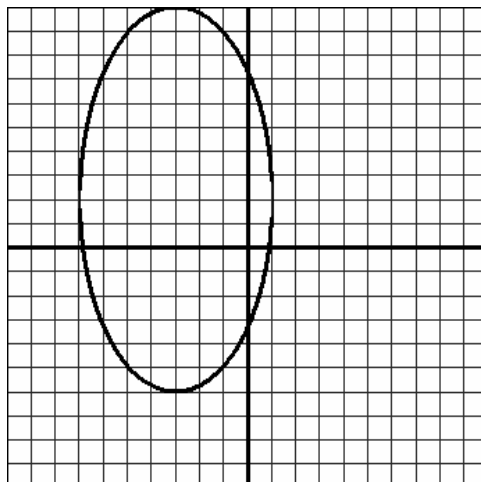


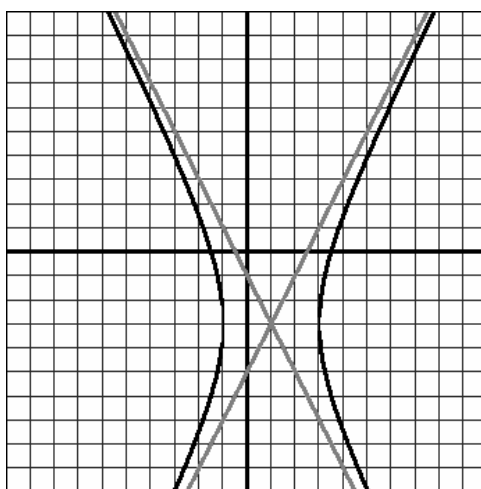
1. a. $(x + 3)^2 + (y - 2)^2 = 4^2$.
 b. $\left(\frac{x + 3}{4}\right)^2 + \left(\frac{y - 2}{8}\right)^2 = 1$
 c. see grid
 d. Using $a^2 = b^2 + c^2$ with $a = 8$ and $b = 4$ gives $c = \sqrt{48}$. Foci are at $(-3, 2 \pm \sqrt{48})$.
 e. eccentricity $= \frac{c}{a} = \frac{\sqrt{48}}{8} \approx 0.866$.



2. a. It's a hyperbola. Two possible justifications:
 • $B^2 - 4AC = 16$, which is positive.
 • the x^2 and y^2 terms have opposite signs and there's no xy term, so the equation can be rewritten into a general form for a hyperbola.

b. $4(x^2 - 2x + 1) - (y^2 + 6y + 9) = 21 + 4 - 9$
 $4(x - 1)^2 - (y + 3)^2 = 16$
 $\left(\frac{x - 1}{2}\right)^2 - \left(\frac{y + 3}{4}\right)^2 = 1$

- c. $(-1, -3)$ and $(3, -3)$
 d. ± 2 e. see grid



3. a. parabola should be C-shaped with its vertex at $(1, 0)$; directrix is the vertical line $x = -5$.

b. distance from (x, y) to the focus $\sqrt{(x - 3)^2 + y^2}$
 distance from (x, y) to the directrix $|x - (-5)|$

c. $\sqrt{(x - 3)^2 + y^2} = |x - (-5)|$

d. $(x - 3)^2 + y^2 = (x - (-5))^2$
 $x^2 - 6x + 9 + y^2 = x^2 + 10x + 25$
 $y^2 = 16x + 16$
 $\frac{1}{16} y^2 = x + 1$

e. $y = \sqrt{16x + 16}$ and $y = -\sqrt{16x + 16}$

4. a. Graph should have vertex $(0, 1)$ and open upward.

- b. It's a half-hyperbola, because the criteria involves subtraction of two distances.

c. Using $c^2 = a^2 + b^2$ with $c = 4$, $a = 1$ gives that $b = \sqrt{15}$.
 equation: $y^2 - \frac{x^2}{15} = 1$ with the range restriction $y > 0$

better equation: $y = \sqrt{\frac{x^2}{15} + 1}$ (better because it doesn't need a restriction)