

Parabolas

Objectives

- 1 Identify vertex, focus, and directrix from an equation.
- 2 Find the equation given vertex, focus, and/or directrix.
- 3 Convert parabolas between general and vertex form.

Parabolas

If we look at the graph of the quadratic function
, $f(x) = ax^2 + bx + c$, we obtain what is known as a *parabola*.

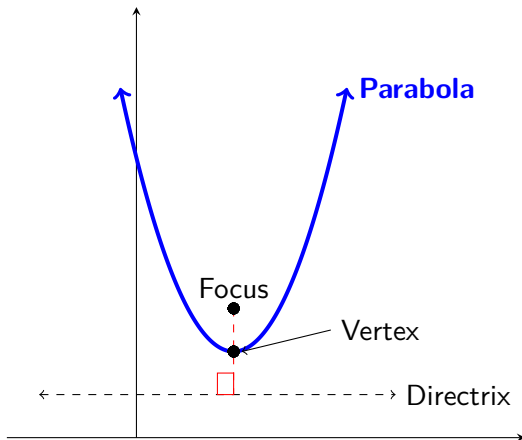
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Parabolas

The set of all points in the plane that are the same distance from the focus and the directrix line.

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General Form of a Parabola

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The **vertex forms** of a parabola is given below.

	Opens Up or Down	Opens Left or Right
	$y = a(x - h)^2 + k$	$x = a(y - k)^2 + h$
, Vertex	(h, k)	(h, k)
Focus	$(h, k + p)$ where $a = \frac{1}{4p}$	$(h + p, k)$ where $a = \frac{1}{4p}$
Directrix	$y = k - p$	$x = h - p$

General Form of a Parabola

Note: , p is the distance from the focus to the vertex, or the distance from the vertex to the directrix; either interpretation is correct.

Example 1

Identify the vertex, focus, and directrix for each of the following.

(a) , $y = 2(x + 1)^2$

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