

Moonward Bound

The Space Race

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Published by *K20 Center*

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Grade Level	10th Grade	**Time Frame**	100 minutes
Subject	Social Studies	**Duration**	2 periods
Course	U.S. History		

Essential Question

What was the Space Race? What was its impact on the U.S. and the world?

Summary

This lesson focuses on events that led up to and occurred during the "Space Race" between the United States (U.S.) and the Union of Soviet Socialists Republic (U.S.S.R.). The lesson introduces students to the astronauts, cosmonauts, scientists, and politicians who played pivotal roles on both sides. Students explore an interactive timeline to gain an understanding of the events that transpired in both nations over the course of the Space Race. They will also watch and analyze an ICAP interview with aerospace engineer Donna Shirley, who was a manager of NASA's Mars Exploration Program. In the interview, Shirley discusses her experiences in school and on the job.

Snapshot

Engage

Students assess their prior knowledge of the Space Race using the 30-Second Expert instructional strategy.

Explore

Students analyze quotes about the Space Race using the S-I-T instructional strategy.

Explain

Students examine a Space Race timeline and record their observations using the Fishbone instructional strategy.

Extend

Students watch an interview with the famous aeronautical engineer Donna Shirley, in which she speaks about her experiences in school and on the job. Students reflect on the video by completing a 3-2-1 activity.

Evaluate

Students link what they have learned to current events by responding to an Exit Ticket prompt.

Standards

Oklahoma Academic Standards (Social Studies: United States History (9th through 12th grade))

USH.6.2: Describe domestic events related to the Cold War and its aftermath.
USH.6.2B: Examine the impact of the proliferation of nuclear weapons and the resulting nuclear arms race, the concept of brinkmanship, the doctrine of mutually assured destruction (MAD), the launching of Sputnik and the space race.

Attachments

- Fishbone—Moonward Bound.docx
- Fishbone—Moonward Bound.pdf
- Lesson Slides—Moonward Bound.pptx
- S-I-T—Moonward Bound.docx
- S-I-T—Moonward Bound.pdf

Materials

- Lesson Slides (attached)
- S-I-T handout (attached; one per student)
- Moonward Bound Timeline (linked)
- Fishbone note catcher handout (attached; one per student)
- Pencils or pens
- Notebook paper
- Student computers or tablets
- Internet access

15 minutes

Engage

Use the attached **lesson slides** to guide the lesson. Review the essential questions on **slide 3** and the lesson objectives on **slide 4**.

Move to **slide 5** and introduce the 30-Second Expert strategy. Ask students to draw a T-chart and label one side “What I know about this topic” and the other “What my partner knows about this topic.”

Show **slide 6** and give students about 5 minutes to write down all they know about the Space Race in the left column. Next, give them another 5 minutes to share with a partner. Ask them to fill out the right side of their T-chart as they discuss with their partner.

Teacher's Note: More Information

Consider watching the K20 Center’s 30-Second Expert video for more information on the strategy.

Once students have finished the exercise, call on a few volunteers and ask them to share what they know about the Space Race and what they learned from their partners about it.

15 minutes

Explore

Show **slide 7** and introduce the S-I-T strategy. Distribute the **Moonward Bound S-I-T handout.** The handout contains a list of quotes relating to the Space Race that were taken from oral history interviews and other sources.

Give student groups at least 10 minutes to read through the quotes together. Then, ask groups to use the S-I-T strategy to discuss whether the information presented in each quote strikes them as *surprising*, *interesting*, or *troubling,* and why.

After groups have had time to discuss, call on a member of each group to share at least one of the quotes they found *surprising*, *interesting*, or *troubling*. Invite student groups to share their reasoning with the class.

Possible Student Responses

- ***Surprising:*** *We were surprised that Jerry Elliott could see Sputnik from his backyard in Oklahoma City.*
- ***Interesting:*** *We thought it was interesting that Katharine Johnson was able to use algebra to help Alan Shepard return to Earth from orbit.*
- ***Troubling:*** *We found it troubling that Gus Grissom knew he was risking his life and was tragically killed in an accident.*

45 minutes

Explain

Assign each student the number 1, 2, or 3. Tell students that they will be exploring a portion of an interactive timeline that documents the entire history of the Space Race, and the number they have been assigned will determine the portion of the timeline that they will be exploring. All groups will be reading the first three entries of the timeline that explain the events between 1945-1955 that led up to the start of the Space Race. The groups will then be tasked with exploring events from the following time periods in the timeline:

- Group 1: July 30, 1955 - Jan. 31, 1961
- Group 2: April 12, 1961 - June 3, 1965
- Group 3: Feb. 3, 1966 - July 17, 1975.

Show **slide 8** and introduce the Fishbone instructional strategy. Distribute the **Fishbone handout** and direct students to the Space Race timeline. Explain to students that they will have about 15 minutes to read their assigned portions of the timeline. Encourage them to take notes either on the back of the Fishbone handout or on a separate piece of paper.

1. Once students have finished taking notes, move to **slide 9** and tell students to write down in the "Moon" space of the handout what they think the key outcome was for both countries during the time period they have just researched.
2. Next, instruct students to list in each of the three spaces above the "Rocket" a different factor that contributed to the outcome they have identified.
3. Have them write examples next to each factor to demonstrate how that factor led to the outcome.
4. Instruct students to repeat this process in the bottom three spaces below the rocket for the U.S.S.R.
5. Give students at least 15 more minutes to complete this part of the activity.

After students have had time to explore and take notes on their own, allow them about 5 minutes to meet with their groups to share what they wrote in their handouts. Then, engage in a full class discussion, and invite a representative from each group to share the most significant takeaways from each group.

Teacher's Note: Group Work

As an alternative to the instructions listed above, you are welcome to use a different grouping strategy for your class. For instance, if you would like to have students work in groups throughout the activity but you have a large class, you could further divide Groups 1, 2, and 3 into groups of 3-4. Those small groups could complete the activity together and share their findings with the class at the end.

Possible Student Responses

Below are examples of responses that students from each group could include in their Fishbone handouts. They by no means need to list all of this information, and they will likely find many other ways of classifying the following examples.

Group 1: *Outcome:* Both countries show that they have the technology needed for successful space exploration.; *U.S. Factor 1:* Satellites (Explorer 1, SCORE, Explorer 6); *U.S. Factor 2:* Programs (NASA, Project Mercury); *U.S. Factor 3:* Firsts (1st to announce plan for satellite launch, 1st communications satellite, 1st voice broadcast in space, 1st picture of Earth from a satellite, 1st Great Ape in space); *U.S.S.R. Factor 1:* Satellites (Sputnik 1, Sputnik 2); *U.S.S.R. Factor 2:* Programs (Satellite launch effort, Luna Program); *U.S.S.R. Factor 3:* Firsts (1st satellite in orbit, 1st animal in orbit, 1st spacecraft to reach Moon, 1st spacecraft to land on Moon)

Group 2: *Outcome:* People from both countries are motivated to prove that space travel is possible.; *U.S. Factor 1:* Politics (JFK speech to Congress, JFK Goes to Vienna Summit, Meeting of JFK & Glenn & Titov, JFK Rice Univ. speech); *U.S. Factor 2:* Programs (Project Mercury, Project Apollo, Project Gemini, NASA); *U.S. Factor 3:* Firsts (1st American in space, 1st American to orbit Earth, 1st American spaceflight with multi-person crew, 1st American spacewalk); *U.S.S.R. Factor 1:* Politics (Khrushchev Goes to Vienna Summit, Meeting of JFK & Glenn & Titov); *U.S.S.R. Factor 2:* Programs (Vostok, Voskhod); *U.S.S.R. Factor 3:* Firsts (1st person in space and to orbit Earth, 1st long-duration flight in space, 1st woman in space, 1st spaceflight with multi-person crew, 1st spacewalk)

Group 3: *Outcome:* After the U.S. wins the race to the Moon and losses are suffered along the way, both countries decide to explore space together.; *U.S. Factor 1:* Tragedies (Apollo 1, Robert H. Lawrence Jr.); *U.S. Factor 2:* Programs (Project Gemini, Project Apollo, Surveyor, Apollo-Soyuz); *U.S. Factor 3:* Firsts (1st successful docking of two orbiting spacecraft, 1st American spacecraft to land on Moon, 1st people to orbit Moon, 1st people to walk on Moon, 1st successful rescue of astronauts after explosion in space, 1st drive around surface of Moon); *U.S.S.R. Factor 1:* Tragedies (Soyuz 1, Soyuz 11); *U.S.S.R. Factor 2:* Programs (Luna Program, Soyuz Program, Apollo-Soyuz); *U.S.S.R. Factor 3:* Firsts (1st spacecraft to make soft landing on Moon, 1st-ever photo on Moon's surface, 1st spacecraft to orbit Moon, 1st space station)

15 minutes

Extend

Teacher's Note: ICAP Videos

The goal of an ICAP video is to expose students to different career opportunities in fields related to this content. Let students know the video they will watch has a threefold purpose:

- To detail the educational background of the speaker and the path the speaker took to get to her career;
- To highlight the experiences of the speaker during her career as an aerodynamicist; and
- To provide them with an understanding of the steps they will need to take in order to pursue a career in the aeronautics industry.

Display **slide 10,** which contains an introduction slide for the interview with the aeronautical engineer, Donna Shirley. Briefly review the details with students.

Use the link on **slide 11** to play the ICAP interview for students.

Embedded video

https://youtube.com/watch?v=JZgVzrLKltQ

Among other things, Donna Shirley describes her determination to pursue a career in aerodynamics, despite the fact that some people told her that being a woman would make her ineligible in that field. She also talks about the many triumphs and occasional failures she experienced while working at NASA's Jet Propulsion Laboratory and ultimately as the Manager of the Mars Exploration Program.

Teacher's Note: Video Index

The interview video is approximately 16 minutes long. While it is recommended that students watch the video in its entirety, if you decide that you would like to skip over portions of it due to time constraints, you are welcome to consult the index below. It includes the questions asked throughout the video and the times at which they occur.

- Intro - 0:05
- How did you become interested in the field of aeronautics? - 0:15
- What was it like pursuing a career field historically crowded with men? - 0:57
- What exactly did you do as an Aerodynamicist, and how did that fit into the larger context of the work being done at JPL? - 2:55
- How did your missions to Mercury and Saturn prepare you for the work you would later do on the Pathfinder/Sojourner Mission and the Mars Rover? - 4:28
- Can you talk us through the Mars Rover mission and your time as Mars Program manager? - 5:33
- What challenges are there in communicating such technical topics to the general public? - 8:02
- What was it like working on NASA missions at the height of the Space Race? - 8:57
- What led you to return to higher education? - 12:29
- What can students do to begin pursuing a career in aeronautics and engineering? - 13:59
- What improvements have we made for girls who want to be engineers and astronauts, and what work do we still have to do? - 14:55

As students watch the interview, they should keep the following 3-2-1 questions in mind:

- What are **3** things you learned about having a career in the aeronautics industry?
- What are **2** things you would do if you wanted to pursue a career in a STEM field, such as aeronautical engineer?
- What is **1** thing Shirley said that really resonated with you?

Display **slide 12.** Remind students of the questions and give them about five minutes to write down their answers. Spend another five minutes inviting students to share their responses with the rest of the class.

Teacher's Note: Further Reading

If students are interested in learning more about Shirley's experiences, encourage them to read her autobiography, *Managing Martians.*

10 minutes

Evaluate

Show **slide 13** and introduce students to the Exit Ticket strategy.

Have students write a 1–2 paragraph on a separate sheet of paper a response to the following prompt: “NASA has announced the start of the Artemis program, which may have people landing on the Moon as soon as 2027. Do you think we should go back to the Moon?”

Have students turn in their exit ticket on the way out.

Resources

K20 Center. (2020, September 16). Bell ringers and exit tickets. Strategies. https://learn.k20center.ou.edu/strategy/125

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