

# Voyage to Venus Mission

## Target Standard

### Algebra

- Describe, extend, and make generalizations about geometric and numeric patterns
- Represent and analyze patterns and functions using words, tables, and graphs
- Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions

## Related Standard

### Representation

- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

## Prior Knowledge

- Measurement
- Estimation to the nearest cm
- Contour maps

## Teaching Plan

### Purpose

To collect, organize, and analyze data to generate a model that can be used for a possible landing site on Venus.

### Materials

Graph paper

Skewers

Contour maps

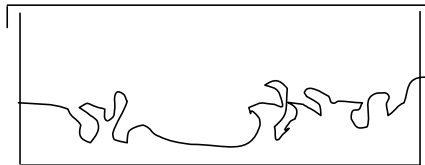
Activity Sheet: Mission: Voyage to Venus...

To be made in advance by teacher:

- Shoe boxes with simulated Venus terrain inside them using any of the following: Newspaper, cups, rocks, tape, foil, etc...
- Play dough, using flour, salt, oil, cream of tartar, food coloring, and water (recipe provided under **Day 3**)

### Background

The teacher should make the Venus boxes in advance. Begin by creating a simulation of the surface of Venus in the bottom of a shoebox using any handy materials. Be sure to create at least two flat areas for the students to choose as an appropriate landing site. For example:



Possible side view of inside of shoebox

Use graph paper or create a grid with coordinates on top of the shoebox. Punch holes with a small nail at the intersection of the grid lines for the entire surface of the box.

### Implementation

Cooperative teams of two are appropriate for this activity. Students should switch between the two roles of measurer and recorder.

## Day 1

Have students use bamboo skewers to simulate radar signals bouncing off the Venusian surface. The students will poke the skewers in the pre-existing nail holes of the shoebox in a systematic way to record the elevation of the surface. Students measure and record how far the skewer goes into the box before hitting 'Venus'. *note® be sure students recognize that they are measuring the distance from the top of the box lid to the surface of Venus.*

It may be helpful to create a table as follows:

Coordinate Locations		Distance on Skewer (cm)
X	Y	

## Day 2

Develop individual contour maps using the team data. Record data on graph paper. Discuss and develop the various view representations of their model. *For example: Aerial view and cross section.*

## Day 3

Using their data, the teams re-construct a 3-D model of the Venusian terrain using Play-Dough™. The recipe for Play-Dough™ is as follows:

1 cup flour	Mix ingredients and cook until it forms a ball and all mushy spots are gone. Knead slightly. Store in an airtight container.
½ cup salt	
1 tablespoon oil	
2 teaspoons cream of tartar	
food coloring	
1 cup water	

## Day 4

Students are given a scale model to use as one parameter for determining the landing site. Other options may be to use classroom odds and ends to create a craft of their own design fitting specified dimensional requirements. *For example: 2cm x 2cm x 2cm—like gumdrops or centimeter cubes. note® models of Venus Pathfinder Spacecraft can be made from scissors, tape, and or glue and 8.5" by 11" paper by downloading a small file (use the 'less sharp GIF version) from <http://Venus3.jpl.nasa.gov:80/MPF/mpf/education/cutouts.html>.*

## Day 5

Using their models and their data (re-analyze), the teams now determine the landing sites based upon a model craft. The teams must defend their choices using their data and their models. *note® there may be many possible sites. A set of criteria may emerge from the students interaction and teacher guidance to determine what are acceptable locations or sites.*

Name:

# Mission: Voyage to Venus Landing Proposal

**Your mission:** To identify a landing site on Venus for your exploring spacecraft.

## Mission Landing Proposal

List landing coordinates and explain your choices below.

### Choice 1:

The landing site coordinates are ( \_\_\_\_\_ , \_\_\_\_\_ )

The surface of my first landing choice can be described as:

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### Choice 2:

The landing site coordinates are ( \_\_\_\_\_ , \_\_\_\_\_ )

The surface of my second landing choice can be described as:

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Why is choice 1 your top selection? Explain why you choice 1 is better than choice 2.

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## Proposal Presentation

Present your proposal to Mission Control. Include a map and/or model of the landscape of Venus that you investigated with two landing sites labeled. (Model spaceships may be used.)



An image of the surface of Venus from the Venera-9 mission, found at:  
<http://www.seds.org/nineplanets/nineplanets/venus.html>