

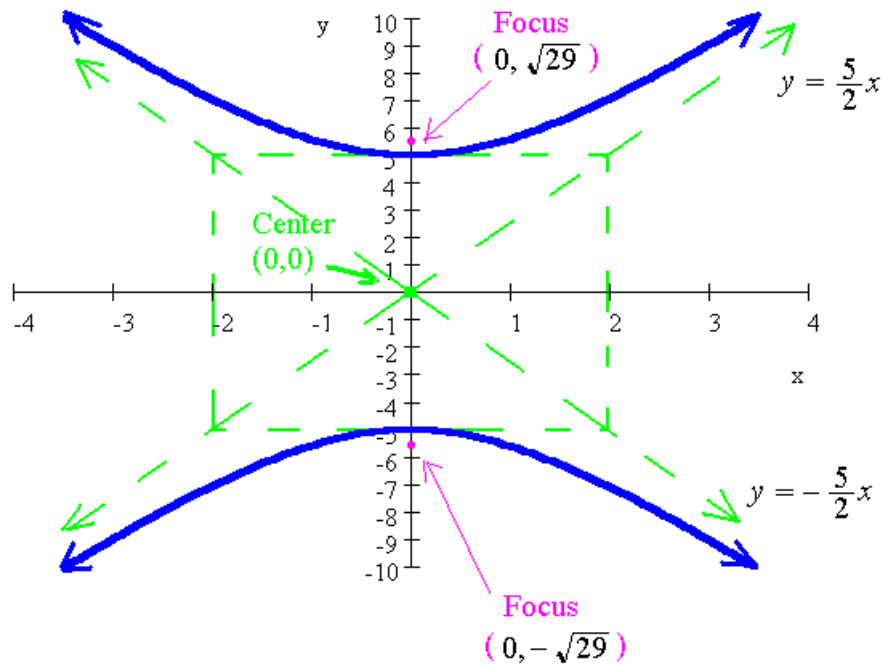
Carefully sketch the following conic sections. Be sure to clearly label all important parts (foci, vertices, etc.).

$$1. \frac{y^2}{25} - \frac{x^2}{4} = 1.$$

$$a = 2, b = 5$$

$$c = \sqrt{a^2 + b^2} = \sqrt{29}$$

$$\text{Asymptotes} : y = \pm \frac{5}{2}x$$



$$2. x - 2 = \frac{1}{12}(y + 1)^2$$

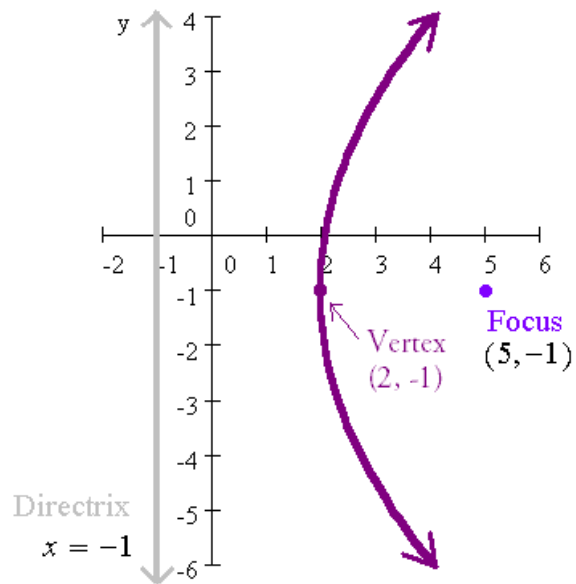
$$\frac{1}{a} = \frac{1}{12}$$

$$a = 12$$

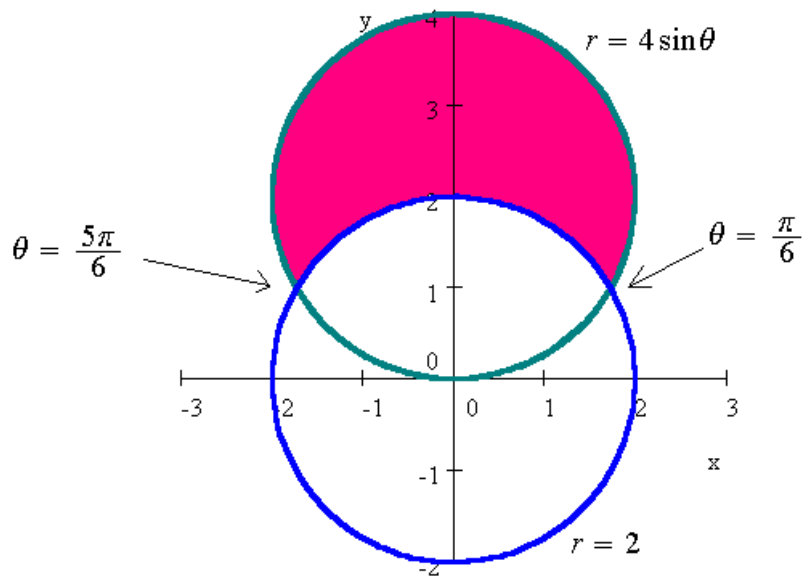
$$\text{Vertex} : (2, -1)$$

$$\text{Directrix} : x = 2 - \frac{12}{4} \implies x = -1$$

$$\text{Focus} : (x, y) = \left(2 + \frac{12}{4}, -1\right) = (5, -1)$$



Extra Credit: Sketch the region that lies inside the circle $r = 4 \sin \theta$ and outside the circle $r = 2$. Then set up, but do not evaluate the area of the region.



$$\text{Area} = \frac{1}{2} \int_{\theta=\frac{\pi}{6}}^{\theta=\frac{5\pi}{6}} ((4 \sin \theta)^2 - 2^2) d\theta$$