Design a Rover

Design and build a model rover to study the Solar System!

Mars Perseverance rover. Image: NASA.

A rover is a robotic vehicle for exploring the surface of a planet or moon. They give scientists a close-up view of objects in the Solar System by driving around to different areas to explore, take pictures, and collect rock samples.

Materials Needed:

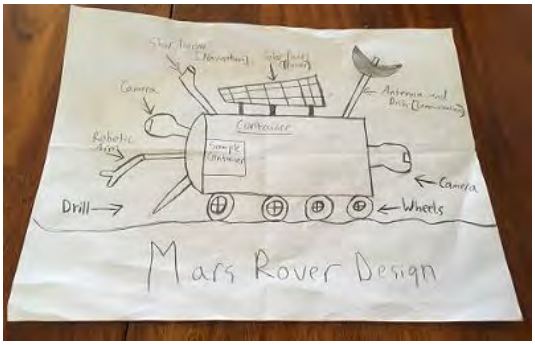
Paper, pencil, craft materials (small recycled boxes, cardboard, paperclips, toothpicks, wooden chopsticks, straws, bottle caps, yarn, etc.), fastening materials (glue, tape, rubber bands, string, etc.). You can use whatever supplies you have!

Instructions:

Step 1: Decide where your rover will go. Will it explore the dry, dusty surface of Mars? The hot, acidic volcanoes of Venus? The craters of Mercury? Or somewhere else in the Solar System? Your rover will need different features in different environments.

Step 2: Design your rover. Draw a picture of what it will look like. You can look at the *All About Rovers* sheet for inspiration.

Make sure to include these parts:



A Way to Move: Wheels or treads to move around on the surface.

Power Source: Solar panels, batteries, or energy from radioactive atoms to create electricity.

Scientific Instruments: Cameras, microphones, robotic arms, magnets, or sample collectors to collect data from the environment.

Communication Device: Antenna or dish to send and receive messages from Earth.

Navigation Device: A sun or star tracker to help the rover know where it is and what direction to move in.

Container: To hold everything together and protect the rover from harsh conditions.

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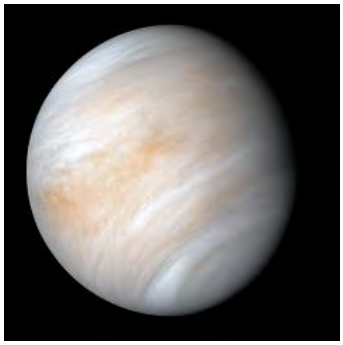
Step 3: Build your rover! Use materials you have at home to construct your rover. You may have to adjust your design as you build. Try different materials and methods to see what works best.

Step 4: Your rover will need to survive launching into orbit and landing on another planet or moon. Test your rover by gently shaking or spinning it. How well did it hold together? Adjust your design and try again!

Step 5: Give your rover a name! Choose a name that reflects your goals for the rover. Past Mars rovers have been named Sojourner, Spirit, Opportunity, Curiosity, and Perseverance.



Venus's atmosphere (NASA/JPL-Caltech).

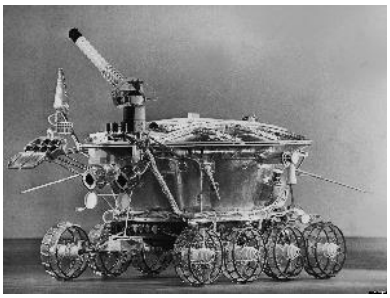
Extension: In September 2020, astronomers announced they had found phosphine gas high in Venus's atmosphere. On Earth, this gas is only created in lab settings or naturally by bacteria. This *could* be evidence of possible life on Venus. It is not proof; there could be a non-biological explanation. But it is an intriguing discovery!

Learn more about this discovery.

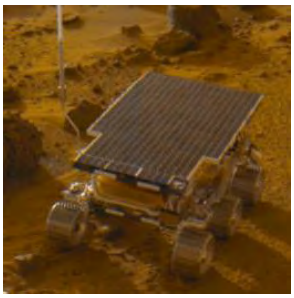
Try This: The only way to know for sure if there is life on Venus is to get a closer look. Rovers might play an important role in exploring Venus and gathering more information. Any rover that landed on Venus would have to survive extremely hot temperatures, immensive pressures, and clouds of sulfuric acid. How would you design a rover to explore in these conditions?

All About Rovers

A **rover** is a robotic vehicle for exploring the surface of a planet or moon. They give scientists a close-up view of objects in the Solar System by driving around to different areas to explore, take pictures, and collect rock samples. Sending a rover to space is safer and cheaper than sending humans, and rovers can survive in harsher conditions than humans can.



Soviet rover Lunokhod 1, the first rover on the Moon (NASA/GSFC).



So far, rovers have been sent to the Moon, Mars, and the asteroid Ryugu, but in the future rovers may be sent to even more destinations!

Left: Sojourner, the first rover on Mars (NASA).
Right: Hayabusa2 on the asteroid Ryugu (JGarry, via Wikimedia Commons).

Rovers come in many sizes. The Sojourner rover was the size of a microwave, Spirit and Opportunity were each the size of a golf cart, and Curiosity and Perseverance are each as big as a minivan!

Meet the Mars rovers: spaceplace.nasa.gov/mars-rovers/en/

Artist's conception of Perseverance rover and Ingenuity helicopter (NASA/JPL-Caltech).

In July 2020, NASA launched the **Perseverance rover**. It will land on Mars in February 2021, and operate for about one Martian year (about 687 Earth days). Its goals are to seek signs of past microbial life, collect rock and soil samples, and demonstrate technology needed for future exploration of Mars.

Did You Know? The Perseverance rover has a companion: a tiny helicopter named Ingenuity! The helicopter weighs less than 4 pounds (1.8 kg), and will be the first aircraft to fly on another planet. This is a test to see if small aircraft can be used on future Mars missions.

Discover more about the Perseverance rover:

mars.nasa.gov/mars2020/spacecraft/rover/