

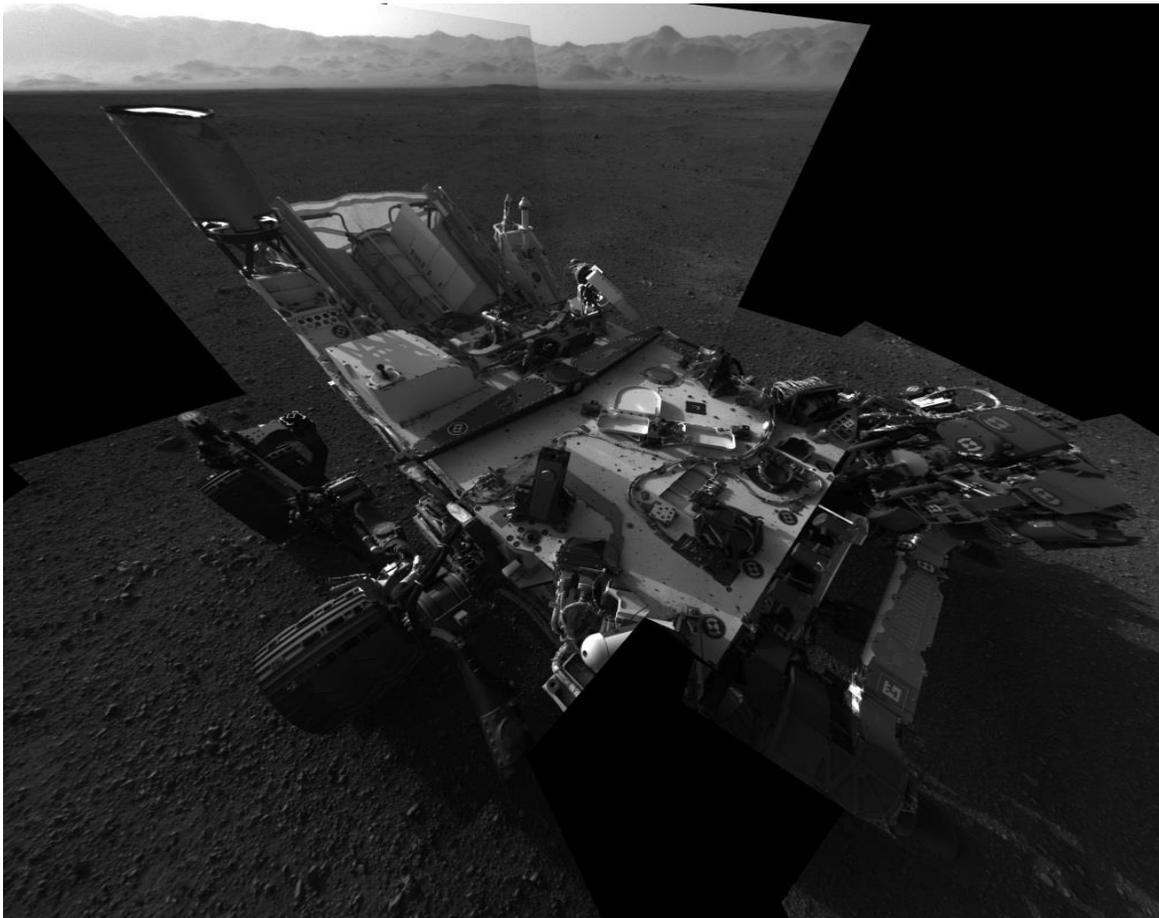


# Mars Rover Celebration

## Curriculum Module

### Week 3: Designing the Mission

#### Lesson 6: Mission Measurements



Educational Product	
Educators & Students	Grades 3-5

# Week 3: Designing the Mission

**LESSON 6:** MISSION MEASUREMENTS

**GRADE LEVEL:** 3-5

**LENGTH:** 2 DAYS

**VOCABULARY:** measurement  
plausible  
solution

## **MATERIALS:**

- Team Charts (from Lesson 5)
- Science Notebooks

## **ESSENTIAL QUESTION:**

Why is it important to write your scientific question so you can answer it using data?

## **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?
  - What measurements will I need to make to carry out my mission?

- Does this mission make sense? What problems could cause my mission to fail?

## EXPLORATION

1. Students will work with their teams to answer their own scientific question by completing the chart on the Mission Matrix worksheet.
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 reasonable....?
  - How did you conclude that....?

## EXPLANATION

1. Once students have completed the Mission Matrix worksheet, students may record their final solution in their Science Notebooks. Then, draw their attention back to the chart papers that students began during Lesson 5. Have students complete their chart papers by transferring the information from their Science Notebook 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 work to assess their solutions by using a team-created chart to try to determine which solutions are most likely to meet some or all of the criteria and constraints of the problem.

## 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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