If a parabola is lined up with either the *x*-axis or *y*-axis, the equation will look like one of these:

$(x-h)^2 = 4p(y-k)$ This parabola has vertex (h, k) and opens up. The focus is p units above the vertex and the directrix is a horizontal line p units below the vertex.

$(x-h)^2 = -4p(y-k)$ This parabola has vertex (h, k) and opens down. The focus is p units below the vertex, and the directrix is a horizontal line p units above the vertex.

$(y-k)^2 = 4p(x-h)$ This parabola has vertex (h, k) and opens to the right. The focus is p units to the right of the vertex, and the directrix is a vertical line p units to the left of the vertex.

$(y-k)^2 = -4p(x-h)$ This parabola has vertex (h, k) and opens to the left. The focus is p units to the left of the vertex, and the directrix is a vertical line p units to the right of the vertex.

An ellipse centered at (h, k), with long axis horizontal has equation

$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$, where $a > b$.

An ellipse centered at (h, k), with long axis vertical has equation

$\frac{(y-k)^2}{a^2}+\frac{(x-h)^2}{b^2}=1$, again where $a > b$.

For an ellipse, $a^2 = b^2 + c^2$

A hyperbola centered at (h, k), opening left and right has equation

$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$, with no condition on a and b.

A hyperbola centered at (h, k), opening up and down has equation

$\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$, again with no condition on a and b.

The a always matches up with the positive term, and the b with the negative term.

For a hyperbola, $c^2 = a^2 + b^2$

A circle centered at (h, k), with radius r has equation

$(x-h)^2+(y-k)^2=r^2$