

Make a Robo-Puzzle . . . Then Just Try to Solve It!

Gather These Things:

Copy of Robo-Puzzle (on page 3)
Scissors
Glue
Heavy paper or file folders (clean)

Make the Puzzle:

Glue the Robo-Puzzle page onto a piece of heavier paper or half of a file folder.

Then, carefully cut out the squares on the lines. Make your cuts very smooth and straight and cut right through the robots.

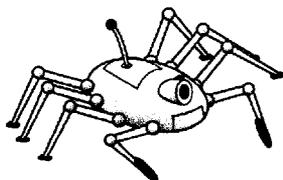
Solve It!

Now mix the pieces up, and try to put the puzzle back together again.

Not so easy, is it? There are millions of wrong ways to put the squares together, but only one right way. Adults find this puzzle especially hard! If you need help with the solution, visit The Space Place at http://spaceplace.nasa.gov/robots/robot_puzzle.htm.

Are These Robots for Real?

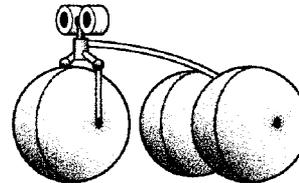
All the cartoon robots on the puzzle are something like the robots NASA is designing to go into space!



A Palm-sized Spiderbot

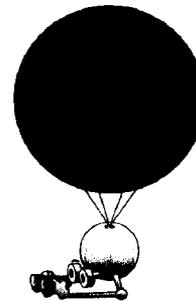
If it had fur and a couple more legs, it would look like a tarantula! Like a real spider, this robot has feeler-like antennae, which help it detect ob-

stacles in its path. Instead of eyes, it has cameras. With its six legs it walks much like a spider and moves very nicely across rough terrain. Someday, spiderbots like these, or even much tinier, could be used to explore comets, asteroids, or the Moon, or do maintenance and repair jobs on the outside of the International Space Station. On Earth, spiderbots could fill in for humans by sniffing out hazardous materials or taking soil measurements on farms.



Big Wheels in Space?!

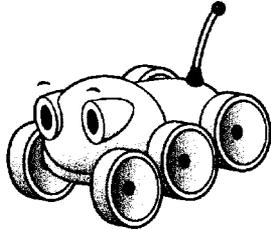
What do you get when you cross a tricycle with a monster truck? Then replace the truck's body with computers, cameras, and scientific instruments? You get a funny-looking vehicle with beach ball-like tires that can drive around by itself, climb over big rocks, and take notes and pictures of its surroundings. Just the thing for exploring planets such as Mars! NASA has already tested the Big Wheels rover idea on sand dunes, rocky terrain and even water.



Balloon-bots on Alien Worlds?!

Another way to get around on planets or moons that have atmospheres is by hot air balloon—sort of. A hot air balloon rises when the air inside it is heated. This makes the air expand and become

lighter than the air outside the balloon, so the balloon goes up. On Mars, for instance, the Sun would heat helium gas inside the balloon and make it go up. At night, the helium would cool and the balloon would come back down and rest on the ground until the next day. The balloon could carry instruments and cameras to study the planet's atmosphere and surface.



Here, FIDO!

A rover a bit like the one in this photo went to Mars in 1997 and two more are on their way to Mars now! This particular rover is part of NASA's Field Integrated Design and Operations (FIDO!) project. This project develops and tests technologies that will be used on robotic rover missions on the surface of Mars. The FIDO rover tries out navigation and control systems, sensing instruments, intelligent behavior systems, data processing, and other types of instruments and tools. NASA plans to send a mission to Mars to collect soil and rock samples and return them to Earth. The field tests that FIDO is doing in Mars-like terrain on Earth will help NASA explore the Martian surface.

Robots can go where no one has gone before. NASA is building smart machines that will be able to do very hard tasks far from home. The robots and spacecraft are our eyes and ears on distant planets, moons, and asteroids. From the information they gather, we will be able to plan for possible human travel to those places someday in the future.

Learn More:

Books:

The Adventures of Sojourner: The Mission to Mars that Thrilled the World, by Susi Trautmann Wunsch. ISBN: 0965049353 (ages 9-12).

Robot Inventor's Workshop: An Explorer's Kit, by Greg Vogt, Gregory Vogt, Deborah Shearer. ISBN: 0762407417 (ages 9-12).

How to Build a Robot, by Clive Gifford ; Illustrated by Tim Benton (How to) by Clive Gifford, Tim Benton (Illustrator). ISBN: 0531146499 (ages 9-12).

Robots (Fast Forward), by Mark Bergin. ISBN: 0531146162 (ages 9-12).

Web Sites:

NASA's Planetary Aerobot Program: <http://robotics.jpl.nasa.gov/tasks/aerobot/aerobot.html>

NASA's Inflatable Rover Program: http://www.jpl.nasa.gov/adv_tech/rovers/summary.htm

Robotic rover videos: <http://www.jpl.nasa.gov/videos/index.cfm?search=rovers>

Spiderbot video: <http://www/video/spiderbot.cfm>

Robotics Education: <http://robotics.nasa.gov/>

The Space Place: <http://spaceplace.nasa.gov>.



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**Glue page onto heavier paper or half of a file folder.
Then cut out puzzle along edges.
Then cut puzzle pieces apart to make nine squares.**

