

Unit 2: Challenge - Olympus Mons Mineral Challenge
Goals:

In this culminating Challenge for Unit 2, you will use the student map to plot a path around Olympus Mons that finds and identifies all the minerals.

Coordinate points (x,y) are used to write a program on a calculator connected to TI-Innovator™ Rover. You will use the color sensor and If-then statements to find and identify various minerals based on color. Finally, you will test your paths and programs on the drive mat that the teacher has laid out on the floor of the classroom.

1. Use the color sensor and a While loop to detect colors on the Olympus Mons map.
2. Use an If Then statement to display messages based on detected colors.
3. Plot a course on the student map using **X,Y** coordinates to navigate around Olympus Mons.
4. Test and refine your program by driving a TI-Innovator™ Rover on the Olympus Mons drive mat.

Background:

One of the main goals for the Mars Exploration Rovers© is to perform geological tests on soils and rocks to determine clues to the planet's past. The initial goal for the rover was to drive and analyze about 40 yards of terrain each day. The Mars Exploration Rovers© contains a camera and high resolution imagers for imaging; different types of spectrometer's to analyze temperature, mineralogy and elemental make up; and magnets to collect magnetic dust particles. For more information about the Mars Exploration Rovers© go to <https://mars.nasa.gov/mer/overview/>.

In this challenge, students will identify four minerals, Sulfur, Olivine and Azurite and Calcium Carbonate.

- Sulfur is a bright yellow chemical element. Sulfur is a key element in the production of matches, insecticides and fertilizers.
- Olivine is typically green in color. As a gem it is called "peridot" and serves as the birthstone for August.
- Azurite is a rare blue mineral that often indicates the presence of copper deposits. It can be ground to make pigments or polished for jewelry.
- Calcium Carbonate is white chemical compound. Calcium Carbonate is a key ingredient in antacids.

Rover WAYPOINT.CMDNUM is a command that is used to determine if the Rover has completed driving its path. The CMDNUM value will be 0 if the Rover is still driving its path and 1 if the Rover has completed the path. Because it will take time for your rover to physically drive from one coordinate location to another, you will need to use this command in this project so it will continually monitor, check and update your screen with chemicals found. Your code could include something similar to the following code below. After the Get cmdnum line but before the EndWhile you will write the code for color detection.

```
0→N
While N=0
  Send ("READ RV.WAYPOINT.CMDNUM")
  Get (N)
End
```

Directions:

Challenge 1: Plot a course using the “RV to XY” command around the Olympus Mons volcano that drives over the squares of colored construction paper (representing minerals) attached to the mat. When the Rover drives over the following colors, display an appropriate message on the calculator such as:

- If green (2), display “Olivine Found!”
- If blue (3), display “Azurite Found!”
- If yellow (6), display “Sulfur Found!”
- If white (8), display “Calcium Carbonate Found!”

Challenge 2: Change the LED light to match the color of the last mineral found and play a specific sound for each mineral when it is found.

