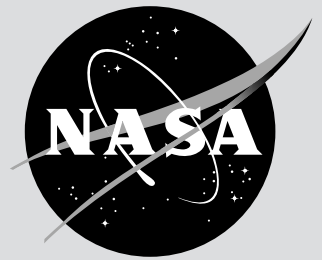


INSPECTOR DETECTOR



When huge amounts of fluids circulate in a planet or moon, such as a molten core, it can produce a magnetic field. Scientists can tell a lot about how the planet or moon formed and has changed by studying its magnetic field.

WE CHALLENGE YOU TO...

...build a device that you can pass above a surface to detect magnetic fields.

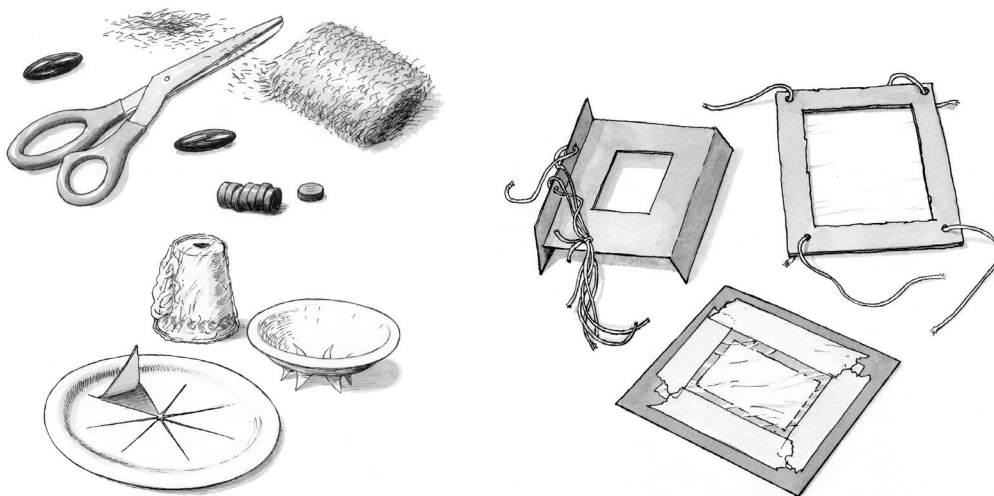
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1. IDENTIFY THE PROBLEM AND BRAINSTORM

- How can you make sure that the metal shards stay in your detector and don't fall off?
- How can you make it easy to see when the metal shards move?
- How will you hold the detector as you move it above the surface?

2. DESIGN AND BUILD

Below are some ideas for detectors. Invent your own design or improve on one of these.



MATERIALS

- Pieces of cardboard or a small box
- 1–2 paper cups (6- to 8-ounce)
- 1 piece copier paper
- A small pile of metal shards (cut off a pad of coarse [# 3] steel wool)
- 1 small magnet for testing
- 8–10 strong magnets per planetscape
- Tape (clear or masking)
- String (50 centimeters [20 inches])
- Scissors
- 1 grid map

WORDS TO USE

- **magnetic field:** *The area around a magnet where a magnetic force can be detected*
- **magnetometer:** *A device that detects magnetic fields*

3. TEST

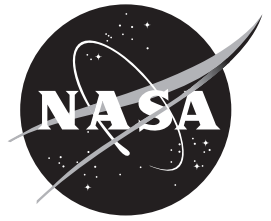
- **Try out your detector.** Use the small magnet to test how well your detector works.
- **Find the hidden magnets.** Slowly pass your detector over the grid, one section at a time.
- **Map the magnets.** Use the grid lines to identify the locations. Mark each magnet with a dot on your map (NOT on the newspaper).

4. EVALUATE AND REDESIGN

- **If it's hard to see the shards move...** Design a window or remove parts that block your view.
- **If your detector doesn't respond...** Check that you have enough metal shards and that nothing blocks how they move. Also check that you're not holding it too far above the surface.

5. TRY THIS NEXT!

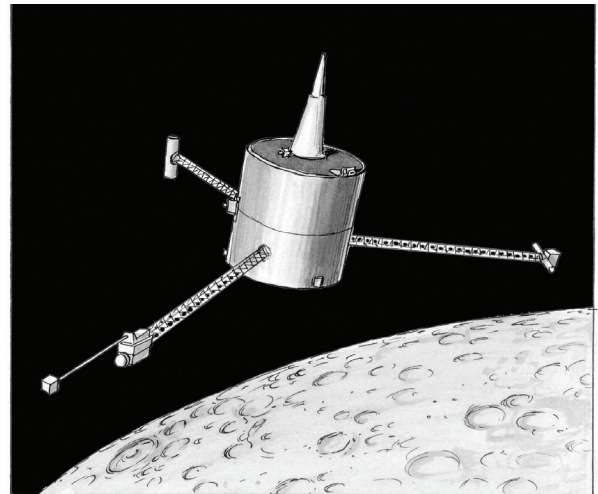
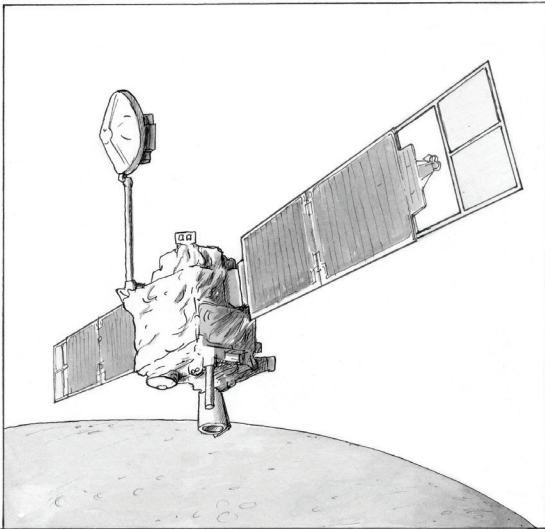
- **Magnet treasure hunt.** Use your detector and see how many invisible fields you can find. Check things like door closers, speakers, electric motors, and microphones.



Check out NASA's missions at nasa.gov

NASA EXPLORES SPACE

NASA's *Mars Global Surveyor* carries magnetometers on the ends of its solar panels. The mission determined that Mars no longer has a strong magnetic field, meaning that its interior has cooled.



NASA's *Lunar Prospector* measured the strength of the moon's magnetic fields. The mission also used magnetometers to find the location of minerals and to determine the size and makeup of the moon's core.

Visit the *Design Squad Nation* website at pbskids.org/designsquad.

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MAJOR FUNDING



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MAP OF THE MAGNET LOCATIONS

Put an "X" where you think there is a magnet. (A big "X" = Strong and a small "x" = Weak.)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|----|
| A | | | | | | | | | | |
| B | | | | | | | | | | |
| C | | | | | | | | | | |
| D | | | | | | | | | | |
| E | | | | | | | | | | |
| F | | | | | | | | | | |
| G | | | | | | | | | | |
| H | | | | | | | | | | |
| I | | | | | | | | | | |
| J | | | | | | | | | | |

Check the planet you mapped: ___Earth ___Mars ___Venus ___Team Members: _____