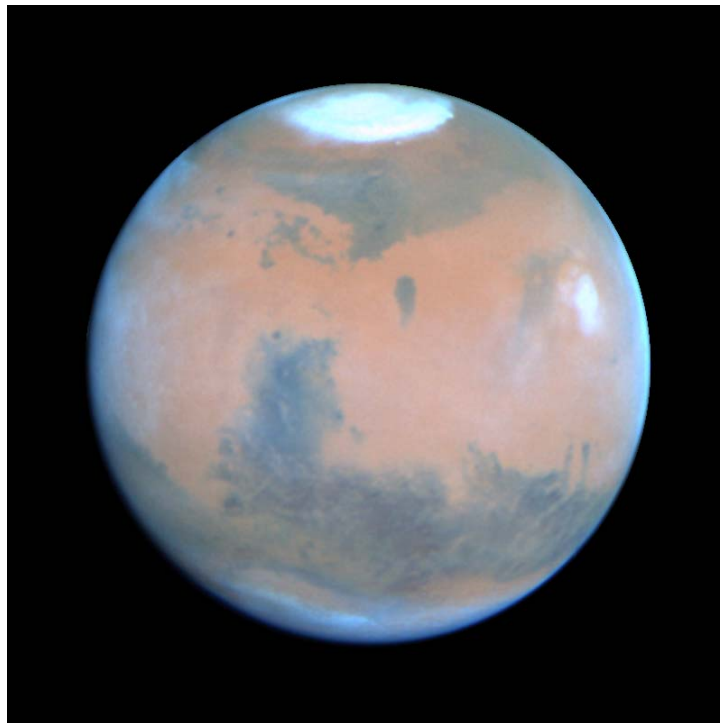


Space Odyssey Online Teacher's Guide

Edible Mars Maps

Postvisit Activity for Solar System



Courtesy Philip James (University of Toledo), Steven Lee (University of Colorado), NASA

Grades K-3
CDE Standards
Science: 4.4a, 4.4d

Preparation and Materials

Estimated Preparation Time: 90 minutes

Estimated Activity Time: 45-60 minutes

Materials

Refrigerated cookie dough to make large sugar cookies (one per student)

Two cans vanilla frosting

Red and orange food coloring

Hershey kisses

Chocolate chips

Paper plates

Plastic knives

Red sugar sprinkles or cinnamon

Mars maps

Toothpicks

Napkins

Chart paper

White paper

Pencils

Copies of Mars map activity sheet

Learning Goals/Objectives

Students will

- Identify and label the major physical features on a map of the surface of Mars
- Compare geologic features of Mars with those of Earth

Connection to Space Odyssey

Your trip to *Space Odyssey* will be centered on Mars, at the Candor Chasma diorama, designed to be your Visitor Center to the Universe. Here, you may see an astronaut performing experiments on the surface of Mars. You may decide to experiment yourself at the Experiment Bar. You may also want to learn about how different landscapes on Mars were formed at the Carving Landscapes and Cratering interactives. Don't forget to find out about those awesome dust storms at the Martian Dust Devil exhibit!

Advanced Preparation

1. Make one sugar cookie for each student in your class. Using the refrigerated sugar cookie dough available at grocery stores, cut slices of dough at least $\frac{1}{4}$ to $\frac{1}{2}$ inch thick. Follow baking directions on the package. Give the cookies enough room to spread out on the cookie sheet so that they will be round.
2. Use food coloring to tint one can of vanilla frosting so that it is reddish orange in color. Don't tint the other can of frosting.
3. Obtain a copy of one or more of the Mars books on the resource list below to share with your class.

Classroom Activity

1. View pictures of Mars surface maps and point out important landforms on Mars, including Valles Marineris, Olympus Mons, and the polar ice caps. Discuss how these surface features are similar to surface features on Earth.
2. Inform students that they will be making their very own maps of Mars that they will be able to eat!
3. Using information from books and maps available on the Internet, help students re-create the Mars map on a large piece of chart paper. Students will use this map (similar to the one included at the end of the lesson) to create their own cookie maps. Keep in mind that the map provided for this activity is not to scale; it is a representation to aid students in learning the geologic features.
4. Ask students to wash their hands and review important rules about sharing food. Ask students not to lick their fingers or plastic frosting utensils so that they do not spread germs.
5. Provide each student with a paper plate and a cookie. Each student will also need one Hershey kiss, three chocolate chips, a plastic knife for spreading frosting, a toothpick for carving, and a napkin.
6. For each group of students, provide a paper plate with enough reddish orange and white frosting for students to share.
7. Have students shave the top "pointy" parts off of their Hershey kiss and chocolate chips. At this point, you could discuss how the volcanoes on Mars are similar to the volcanoes in Hawaii. They are not tall peaks, but rather gentle slopes. You may wish to show students examples of this. One great picture is located at the following website:
http://www.lpi.usra.edu/images/shaw/shaw_S32.gif

8. Allow students to eat the discarded chocolate shavings. They may also use their toothpicks to carve a crater in the Hershey kiss.
9. Now students have the materials they need to create their cookie maps. Have them spread the reddish orange frosting on first. At this point it might be helpful to have a brief discussion on how much frosting is appropriate to spread on one cookie.
10. Once their entire cookie is frosted in reddish orange, they may use the white frosting to create the polar ice caps.
11. Then students may place their Hershey kiss to represent Olympus Mons and the three chocolate chips to represent the Tharsis volcanoes; Arsia Mons, Pavonis Mons, and Ascraeus Mons.
12. Students may then use their toothpicks to create Valles Marineris in the center of their cookie. Here you might discuss how this feature can be compared to the Grand Canyon, but that the two were formed in different ways. The Grand Canyon was carved by the Colorado River, whereas Valles Marineris was formed as the crust of Mars split apart, much like a fault line here on Earth.
13. Allow students to sprinkle cinnamon or red sugar sprinkles on their cookies to represent the dust on Mars.
14. Let students display their cookies to the rest of their group before eating.
15. Finally, allow students to eat their map creations!

Variations/Extensions

1. Have students label the map of Mars after completing their cookie maps. Students may color the map when they're finished.
2. Create a Venn diagram with students to compare geologic features of Mars with those of Earth.
3. Have students research Mars further and create mini-reports of interesting facts they learn about the planet.
4. Ask students to create similar surface maps of other planets. For instance, a Mercury cookie map might be frosted a grayish brown and marked with tons of craters made by dropping objects onto the surface.

Resources

Books

Meachen Rau, Dana. *Mars*. Minneapolis, Minn.: Compass Point Books, 2002.

Ride, Sally and Tam O'Shaughnessy. *The Mystery of Mars*. New York: Crown Publishers, 1999.

Simon, Seymour. *Destination: Mars*. New York: William Morrow, 1987.

Sumners, Carolyn. *An Earthling's Guide to Mars*. New York: McGraw Hill, 1999.

Web sites

<http://www.the-planet-mars.com/volcanoes/mars-volcanoes-map.html>

<http://www.the-planet-mars.com/map-of-mars/map-mars.html>

<http://www.the-planet-mars.com/map-mars.html>

<http://www.gsfc.nasa.gov/gsfc/spacesci/pictures/mola/mars3d.htm>

<http://mars.jpl.nasa.gov/>

http://mars.jpl.nasa.gov/funzone_flash.html

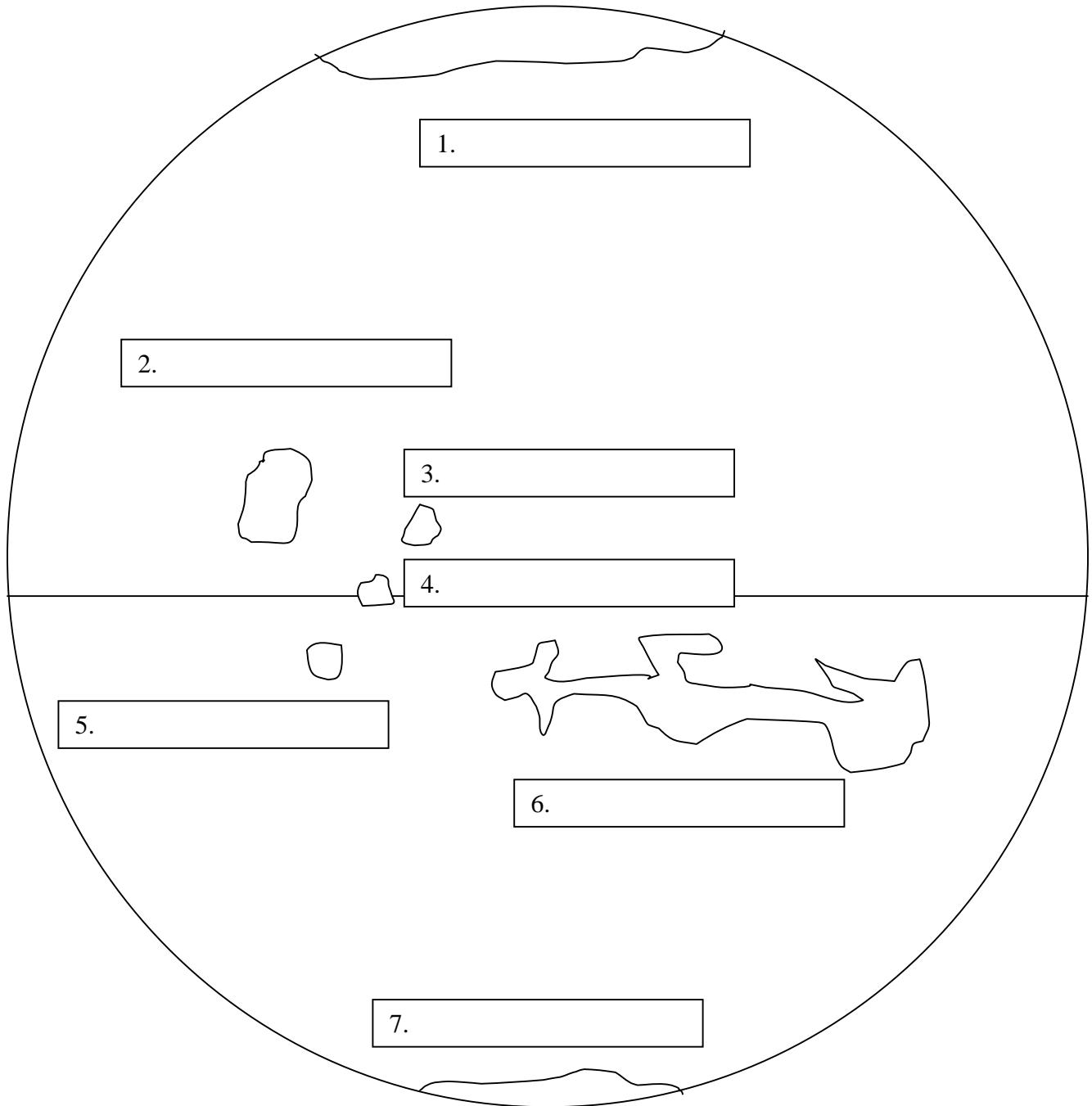
<http://mars.jpl.nasa.gov/kids/>

<http://athena.cornell.edu/kids/index.html>

Name: _____

The Red Planet

Label the geologic features of Mars on the map below.



South Polar Ice Cap
Pavonis Mons
Olympus Mons
Ascraeus Mons

North Polar Ice Cap
Valles Marineris
Arsia Mons

The Red Planet

