

## Venus Topography Box

Adapted: [http://quilt.jpl.nasa.gov/docs/Venus\\_Topo\\_508FC.pdf](http://quilt.jpl.nasa.gov/docs/Venus_Topo_508FC.pdf)

**Time Allotted:** Two class periods

**Teachers:** Michael K. Wilson and Jennifer LaPoma

**Goals:** Use a model research technique to map the land surface features of the planet Venus, which has a very dense atmosphere and cloud deck. Students will measure the topography of a model Venus (the shoebox) as a representation of scientists who completed this task. Students will then learn how to make a contour map based on their results.

**Objectives:** Measure, Model, Gather and Record Data, Estimate, Predict, and Interpret, Introduction to xy coordinate plane.

**NJCCS:** 5.3.6.D.1, 5.9.6.B.1

### **Materials:**

Shoebox

Newspaper and/or Aluminum foil

Skewer stick (or chopstick or thin pencil)

Nail (or ice pick, awl)

Plaster of Paris

Rulers

Graph Paper

Rubber bands

### **Preparation of Model Venus Topography in a Shoebox:**

1. Prepare a model Venus shoebox for each of your selected group of students.
2. Crumple up of pieces of newspaper and place on the bottom of shoebox
3. Place aluminum foil over newspaper to create a varied surface topography
4. Prepare Plaster of paris and pour over the foil in box.
5. Create a grid on top of each shoebox top that is 1" x 1". A1 through H11 (or best suited for shoebox size)
6. Punch a hole using the nail or other sharp object in each grid box.
7. Rubber band the lid onto the shoebox so that students cannot lift open to see the model topography.

**Student In-Class Prep & Procedure:**

1. Arrange students in groups and pass out the model Venus shoebox, measuring stick, and blank grid to each group.
2. Instruct students that they will represent a research team investigating the surface topography of Venus.
3. Discuss the difficulty scientists have had in understanding the surface of Venus
  - Cloud-covered planet
  - Average temperature of 867 degrees Fahrenheit prevents scientists from being able to land a probe down on surface for a given period of time
  - Scientists developed a way in which the spacecraft Magellan could use radar signals that penetrated the clouds and bounced off the surface of Venus. These signals were timed and could then be measured based on time to make a detailed map of Venus' surface.
  - Do a simple  $\text{Distance} = \text{Rate} * \text{Time}$  equation on the board and draw a schematic of how Magellan sends a radar pulse to Venus and collects the time result.
4. Ask students based upon their knowledge of Venus – it's location in the solar system, gravitational force, size, atmosphere what they might suspect the surface to look like. Record hypothesis on worksheet.
5. Demonstrate for the students how to insert the stick and record their measurement. Assign tasks or rotations for the groups.

Option for younger grades and other adaptations: You can pass out colored pencils to color code measurements.

6. Once the contour map has been completed have students take off shoebox lid and compare their map to the model topography.
7. Show students topographic map of Venus and compare to their hypothesis
8. In their groups students can complete the attached worksheet.

Name:

Team:

### **Modeling Venus's Topography**

1. Explain what you think the surface of Venus might look like based on your knowledge of the planet.

Hypothesis:

2. How did scientists determine the topography of Venus?

3. What equation was used in this process?

4. How did your map compare to the topography inside the shoebox?

5. Why do you think the NASA scientists were not able to make a truly accurate map of Venus's surface?