it set an audacious goal. On September 12, 1962, President Kennedy announced the goal to land on the Moon before the decade's close. Between 1968 and 1972, America launched nine human missions to the Moon. Of these missions, six touched down and allowed 12 men to walk on the lunar surface. On July 20, 1969, Buzz Aldrin and Neil Armstrong became the first humans to walk on the Moon.

After the Apollo program concluded in the 1970s, NASA worked on making space more accessible through the development of the Space Shuttle. NASA also collaborated with many countries to develop the International Space Station, a research laboratory and habitat that has orbited Earth and been continuously occupied by humans for over 20 years. The knowledge NASA gained through the Space Shuttle program, aboard the International Space Station, and via other space exploration programs will help the United States to establish a base on the Moon.

Recently, NASA returned to Moon exploration with a mission called Artemis. With Artemis, NASA aims to establish a long-term human presence on the Moon and prepare for a more complex human mission to Mars. Another goal of the Artemis program is to place the first woman and the first person of color on the Moon. The name "Artemis" pays homage to the Apollo program, Apollo being Artemis' twin brother in Greek mythology.

In 2022, NASA completed the Artemis I mission in which an uncrewed space capsule made an orbit around the Moon and safely returned to Earth. This is leading to what will be a crewed mission to the Moon, Artemis II, which is currently expected to occur in 2024.

Preparation

The goal of this lesson is to help students understand the history of NASA's Moon exploration efforts and the new Artemis mission to return to the Moon for the first time in 50 years. To do this, students will construct a timeline of events that include early achievements in space exploration, NASA's first visit to the Moon through the Apollo program, NASA's current plans for Moon exploration through the Artemis program, and plans for the future after Artemis.

Print and cut out the 12 Apollo to Artemis History Cards. There are four groups of three cards. Below is a summary of the groups of cards.

[EDUCATOR NOTE: Years are not included on the cards as that would make it too easy for students to put the cards in order. Let students use their critical thinking skills to construct the timeline. The information below is primarily to help prepare you to support timeline construction.]

Card Group 1: Getting to the Moon with Apollo (1957-1972)

- Space Exploration Firsts (1957-1961)
  Firsts in space exploration that led to the United States setting the goal of landing on the Moon.
- Setting the Moon Landing Goal (1962)
  The famous speech in which President John F. Kennedy set the United States' goal to get to the Moon.
- First Moon Landing (1969)
  Two humans, Neil Armstrong and Buzz Aldrin, landed on the Moon for the first time.

Card Group 2: From Apollo to Artemis (1970s-2022)

- First Reusable Space Vehicles (1970s and 1980s)
  After reaching the Moon, we developed reusable space vehicles that could take humans and things to space over and over again.
- First Habitats in Space (1980s and 1990s)
  Once we could reliably, regularly transport humans and cargo to space, we began building the first habitats in space, including the International Space Station (ISS).
- Conducting Research in Space (1998 to Today)
  The experience of building the ISS and the research conducted on it will help us build a habitat and stay on the Moon longer than we ever have before.

Card Group 3: New Frontiers with Artemis (2022-2023)

- Artemis Missions Launch (2022)
  Artemis I was an uncrewed flight to test the safety of the vehicle and test the orbit path around the Moon and back to Earth. Artemis I was a success!
- Remaining Artemis Missions (Estimated 2024-2025)
  Artemis II will be the first crewed mission, carrying four astronauts on a lunar flyby. Artemis III will land astronauts on the lunar surface for research.
- Laying the Groundwork for Mars (Estimated 2025-2033)
  While on the Moon, we will build habitats and learn what humans need to live in space for a long time. This information will help us plan for a long trip to Mars.

Card Group 4: After Artemis (2030s and Beyond)

- Launch Mars Missions (Estimated 2033)
  The Artemis missions are complete, and we are ready to get astronauts to Mars! NASA aims to launch astronauts to Mars by the late 2030s or early 2040s.
- Establishing a Base on Mars (Estimated 2030s to 2040s)
  We will use what we learned on the Moon to build habitats that can sustain human life on Mars.
- Decide Where to Go Next!
  You're up! Where would you go next to explore space?

STUDENT ACTIVITIES

Supplies

- Print and cut out the Apollo to Artemis History Cards

Warm-Up and Introduction (5 minutes)

Briefly explain that NASA put humans on the Moon in the 1960s and 1970s. Then, there was a long period in which we continued space exploration closer to Earth. Now, NASA aims to go back to the Moon, and eventually, beyond the Moon to Mars.

Do not give further details as students will learn more about the specific history through the timeline activity.

Timeline Activity (30-40 minutes)

- Break students into groups.
  [EDUCATOR NOTE: You may give each group a full set of cards (best for older students), or one groups of cards (best for younger students.]
- Explain that students will be given cards that include facts about the Moon exploration history and plans.
- Each group will use their critical thinking skills to read the facts on the cards and arrange them in the proper timeline.
- Students will then share their timelines with the class and explain their reasons for selecting this order.
- If you split the full set of cards across several groups, a second step is to place each set of cards in proper order to complete the full timeline.
- After students present their timelines and thoughts, you will then reveal the correct order of the timeline. This may be a good time to share with students the video clip of President Kennedy's "We Choose to Go to the Moon" speech so students understand how the Moon exploration program was started.

- After reviewing the timeline and explaining each event along the way, have them return to discussions with their groups.

Post Activity Discussion Questions and Activities (10 minutes)

Ask the class open-ended questions to extend their critical thinking and learning about the United States history and plans:

- What do you think of the timeline? Did anything stand out to you?
- What do you think about the long pause of 50 years in returning to the Moon?
- Imagine you are the leader of a country, like the President of the United States. How would you respond if another government/nation is beating your nation in science and technology? Why does your response matter?
- What are the advantages of using the Moon as a starting point for missions to Mars?
- Where would you go after Mars and why?

GUIDING IDEAS AND QUESTIONS

- What were the key moments in NASA's exploration of the Moon?
- Why is going back to the Moon important?
- What might we learn from the Artemis missions and how will we use that information?

PERFORMANCE EXPECTATIONS

Students will develop an understanding of NASA's Moon exploration programs over the years, as well as how the current Artemis program fits into this history with its new goals.

Students will develop social-emotional skills working together in groups to collaborate, think critically about the sequences of events, and present a unified arrangement to the class.

NGSS SCIENCE AND ENGINEERING PRACTICES

For educators based in the United States, the Next Generation Science Standards (NGSS) Science and Engineering Practices in this lesson are:

- obtaining, evaluating, and communicating information; and
- engaging in argument from evidence.

EXTERNAL REFERENCES

JFK Library | "We Choose to Go to the Moon" Speech
https://www.jfklibrary.org/learn/about-jfk/historic-speeches/address-at-rice-university-on-the-nations-space-effort

NASA | How We Are Going to the Moon
https://youtu.be/_T8cn2J13-4

NASA | July 20, 1969: One Giant Leap For Mankind
https://www.nasa.gov/mission_pages/apollo/apollo11.html

NASA | Then and Now: Apollo to Artemis
https://www.nasa.gov/feature/then-and-now-apollo-to-artemis

Apollo to Artemis and Beyond

NASA | Why the Moon
https://youtu.be/bmC-FwibsZg

Seeker | NASA's 2024 Artemis Moon Landing Mission Explained
https://youtu.be/B2lA3Uu29KI

Space.com | The Apollo Program: How NASA Sent Astronauts to the Moon
https://www.space.com/apollo-program-overview.html

SUPPORTING FILES

- Vocabulary List
- Apollo to Artemis History Cards
- Discussion Questions

EXTENSIONS

GAMIFY THIS LESSON

Once students have an understanding of the historical order of events, divide them into groups. Use the timeline cards to read out facts, and have students arrange them in the correct order. Each correct answer earns 10 points. The group with the most points gets to pick which planet will be added to the timeline for future study. If there's a tie, add multiple planets for students to explore.

LANGUAGE ARTS EXTENSION

Put your students in the shoes of a public relations specialist during the Cold War era. Task them to think creatively and strategically while designing flyers and other marketing materials to persuade the American public to support the space race and Moon program. Use knowledge gained from this lesson to create compelling and persuasive messages and consider highlighting the benefits of space exploration (technological advancements, national pride, and scientific discoveries).

STEAM EXTENSION

Use the timeline graphics to inspire students' artwork! Ask them to design their own artificial satellites, space launch systems, astronaut uniforms, and more. Share their artwork on social media using the hashtag #ChallengerCenterMinecraftEd!