

Mission to Mars

Lesson Plan

Grade Level: 6-8

Curriculum Focus: Astronomy/Space

Lesson Duration: Two class periods

Student Objectives

- Research past missions to Mars
- Examine NASA's three-phase strategy for exploration of celestial bodies
- Consider specific discoveries and questions to be answered by future missions.

Materials

- Discovery School video on *unitedstreaming: Life on Mars?* and *Destination: Mars*
Search for this video by using the video title (or a portion of it) as the keyword.

Selected clips that support this lesson plan:

- The Story of the Rock
 - The Story of the Rock
 - The Story of the Rock (Part 2) Continued
 - Preparing for the First Manned Trip to Mars
 - Developing the Technology to Support a Journey to Mars
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- Research materials about recent exploration within our solar system
 - Computer with Internet access

Procedures

1. Begin the activity by asking students to share their opinions about whether there is life on Mars. Ask them to back up their opinions with facts they have learned.
2. Conclude the discussion by reviewing with your students what they know about spacecraft that have been sent by NASA to explore our solar system. Let students know that since the 1960s, we have sent spacecraft to explore Mars and other places in our solar system that are most easily reached.
3. Mention that NASA has developed a three-phase strategy for scientific exploration of celestial bodies. Then tell the class that they are going to be finding out more about NASA's program and plans for further exploration of the solar system. Invite them to suggest ways of conducting their research. Where might they find the most up-to-date information?

4. Have groups of students contact NASA to learn the basic outline of the three-phase strategy (reconnaissance, surveillance, in-depth study). They should find out the criteria and limits that define each phase, discover which technologies each phase utilizes for exploration, and understand how each phase builds on information learned from the previous phase.
5. Have students do further research, using materials you have provided and the Internet, to learn about past missions to Mars, what discoveries were made on each mission, and what questions were raised by each mission.
6. The members of each group should work together to produce a report on their findings.
7. Have the groups share their reports. Then, as a class, create a time line entitled "Missions to Mars." The time line should date each mission and categorize the missions into their strategic phases.

Discussion Questions

1. Discuss how meteorites are classified.
2. Discuss why Mars is referred to as the "red planet." What do we know about the geologic history, surface, and atmosphere of Mars?
3. Even before this meteorite was discovered, there has been discussion about life on Mars. What other scientific observations launched this speculation?
4. What technology is available today that was not available 100 years ago to analyze a meteorite?
5. Discuss the significance of the tiny fractures found on the rock.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Student reports clear, complete, well organized, and error-free.
- 2 points: Student reports fairly clear, sufficiently well organized, with some errors.
- 1 point: Student reports sketchy and vague, poorly organized, with numerous errors.

Vocabulary

abstract

Definition: A written summary that concentrates on the essentials of a subject.

Context: The scientists sent the abstract to NASA headquarters.

biogenic

Definition: Relating to living organisms.

Context: The scientists could be seeing biogenic activity in a microfossil.

carbonates

Definition: Compounds that are derivatives of carbonic acid.

Context: Dissolved in the water were minerals called carbonates.

galaxy

Definition: A massive assembly of hundreds of millions of stars, gas and dust.

Context: Over the decades, the scientist tried to approximate how many places in the galaxy might harbor intelligent life.

mass spectrometer

Definition: An instrument that identifies the chemical composition of a substance.

Context: Professor Richard Zare was using a dual laser mass spectrometer.

meteorite

Definition: The metallic or stony remains of a meteor.

Context: The world was formally introduced to meteorite ALH84001 on August 7,1996.

microfossils

Definition: Fossils that may be a fragment of a larger organism and may be studied only microscopically.

Context: The scientists saw some pictures that looked like microfossils, which could be signs of life.

oxidized

Definition: Combined with oxygen.

Context: A substantial amount of the iron is highly oxidized.

planet

Definition: Any nonluminous celestial body that orbits around a star.

Context: The development of life on planets like the earth is a normal thing.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Earth and Space Science: Earth in the solar system

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/compendium/browse.asp>.



This lesson plan addresses the following national standards:

- Science—Earth Science: Understands Earth's composition and structure.
 - Science—Space Science: Understands the composition and structure of the universe and the Earth's place in it.
 - Science—Life Science: Understands biological evolution and the diversity of life.
 - Science—Nature of Science: Understands the nature of scientific knowledge.
 - Science—Nature of Science: Understands the nature of scientific inquiry.
 - Technology: Understands the relationships among science, technology, society, and the individual.
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>