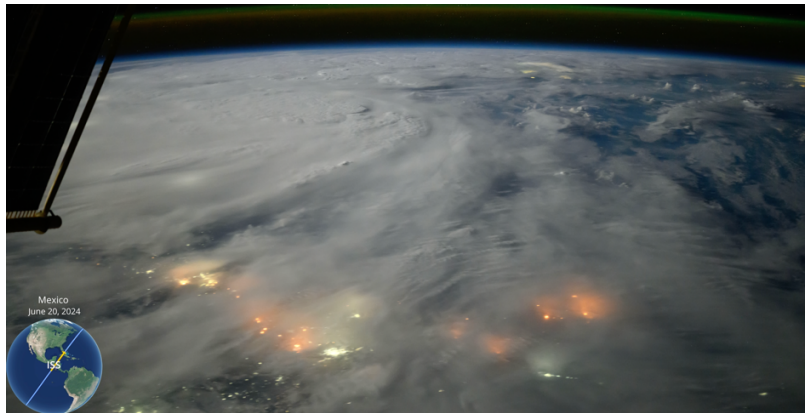


# Space Exploration: Is It Worth It?

## A Lesson in Argumentation

Developed by: Pam Kraus



### Description

This cross-curricular lesson investigates the importance of continued space exploration and culminates with a debate on this topic providing students with the opportunity to analyze and interpret data, develop an argument, and present it with their conclusions. These are cross-curricular skills found in Science, English Language Arts, and Social Studies standards, providing an opportunity for collaboration across subject areas.

### Grade Level

High School (can be modified for middle school use - see below)

### Duration

Approximately ten 45-minute lessons plus time to complete debate rounds

## Materials

Internet access and devices for students for research

Sticky Notes or electronic platform for Driving Question Board

- [GOOGLE FOLDER](#) with resources
- Slide Shows
  - [ISS Facts](#) PowerPoint
    - [NASA website](#)
  - [Overview Effect](#) PowerPoint
    - [10 Astronaut Quotes on the Overview Effect](#) (slide 2)
    - [Emily Calandrelli](#) video (slide 3)
    - [Houston We Have a Podcast](#) – Frank White (slides 5 & 6)
- Videos
  - [Earth Music Theater](#) video
  - [Public Forum Debate Round Intro](#)
- Websites
  - [National Speech and Debate Association](#)
- Lessons and Other Resources
  - [WORLD MAP](#)
  - [Driving Question Board](#)
  - [Lesson 6 Argumentation](#)
  - [RESOURCES](#) (select “Public Forum Debate in the menu on the left)
  - [Lesson 1 Intro to Middle School Public Forum Debate](#)
  - [Format for Public Forum Debate](#)
  - [Introduction to Public Forum and Congressional Debate](#)
- [NASA Resources](#) to begin research
  - [10 Things: What We Learn About Earth By Studying the Moon](#)
  - [NASA Technologies Spin off to Fight Climate Change](#)
  - [Studying Hurricane Beryl from Space](#)
  - [NASA's Economic Impact in 2023](#)
  - [Benefits Stemming from Space Exploration](#) (be aware of publication date, however, it may trigger some ideas for arguments that can then be researched further and newer evidence found)
- Rubrics
  - [SIMPLE RUBRIC](#)
  - [PUBLIC FORUM DEBATE RUBRIC](#)
- Standards
  - [Next Generation Science Standards](#)
    - [Science & Engineering Practices](#)
    - [Disciplinary Core Ideas](#)
    - [Crosscutting Concepts](#)
  - [Social Studies Themes from the National Council for the Social Studies](#)
  - [Common Core State Standards for English Language Arts](#)

## Learning Goals

*Topic:* Should we continue to invest in space exploration?

*Cross-curricular lesson:* Science, English, and Social Studies

*Performance Expectations:* Students will be able to develop a clear, organized argument and communicate it effectively.

*Specific Learning Outcomes:* Students will gather data, analyze it, develop an argument, and present it in a debate format.

*Prior Student Knowledge:* Claim-Evidence-Reasoning (CER); Basic research skills; If students have prior knowledge of debate portions of this lesson won't be necessary.

| Next Generation Science Standards addressed in the lesson                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                        |
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| <b>Science &amp; Engineering Practices</b> <ul style="list-style-type: none"> <li>Asking Questions and Defining Problems</li> <li>Analyzing and Interpreting Data</li> <li>Constructing Explanations and Designing Solutions</li> <li>Engaging in Argument from Evidence</li> <li>Obtaining, Evaluating, and Communicating Information</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Disciplinary Core Ideas</b> <ul style="list-style-type: none"> <li>ESS1.A The Universe and its Stars</li> <li>ESS1.B Earth and the Solar System</li> <li>ESS1.C The History of Planet Earth</li> <li>ESS2.B Plate Tectonics and Large-Scale System Interactions</li> </ul> | <b>Crosscutting Concepts</b> <ul style="list-style-type: none"> <li>Systems and Systems Models</li> <li>Interdependence of Science, Engineering, and Technology</li> <li>Influence of Engineering, Technology, and Science on Society and the Natural World</li> </ul> |
| Social Studies Themes from the National Council for the Social Studies addressed in the lesson                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>Time, Continuity, and Change</li> <li>People, Places, and Environments</li> <li>Individuals, Groups, and Institutions</li> <li>Power, Authority, and Governance</li> <li>Production, Distribution, and Consumption</li> <li>Science, Technology, and Society</li> <li>Global Connections</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                        |
| Common Core State Standards for English Language Arts addressed in the lesson                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.</li> <li>WHST.9-12.1 Write arguments focused on <i>discipline-specific content</i>.</li> <li>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</li> <li>SL.11-12.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.</li> </ul> |                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                        |
| <b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>Misconception that debates lack structure and are based on opinions</li> <li>General lack of awareness or understanding of current state of space exploration</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                        |

## Lesson Activities:

| 5E Model Lesson Plan:                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <p><b>Engage:</b> Capture students' interest and connect the lesson to their prior knowledge.<br/>(30 minutes)</p>                      | <ul style="list-style-type: none"> <li>• Introduce facts about the International Space Station (ISS) using <a href="#">ISS Facts</a> PowerPoint (also found in Materials, above)</li> <li>• Show clips from <a href="#">Earth Music Theater</a> ("Same Movie-with Guitarscapes") of views from the ISS; select approximately 7-10 minutes from the video or use these clips (see Materials, above, for video locations with timestamps for the entire video) <ul style="list-style-type: none"> <li>○ 0:00-2:03</li> <li>○ 3:35-5:20</li> <li>○ 7:50-8:20</li> <li>○ 10:30-10:45</li> <li>○ 12:20-13:00</li> <li>○ 18:50-19:20</li> <li>○ 30:45-31:30</li> <li>○ 39:30-42:20</li> <li>○ 45:20-45:50</li> </ul> </li> <li>• Provide access to a world map as they watch the video. <a href="#">WORLD MAP</a> (also found in Materials, above)</li> <li>• Instruct students to jot down notes while they watch, including questions, feelings, locations/geographical features they recognize, comparisons with the world map, etc.</li> <li>• Have a few students share from their notes to stimulate discussion</li> <li>• Introduce the "overview effect" using <a href="#">Overview Effect</a> PowerPoint (also found in Materials, above)</li> </ul> |
| <p><b>Explore:</b> Allow students to investigate the topic through hands-on activities and collaborative tasks.<br/>(10-15 minutes)</p> | <ul style="list-style-type: none"> <li>• Based on their notes and the class discussion, develop a <a href="#">Driving Question Board</a> (DQB) (also found in Materials, above) by having students place sticky notes under these three headings: Our Ideas, Our Questions, What We Figured Out. Alternatively, use an electronic format that can be accessed and edited by the entire class to develop the DQB.</li> <li>• DQB will be used in the next section of the lesson to determine the resolution for the debate</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

**Explain:** Facilitate understanding through direct instruction and student explanation.  
(180 minutes)

- Explain to students that they will be working in teams to conduct a public forum-style debate
  - Note to Teacher – the purpose of this lesson isn’t to become proficient in a certain style of debate, but to learn how to develop and communicate an effective argument. Feel free to set up the debate format in whatever way works best for your situation. The resources provided are designed to help you teach about the Public Forum Debate format, but feel free to stress the parts of an argument and develop your own usable format for structuring and delivering their argument. If this is being taught as a cross-curricular lesson, utilize the ELA teacher to teach the debate portion. The other teachers can assist with research related to their subject areas.
- Use resources from the [National Speech and Debate Association – Lesson 6 Argumentation](#) (also found in Materials, above) to introduce the parts of an argument: claim, data, warrant, impact (**relate these to prior knowledge of claim, evidence (data), and reasoning (warrant)**; impact will be a new addition)
  - Follow Lesson 6 (eliminate Part 2 and reading in textbook due to time considerations)
- Note - Public Forum debate has been chosen as the debate format as it is easier for newcomers to learn. See these [RESOURCES](#) (select “Public Forum Debate in the menu on the left) for assistance in teaching this style of debate. Feel free to modify the structure and length of the debate to fit your classroom/student needs.
- Use resources from the [National Speech and Debate Association – Lesson 1 Intro to Middle School Public Forum Debate](#) PowerPoint (also in Materials, above) to introduce the Public Forum Debate format.
  - Note – although the above referenced lesson is designed for middle school, the level is sufficient for introducing high school students to the Public Forum Debate format. If the students have prior debate knowledge, this lesson won’t be necessary.
- Refer back to the DQB developed previously. Lead the students in a discussion about their questions. If necessary, steer the conversation to the topic of the pros and cons of space exploration. Ultimately, you will want to arrive at the resolution for the debate:
  - Resolved: The United States should continue to support and provide funds for space exploration.
- Provide students with the table showing the [Format for Public Forum Debate](#) (or substitute a table of your own making if you are altering the format). Table can also be found in Materials, above. Go over the format together.
- Explain that in a debate each team has to research and prepare for both the affirmative and the negative case since they won’t

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| <p><b>Elaborate:</b> Extend students' understanding and apply knowledge in new contexts.<br/>(225 minutes)</p>                                                                              | <ul style="list-style-type: none"> <li>Students will research the resolution topic (Resolved: The United States should continue to support and provide funds for space exploration.) <ul style="list-style-type: none"> <li>Note – Depending on the ability level of students and their prior experience with research, you may want to develop another DQB as a class to assist them in organizing their ideas prior to starting research. Also, see <a href="#">NASA Resources</a> (also found in Materials, above) for a few suggested articles to begin research.</li> <li>Have them refer to <a href="#">Introduction to Public Forum and Congressional Debate</a>, Chapter 12 – Preparing for Tournaments, using sections on Preparation in Public Forum Debate, Research, and Materials (pages 114-120) (also found in Materials, above), paying particular attention to citing sources</li> <li>Place teams in groups of 6 students to brainstorm possible sources and arguments to provide a starting point</li> <li>Teams will conduct research</li> </ul> </li> <li>Teams will develop their affirmative and negative arguments <ul style="list-style-type: none"> <li>Have them refer to <a href="#">Introduction to Public Forum and Congressional Debate</a>, Chapter 3 – Argument Construction (pages 13-19) (also found in Materials, above)</li> </ul> </li> <li>Teams will practice their speeches</li> <li>Throughout this team preparation time, teachers will monitor progress, and add class instruction when it is deemed necessary.</li> </ul> |
| <p><b>Evaluate:</b> Assess students' understanding and skills to gauge their progress and mastery of the lesson.<br/>(Time is dependent on # of rounds)</p>                                 | <ul style="list-style-type: none"> <li>Set up a system that allows all teams to participate in at least one round of debate. As time allows you may want to set up brackets and have a mock tournament. <ul style="list-style-type: none"> <li>Consider inviting parents, other classes, staff, etc. to observe</li> </ul> </li> <li>Select one of these rubrics to evaluate the teams (both rubrics are also found in Materials, above). <ul style="list-style-type: none"> <li><a href="#">SIMPLE RUBRIC</a></li> <li><a href="#">PUBLIC FORUM DEBATE RUBRIC</a></li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p>Differentiation Strategies:</p> <ul style="list-style-type: none"> <li>Visual</li> <li>Auditory</li> <li>Kinesthetic</li> <li>Accommodations/Modifications for Learning Needs</li> </ul> | <p>Consider students' needs when making team assignments</p> <ul style="list-style-type: none"> <li>Use text-to-speech and/or browser extensions; read written descriptions</li> <li>Provide written instructions; have teammates provide written information</li> <li>Collaborative time with teammates allows for movement and interaction</li> <li>Extended time, simplified instructions, peer support from teammates, etc. as indicated in IEP/504</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

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| Modifications for Grade level | To modify for use in middle school use the materials provided (except for those teaching about public forum debate), but instead of preparing and delivering a debate, they will use the resolution and collaboratively research the topic, then use the evidence to write a Claim-Evidence-Reasoning statement. |
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