

KITCHEN PARABOLOIDS

Teaching Guidelines

Subject: Mathematics

Topics: Algebra, Quadratic Equations and Functions

Grades: 9 - 12

Concepts:

- Parabola

Knowledge and Skills:

- Can recognize a parabolic shape
- Can determine the equation of a quadratic function that closely matches a set of points

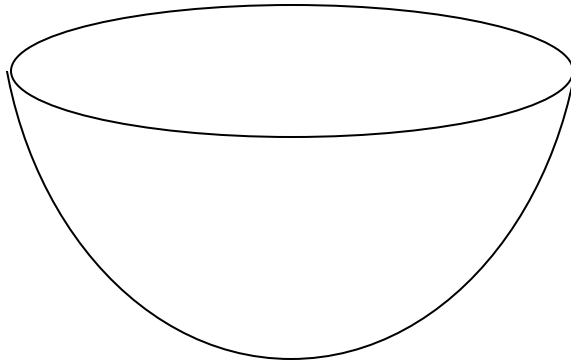
Materials: (for each team)

- Several glasses and bowls (without flat bottoms)
- Ruler
- Piece of string
- Straws or toothpicks

Procedure: This activity is best done by students working in small teams of 2-3 people each.

Kitchen Paraboloids

A "paraboloid" is a curved surface which, if cut through the center, would have a cross-section in the shape of a parabola:

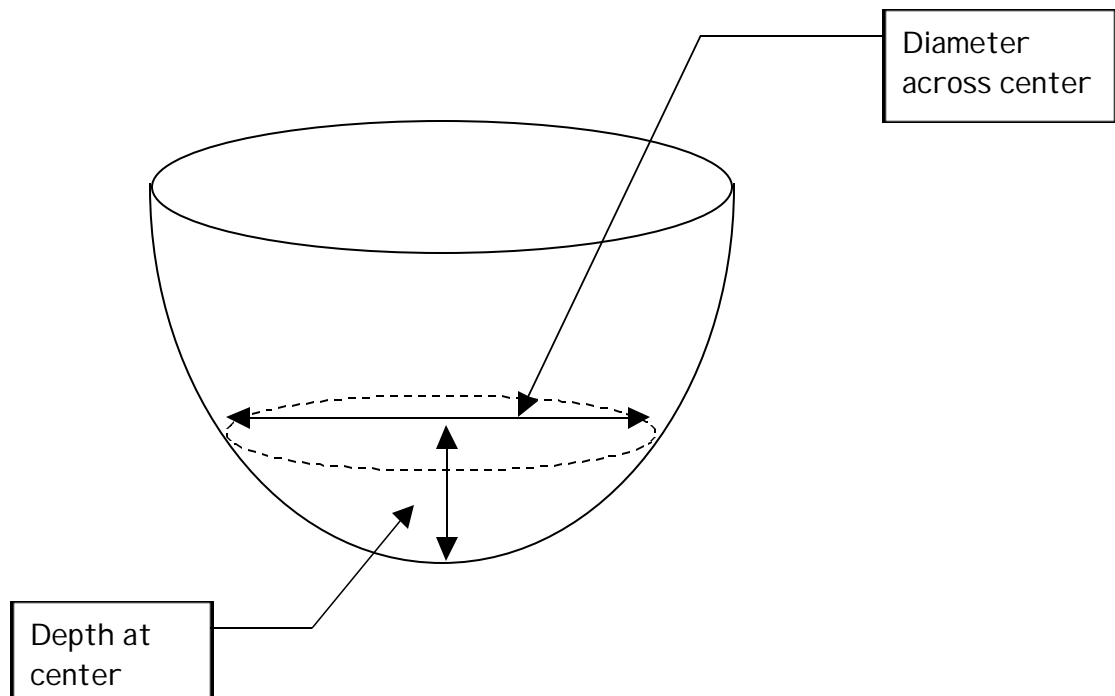


Telescope mirrors and headlights are both paraboloids.

In this investigation, you will find if some common kitchen dishes are actually paraboloids.

Investigation steps:

1. Choose a glass or bowl which seems to have a paraboloid inner surface.
2. Put a little water into the object.
3. Measure the depth of the water and the diameter of the circular surface of the water.
 - To measure the depth of the water, insert a thin object, such as a toothpick or straw, into the water at the center point, and measure the length that became wet. Be sure that when you insert the object it is exactly vertical.
 - To measure the diameter, use a string to mark off the length.



4. Record your data in a chart.
5. Add a little more water.
6. Repeat steps #3 and #4 until you have data that spans the object from being nearly empty of water to being nearly full.
7. Graph the height of the water (on the y-axis) against the radius (not diameter) on the x-axis.
8. See if you can find an equation of the form $y = ax^2$ that matches the graph.
9. Repeat with another glass or dish.
10. Report on your results.