

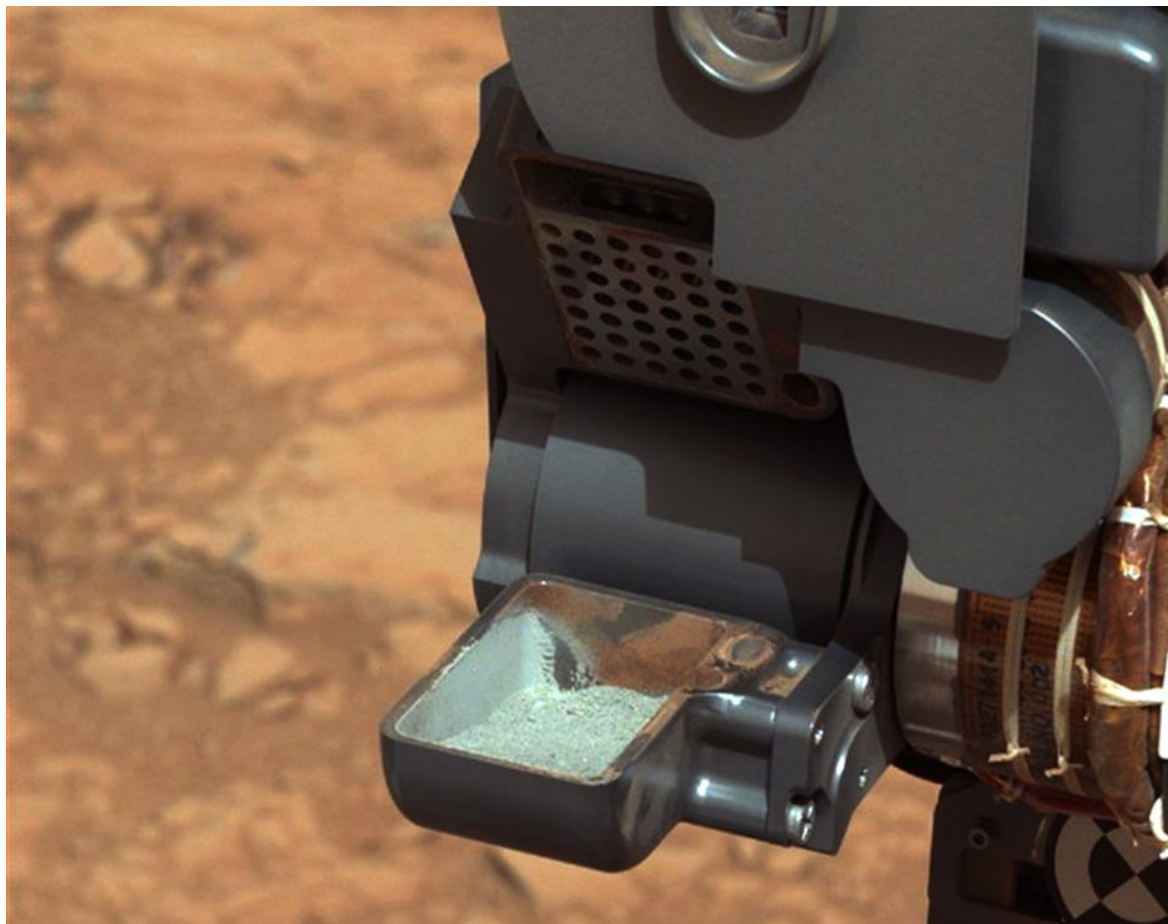


Mars Rover Celebration

Curriculum Module

Week 3: Designing the Mission

Lesson 8: Where is the Best Place to Measure?



Educational Product	
Educators & Students	Grades 3-5

www.marsrover.org

Week 3: Designing the Mission

LESSON 8:	WHERE IS THE BEST PLACE TO MEASURE?
GRADE LEVEL:	3-5
LENGTH:	1 DAY
VOCABULARY:	control variable

MATERIALS:

- Video: [Mars Rover Curiosity Trailer](#)
- Video: [The Challenges of Getting to Mars: Selecting a Landing Site for MSL Curiosity](#)
- Interactive: [NASA Explore Mars! Gale Crater](#).
- Google Earth- Previously downloaded for Lesson 3
- Science Notebooks
- Chart paper

*Administrator access is needed to download and install the required plug-in for the NASA Explore Mars! Gale Crater interactive module. Teachers without administrator access on their computers should consult their technology department for assistance prior to beginning this lesson.

ESSENTIAL QUESTION:

How did you select the place for your Mars rover mission? Describe how the site you selected meets the needs of your question.

LESSON OBJECTIVE(S):

Students will be able to:

- Determine a landing site for their Mars Rover
- Work with their team to summarize information and identify important details in non-fiction writing
- Use technology skills to research Gale Crater through an online interactive module
- Learn about features of Mars through use of Google Earth Mars
- Gather, and analyze data to conduct a scientific experiment
- Collect and record data to draw logical and scientific conclusions
- Define and identify the role of controls and variables in teams' scientific or technical questions
- Differentiate between weather and climate

ENGAGEMENT

1. At the beginning of this lesson, and using the attached documents, present the Essential Question and Key Vocabulary for students to consider during the lesson.
2. To encourage student motivation, students will view [Mars Rover Curiosity Trailer](#) (Runtime: 1:37) and briefly discuss the importance of making discoveries on other planets. Students will work with their teams to remember/identify what their specific mission will aim to discover.

3. Next, lead students through a discussion of the importance of selecting an appropriate landing site for their rovers. Tell students that there was a great deal of discussion and research to select where Curiosity would land and show the video [The Challenges of Getting to Mars: Selecting a Landing Site for MSL Curiosity](#) (Runtime: 3:51)

EXPLORATION

1. Students will begin to explore Gale Crater, the selected landing site for the Curiosity rover at the [NASA Explore Mars! Gale Crater](#).
2. Using their Science Notebooks as a guide, students will identify some controls of this site as well as a variable that could be tested. Then, students will write their observations of why Gale Crater was a good place for Curiosity to land.

Note: Students may require support and guidance to identify the controls and variable. During this time, the teacher should circulate answering questions when needed and guiding student learning while reinforcing the definitions and practice of identifying controls and variables.

1. Once students have gained some background knowledge in identifying controls and variables, students should work in their groups to review their scientific or technological question.
2. Using the information learned in the mini-lesson, students will use their scientific or technological question to identify the controls they will need when selecting their own landing site. Students will also identify the variable that they will change to collect relevant and accurate data.
3. After students have explored, they may use Google Earth Mars to explore one of the five possible landing sites for their rover (Eberswalde Crater, Holden Crater, Mawrth Vallis, Olympus Mons, Valles Marineris).
4. Once students have decided where they will land their rover, students will collect pertinent information about their site in their Science Notebooks and explain how their chosen site will help them to answer their chosen scientific question.

EXPLANATION

1. Students will write their main details on a piece of chart paper and share their results with the class:
 - Chosen Landing Site
 - Exact location on Mars
 - Description of terrain and weather/climate present
 - Three reasons why this site was chosen
 - How this landing at this site will help answer the team's scientific question

ELABORATION

1. If time allows, students may explore Gale Crater on Google Earth Mars. Students may also opt to further investigate their chosen site and/or add additional information to their team chart paper.
2. Students may focus on making observations and measurements, when appropriate, that support the evidence of weathering or erosion by different factors (water, ice, wind, etc.) over time.
3. Students may also opt to design a landing site made of Mars-like surfaces to better understand the terrain on Mars.

EVALUATION

1. During this lesson, the teacher is encouraged to use formative assessments to determine and deepen student understanding. Teachers may wish to grade students' science notebooks to establish student understanding or assess student graphs and analyses/summaries.
2. Teachers are encouraged to create their own grade-level and ability-level assessments so as to best meet the needs of their students.

SUPPLEMENTAL RESOURCES

Mars Rover Curiosity Trailer

<http://www.jpl.nasa.gov/video/index.php?id=1014>

The Challenges of Getting to Mars: Selecting a Landing Site for MSL Curiosity

<http://www.jpl.nasa.gov/video/index.php?id=985>

Explore Mars: Curiosity

<http://mars.jpl.nasa.gov/explore/galecrater/>

Supplemental Videos

<http://mars.jpl.nasa.gov/msl/multimedia/videos/index.cfm?v=120>

MSL Landing Site Selection

<http://mars.jpl.nasa.gov/msl/mission/timeline/prelaunch/landingsiteselection/>

What to look for in a Landing Site

http://www.racetomars.ca/mars/article_landing.jsp

Mars in a Minute: How Hard is it to Land Curiosity on Mars?

<http://www.jpl.nasa.gov/video/index.php?id=1087>

Mars Rover Mission Page

http://www.nasa.gov/mission_pages/msl/#.U7o7jSi4Nd0

How Wheel Damage Affects Mars Rover Curiosity's Mission

http://news.yahoo.com/wheel-damage-affects-mars-rover-curiositys-mission-094634994.html?soc_src=copy

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