

# Cultural Relevancy Assignment #3

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Context Issues of the Lesson

<b>Unit or Lesson Title:</b>	<b>Mission to Mars</b>
<b>Grade Level</b>	<b>6<sup>th</sup> Grade Science</b>
<b>Topic/Theme/Nature of the Investigation:</b>	<b>The Challenges of Space Exploration</b>
<b>NGSS Performance Expectation(s)</b> <a href="#">Next Generation Science Standards</a>	<b>MS-ETS1-1</b> Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit solutions.
<b>NGSS Dimension 1 component</b> (Scientific and Engineering Practices) <a href="#">Dimension 1</a>	<ul style="list-style-type: none"> <li>➤ Obtaining, evaluating, and communicating information.</li> <li>➤ Asking questions and defining problems.</li> <li>➤ Engaging in argument from evidence.</li> </ul>
<b>NGSS Dimension 2 component</b> (Crosscutting Concepts) <a href="#">Dimension 2</a>	<ul style="list-style-type: none"> <li>• Influence of science, engineering, and technology on society and the natural world.</li> </ul>
<b>NGSS Dimension 3 component</b> (Disciplinary Core Ideas) <a href="#">Dimension 3</a>	<b>ETS 1.A</b> Defining and delimiting engineering problems.
<b>Duration:</b>	2 Weeks (Ten 50-minute class periods)

## Planning Stages Within the 5-E Inquiry Model

Engage	
<p><b>PURPOSE:</b> 1 Class Period</p> <ul style="list-style-type: none"> <li>• <b>Focus Question: What are the criteria and constraints for humans to live in space?</b></li> <li>• Introduction to Mission to Mars and Google Mars.</li> <li>• Think/Pair/Share observations of Mars.</li> <li>• Class KWL Chart</li> <li>• Exit Ticket: Class Survey “Would you volunteer to be a Mars pioneer?” + Research 1 Interesting Fact.</li> </ul>	
<p><b>What is the teacher doing? What are the students doing?</b></p> <ol style="list-style-type: none"> <li>1. Introduce the student’s new Mission to Mars that states your students have been selected by NASA to be the first humans to inhabit the planet of Mars. Introduce and have student’s read aloud <a href="#">NASA’s Journey to Mars Challenge</a>, and show the short video clips of “Buzz Aldrin Mars Mission” and “NASA Dreams of Boot prints on Mars” included in NASA’s Journey to Mars Challenge Website.</li> <li>2. Show <a href="#">NASA’s Mars as Art Slideshow</a>. Describe as the next frontier (clarify meaning of frontier).</li> <li>3. Think: On the interactive whiteboard, display Google Mars and ask students to go to Google Mars on their Chromebooks. Instruct to explore the surface of Mars and write down as many descriptive words that come to mind as you explore the aerial photography.</li> <li>4. Pair: Have pairs of students discuss their descriptive words, add any of your partners words to your list that you thought were accurate words that you did not think of.</li> <li>5. Share: Create a Word Cloud using Poll Everywhere and capture screen shot of class descriptive words. Invite pairs to share their observations.</li> <li>6. Create a class KWL Chart of prior knowledge of students, explore what students want to know about Mars, and brainstorm ways they can learn more about Mars.</li> <li>7. Pass out Exit Tickets. Have students check Yes, they would volunteer to go to Mars, No, they would not, or Undecided. Have students research 1 interesting fact they did not know about Mars.</li> </ol>	
Explore	
<p><b>PURPOSE:</b> 2 Class Periods</p> <ul style="list-style-type: none"> <li>• Students begin to consider advantages and disadvantages to space travel and habitation.</li> <li>• Students consider potential challenges pertaining to habitation on another celestial body.</li> <li>• Hypothesize potential problems that they may face as humans explore habitation outside of Earth.</li> <li>• Obtain, evaluate, and communicate information about the similarities and differences between Mars and Earth.</li> </ul>	
Activities (list)	Driving Question
<ol style="list-style-type: none"> <li>1) Create class survey of percentage of students that would be willing to go to Mars (briefly discuss why). Ask for volunteers to share interesting facts they found that they wrote on Exit Tickets (10 minutes).</li> <li>2) Class Discussion. Misconceptions, background, and history of Mars exploration (<a href="#">NASA Mars Exploration Website</a>).</li> </ol>	<ol style="list-style-type: none"> <li>1) Why are the conditions of Mars not as conducive to life as Earth’s environment?</li> <li>2) Why would we choose to attempt to inhabit Mars instead of the Moon or other planets?</li> </ol>

3) Read “ <i>Looking at Mars and Earth</i> ” and fill in Mars and Earth T-Chart. Include atmosphere, land features, gravity, access to water, and natural disasters of the two planets.	3) How are Mars and Earth the same and different?
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**Student Communication Product:** (written report, oral presentation, poster, etc.)  
 Create a flight plan and a list of tools and resources you will need for your mission. You may choose to select any method of project to display your gathered information. Be sure to include duration of travel, calculate amount of food and water you will need for survival, and create a list of materials to bring with you. Remember, your payload is limited in size and carrying capacity, be sure to include an estimated size and mass of your gear and supplies.

**Explain**

- PURPOSE:** 2 Class Periods
- Students discuss the pros and cons of living in space and construct an evidence-based argument for or against long-duration habitation using claims, evidence, and reasoning.
  - Make a claim for or against human habitation in space using supporting evidence and reasoning.
  - Introduce Key Vocabulary Terms: Rover, surface gravity, weight, and long-duration habitation.

**Read Aloud “*Living in Space*”:** After the reading, facilitate discussion of the accuracy of the student’s flight plans in comparison to this article. Were there any considerations that were included in the article that you did not think of? Define criteria and constraints that a civilization must include to ensure survival.

**Lab:** [NASA Let’s Investigate Mars Activity](#)

**Class Debate:** Divide the class into two large groups. Assign one group to be for Mars habitation, and the other group to be against Mars habitation. Guiding questions should include: Why should we even consider living in space? Who should be able to go there? Who should pay for the space travel and habitation? Would the money be better spent here on Earth? How should we learn from our mistakes humans have made on Earth?

**Content Media:** Watch [“Mars Making the New Earth Documentary”](#)

**Reflective Writing Piece:** Have students create a Claim, Evidence, and Reasoning Outline to help develop a one-page argumentative essay expressing your viewpoint for or against long-duration human habitation of Mars.

**Elaborate**

- PURPOSE:** 4 Class Periods
- Students focus on supporting life during long-duration habitation and begin designing possible solutions that take into consideration the criteria and constraints that survival will depend upon.

**Mars Exploration Timeline:**  
 As a class, have the students create a timeline for past events that have occurred on Mars and projected future timelines from research of NASA, Space X, and other credible sources.

[NASA's Mission to Mars Historical Log.](#)

**Mars Colony Design Project:**

Assign students into groups of 3-4. Have students survey and research Mars surface and select a location for their new colony. Be sure to document and include geographic location of new colony on a map. Either electronically or hand draw an architectural layout of the new city. Be sure to give the colony a name and label structures with descriptions.

**Extending/Application Questions for Whole/Small Group Discourse:**

From your research, Mars and Earth have many of the same planetary processes. How will the differences in gravity, magnetic field, or natural disaster/resources affect the success of habitation? What are the most important aspects should humans consider when designing colonies on Mars?

**Student Communication Product (assessment): STEAM Project**

Individually or with a partner, select one of the following STEM projects to complete:

- 1) A 3-Dimensional version of your Mars Colony.
- 2) Make a NASA Mars Rover
- 3) Code a Mars game or educational resource using Scratch.
- 4) Design a Mars space suit.
- 5) Invent a new piece of technology that everyone on Mars will need.
- 6) Think of your own project and get it approved.

**Content Media: Watch “The Martian” (2015) Movie.**

PG-13 Movie, will need parental permission.

**Evaluate**

PURPOSE: 1 Class Period

- Students demonstrate understanding of exploration and habitation of space.

<b>Skill/Reasoning Learning Objectives</b>	<b>Assessment Instrument</b>
Students are able to identify how Mars and Earth are similar and different.  Students are able to define criteria and constraints for human habitation of Mars to ensure survival.	9 Short Answer Questions
<b>Knowledge Learning Objectives</b>	<b>Assessment Instrument</b>
Students use claim, evidence, and reason to develop an argument for colonization.	1 Essay Question