

Instructions: Show all work. Answer each question as completely as possible. Use exact answers unless specifically asked to round.

1. Find the equation (in rectangular form) of the hyperbola with a center at $(-3, -4)$, a one focus at $(-3, -8)$, and a vertex at $(-3, -2)$. Sketch the graph. Clearly label the center, both foci, both vertices, and both asymptotes. Given the equation of each asymptote.

$$a = 2$$

$$c = 4$$

$$b = \sqrt{4^2 - 2^2} =$$

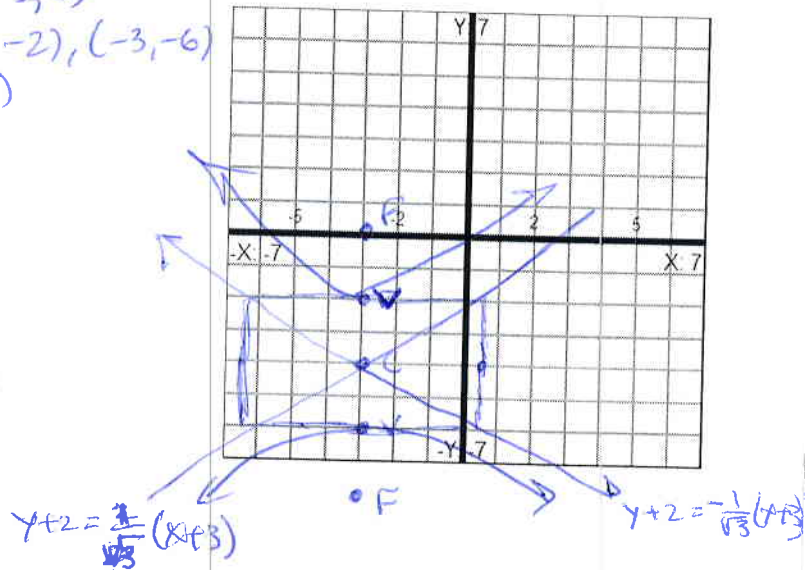
$$\sqrt{16 - 4} = \sqrt{12} = 2\sqrt{3}$$

$$y + 2 = \pm \frac{2}{2\sqrt{3}}(x + 3) \text{ asymptotes}$$

transverse y

$$\frac{(y+2)^2}{4} - \frac{(x+3)^2}{12} = 1$$

foci $(-3, -8)$ $(-3, 0)$
 vertices $(-3, -2)$, $(-3, -6)$
 center $(-3, -4)$



2. For the polar conic $r = \frac{9}{3-6\cos\theta}$, find the eccentricity and state whether the equation is a parabola, a hyperbola or an ellipse. What information in the equation tells you how the graph is oriented?

$$\frac{9/3}{3/3 - 6/3\cos\theta} = \frac{3}{1-2\cos\theta} = \frac{ep}{1-e\cos\theta} \quad e = 2$$

hyperbola

$\cos\theta$ tells you it opens transverse x.