

take note

Key Concept Parabola

Definition

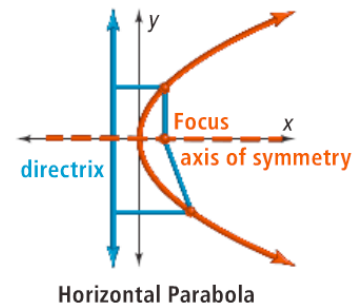
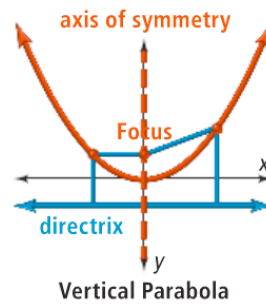
A parabola is the set of all points in a plane that are the same distance from a fixed line and a fixed point not on the line.

The fixed point is called the **focus of a parabola**.

The fixed line is called the **directrix**.

The distance between the vertex and the focus is the **focal length** of the parabola.

Graph



take note

Key Concept Transformations of a Parabola

Vertical Parabola

Equation

Focus

Directrix

Vertex (0, 0)

$$y = \frac{1}{4c}x^2$$

$$(0, c)$$

$$y = -c$$

Vertex (h, k)

$$y = \frac{1}{4c}(x - h)^2 + k$$

$$(h, k + c)$$

$$y = k - c$$

Horizontal Parabola

Equation

Focus

Directrix

Vertex (0, 0)

$$x = \frac{1}{4c}y^2$$

$$(c, 0)$$

$$x = -c$$

Vertex (h, k)

$$x = \frac{1}{4c}(y - k)^2 + h$$

$$(h + c, k)$$

$$x = h - c$$

If $y = ax^2$ and $y = x^2$, what connection can you make?

According to your text (page 583), what is the difference between the **focal length** and the **focal width**?

If c represents the coordinate of the focus (represented as p in our text), what is the value for the **focal width**?