



Mars vs. Earth

Prep Time: 20 minutes

Grades: 5-8

Lesson Time: 60 minutes

Essential Questions:

- Could humans live on Mars?

Objectives:

- Students will be able to model differences between Mars and the Earth.

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:

- **Different levels of prep can be done based on time and age of students:**
 - Dough can be pre-made for the students.
 - Portioned materials can be prepared for group, leaving students only to mix them with water.
 - Students can be responsible for measuring and mixing all materials on their own.

Teacher Notes/Background:

- While this project can be completed based on information in the video, having resources available for students to do more in depth research on the characteristics of Mars and Earth can make this project even more thorough. Links can be found in the additional resources section.
- If you are completing this lesson and the Mars Terrain lesson on consecutive days, it is best to have groups make a large batch of dough and save it in Tupperware or a plastic bag to use the next day.

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| Engage (5 minutes mal) | 3-2-1 Warmup: Students complete a Do Now/warm up. “3 things you learned, 2 things you want to learn more about, 1 question you still have” Have students share out questions. | Materials: Do Now/Paper/Notebook |
| Explore (5 minutes) | Review: Briefly recap the differences between Earth and Mars, with regards to size, temperature, gravity, atmospheric makeup, and radiation levels. This can be done by students sharing out facts, stating a fact and having students identify which it is true for, or playing four corners (Earth, Mars, both, or neither). If playing Four Corners, designate each corner of the room with a different option (Earth, Mars, both, or neither). Read a statement out loud and students will move to the corner of the room they believe goes with the statement. Students will be completing to-scale models of Earth and Mars to compare the two planets. They will do this using salt dough. The two models should accurately represent the relative sizes of Earth and Mars. Students should measure the diameter of their circles to be as accurate as possible. After completing their dough models, they will be displaying them with poster board or another means to display it with additional information, so their models should be small enough to fit on that. <i>*Note: To use less dough and to help the models keep their shape, students can first create balls of aluminum foil to form the inner core of their models. If you select to do this, students should ensure the foil is of proportional size. Students will then use the dough to wrap around the foil.</i> | Materials: N/A |

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| Explain (20 minutes) | <p>Build the Model: First, in groups of 2-3, students will make their salt dough. They will combine:</p> <p>2 cups of flour, 1 cup of salt, 2 tbsp of cream of tartar, and 1 cup of warm water.</p> <p>They should mix together the dry ingredients and then slowly pour in the water. Half of this dough should be put in a plastic bag with no air inside. It will be used for the Mars Terrain lesson plan. If not completing that lesson, half the measurements above. The dough should be able to hold its shape and not be too sticky, but should be easy to manipulate. Add more flour if the dough cannot hold its shape or add more water if it is too stiff.</p> <p>Using this dough, students will make models of Earth and Mars. The size of the models should be proportional to their actual sizes. Students should use a ruler to measure the diameters to ensure that they are correctly proportional.</p> | <p>Materials:</p> <ul style="list-style-type: none"> • Aluminum foil • Bowl • Salt • Flour • Warm water • Cream of tartar (optional) • Notecards for labels • Scissors/pen |
| Elaborate (25 minutes) | <p>Label the Model: Using the attached map, students will use markers to color in Mars' climate zones, based on average temperatures at equinox. The same should be done for Earth.</p> <p>Students need to make a standard key for what temperatures correspond with which colors. Both planets should share the same key to highlight the differences in temperatures.</p> <p>Once the models have been colored, students should put a toothpick about halfway into the clay on one side of the planet model and then put another directly across from it. These will be used to help them dry and for display purposes.</p> <p>In addition to the model, students need to put the following facts about each planet on their poster:</p> <ul style="list-style-type: none"> • Gravity, with examples of relative weight • Atmosphere composition • Radiation <p>The planets can be displayed in any way, such as tying strings around the toothpicks (when fully dry) and hanging them off a poster or creating a mobile, or gluing them to a bottle cap to display on cardboard poster (laid flat).</p> | <p>Materials:</p> <ul style="list-style-type: none"> • Toothpicks • Markers • Poster or other means to display info |

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| Evaluate (5 minutes) | Rubric: The project can be assessed using the attached rubric. If time allows, have students display their projects and do a gallery walk to see other students' projects. | Materials: <ul style="list-style-type: none">• "Is Mars Really that Different?" handout |
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Extensions and Enrichment:

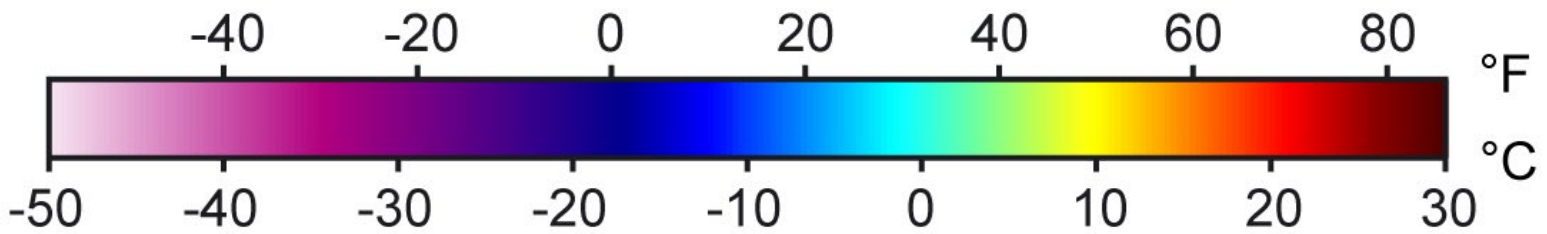
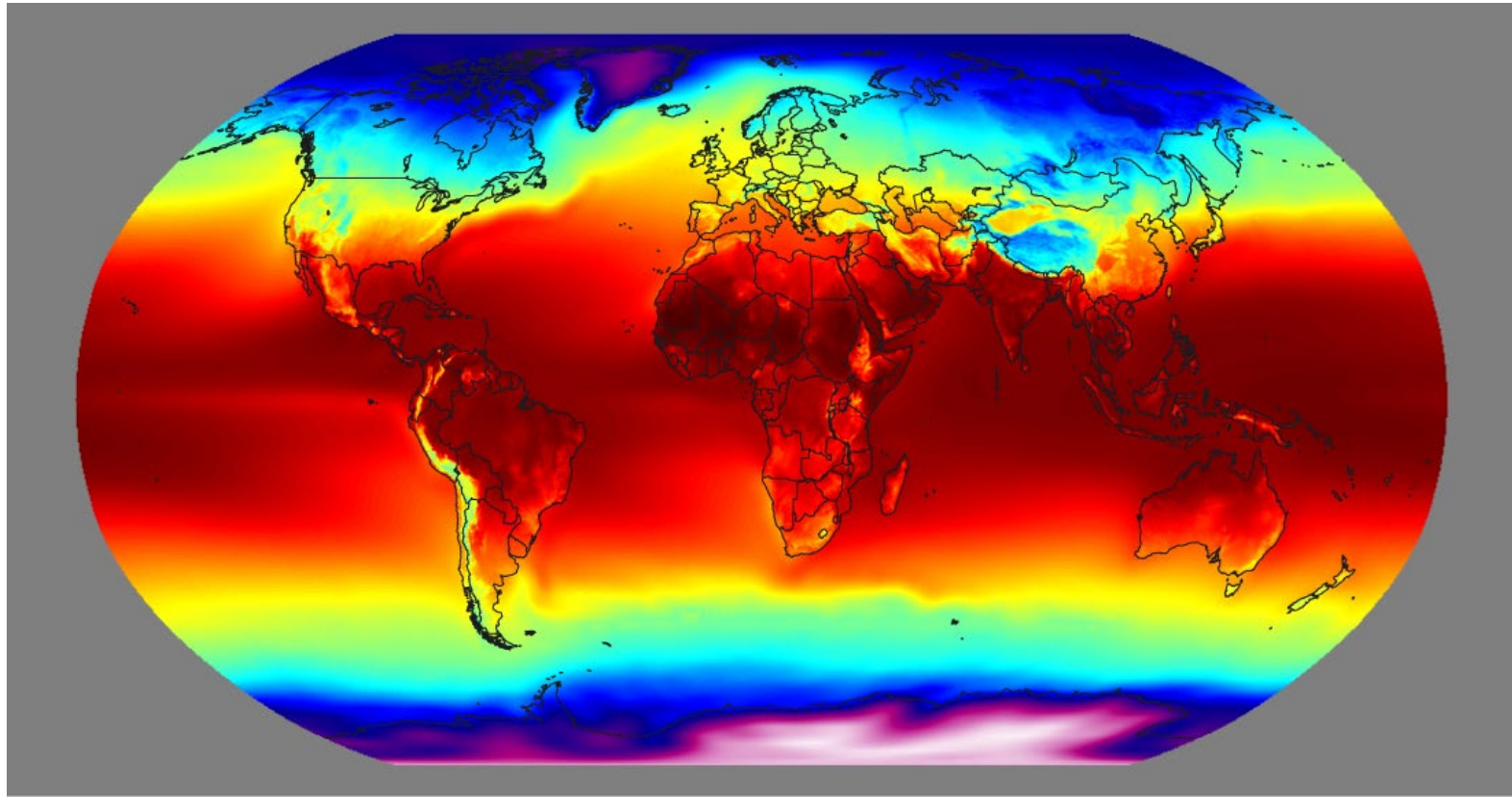
- This activity can be done with many types of materials, depending on class time and budget. Here are a few other suggestions:
 - Papier Mache (will require 2 days)
 - 2D model on poster board
 - Clay

Additional Resources:

- **Mars vs. Earth information:** <https://mars.nasa.gov/allaboutmars/extreme/quickfacts/>
- **Our World: Life on Other Worlds**

Explore the possibility of finding life on other planets. See how NASA's search for water on Mars proved successful with the Phoenix Lander. Find out about extremophiles and what makes a habitable zone for life as we know it. 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-life-on-other-worlds>



Annual Mean Temperature

Image from: https://upload.wikimedia.org/wikipedia/commons/a/aa/Annual_Average_Temperature_Map.jpg

EQUINOXES ON MARS TEMPERATURE ZONES., FROM MGS TES



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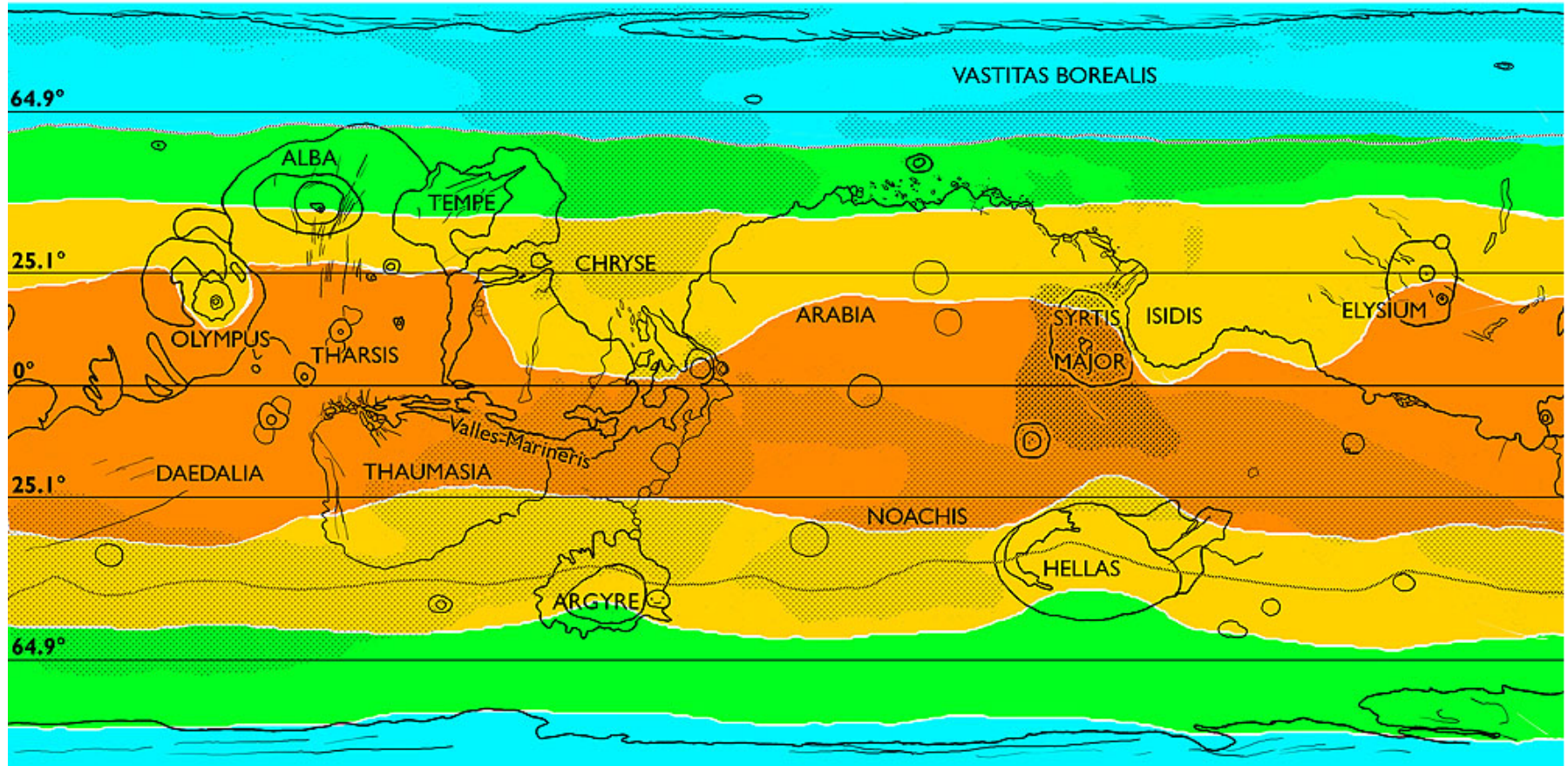


Image adapted from: <http://planetologia.elte.hu/mcdd/climatemaps.html>

Converted to Celsius by Challenger Center