

Rover Communication

Electromagnetic radiation is a form of energy that travels through space in wave-like patterns. Types of electromagnetic waves include microwaves, infrared waves, and even x-rays. When in space, these waves help spacecraft, rovers, and probes to communicate with Earth. When rovers communicate with Earth, they send and receive radio waves at low frequency to antennas on Earth.



The Challenge:

Work with your team to maximize the amount of time that Mars and Earth can communicate using electromagnetic radiation.

Materials Per Team:

- 1- Inflated balloon
- 1- Flashlight or Laser Pointer
- 4- Mirrors
- 20- 1 square inch pieces of Aluminum Foil
- 1- Stopwatch

Rules:

1. Earth (inflated balloon) must rotate on its axis once every 30 seconds
2. Mars (person holding the flashlight) must rotate on its axis (spin around) once every 30 seconds.
3. Every second that the flashlight hits the aluminum foil that it taped to the balloon (ground receivers/ transmitters on Earth) counts as a second of communication.

First, tape the square pieces of aluminum foil (ground receivers/transmitters) to the inflated balloon (Earth). These ground receivers/transmitters will need to catch a signal from Mars. Think of where the best places would be to locate these items.

Then, decide as a team which person will play each role:

Flip Card Over



Mars

Next, select one person to be Mars. This person will hold the flashlight and will rotate on their axis (spin around) once every 30 seconds.

Earth

Select one person to hold Earth. This person will hold the inflated balloon containing the aluminum foil (Earth containing the ground receivers/transmitters) and will rotate it on its axis once every 30 seconds.

Satellite

Select one person to be the satellite. This person will hold the mirror(s) and may tilt the mirrors in any direction, but may not move from the spot that the team has picked.

Scientist

Select one person to be the scientist. This person will conduct the experiment by using the stopwatch to time 30 seconds at a time.

All Team Members

Work with your team to see how many total seconds Earth is able to communicate with Mars during a period of two minutes. Your team will get to try each arrangement five times. Be sure to record your data in your Science Notebook.

