#11 Conics Combo

Name Key

Identify the Conic, graph and give the appropriate parts, write N/A for parts that do not apply.

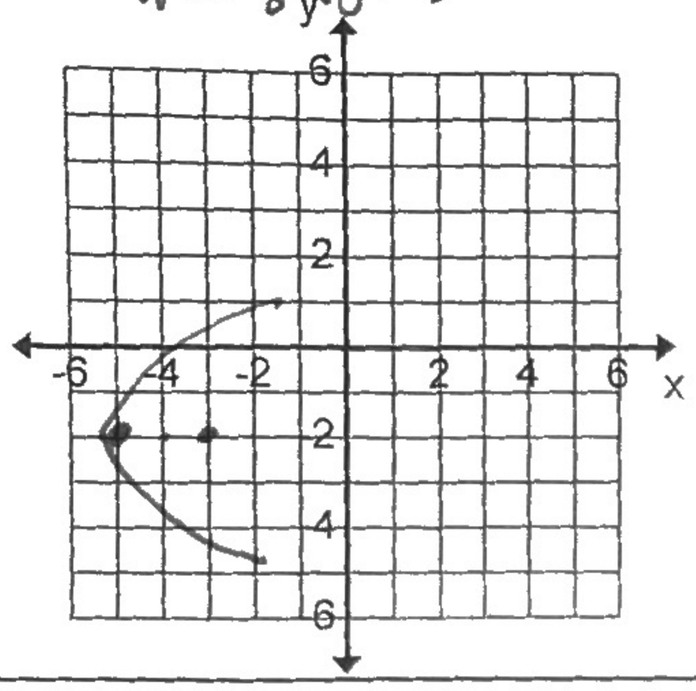
1. $y^2 - 8x + 4y - 36 = 0$

parabola

$(y^2+4y+2^2) - 36 - 4 = 8x$

$(y+2)^2 - 40 = 8x$

$x = \frac{1}{8}(y+2)^2 - 5$



$\frac{1}{8} = \frac{1}{4p}$

$8 = 4p$

$2 = p$

Type Conic: parabola Center: ~~(,)~~

Vertices: (-5 , -2), ~~(,)~~

Co-vertices: ~~(,), (,)~~

Foci: (-3 , -2), ~~(,)~~

Asymptotes: ~~_____~~ D: $x = -7$

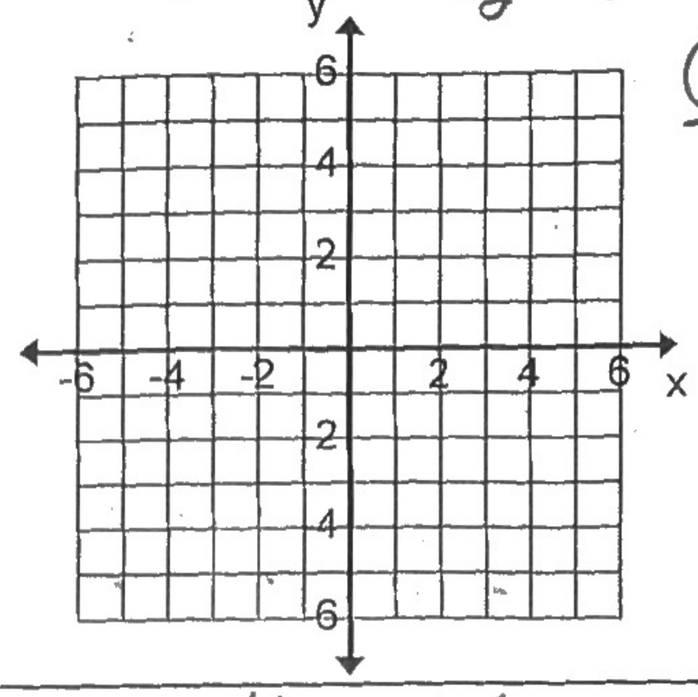
2. $9x^2 - 16y^2 - 18x + 96y + 9 = 0$

$(9x^2 - 18x + \_) + (-16y^2 + 96y + \_) = -9 + \_ + \_$

$9(x^2 - 2x + 1) - 16(y^2 - 6y + 9) = -9 + 9 + -144$

$9(x-1)^2 - 16(y-3)^2 = -144$

$\frac{(y-3)^2}{9} - \frac{(x-1)^2}{16} = 1$



Type Conic: Hyperbola Center: (___ , ___)

Vertices: (___ , ___), (___ , ___)

Co-vertices: (___ , ___), (___ , ___)

Foci: (___ , ___), (___ , ___)

Asymptotes: _____

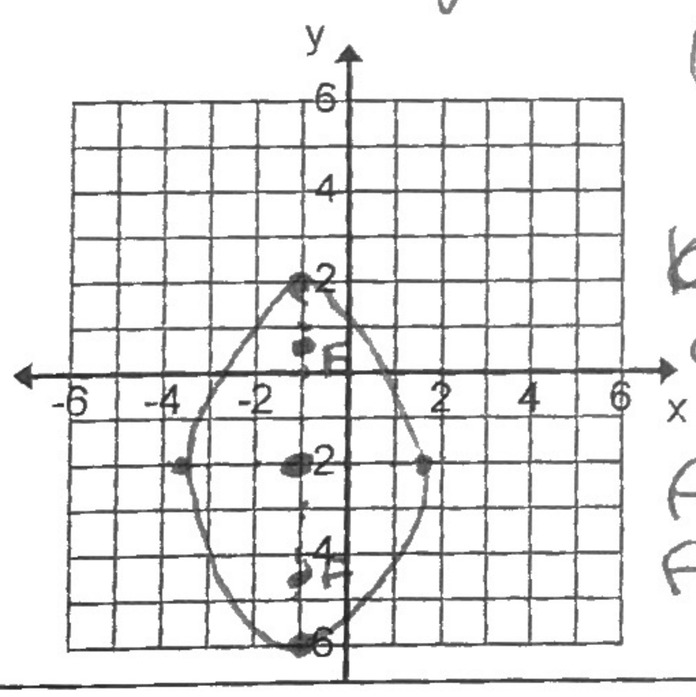
3. $2x^2 + y^2 + 4x + 4y - 10 = 0$

$(2x^2+4x+\_) + (y^2+4y+2^2) = 10 + 2 + 4$

$2(x^2+2x+1) \quad = 10 + 2 + 4$

$2(x+1)^2 + (y+2)^2 = 16$

$\frac{(x+1)^2}{8} + \frac{(y+2)^2}{16} = 1$



$b = 2\sqrt{2}$

$a = 4$

$f^2 = 16 - 8$

$f = \sqrt{8} = 2\sqrt{2}$

Type Conic: ellipse Center: (-1 , -2)

Vertices: (-1 , 2), (-1 , -6)

Co-vertices: ($-1+2\sqrt{2}$, -2), ($-1-2\sqrt{2}$, -2)

Foci: (-1 , $-2+2\sqrt{2}$), (-1 , $-2-2\sqrt{2}$)

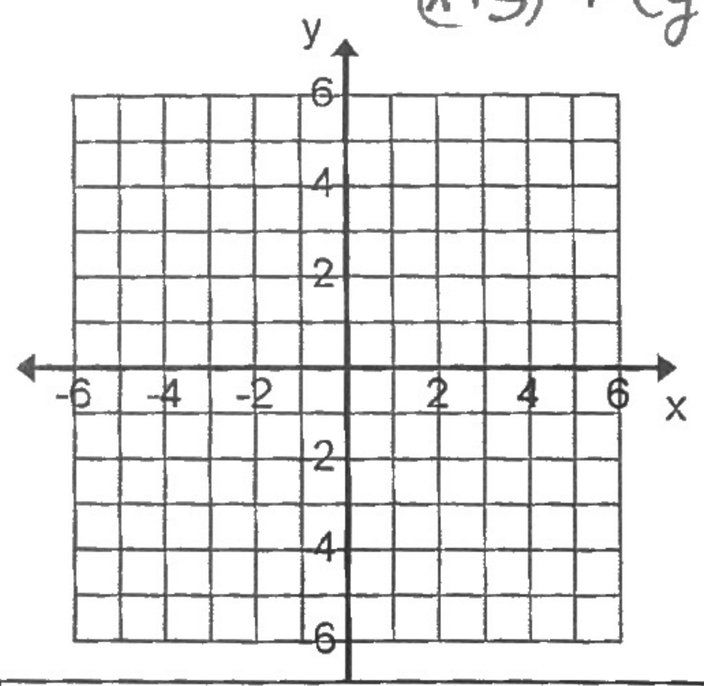
Asymptotes: _____

4. $4x^2 + 4y^2 + 24x + 16y - 12 = 0$

$x^2 + y^2 + 6x + 4y - 3 = 0$

$(x^2+6x+3^2) + (y^2+4y+2^2) = 3 + 9 + 4$

$(x+3)^2 + (y+2)^2 = 16$



Type Conic: circle Center: (___ , ___)

Vertices: (___ , ___), (___ , ___)

Co-vertices: (___ , ___), (___ , ___)

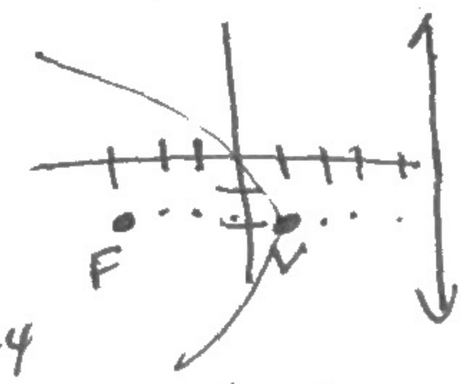
Foci: (___ , ___), (___ , ___)

Asymptotes: _____

Write the equation for the specified conic with the given information.

5. Write the equation for a parabola with a focus of (-3, -2) and a directrix of $x = 5$.

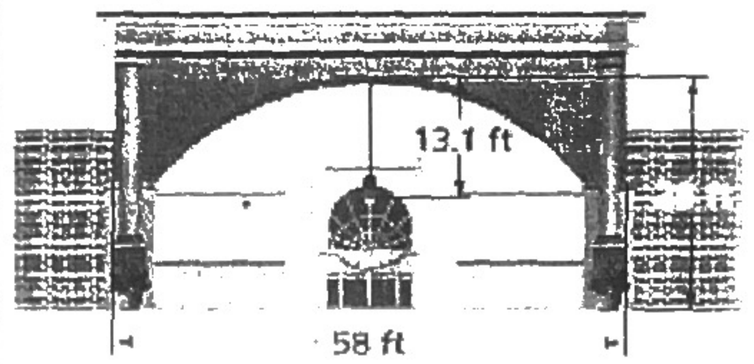
$x = -\frac{1}{16}(y+2)^2 - 1$



$p = 4$

$a = \frac{1}{4(4)}$ C: (1, -2)

6. The entrance to an open-air plaza has a parabolic arch above two columns. The light in the center is located at the focal point. Write an equation to model parabola.



7. Write the equation for an ellipse with vertices of (-7, -3), (13, -3) and foci of (-5, -3), (11, -3).

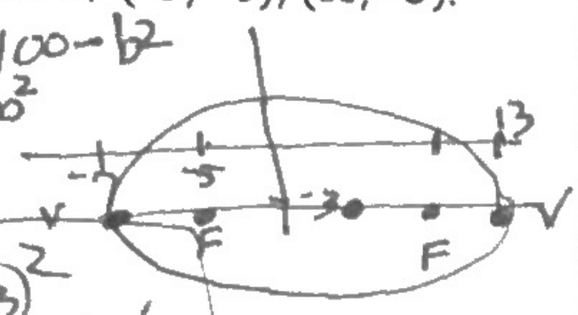
C: (3, -3)

a: 10 f = 8

b: 6

$64 = 100 - b^2$

$36 = b^2$



$\frac{(x-3)^2}{36} + \frac{(y+3)^2}{100} = 1$

8. Write the equation for an ellipse with vertices of (4, 3), (4, -9) and the length of the minor axis is 8.

Show work!

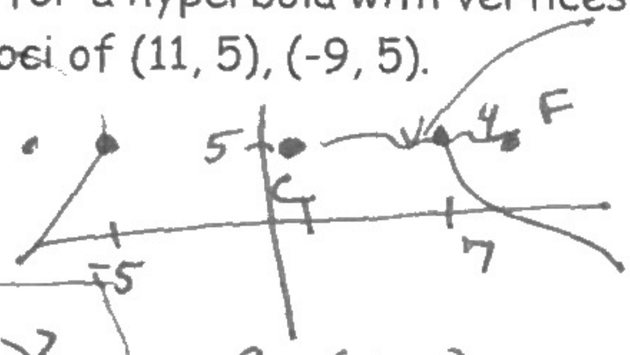
$\frac{(x-4)^2}{16} + \frac{(y+3)^2}{36} = 1$

9. Write the equation for a hyperbola with vertices of (7, 5), (-5, 5) and foci of (11, 5), (-9, 5).

$f^2 = a^2 + b^2$

$100 = 36 + b^2$

$64 = b^2$



$\frac{(x-1)^2}{36} - \frac{(y-5)^2}{64} = 1$

C (1, 5)

$a = 6$

$b^2 = 64$

$f = 10$

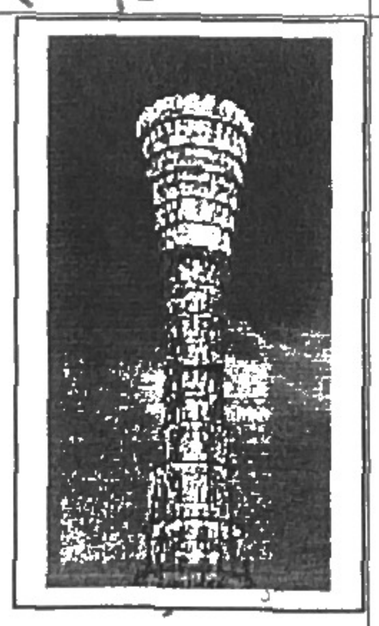
10. Write the equation for a hyperbola with foci of (9, -1), (-3, -1) and the length of the conjugate axis is 6.

Show work!

:)

$\frac{(x-3)^2}{27} - \frac{(y+1)^2}{9} = 1$

11. The Kobe Port Tower is a *hyperboloid*, meaning the shape is formed by rotating a hyperbola about its conjugate axis. Suppose the hyperbola used to generate the hyperboloid mode lung the shape of the tower has an eccentricity of 19. If the tower is 8 meter wide at its narrowest point, determine an equation of the hyperbola used to generate the hyperboloid.



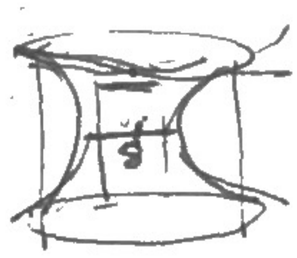
$e = 19$

$19 = \frac{f}{a}$

$19 = \frac{f}{4}$

$76 = f$

$\frac{x^2}{16} - \frac{y^2}{5760} = 1$



$76^2 = 16 + b^2$

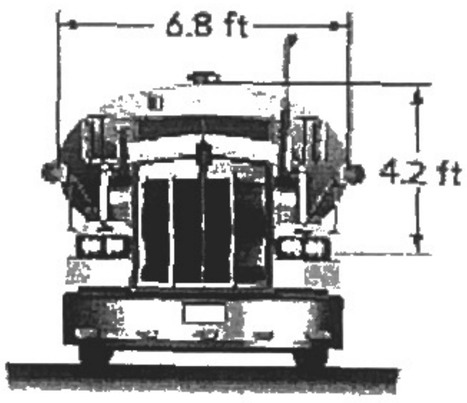
$5760 = b^2$

12. Elliptical tanker trucks, as shown below, are often used to transport liquids because they are more stable than circular tanks and the movement of the liquid is minimized.

A) Draw and label the elliptical cross-section of the tank on a coordinate plane.

B) Write an equation to represent the elliptical shape of the tank.

C) Find the eccentricity of the ellipse.



$e = .786$