



## Surface of Mars

**Prep Time:** 10-30 minutes

**Grades:** 5-8

**Lesson Time:** 60 minutes

### Essential Questions:

- Could humans live on Mars?

### Objectives:

- Students will be able to create a topographic map of the surface of Mars.

### Standards:

- MS-ESS1-2 - Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
- MS-ESS1-3 - Analyze and interpret data to determine scale properties of objects in the solar system.

### Teacher Prep:

- It is easier to measure out the supplies ahead of time and hand out a box of materials to each group. This activity is done best with 3-4 students, but can be altered based on number of students and materials available.
- Additionally, to save time, dough can be prepared ahead of time and stored in a bag with all air removed.

### Teacher Notes/Background:

- While this project can be completed based on the information in the video, having resources available for students to do more in depth research on the surface of Mars and the elevation of physical features can be beneficial.

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<b>Engage</b> (5 minutes)	<b>3-2-1 Warmup:</b> Students complete a Do Now/warm up. This can be done in their notebooks or on a separate piece of paper.  “3 things you learned, 2 things you want to learn more about, 1 question you still have”  Have students share out questions.	<b>Materials:</b> Do Now/Paper/Notebook
<b>Explore</b> (15 minutes)	<b>Topographic Maps:</b> Introduce students to the concept of a topographic map. Topography is the study of the surface of a planet and its features. A map shows the geographical features, such as mountains and valleys, and the elevation across the surface. They will be making a topographic map of the surface of Mars and label 5 physical features of Mars.  Go over this map— <a href="http://web.csulb.edu/~rodrigue/mars/MOLAmecatorlabel.jpg">http://web.csulb.edu/~rodrigue/mars/MOLAmecatorlabel.jpg</a> — with students.  Tell the students that the lower elevation is blue/purple and the higher the elevation, the more orange and red it gets. Some areas are white, which means a very high elevation in the form of a mountain. Feel free to add in checks for understanding for students, such as showing two colors and asking which represents a higher elevation.  On the map they build, they should make the dough (relatively/comparatively) match the elevations on the topographic map displayed.	<b>Materials:</b> <ul style="list-style-type: none"><li>• Color print outs of map</li></ul>

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<b>Explain</b> (25 minutes)	<b>Create the Model:</b> The first step is to create the salt dough that will be used, if dough has not already been made. Each group of 3-4 will create their own batch of dough. They should mix together the following:  2 cups flour, 1 cup salt, 1 cup water, 2 tsp cream of tartar.  On their piece of cardboard, they need to draw a rectangle (leaving a few inches on each side) for where the dough will go. Once, they have drawn that, cover the rectangle with a thin layer of dough. From there, they can use the topographic map from the previous section to create the different elevations and mountains.  They should also select five of the labeled features and put a toothpick in their approximate location. These locations will be labeled later.	<b>Materials:</b> <ul style="list-style-type: none"><li>• Bowls for mixing</li><li>• Flat cardboard</li><li>• 5 toothpicks per group</li><li>• Notecard (for labels)</li><li>• Mars maps</li><li>• Flour, water, salt, cream of tartar (optional)</li></ul>
<b>Elaborate</b> (10 minutes)	<b>Label the Model:</b> As the map dries, have students create small labels for the 5 physical features they labeled on their map. It should include the name and the elevation. Students will attach the label onto the toothpick once it is stable.  If resources and time allow, have students paint or color their maps based on elevation, like the map given, and include a key.	<b>Materials:</b> <ul style="list-style-type: none"><li>• Notecards to create labels</li><li>• Markers, tape, scissors</li><li>• Paint supplies (optional)</li></ul>
<b>Evaluate</b> (5 minutes)	<b>Evaluation:</b> Students can turn in their projects for an evaluation grade.	<b>Materials:</b>

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### Extensions and Enrichment:

- For an additional challenge, students could make the terrain map onto a spherical representation of Mars.
- Have students complete more in-depth research on the locations they labeled.

### Additional Resources:

- **Our World: Investigating Mars with the Phoenix Lander**  
Find out about the amazing discoveries made on Mars with the Phoenix Lander. See how Phoenix uncovered water ice on Mars. Learn about habitability and the difference between a day on Earth and a sol on Mars. Since the production of this video, NASA has learned more about Mars through these missions: Mars Reconnaissance Orbiter, Mars Science Laboratory (Curiosity), Mars Orbiter Mission, and MAVEN.  
<https://nasaclips.arc.nasa.gov/video/ourworld/our-world-investigating-mars-with-the-phoenix-lander>
- **Launchpad: Curiosity Goes to Mars**  
Find out why Curiosity is the best name for the largest rover ever sent to another planet. Learn about the challenges of landing on a planet with an atmosphere and the geology and chemistry questions scientists hope to answer with instruments on the Mars Science Laboratory. Since this production, Curiosity was successfully launched to Mars and is sending back data and images.  
<https://nasaclips.arc.nasa.gov/video/launchpad/launchpad-curiosity-goes-to-mars>
- **Launchpad: Methane -- An Indicator for Life?**  
See how scientists are using spectroscopy to identify methane plumes on Mars. Learn about the biological and geological processes that form methane on Earth and the implications for astrobiologists who are looking for life beyond Earth. Since the production of this video, Curiosity is now exploring the surface of Mars.  
<https://nasaclips.arc.nasa.gov/video/launchpad/launchpad-methane-an-indicator-for-life>