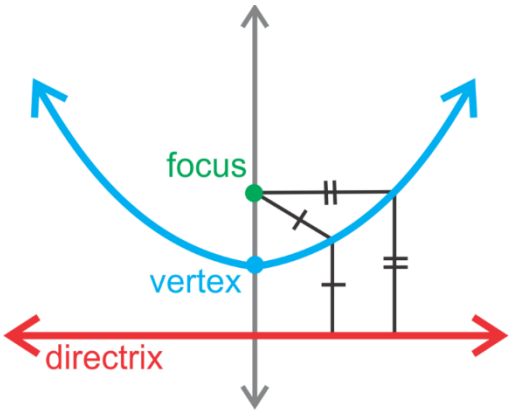
Chapter 9: Conic Sections
Conic Section #3: Parabola
Features & Graphs

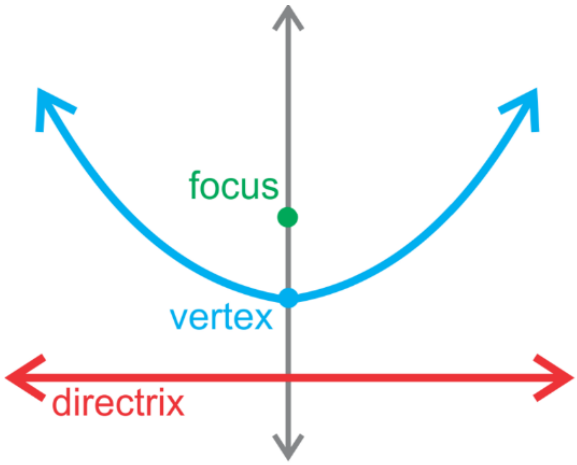
Locus:

The locus definition of a parabola is:



<u>Standard Form of a Parabola:</u>

x^2



Vertex point

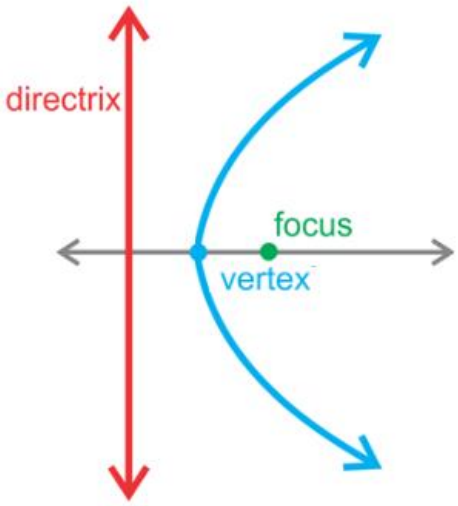
Focus point

Directrix line

If $p > 0$, the parabola opens _____.

If $p < 0$, the parabola opens _____.

y^2



Vertex point

Focus point

Directrix line

If $p > 0$, the parabola opens _____.

If $p < 0$, the parabola opens _____.

***Exercise #1*:** Given the equations of the parabolas below, identify the vertex, focus and directrix.

(a) $(x-2)^2 = 8(y-1)$

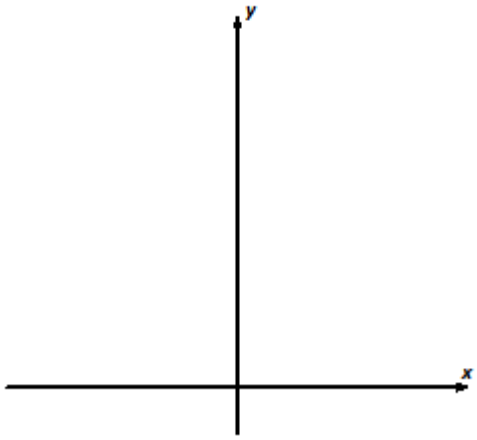
(b) $y^2 + 2y + 12x + 25 = 0$

(c) $x^2 = -16y$

***Exercise #2*:** Consider a parabola whose focus is the point $(3, 1)$ and whose directrix is the line $y = -3$. Determine the equation of this parabola.

***Exercise #3*:** Consider a parabola whose focus is the point (0, 7) and whose directrix is the line $x = 4$.

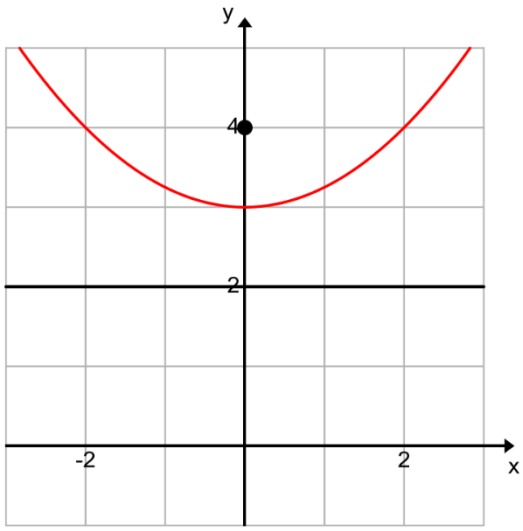
(a) Sketch a diagram of the parabola and identify its vertex



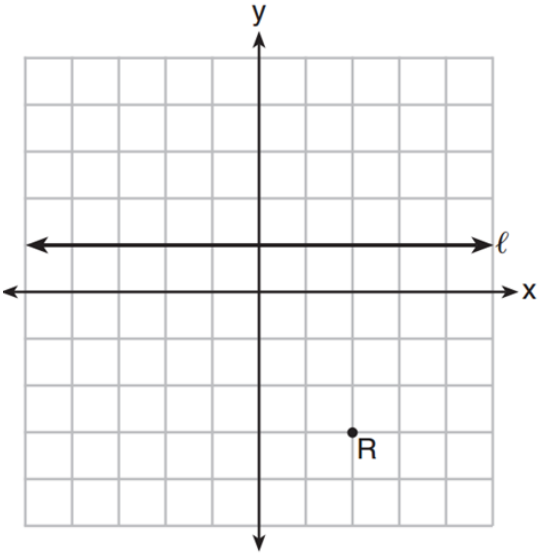
(b) Determine the equation of the parabola

***Exercise* #4:** Determine the equation of the parabola whose focus is the point (-3, 4) and whose directrix is the horizontal line y = 2.

***Exercise* #5:** Derive the equation of the parabola shown in the diagram. Begin by identifying the focus and directrix.



Exercise #6: Which equation represent the set of points equidistance from line l and point R shown on the graph below?



(1) $y = -\frac{1}{8}(x + 2)^2 + 1$

(2) $y = -\frac{1}{8}(x + 2)^2 - 1$

(3) $y = -\frac{1}{8}(x - 2)^2 + 1$

(4) $y = -\frac{1}{8}(x - 2)^2 - 1$

Exercise 7: The directrix of the parabola $12(x + 3) = (y - 4)^2$ has the equation $x = -6$. Find the coordinates of the focus of the parabola.

HOMEWORK:

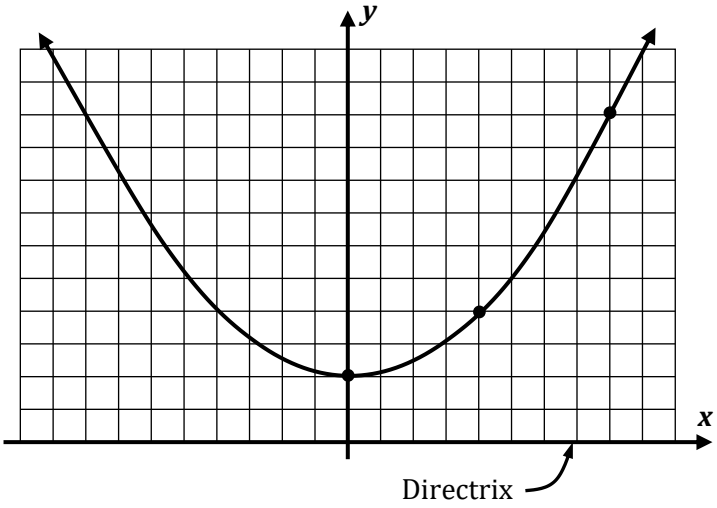
1. Given the equations of the parabolas below, identify the direction, vertex, focus, and directrix.
   a. $(x-3)^2 = -8(y-4)$

   b. $y^2 - 2y + 12x - 35 = 0$

   c. $x^2 - 2x - 4y + 9 = 0$

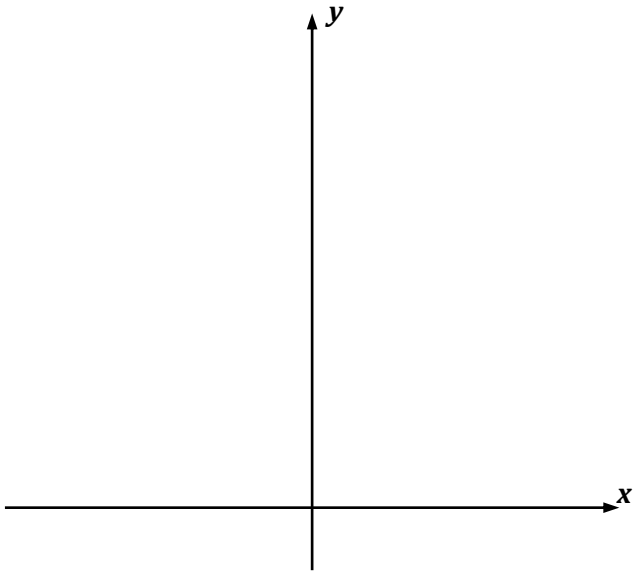
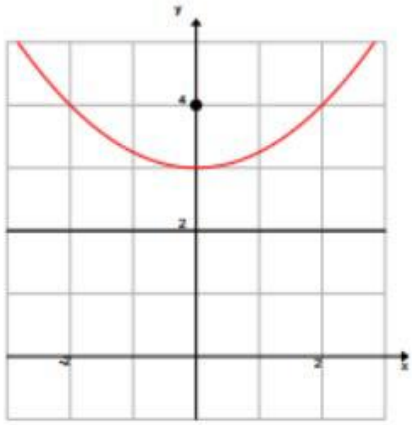
   d. $x^2 + 6x + 8y + 1 = 0$

2. A parabola is shown graphed on the grid below. Its directrix is the x-axis. Write the equation of the parabola.



3. Consider a parabola that is all points equidistant from the point (0, 8) and the line y = 2
   a. Sketch a diagram of this parabola and label the vertex

   b. Find the equation of this parabola



4. Derive the equation of the parabola shown in the diagram.