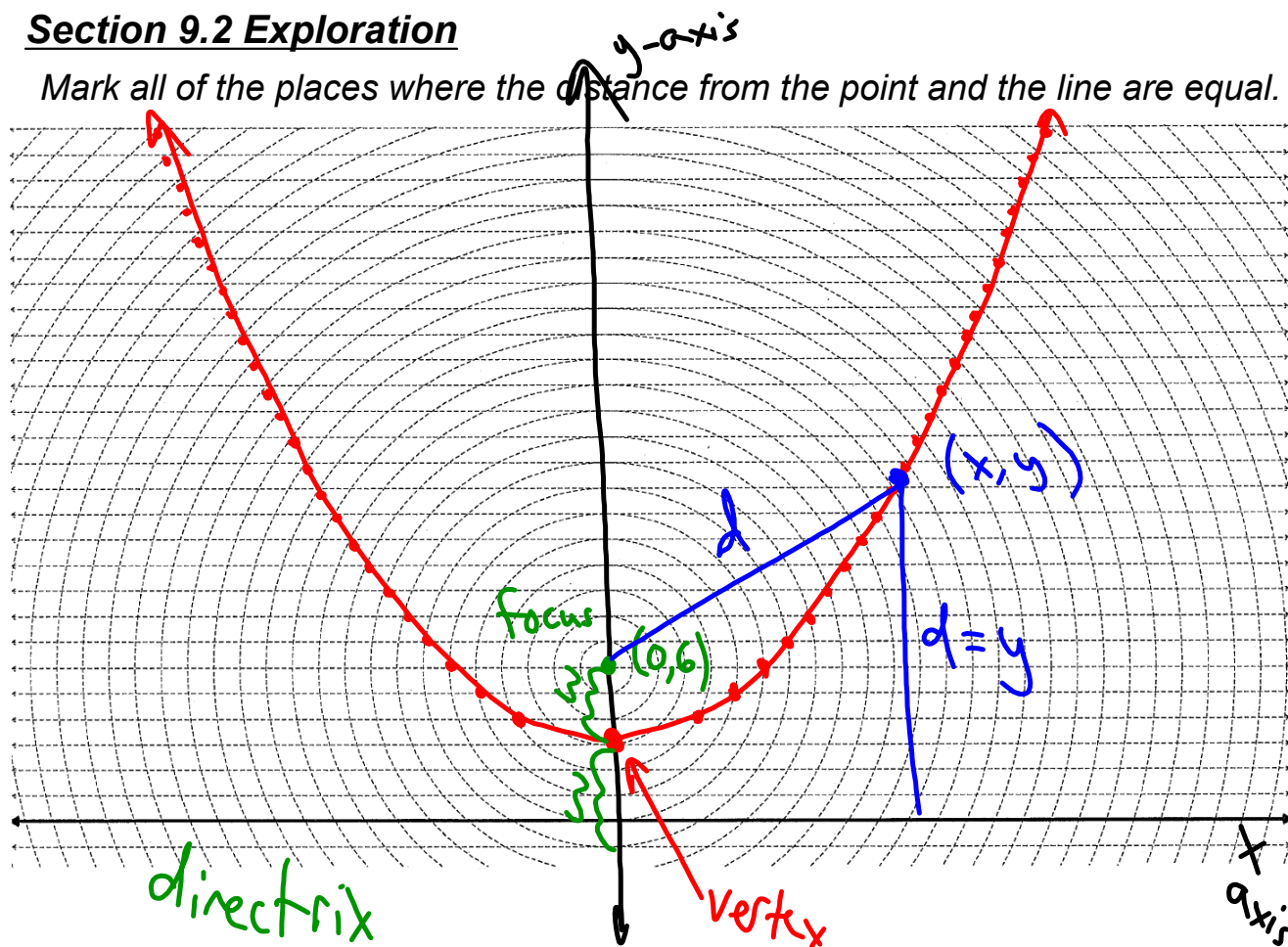


Section 9.2 Exploration

Mark all of the places where the distance from the point and the line are equal.



9.2 Graph and Write Equations of Parabolas

KEY CONCEPT

For Your Notebook

Standard Equation of a Parabola with Vertex at the Origin

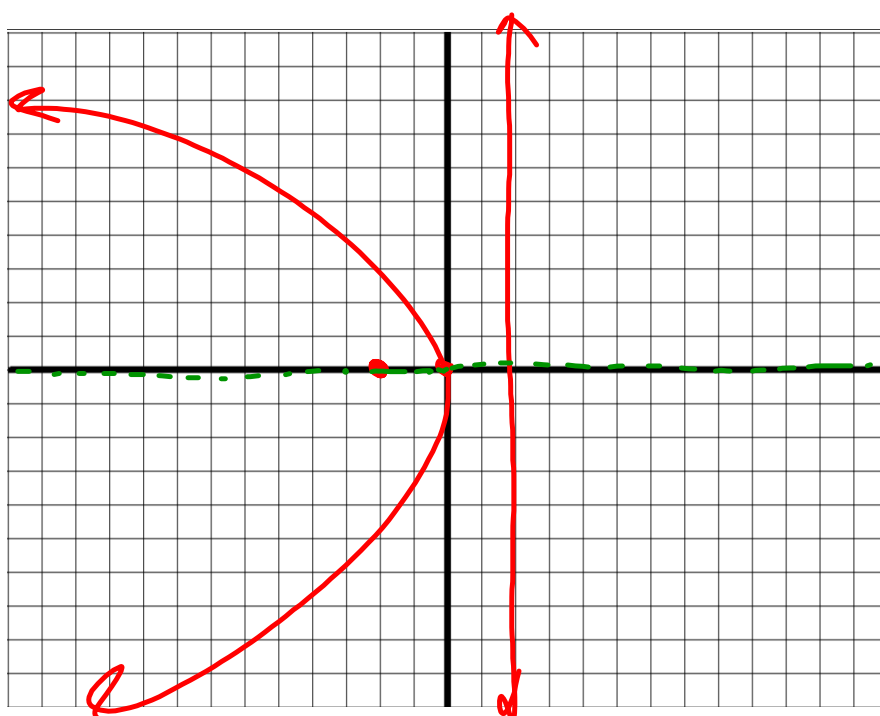
The standard form of the equation of a parabola with vertex at $(0, 0)$ is as follows:

Equation	Focus	Directrix	Axis of Symmetry
$x^2 = 4py$	$(0, p)$	$y = -p$	Vertical ($x = 0$)
$y^2 = 4px$	$(p, 0)$	$x = -p$	Horizontal ($y = 0$)

EXAMPLE 1 Graph an equation of a parabolaGraph $x = -\frac{1}{8}y^2$. Identify the focus, directrix, and axis of symmetry.

$$x = -\frac{1}{8}y^2$$
$$-8x = y^2$$
$$4px = y^2$$
$$p = -2$$

focus: $(-2, 0)$
directrix: $x = 2$

axis of sym: $y = 0$

EXAMPLE 1 Graph an equation of a parabola

Graph the equation. Identify the focus, directrix, and axis of symmetry of the parabola.

$$x^2 = 2y$$

$$x^2 = 4py$$

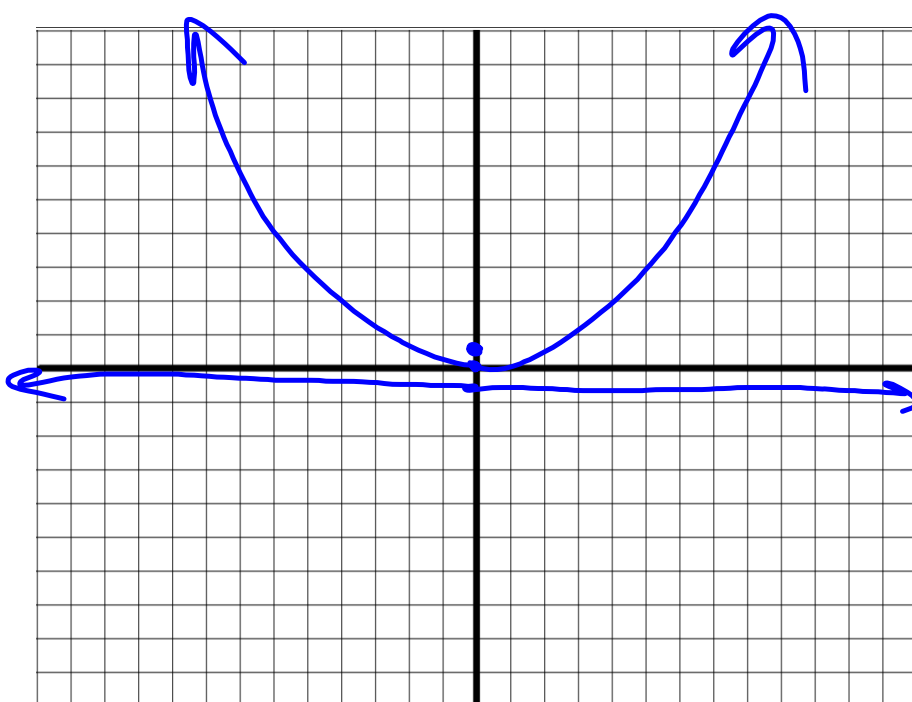
$$\frac{4p}{4} = \frac{2}{4}$$

$$p = \frac{1}{2}$$

$$f: (0, \frac{1}{2})$$

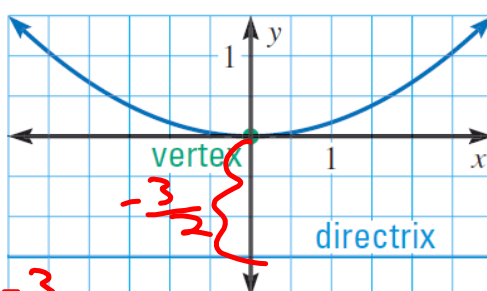
$$d: y = -\frac{1}{2}$$

$$a.o.s.: x = 0$$



EXAMPLE 2 Write an equation of a parabola

Write an equation of the parabola shown.



$$y = -\frac{3}{2}$$

$$p = \frac{3}{2}$$

$$x^2 = 4py$$

$$x^2 = 4\left(\frac{3}{2}\right)y$$

$$x^2 = 6y$$

EXAMPLE 2 Write an equation of a parabola

Write the standard form of the equation of the parabola with vertex at $(0, 0)$ and the given directrix or focus.

Focus: $(-2, 0)$

$$p = -2$$

$$y^2 = 4px$$

$$y^2 = 4(-2)x$$

$$y^2 = -8x$$

Directrix: $x = 4$

$$p = -4$$

$$y^2 = 4px$$

$$y^2 = 4(-4)x$$

$$y^2 = -16x$$