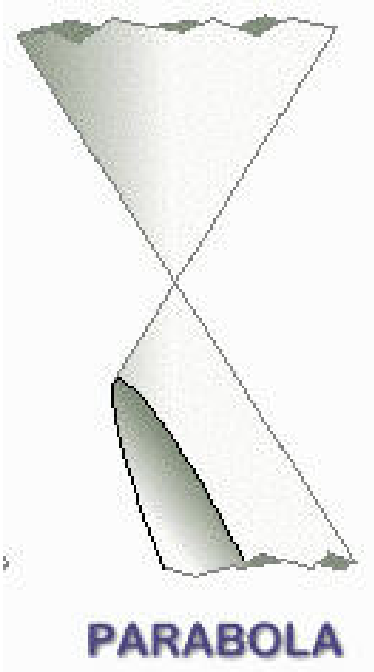
Déjà Vu, It's Algebra 2!

Lesson 31

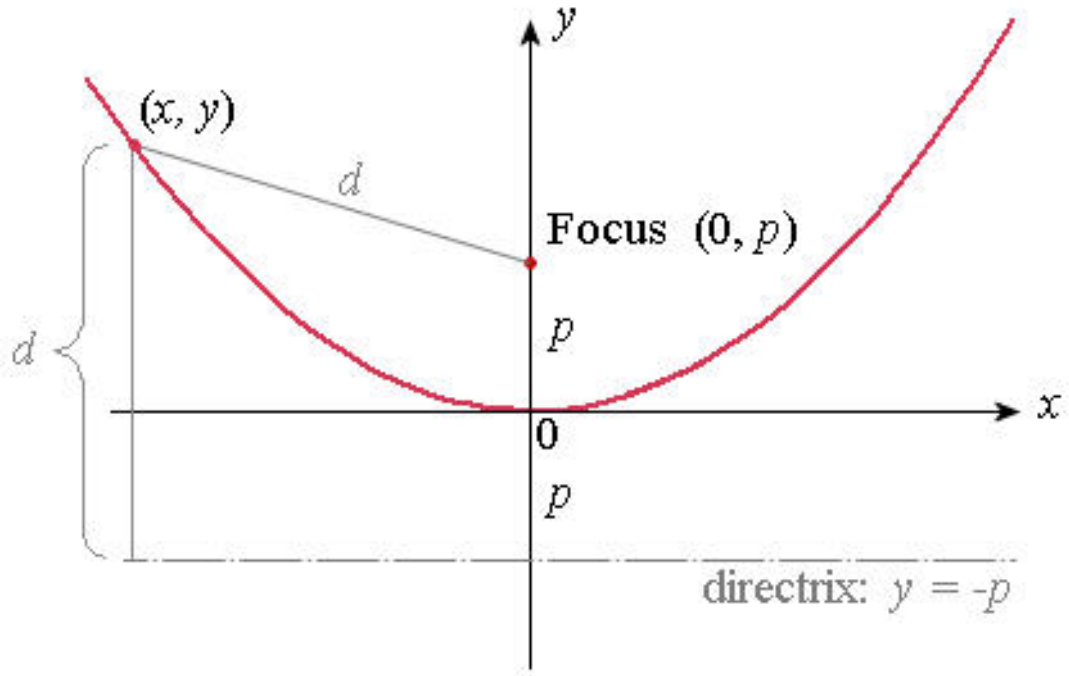
Conic Sections continued: Parabolas

A **PARABOLA** is formed by slicing a cone at an angle that is slanted the same as, or parallel to, the cone.



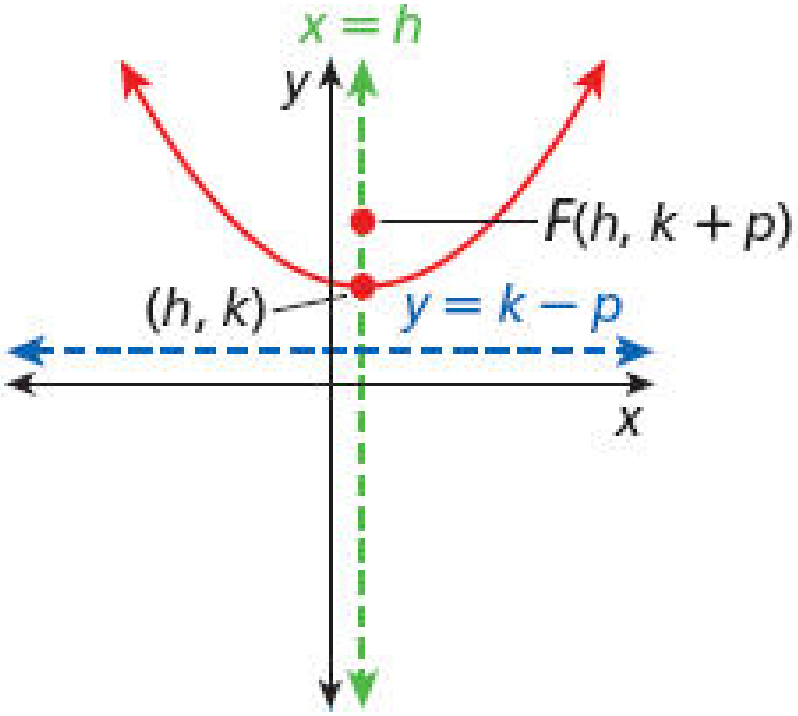
Locus Definition of a Hyperbola:

The set of all points in the plane whose distances from a fixed point, called the *focus*, and a fixed line, called the *directrix*, are always equal.

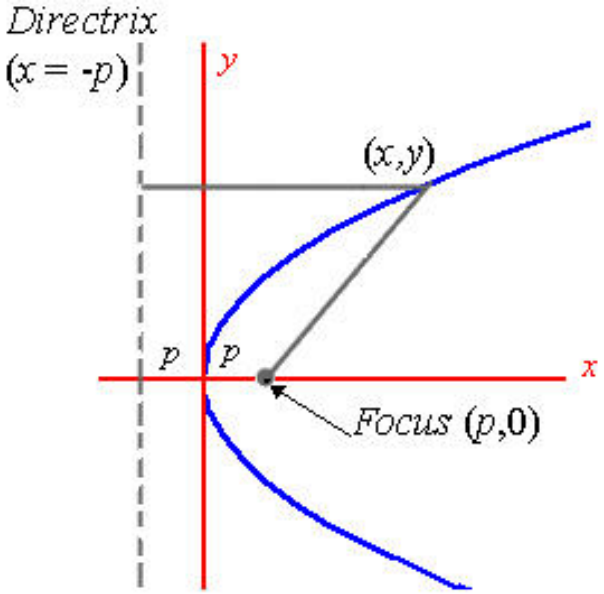


The point directly between, and hence closest to, the focus and the directrix is called the *vertex* of the parabola.

Parabola $y - k = \frac{1}{4p}(x - h)^2$



If the parabola opens horizontally, it is NOT a quadratic function (but still a parabola.) It's standard equation would be:



$$x - h = \frac{1}{4p}(y - k)^2$$

If $p > 0$, the parabola opens in the positive direction, up or to the right.

If $p < 0$, the parabola opens in the negative direction, down or to the

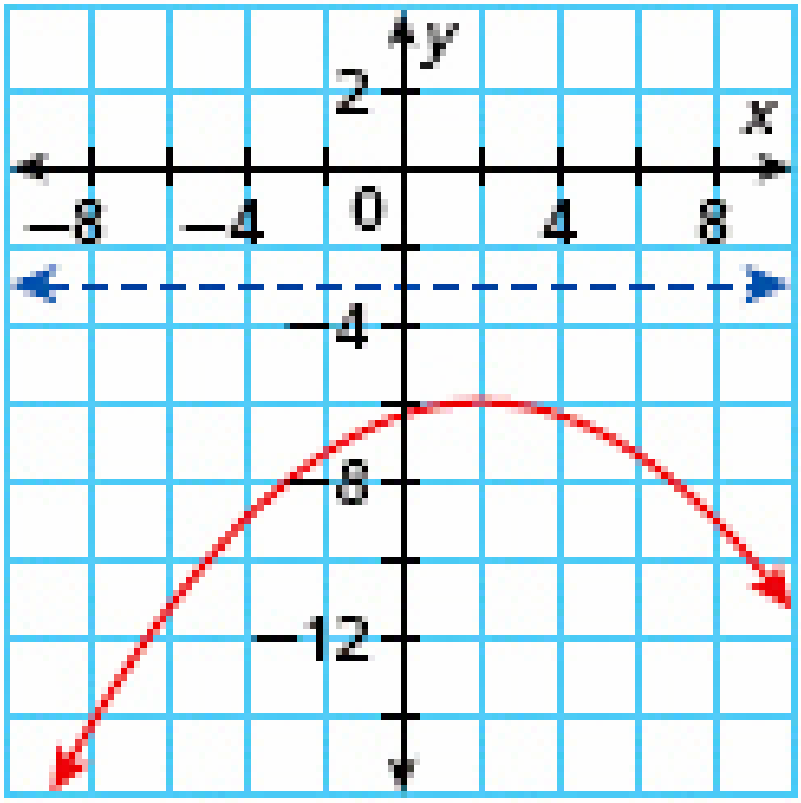
Let's graph one ourselves.

Example:

Graph the following parabola. Show the vertex, focus, and the directrix. $x = \frac{1}{2}(y+1)^2 + 2$

We can also write equations of parabolas from given information.

Example:
Write an equation in standard form of the following parabola, then find the coordinate of the focus.

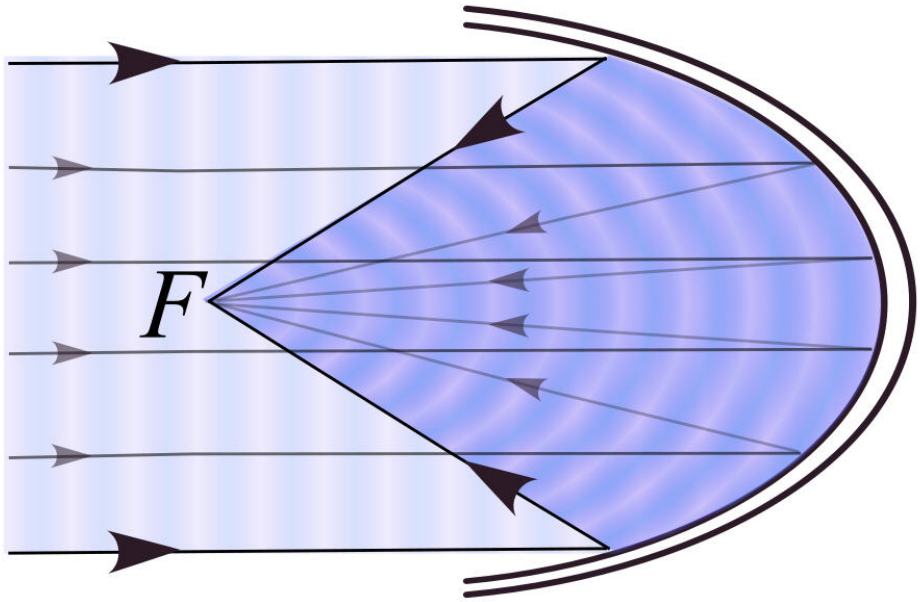


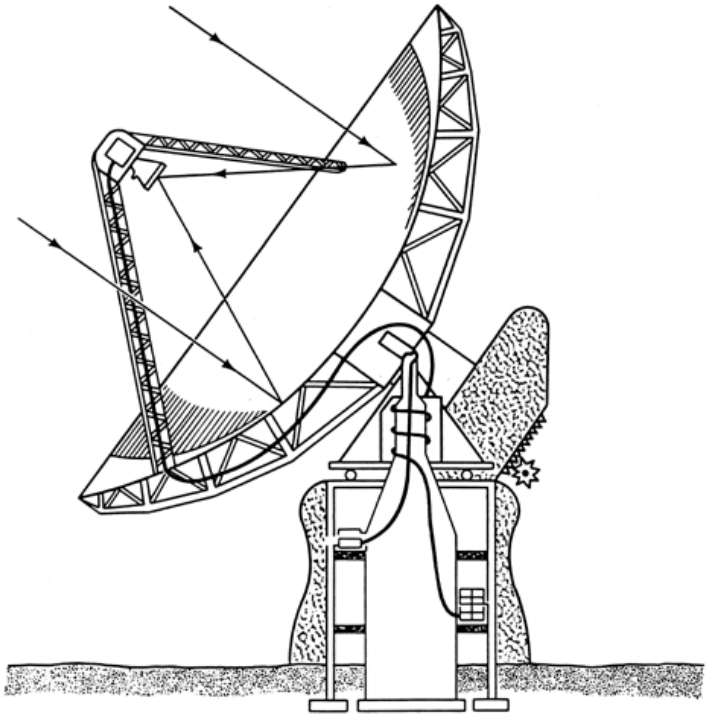
Example:

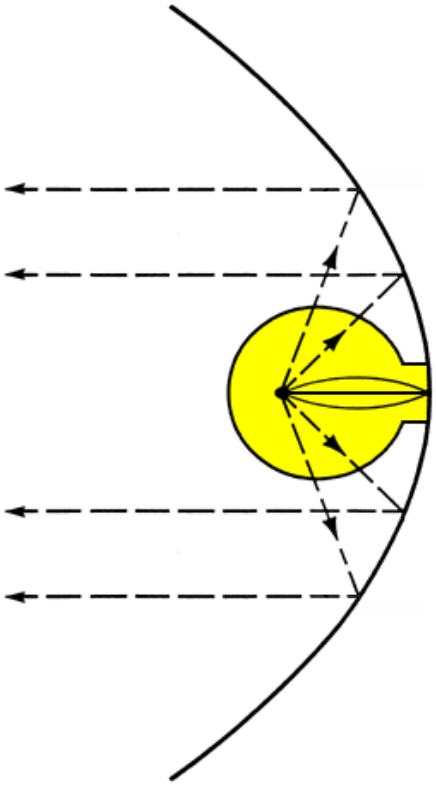
Write the equation in standard form of the parabola with focus at $(4,-5)$ and directrix at $x = 12$.

Déjà RE-Vu

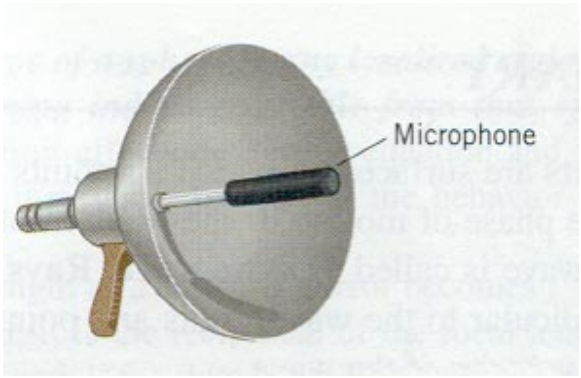
The reflective properties of parabola make it very useful in a variety of practical applications.







Let's say you are constructing a parabolic microphone. The surface the parabolic microphone will reflect sounds to the focus of the microphone at the end of a part called a feedhorn. The equation for the cross section of the parabolic microphone dish is $x = \frac{1}{32}y^2$, measured in inches.



How long should you make the feedhorn?

Math is everywhere!

References:

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