9.2 Graph and Write Equations of Parabolas

TEKS a.5, 2A.5.B, 2A.5.C

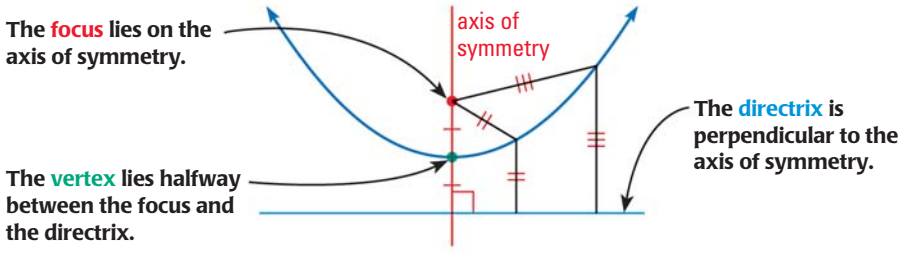
Before You graphed and wrote equations of parabolas that open up or down.

Now You will graph and write equations of parabolas that open left or right.

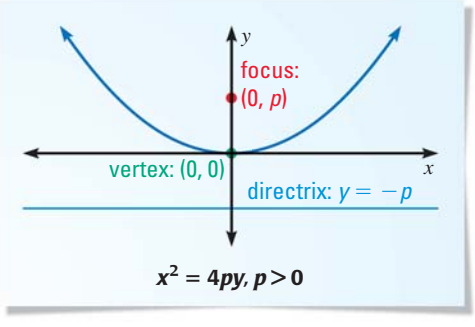
Why? So you can model sound projection, as in Ex. 56.

Key Vocabulary
- **focus**
- **directrix**
- **parabola,** *p. 236*
- **vertex,** *p. 236*

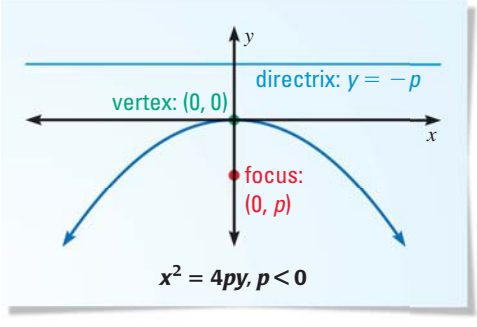
You know that the graph of $y = ax^2$ is a parabola that opens up or down with vertex (0, 0) and axis of symmetry $x = 0$. On any parabola, each point is equidistant from a point called the **focus** and a line called the **directrix**.



The equation of a parabola that opens up or down and has vertex (0, 0) can also be written in the form $x^2 = 4py$. Parabolas can open left or right as well, in which case the equation has the form $y^2 = 4px$ when the vertex is (0, 0). Note below that for any parabola, the focus and directrix each lie $|p|$ units from the vertex.



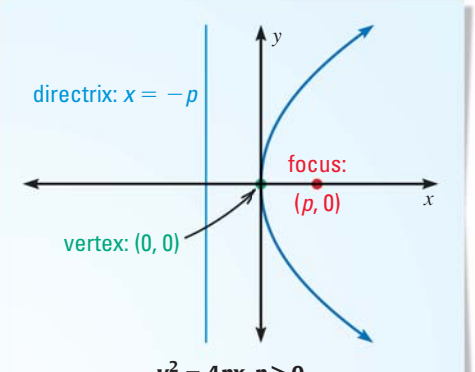
$x^2 = 4py, p > 0$



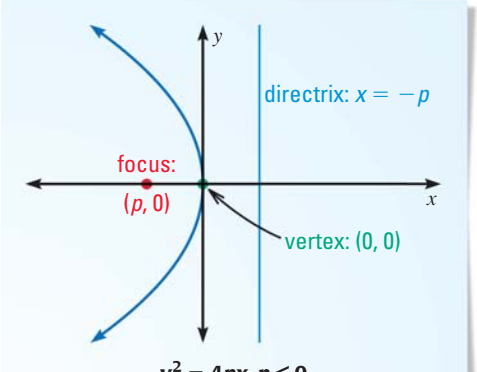
$x^2 = 4py, p < 0$

IDENTIFY FUNCTIONS

Notice that parabolas that open left or right do *not* represent functions.



$y^2 = 4px, p > 0$



$y^2 = 4px, p < 0$