

Friday, February 22, 2019

- Warm-up
 - Graph the following parabola: $f(x) = 2x^2 + 4x - 6$
 - Mark the y-intercept(s), x-intercept(s), and vertex
- Review graphing quadratics
- Introduce focus & directrix

Objectives:

Content: I will review parabolas and add new components including the **focus** and **directrix**.

Social: I will listen well and not distract others from the lesson.

Language: I will write clear notes with the definition of **focus** and **directrix** in various forms.

Warm-up

$$f(x) = ax^2 + bx + c$$

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

$$\longrightarrow 2(x^2 + 2x - 3)$$

$$x\text{-intercept(s)}: (1,0)(-3,0) \quad 0 = 2(x-1)(x+3)$$

$$y\text{-intercept(s)}: (0, -6)$$

$\leftarrow c$

$$x-1=0 \quad x+3=0$$

$$x=1 \quad x=-3$$

vertex:

$$(-1, -8)$$

$$2(-1)^2 + 4(-1) - 6$$

$$2 \cdot 1 - 4 - 6$$

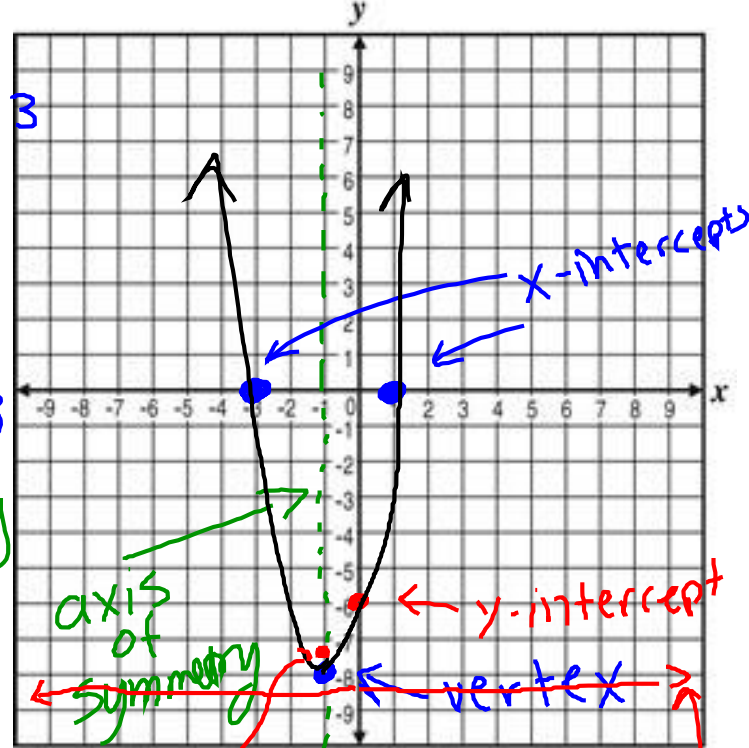
$$2 - 4 - 6$$

$$\underline{\quad -2 - 6}$$

$$\textcircled{-8}$$

axis of symmetry

$$\textcircled{-\frac{b}{2a}}$$



$$\text{Focus} = (-1, -7\frac{1}{2})$$

$$\text{Directrix} = y = -8\frac{1}{2}$$

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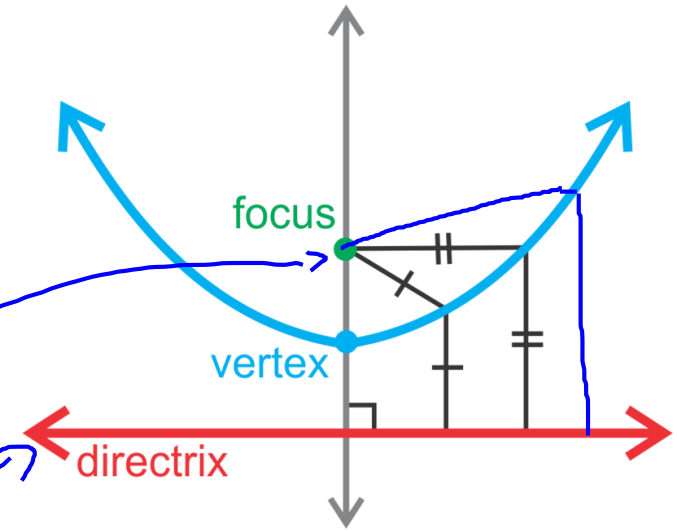
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What are a focus and directrix?

- New definition of parabola:
“the set of all points that
are equidistant from a point
and a line”

- same distance*
- The focus is the point
 - The directrix is the line



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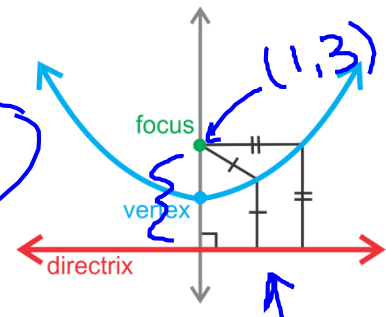
Getting the parabola...

STEPS

Focus $\rightarrow (1, 3)$
 Directrix $\rightarrow y = -1$

EXAMPLE

$$y = ax^2 + bx + c$$

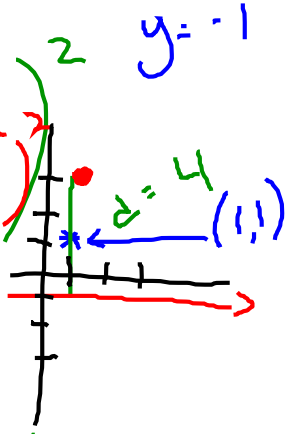


Distance from Parabola to focus = Distance from parabola to directrix

use distance formula

(x, y) (given $(1, 3)$) (x, y)

$$\sqrt{(y-1)^2 + (x-3)^2} = \sqrt{(y-1)^2 + (x-x)^2}$$



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

Solve \rightarrow

$$(y-1)^2 = (y-1)(y-1)$$

$$y^2 - y - y + 1$$

$$y^2 - 2y + 1$$

$$y^2 - 2y + 1 + x^2 - 6x + 9 = y^2 + 2y + 1 + 0$$

$$\frac{1}{4}x^2 - \frac{3}{2}x + \frac{9}{4} = y$$

$$\frac{x^2}{4} - \frac{6x}{4} + \frac{9}{4} = \frac{4y}{4}$$

* Distance

$$d = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

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