



DEFINITION

A parabola can be defined as the locus of points equidistant from a point (called the focus) and a line (called the directrix). The parabola with vertex at the origin and opening upward has the equation $4py = x^2$, where p is a constant representing the distance from the focus to the vertex (or from the vertex to the directrix). Algebra students also learn that the graph of a parabola is $y = ax^2 + bx + c$, where a , b , and c are arbitrary constants, $a \neq 0$. Students can do many activities to explore how the parameters a , b , and c affect the shape of the graph. The parabola is also one of the conic sections and can be formed by slicing a right circular cone with a plane parallel to the generating line of the cone.

MATH IS ALL AROUND US

Bridges are physical manifestations of the catenary (the mathematical model for a hanging cable supported at its ends and bearing only its own weight), but a suspension bridge takes the form of a parabola. A parabola can also model the height-versus-time graph of falling objects at or near the center of the earth. It is usually the first nonlinear curve that students study in algebra.

ACTIVITY

Should you ever find yourself with uncooked hot dogs for lunch on a sunny day, try this flameless approach to feeding your hunger. You can use your math skills and the sun as your source of heat to build a parabolic solar cooker!

Start with anything flexible, such as cardboard, and bend it into the shape of a parabolic trough. Then line the trough with something shiny, such as tinfoil, to reflect the sun's rays onto your meat. Suspend your hot dog with a wire through the focus of each end piece of the trough.

Consider a trough that is 1 foot wide and 4 inches deep. How far from the bottom of the trough should the wire be placed to best cook your dog?