

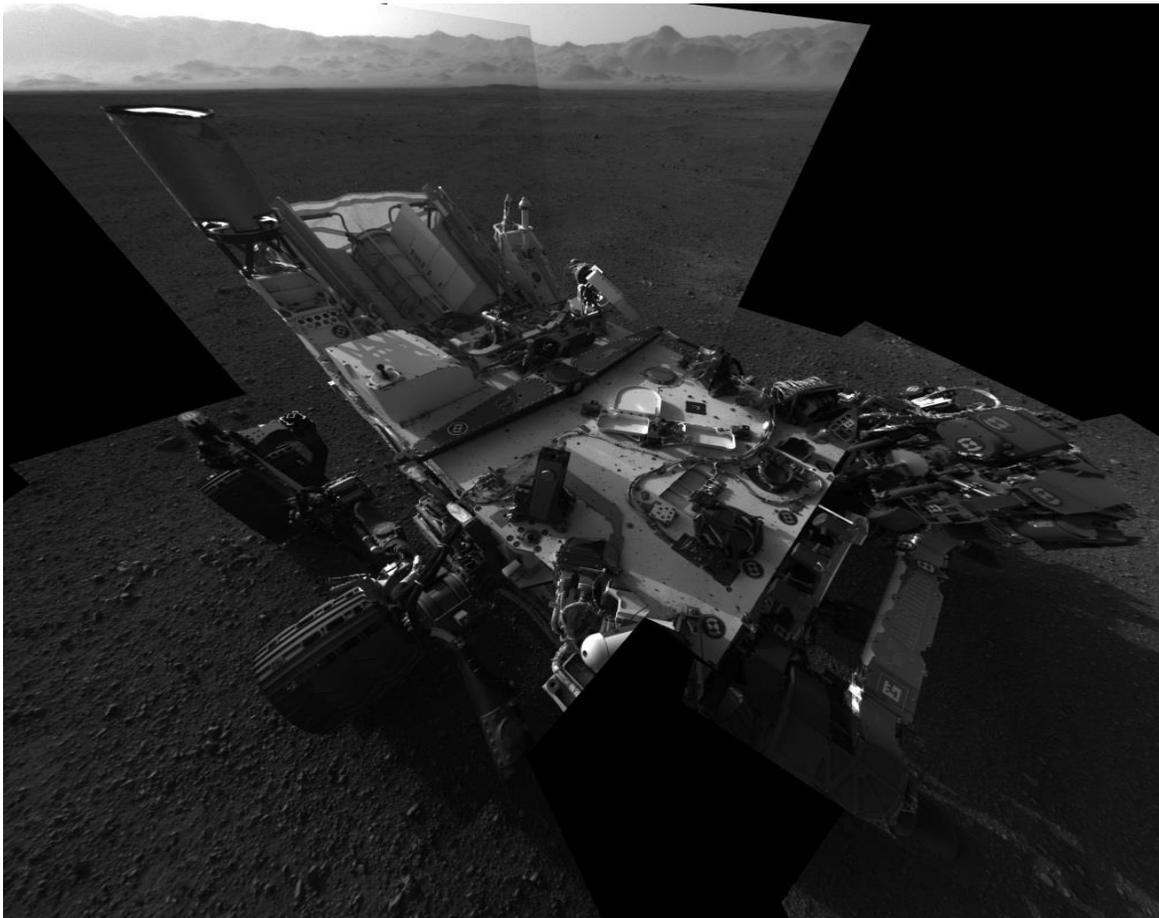


Mars Rover Celebration

Curriculum Module

Week 3: Designing the Mission

Lesson 6: Mission Measurements



Educational Product	
Educators & Students	Grades 6-8

Week 3: Designing the Mission

LESSON 6: MISSION MEASUREMENTS

GRADE LEVEL: 6-8

LENGTH: 2 DAYS

VOCABULARY: measurement
plausible

MATERIALS:

- Team Charts (from Lesson 5)
- Science Notebooks

ESSENTIAL QUESTION:

How does coming up with a plausible solution for your scientific question help you design the measurements you need for your Mars Rover mission?

LESSON OBJECTIVE(S):

Students will be able to:

- Refine their team’s scientific question so that it can be answered by data and/or modeling
- Brainstorm possible missions for the scientific question chosen
- Determine reasonableness of proposed missions
- Use the brainstorming process to enhance meaningful learning
- Use the proposed mission matrix worksheet to help determine the most practical mission

ENGAGEMENT

Note: Because students will be focusing on and researching Mars, the example of Saturn has deliberately chosen to demonstrate the process so that the teacher can more accurately assess student understanding.

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. Ask students to recall their scientific questions that they created in the last lesson. Today students will brainstorm possible solutions to their questions.
3. To start, tell students that you have been wondering about Saturn and you developed a scientific question to answer.
4. Using the “Comparing and Defining Missions” mini-lesson, walk students through the thought process of brainstorming possible solutions to the scientific question. While progressing, remember to continue an “internal dialogue” (Lesson 2) by modeling the process for students and asking questions:
 - How might this happen?
 - What else could happen?
 - Have I thought it through?
 - Does this mission make sense?

- Can this be done?
- Is this possible and/or reasonable?

EXPLORATION

1. Students will work with their teams to answer their own scientific question by completing the chart in their Science Notebooks. (The Mission Matrix worksheet may be used for additional room or as a rough draft.)
2. The teacher should circulate as students work assisting when necessary. The teacher should also challenge students to come up with reasonable and plausible solutions. To further probe students' understanding or guide students back on track if necessary, use the following question starters:
 - Why....?
 - How....?
 - Have you considered....?
 - Does that sound plausible....?
 - How did you conclude that....?

EXPLANATION

1. Once students have completed the chart in their Science Notebooks, draw their attention back to the chart papers that they began during Lesson 5. Have students complete their chart papers by transferring the information from their charts to their chart paper. Teams may elect to simply copy the chart or display the same information in a different format.

ELABORATION

1. If time allows, students may share their worksheets/charts with the class and allow their classmates to ask questions about the solutions that each team brainstormed.
2. Students may also continue to brainstorm more possible solutions for their scientific questions. Students should focus on evaluating their different solutions using a systematic process to determine how well each one meets the criteria and constraints of their chosen question.

EVALUATION

1. During this two day lesson, the teacher is encouraged to use formative assessments to determine and deepen student understanding. Teachers may wish to use one or both of the included Exit Tickets after the conclusion of the first day or review and/or grade students' Science Notebooks to establish student understanding.
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 Exploration Program

<http://mars.jpl.nasa.gov/mer/>

Mars Pathfinder

<http://mars.jpl.nasa.gov/MPF/index1.html>

Mars Science Laboratory

<http://mars.jpl.nasa.gov/msl/>

Mars Polar Lander

<http://mars.jpl.nasa.gov/msp98/lander>

Mars Exploration Programs and Missions

<http://mars.jpl.nasa.gov/programmissions/>

Mission to Mars

<http://www.planetary.org/explore/space-topics/space-missions/missions-to-mars.html>

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