Engineering Activity 6: Put It Together: Creating a Remote Sensing Device

Remote Sensing Engineering Challenge

Your final design challenge is to engineer technologies that can collect information about the surface of Mars from a distance. Humans have never been to Mars, so it's important to learn as much as we can about it before astronauts go there. You will work with one of three NASA scientists to determine what information is needed. You will test your technologies on multiple sites on Earth to make sure it works before launching to Mars.

NASA Career Spotlights

Photo Credit: David Tuman

Aaron Yazzie

My job at NASA is to design robotic mechanisms and tools that allow us to gather rock samples from Mars and beyond.

NASA Scientist Cards

NASA Scientist: Jaime, planetary geologist

> ***"I am interested in how Mars was formed. Minerals can tell me a lot about the planet's history. What minerals are on the surface?"***

Criteria

- The device must be able to identify the minerals that form in water like clays (triangle ▲ and felt) and sulfates (star ★ and foam). It should also be able to identify volcanic minerals (circle ● and paper).
- The device must be able to fit through the opening in the Space Screen, which is 12" × 22" (31 cm × 56 cm) for testing.

Constraints

- You may only use the available materials to complete your design.
- You will have two sessions to engineer your remote sensing device(s).

NASA Scientist Cards

NASA Scientist: Caris, planetary geologist

> ***"I am interested in landing a rover on Mars. Is there a flat, open space where the rover could land safely?"***

Criteria

- Design a device to identify safe areas for the rover to land.
- The device must be able to determine the size of the area. To land safely, a rover needs an area of 3" × 4" (7.5 cm × 10 cm)
- The device must be able to fit through the opening in the Space Screen, which is 12" × 22" (31 cm × 56 cm), for testing.

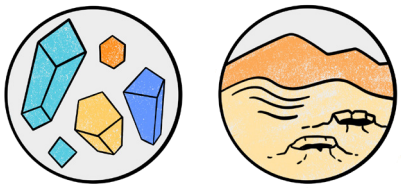
Constraints

- You may only use the available materials to complete your design.
- You will have two sessions to engineer your remote sensing device(s).

NASA Scientist Cards

NASA Scientist: Alex, astrobiologist

> ***"I want to know if Mars can support life. One of the most important materials to support life is water. Are there any sites that show evidence of water?"***



Criteria

- Design a device to identify places where water may have been present. Your device should identify landforms, like canyons, that may have been created by water. Your device should also identify minerals that form in water, like clays (triangle ▲ and felt) and sulfates (star ★ and foam).
- The device must be able to fit through the opening in the Space Screen, which is 12" × 22" (31 cm × 56 cm), for testing.

Constraints

- You may only use the available materials to complete your design.
- You will have two sessions to engineer your remote sensing device(s).

Remote Sensing Plan

Record a plan for your remote sensing device(s). After you test, choose areas of your design that you would like to improve.

Circle the scientist you are working with.

Jaime	**Caris**	**Alex**

Circle all the things your scientist is searching for.


open spaces


canyons

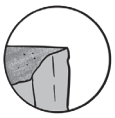

clay minerals (triangle ▲ and felt)


sulfate minerals (star ★ and foam)


volcanic minerals (circle ● and paper)

Data Collection

Site A

Topography:  flat  hilly  steep

Landforms: canyons valleys mountains

Minerals: _____

clay (triangle ▲ and felt)
sulfate minerals (star ★ and foam)
volcanic minerals (circle ● and paper)

Site A Side View (label height and width)

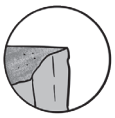
A	**B**
C	**D**

Site A Bird's-Eye View (label as needed)

A	**B**
C	**D**

Data Collection

Site B

Topography:  flat  hilly  steep

Landforms: canyons valleys mountains

Minerals: _____

clay (triangle ▲ and felt)
sulfate minerals (star ★ and foam)
volcanic minerals (circle ● and paper)

Site B Side View (label height and width)

A	**B**
C	**D**

Site B Bird's-Eye View (label as needed)

A	**B**
C	**D**