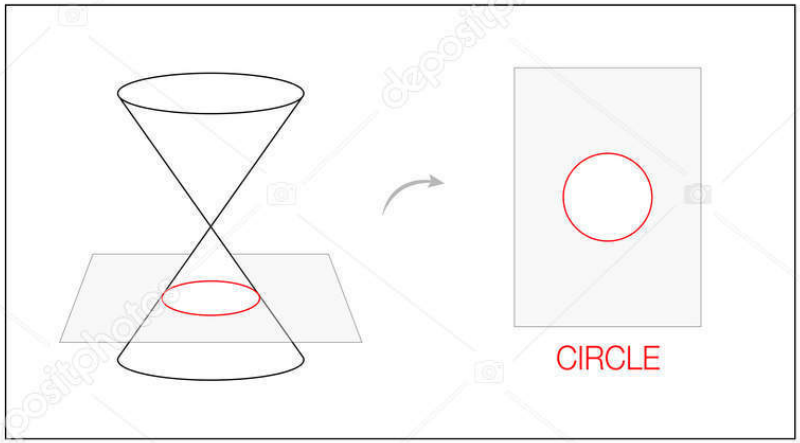
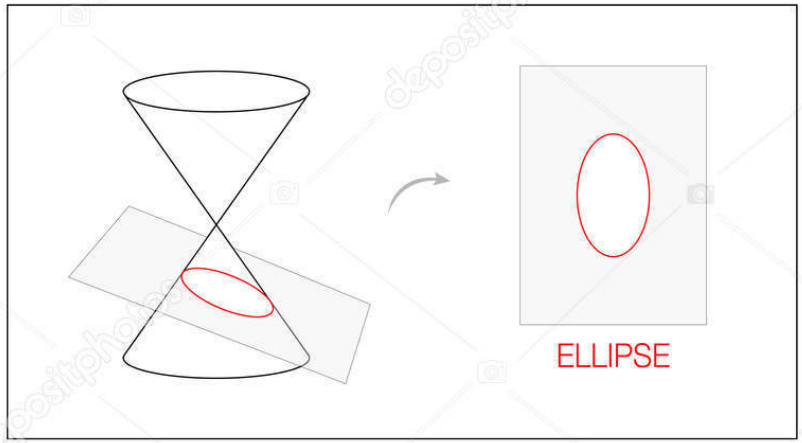
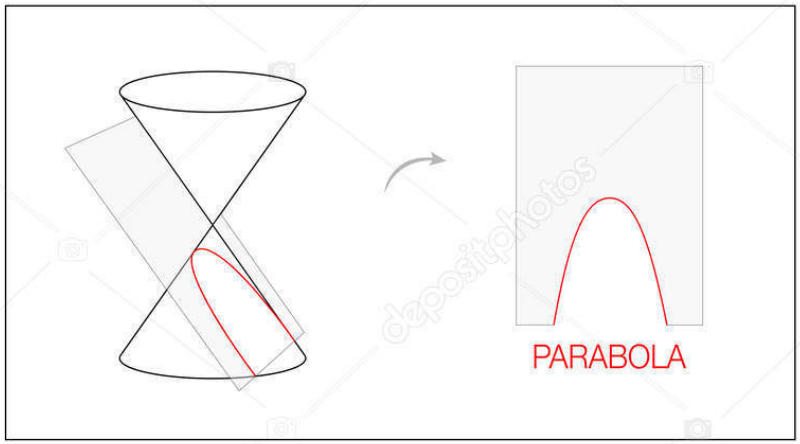
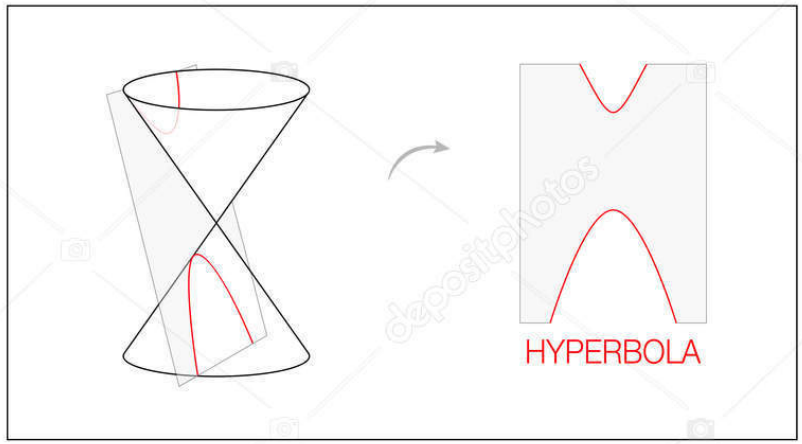
Hyperbolas









Objectives

1. Find the vertices and foci for a hyperbola in standard form.
2. Write the equation for a hyperbola in standard form.

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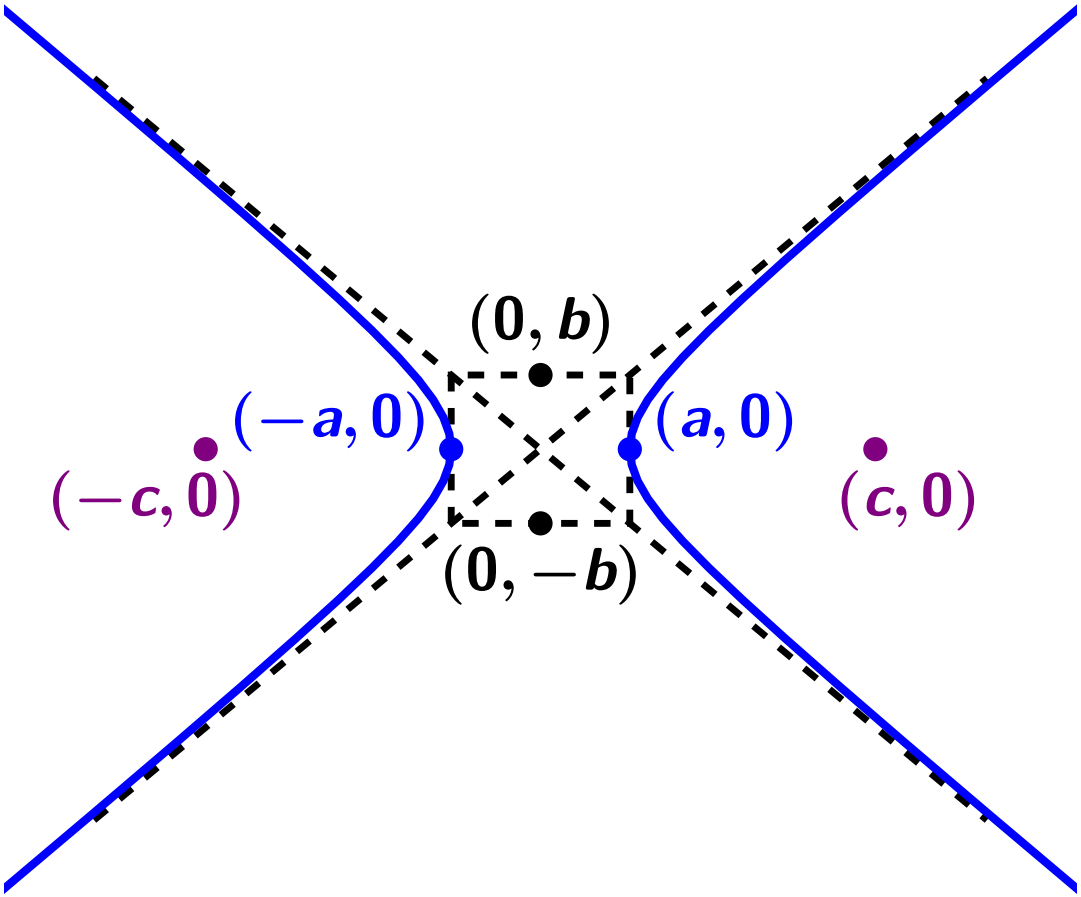
A key difference, however, is that hyperbolas will open left/right if the sign in front of x is positive, and will open up/down if the sign in front of y is positive; regardless of the values of a and b.

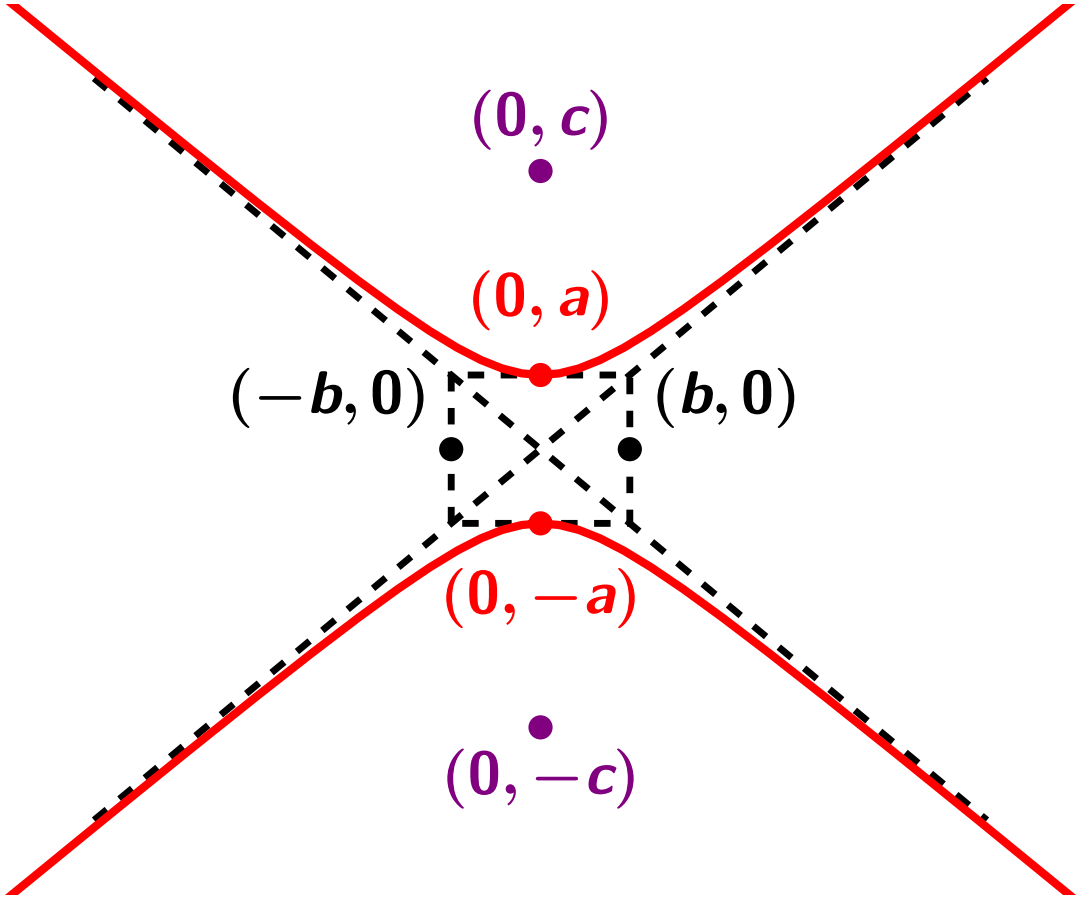
Opening Left and Right



Properties

Equation	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$
Center	(h, k)
Vertices	$(h \pm a, 0)$
Foci	$(h \pm c, 0)$
Co-vertices	$(h, k \pm b)$
***x*-Axis**	Transverse Axis
***y*-Axis**	Conjugate Axis
c^2	$a^2 + b^2$

Opening Up and Down



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Example 1

Find the exact coordinates for the vertices and foci for each of the following.

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Vertices: $(0, 3 \pm 2) \longrightarrow (0, 1)$ and $(0, 5)$

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Foci: $(0, 3 \pm 2\sqrt{5})$ $\dfrac{(y-3)^2}{4} - \dfrac{x^2}{16} = 1$

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