

Information about Parabolas

Form of equation	$y = a(x - h)^2 + k$
Axis of Symmetry	$x = h$
Vertex	(h, k)
Focus	$\left(h, k - \frac{1}{4a}\right)$
Directrix	$y = k$
Direction of Opening	Upward if $a > 0$; downward if $a < 0$
Length of Latus Rectum	$\left \frac{1}{a}\right $ units

Parabola: the set of all points in a plane that are the same distance from a given point called the *focus* and a given line called the *directrix*.

Axis of Symmetry; the line perpendicular to the directrix and which passes through the focus and the parabola's vertex.

Vertex; the midpoint of the line segment connecting the focus and the directrix.

Latus Rectum: the line segment through the focus and perpendicular to the axis of symmetry. Its endpoints lie on the parabola.

Practice.

Express each equation in the form $y = a(x - h)^2 + k$. Name the coordinates of the vertex and focus, the equations of the axis of symmetry and directrix, and the direction of opening of the parabola with the given equation. Then find the length of the latus rectum and graph the parabola.

- $y = 2x^2 - 12x + 6$
- $y = 3x^2 + 5x - 9$
- $y = \frac{1}{2}x^2 + 12x - 8$
- $y = x^2 + 14x + 20$

Write an equation for the parabola described below.

- vertex, $(0,1)$; focus, $(0,5)$
- focus, $(-4,-2)$; directrix, $y = -8$