

Lesson Plan for Space Science: Mars Rover

OBJECTIVES

Students will understand the following:

1. Even though Mars is very close to Earth in relation to our entire solar system, travelling to Mars is still a dream.
2. In order for such a mission to become reality, we would need, among other things, a means of transportation that would allow us to move over the surface of the planet.
3. Both the surface and the surrounding space of the planet Mars have characteristics that challenge existing technologies to create such a means of transportation.

GRADE LEVEL: 6-8

STANDARDS: Understands essential ideas about the composition and structure of the universe and the Earth's place in it. Knows characteristics and movement patterns of the planets in our solar system.

MATERIALS

- Destination Mars video
- Images of the surface of the planet Mars
- Research materials
- Internet access
- Art materials for each group

VOCABULARY

- Centrifuge
- G-force
- Meteor
- Permafrost
- Terraforming

PROCEDURES

1. Ask students to imagine that they have just been hired to design a new vehicle for travelling around on Mar's rocky surface.

2. Begin by showing them the kinds of terrain their vehicles will have to traverse.
3. Remind them to consider the vehicle's fuel source, weight, durability, size, special features, and flexibility.
4. Review with students what they have learned about the planet Mars, challenging them to identify any characteristics of the planet's surface or surrounding space that would present problems for a designer of a Mars surface-exploration vehicle.
5. Allow time for students to do further research on Mars to discover any other facts that might prove useful to them in completing their assignment.
6. Divide the class into groups; ask each group to sketch its idea for a new Mars rover and write a description of how it works.
7. When the groups have completed their sketches and descriptions, have them choose a member of their group to present what the group designed.
8. Have each group select another group member to serve as its delegate to a "NASA committee" for selecting which vehicle to build.
9. Ask the committee members to deliberate the merits of each design, and then vote on a winner. A delegate cannot vote for its own group's entry.

DISCUSSION QUESTIONS

1. Debate the pros and cons of having a consortium of nations working toward a manned flight to Mars instead of a single nation working towards this flight.
2. Meteors, meteoroids, and meteorites are three terms that describe rocks from space under different conditions. Though these terms are not synonymous, they are often used interchangeably. Give definitions of these terms to the students and explain which one applies to the alleged Mars rock discovered in Antarctica by NASA scientists.
3. The people chosen to go to Mars will be out of reach of the Earth. While all the people will be astronauts, should they have various fields of specialty, like botany, engineering, or geology, or should each person be able to do everything? If people are sent with different professional backgrounds, which professions are most desirable?
4. Is it realistic to expect 4 people to compose the entire crew? Imagine having to spend 2 years with the same 4 people, isolated from all other human beings. The psychological effects on these people will be great. Can you think of activities that might help overcome their monotony? Why do you think a 4 person model was selected for the Mars missions as opposed to a 2, 3, or 5 person model? What would be the consequences of waiting until a larger group could go safely?
5. Because of the fact that Mars may have once supported primitive life forms like bacteria, it is irresistible to imagine more advanced beings living there. What if you were one of the first explorers from Earth to arrive on Mars? If you could communicate with the life on Mars, how would you explain to them why you went to their planet to conduct experiments? Think about the encounters throughout history between explorers and the people they "discovered" as you

formulate your answer. Would you have the “right” to visit Mars and conduct experiments there?

6. With any new space exploration endeavor, some citizens question the wisdom and fairness of spending billions of dollars that could be spent on other problems right here on earth. Analyze both sides of the issue to determine where you stand. Compare your viewpoint with those of your classmates, teachers, and family members. Do you see a response pattern correlating with gender, age, education, or profession?

EXTENSION ACTIVITY

Destination Mars- A NASA developed hands-on student guide designed to increase students’ knowledge, awareness, and curiosity about the process of scientific exploration of Mars.

EVALUATION RUBRIC

Based on sketches and descriptions:

- 4 points- careful, detailed sketch; clear verbal description; sketch and description take into consideration the special requirements of the Martian surface and surroundings.
- 3 points- adequate sketch, verbal description incomplete, sketch and description take into consideration the special requirements of the Martian surface and surroundings.
- 2 points- sketch lacking in detail, verbal description incomplete, sketch and description fail to take into consideration some important special requirements of the Martian surface and surroundings.
- 1 point- sketch lacking in detail, verbal description incomplete, sketch and description do not take into consideration any of the special requirements of the Martian surface and surroundings.

CREDIT

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