

Warm-Up:

Graph.

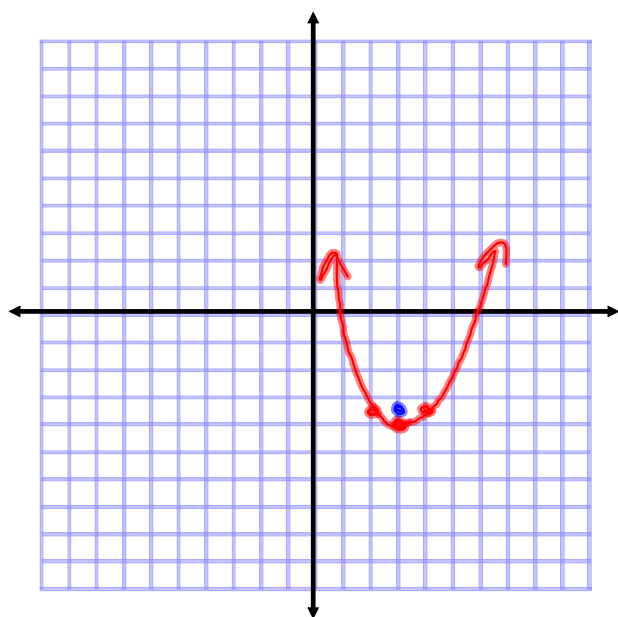
$$1) y = \frac{1}{2} (x - 3)^2 - 4$$

$$\text{Vertex: } (3, -4)$$

$$\text{Focus: } (3, -3\frac{1}{2})$$

$$\text{LR: } \left| \frac{1}{\frac{1}{2}} \right| = 2$$

$$\frac{1}{4a} = \frac{1}{4(\frac{1}{2})} = \frac{1}{2}$$



$$6) x = -\frac{1}{2} (y - 1)^2 + 4$$

$$\text{Vertex: } (4, 1)$$

$$\text{Focus: } (3\frac{1}{2}, 1)$$

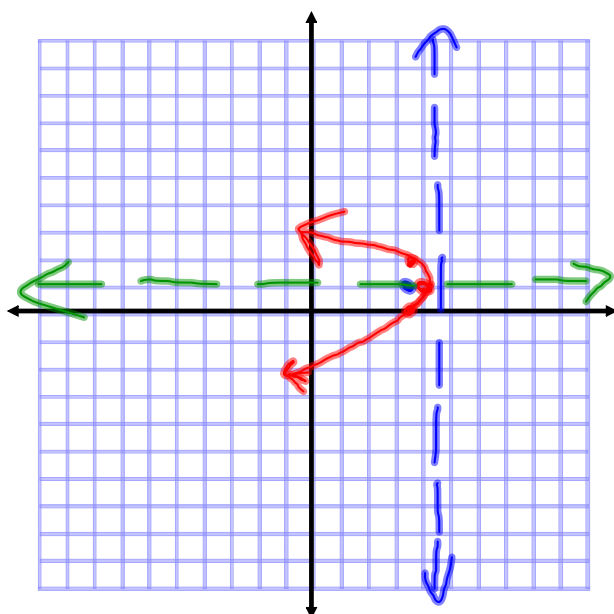
$$\text{Directrix: } x = 4\frac{1}{2}$$

$$\text{Axis: } y = 1$$

Opens Left

$$\text{LR: } \left| \frac{1}{-\frac{1}{2}} \right| = 2$$

$$\frac{1}{4a} = \frac{1}{4(-\frac{1}{2})} = -\frac{1}{2}$$



Section 10-2: Parabolas (cont'd)

Examples:

1) Write in standard form. Identify the vertex, axis of symmetry, and the direction of opening of the parabola.

$$y = (-x^2 - 2x) + 3$$

$$y = -1(x^2 + 2x + 1) + 3 + 1 \quad \left(\frac{2}{2}\right)^2 = 1$$

$$y = -(x+1)^2 + 4$$

Vertex: $(-1, 4)$

Axis: $x = -1$

Opens Down

Examples:

2) Write in standard form. Identify the vertex, axis of symmetry, and the direction of opening of the parabola.

$$y = 2x^2 - 4x + 6$$

$$y = 2(x^2 - 2x + 1) + 6 - 2 \quad \left(\frac{-2}{2}\right)^2 = 1$$

$$y = 2(x-1)^2 + 4$$

Vertex: $(1, 4)$

Axis: $x = 1$

Opens Up

Examples:

3) Identify the coordinates of the vertex and focus, the equations of the directrix and axis of symmetry, and the direction of the opening of the given equation of a parabola. Then find the length of the latus rectum and graph.

$$y = x^2 + 6x - 4$$

$$y = (x^2 + 6x + 9) - 4 - 9 \quad \left(\frac{6}{2}\right)^2 = 9$$

$$y = (x + 3)^2 - 13$$

$$\frac{1}{4a} = \frac{1}{4(1)} = \frac{1}{4}$$

Vertex: $(-3, -13)$

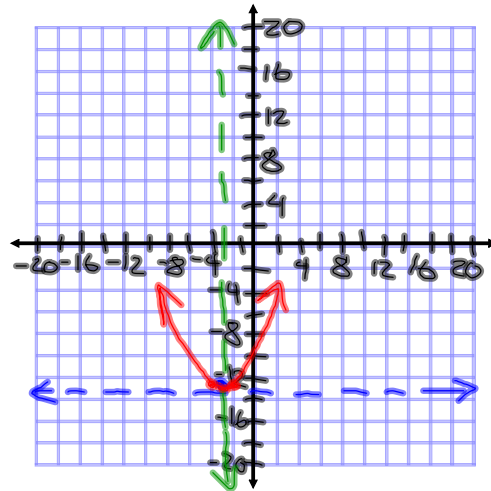
Focus: $(-3, -12\frac{3}{4})$

Directrix: $y = -13\frac{1}{4}$

Axis of Symmetry: $x = -3$

Opening: Up

Length of LR: $\left|\frac{1}{1}\right| = 1$



Examples:

4) Write an equation for a parabola with the given information.

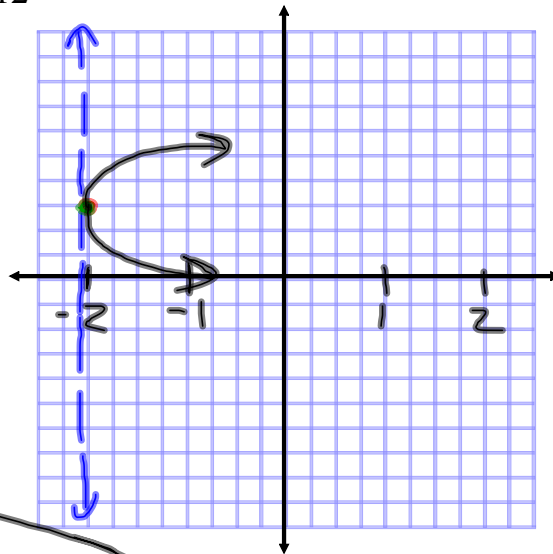
Focus: $(-2, 3)$; Directrix: $x = -2\frac{1}{12}$

$$V: \left(-2\frac{1}{24}, 3\right)$$

$$\frac{1}{4a} = \frac{1}{24}$$

$$a = 6$$

$$x = 6(y - 3)^2 - 2\frac{1}{24}$$



Examples:

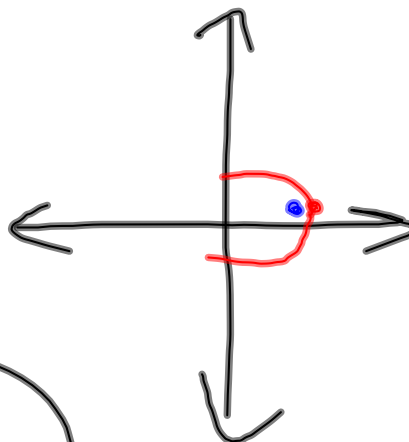
5) Write an equation for a parabola with the given information.

Vertex: $(5, 1)$; Focus: $(4 \frac{11}{12}, 1)$

$$\frac{1}{4a} = -\frac{1}{12}$$

$$a = -3$$

$$x = -3(y - 1)^2 + 5$$

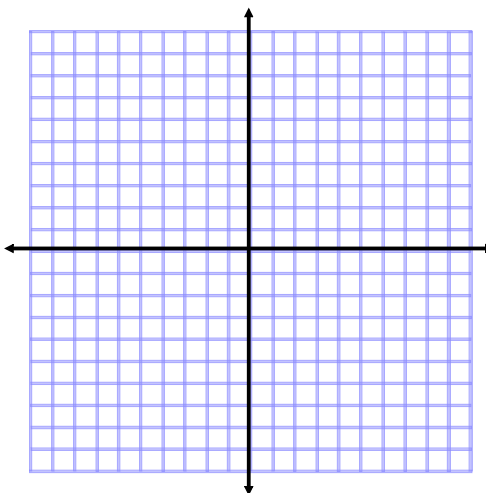


Examples:

3) The 52-meter long Hulme Arch Bridge in Manchester, England, is supported by cables suspended from a parabolic steel arch. The highest point of the arch is 25 meters above the bridge, and the focus of the arch is about 18 meters above the bridge.

a) Let the bridge be the x-axis, and let the y-axis pass through the vertex of the arch. Write an equation that models the arch.

b) Graph the equation.



Homework: Worksheet 10-2