Lunar Roving Vehicle

Purpose

To construct a model of a lunar roving vehicle.

Background

The Apollo lunar roving vehicle was a battery-powered space buggy. The astronauts on Apollo 15, 16, and 17 used it to explore their landing sites and to travel greater distances than astronauts on earlier missions. The lunar rover neatly folded up inside the lunar lander during trips to the Moon. Once on the Moon's surface, it unfolded with the help of springs. The lunar rover carried two astronauts and was manually driven. It was designed to climb steep slopes, to go over rocks, and to move easily over the Moon's regolith. It was able to carry more than twice its own weight in passengers, scientific instruments, rocks, and regolith samples. The wheels on the rover were made of wire mesh (piano wire) with titanium cleats for treads. Engineers did not use solid or air-filled rubber tires because they would have been much heavier than were the wire mesh wheels. The Apollo spacecraft had a fixed amount of mass (payload) it could deliver to the surface, including the rover, rover batteries, scientific instruments, sample collection devices, etc. Hence, the wire-mesh wheels were important to the overall payload mass. This rover was not designed for prolonged use, and it is uncertain if future lunar explorers would use similar designs and materials for their vehicles, use new, more durable components, or turn to robotic rovers.

If students are interested in constructing models that actually move, then refer to Page 38 for more information on rocket and model building.

Preparation

Review and prepare materials listed on the student sheet. While commercial building sets are very popular, models can be built with more simple and recyclable materials such as cardboard boxes, tubes, cans, straws, construction paper, string, tape, pins, styrofoam trays, thread spools, balloons, rubber bands, and mouse traps (for propulsion).

In Class / Wrap Up

After construction, students should name their vehicles and write a description of the capabilities and special features.

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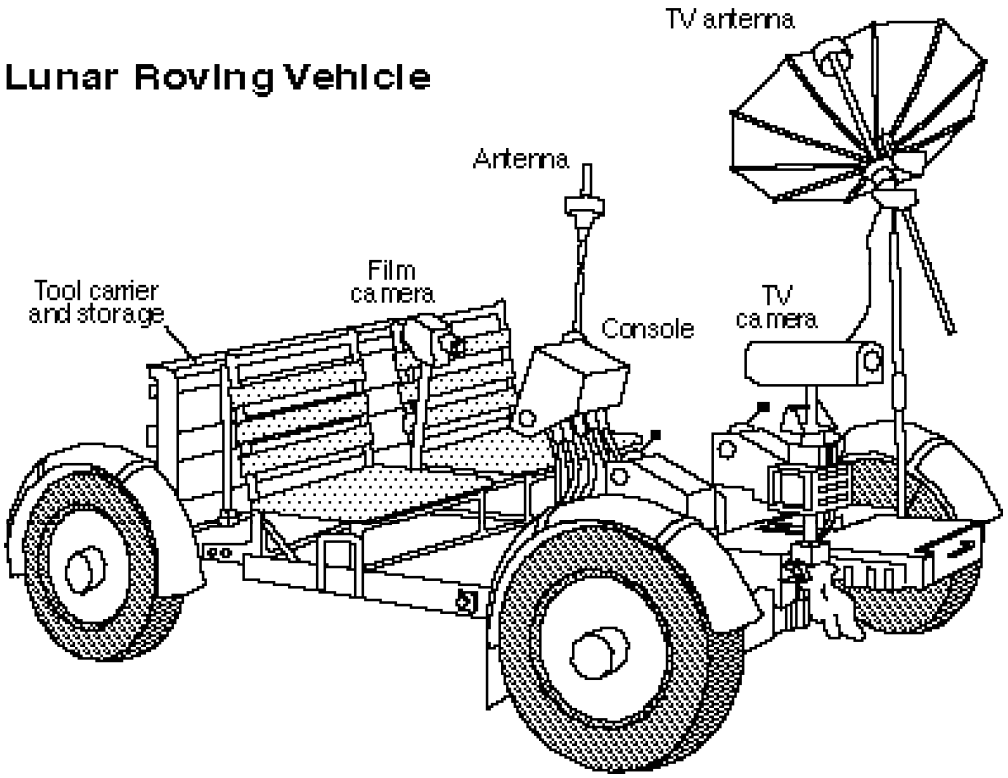
Extensions

Hold competitions between student vehicles with these criteria for judging:

1. Can the vehicle actually move -- by gravity; by some kind of propulsion system?
2. Can the vehicle go over different surfaces -- smooth, flat, bumpy, or inclined?
3. Is the vehicle sturdy?
4. Can the vehicle carry a heavy load? Have the students decide the weight of the load.
5. Could the vehicle withstand meteoritic bombardment?
6. Would the vehicle work on the Moon?

Discuss the pros and cons of manually driven vehicles versus remote-controlled robotic rovers on the Moon.

Diagram of the vehicle used by Apollo astronauts.



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To construct a model of a lunar roving vehicle.

Key Words

antenna

console

tool carrier and storage

robot

Materials

diagram of Apollo lunar roving vehicle

"Moon ABCs Fact Sheet"

construction materials such as cardboard boxes, tubes, cans, straws, construction paper, string, tape, pins, styrofoam trays, thread spools, balloons, rubber bands, mouse traps, etc.

tape measures

stop watches

Procedure

1. Describe the similarities and differences between the Apollo lunar roving vehicle and a typical family vehicle.

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2. What was special about the rover's wheels? Why weren't they made of rubber and filled with air?

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3. Review the "Moon ABCs Fact Sheet." Design a new lunar roving vehicle. Important design issues include size, weight, power supply, number of passengers, controls, scientific instruments, tools, and storage compartments. Use the space provided on the next page to draw a picture of your design. Label the parts.

4. Construct a model of the lunar rover based on your design.

5. Give a name to the vehicle.

6. Write a descriptive essay about the special features and capabilitites of the vehicle and how you solved the design issues raised in Question 3.

Sketch of my model