

Close Reading and Text Dependent Questions in Science **Lunar Rover Making Tracks on the Moon (Motion and Design – Grade 4)**

The text selection, *Lunar Rover: Making Tracks on the Moon*, is found in the *STC Motion and Design* Teacher Guide, pgs 52-53.



Look in the Student Learning Outcome (SLO) Documents for guidance on when this should be taught. These can be found on the BPS Science Department's website: <http://bpsscience.weebly.com/> You will find the Student Learning Outcomes documents organized there by grade level.

Reading Selection

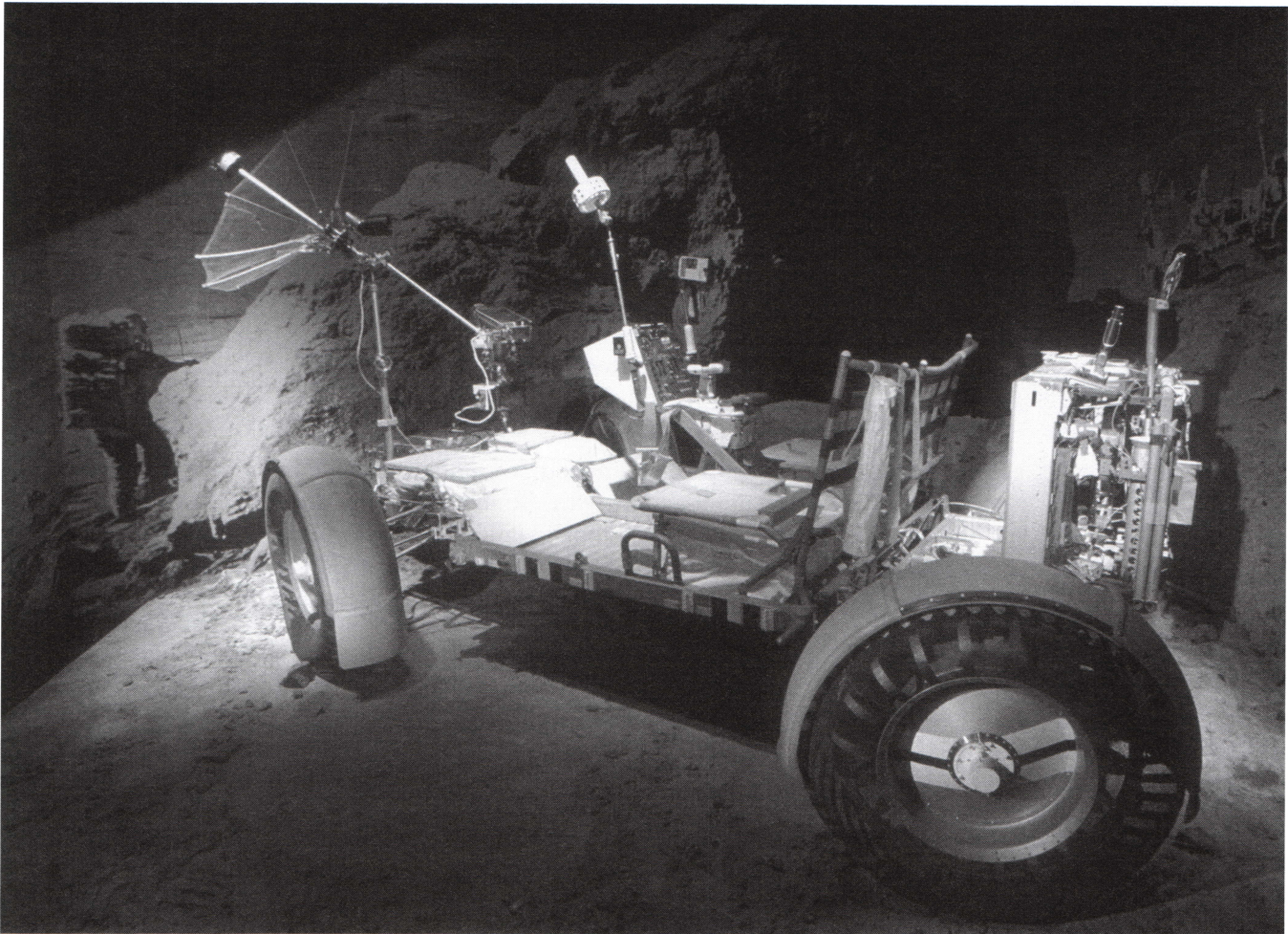
Lunar Rover: Making Tracks on the Moon

Photo: Dane Penland. Courtesy of National Air and Space Museum, Smithsonian Institution.

Lunar Rover

Just imagine that you are an astronaut. Suppose you are flying a spacecraft to the Moon. Your goal is to learn about the Moon's surface. What kind of vehicle would you like to have there?

Engineers have already answered this question. In the Apollo space program, U.S. astronauts flew to the Moon. On many of these flights, the astronauts landed and walked on the Moon's surface. They took samples of Moon rocks and performed many scientific experiments. But since their oxygen supply was limited, they could only walk about 1 km ($\frac{1}{2}$ mile) away from their

spacecraft. Many places they wanted to investigate were too far away.

To help the astronauts in their work on the moon, engineers designed a vehicle called the Lunar Rover. It was big enough to hold two astronauts, their equipment, and many samples of Moon rocks. What were the Lunar Rover's design requirements?

First of all, the Lunar Rover had to be light enough so that a rocket could lift it off Earth. The Rover weighed 210 kg (462 lb) on Earth. It only weighed 35 kg (77 lb) on the Moon. Do you know why?

How did the Lunar Rover get its energy to move? Most cars on Earth burn gasoline to drive their engines. Burning gasoline requires oxygen and oxygen comes from the air. Because there is no air on the Moon, a gasoline engine would not work. Instead, the Rover used electric motors, one for each wheel. Energy for the motors came from batteries.

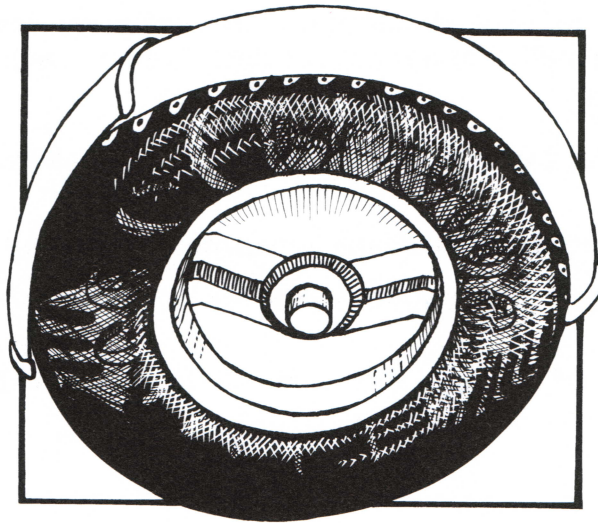
The Rover had to move over the Moon's surface. Some of that surface is rough and uneven. The engineers made the tires big enough so that the Rover could roll over small bumps and cracks. To save on weight, engineers made these tires of wire. The

tires looked like round metal cages, just like the cage around a small electric fan.

The Lunar Rover's top speed was about 12 km (7 miles) per hour. It needed to move slowly to save on the battery. The slow speed also helped astronauts control the vehicle on the rough terrain.

Engineers made careful records of their design for the Lunar Rover. They also recorded

the results of all tests. Suppose engineers needed to build a vehicle to explore the surface of another planet, like Mars. What might this vehicle look like? Do some research and find out!



Close-up of Lunar Rover's tire

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Student Questions

1. Why did engineers create the Lunar Rover?

2. According to the text, what did the Lunar Rover need to be able to hold?

3. How did the engineers make sure the Lunar Rover could get to the Moon?

4. What was the design challenge related to how the Lunar Rover would get its energy to move?
What did they decide to do?

5. How was the design of the wheels related to the success of the lunar rover?

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Sample Answers

1. Why did engineers create the Lunar Rover?

The Lunar Rover was created so that astronauts could investigate places on the Moon that were further away.

2. According to the text, what did the Lunar Rover need to be able to hold?

The Lunar Rover had to hold two astronauts, their equipment, and many samples of Moon rocks.

3. How did the engineers make sure the Lunar Rover could get to the Moon?

The rover had to be lightweight so that a rocket could lift it off Earth.

4. What was the design challenge related to how the Lunar Rover would get its energy to move? What did they decide to do?

The rover could not use gasoline to power its engine because you need oxygen to burn gasoline, and there is no air on the Moon. The engineers used battery-powered electric motors to power the rover.

5. How was the design of the wheels related to the success of the lunar rover?

The surface of the moon is not smooth, so the tires had to be big enough to be able to roll over bumps and cracks in the surface. They also could not weigh much, so the designers built them out of wire in the same shape of ordinary tires.