

Start with a Book: Space Rangers

Landing on Mars



Introduction

To learn about the Red Planet, our NASA scientists and engineers have sent landers and rovers to the surface of Mars. So far, the U.S. has had eight successful Mars landings.

Imagine this: your rover is approaching Mars, going at high speed and you need to land it gently on the surface of the Red Planet, with the spacecraft and all of its equipment safe and sound. The atmosphere on Mars is very thin, so it doesn't help slow the rover down much.

Supplies (for each child)

- Heavy weight paper or card stock cut into 8-inch triangle
- Hole puncher
- 2 large paper clips
- 4 lengths of string, each 36 inches long
- 12" x 12" piece of newspaper
- 12" x 12" piece of cloth
- 12" x 12" piece of plastic wrap or plastic trash bags
- Adhesive tape or packing tape
- Consistently-sized small plastic toy vehicles, crayons, or larger rubber erasers
- Stopwatch, clock with a second hand, or timer on cell phone
- Notepad, pen or pencil

Get kids thinking

Engineers at NASA have explored many new ways to slow down the landers for a safe arrival.

ASK KIDS: can you think of anything that might slow down a Mars lander to make it safe for landing? A parachute does the trick! It opens up after the lander enters the Mars atmosphere, catches air as it floats, creating drag (working against the downward pull of gravity) — that slows down the landing.





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If you have Internet access, watch this video from NASA and the Jet Propulsion Lab (JPL), **WE BRAKE FOR MARS:** [youtube.com/watch?v=9h1NtQJ59kM](https://www.youtube.com/watch?v=9h1NtQJ59kM)

NASA and JPL are testing a supersonic parachute under Mars-like conditions for future exploration.

ASK KIDS: have you ever seen a parachute in action? What did you observe?

Let's get started!

In this challenge, kids will explore which material makes the best parachute for a slow, soft landing of their Mars lander.

RECOMMENDED: Have an adult demonstrate how to assemble the “lander” and then attach the test parachute. It's best to do this activity on a day that isn't windy.

First, build the lander with the triangle cut from heavy weight paper. Take one of the triangle corners and fold it over so that its point is in the middle of the triangle's other side. Crease the fold well, then unfold it. Repeat with the two remaining corners. Use the hole punch to create one hole near the tip of each point. This is your lander!

Next, place the small toy vehicle, crayon or large eraser (the scientific equipment) in the lander. Insert the paper clip through the three punched holes to form a little carrier.

Then, fold the gather the four strings and tie together in a knot at one end. Attach a large paper clip to the knotted end.

The newspaper, cloth, and plastic wrap are your test parachutes. **ASK KIDS:** predict which material will create the slowest landing and write it down in your notepad.

Have kids choose one material for the first test run and tape the ends of each string to a corner of the test parachute — being careful not to tangle up the strings.

Finally, attach the lander to the parachute by interlocking the two paper clips. Now you're ready to test things out!





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Find a high place — stairwell, balcony, edge of a deck — to toss your lander and time it to see how long it takes to reach the ground. Record the observations in your notepad.

Repeat with the two other parachute materials.

ASK KIDS: Which parachute slowed down the lander the most? Is that what you predicted? What other materials might make a better parachute and why?

OPTION B: You can also do this experiment using raw eggs in the lander, instead of plastic toy vehicles, crayons, or erasers. This will also test how soft the landings really are! Warning: it can get messy, so use a dropcloth to catch any broken eggs.

More activities

EGG DROP CHALLENGE (BUGGY AND BUDDY)

buggyandbuddy.com/egg-drop-challenge-free-planning-printable-2014/

DESIGN SQUAD: SOFT LANDING (PBS KIDS)

pbskids.org/designsquad/build/soft-landing/

VIDEO: HOW DOES A PARACHUTE WORK? (SCIENCE FOR KIDS)

[youtube.com/watch?v=vZYwsAvHgVw](https://www.youtube.com/watch?v=vZYwsAvHgVw)





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Mars Lander Template

