Unit 2 Conics

Essential Question: What do I get when I cut a cone?

Standards: ***Translate between the geometric description and the equation for a conic section.***

G.GPE.2 Derive the equation of a parabola given a focus and directrix.
G.GPE.3 Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
A.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line y = -3x and the circle $x^2 + y^2 = 3$.*
G.GPE.1 Derive the equation of a circle of given center & radius using the Pythagorean Theorem; complete the square to find the center & radius of a circle given an equation.

Date	Topic(s)	Assignment/HW	Credit
Thurs, 8/12	Graph and Write Equations of Circles		
Fri, 8/13	Graph and Write Equations of Ellipses		
Mon, 8/16	Graph and Write Equations of Parabolas		
Tues, 8/17	Review - Circles, Ellipses, and Parabolas		
Wed, 8/18	**Quiz**		
Thurs, 8/19	Equations of Hyperbolas & Classifying Conics		
Fri, 8/20	Conic Systems		
Mon 8/23	Review		
Tues, 8/24	Review		
Wed, 8/25	**Unit 2 Conics Test**		

Name _____

WS #1 – Circles

Find the center and radius of the circle.

1. $x^2 + y^2 = 16$

2. $(x+2)^2 + (y-2)^2 = 4$

3. $x^2 + (y+7)^2 = 100$

4. $x^2 + y^2 - 10x - 12y + 45 = 0$

5. $x^2 + y^2 - 2x + 6y = 0$

6. $3x^2 + 3y^2 - 6x + 48y = 168$

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7. Find the equation of the circle with center (0,0) & radius r = 9.

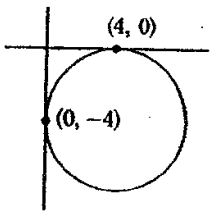
8. Find the equation of the circle with center (4, -3) & radius r=3.

9. Find the equation of the circle with center (5, -4) and radius r = $2\sqrt{5}$.

10. Find the equation of the circle with the diameter's endpoints at (-4, 1) and (2, -3).

Write the equation of the graphs.

11.



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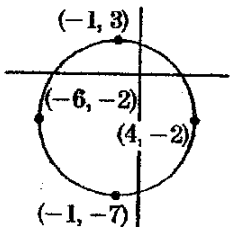
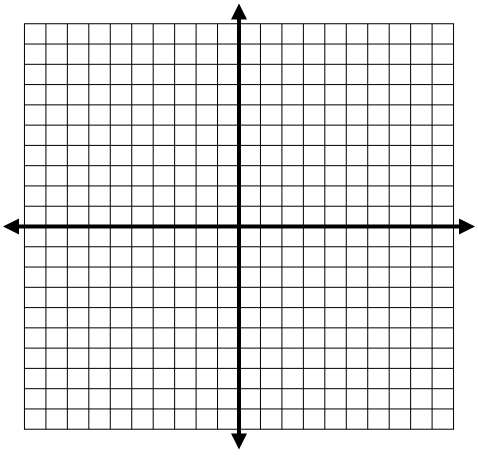
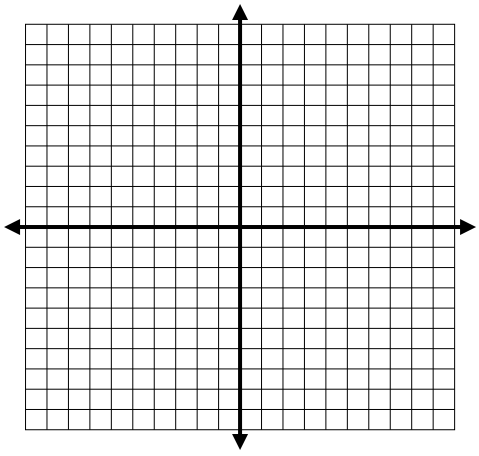


Write the equation in standard form for each circle. Then graph the equation.

13. $x^2 + y^2 - 2y - 15 = 0$

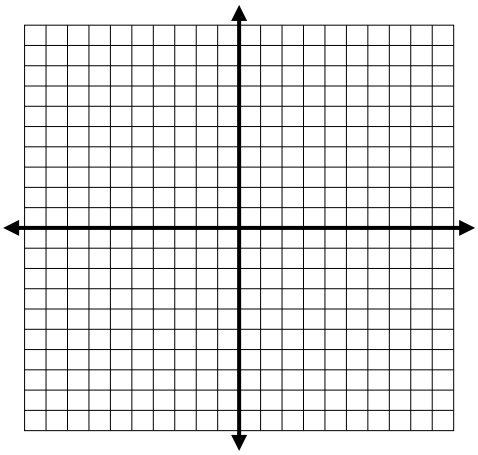
14. $x^2 + 4x + y^2 = 0$

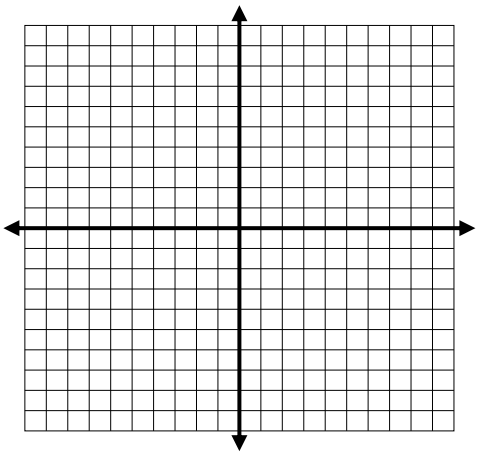




15. $x^2 + y^2 - 8x - 6y + 21 = 0$

16. $4x^2 + 4y^2 - 16x - 8y - 5 = 0$





WS #2 – Ellipses

Graph each equation and state important features.

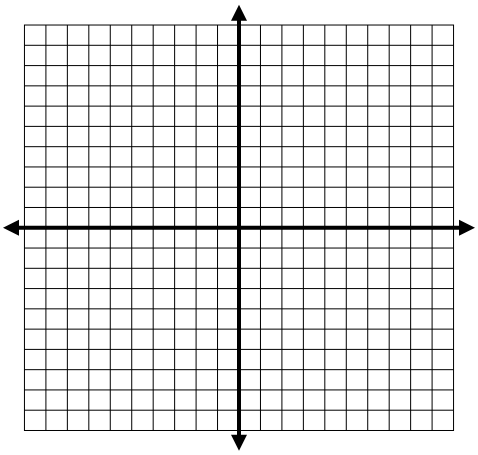
1. $\frac{x^2}{4}+\frac{y^2}{9}=1$

Center_____

Vertices _____

_____

Foci _____



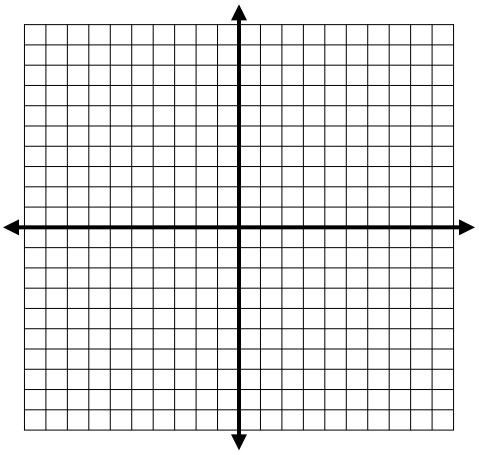
2. $\frac{x^2}{3}+\frac{y^2}{15}=1$

Center _____

Vertices _____

_____

Foci _____



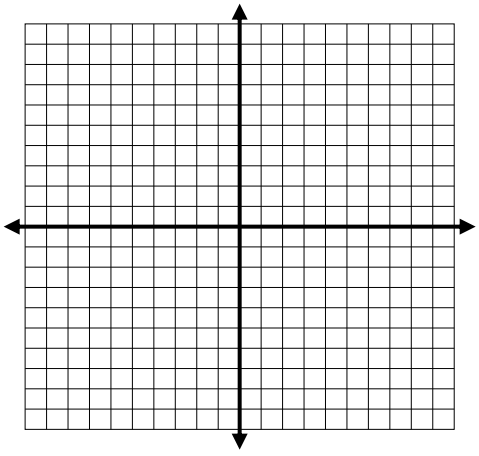
3. $\frac{(x+3)^2}{9}+\frac{(y+2)^2}{64}=1$

Center_____

Vertices _____

_____

Foci _____



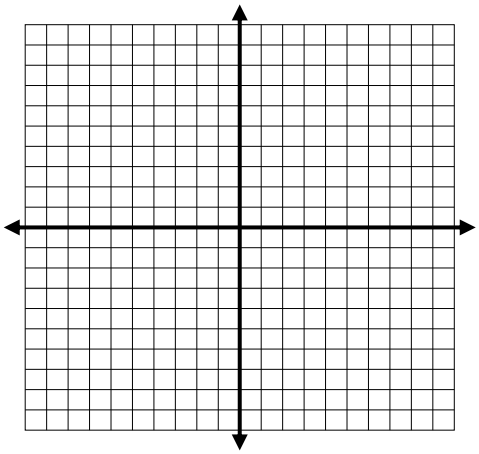
4. $\frac{(x+1)^2}{1}+\frac{(y+6)^2}{36}=1$

Center _____

Vertices _____

_____

Foci _____



Find the center, vertices and foci of the ellipse.

5. $x^2 + 4y^2 = 4$

6. $9x^2 + 16y^2 - 160y + 256 = 0$

7. $9x^2 + 16y^2 - 54x + 32y - 47 = 0$

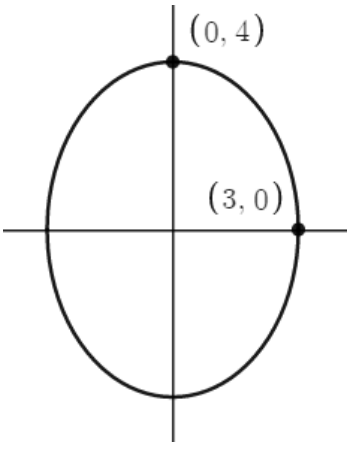
8. $x^2 + 9y^2 - 2y - 54y + 73 = 0$

9. Find the equation of the ellipse with vertices (6, -2), (0, -2), (3, 2) and (3, -6).

10. Find an equation of the ellipse with foci at (1,4) & (3,4) and major axis 4 unit long.

Write the equation of each graph.

11.



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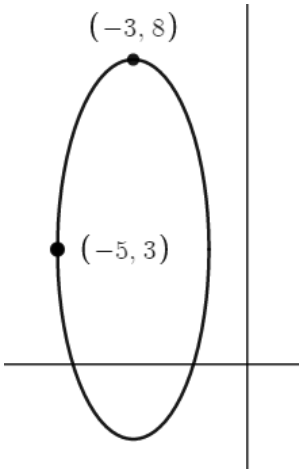


WS #3 – Parabolas

Find the vertex, focus and directrix of each parabola.

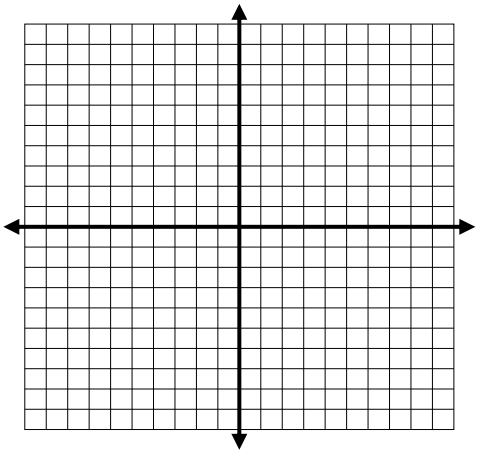
1. $(x-3)^2 = 4(y+6)$

Facing_____

Vertex_____

Foci _____

Directrix _____



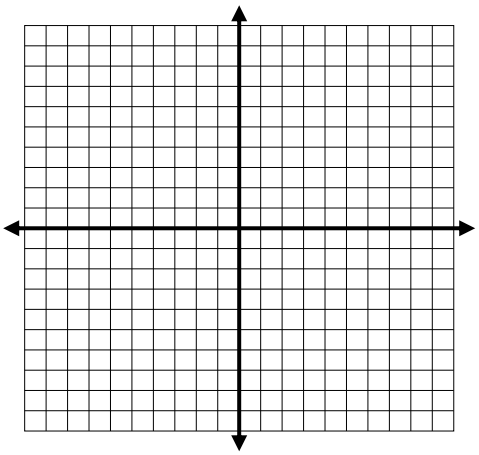
2. $(y+2)^2 = 16(x+3)$

Facing_____

Vertex_____

Foci _____

Directrix _____



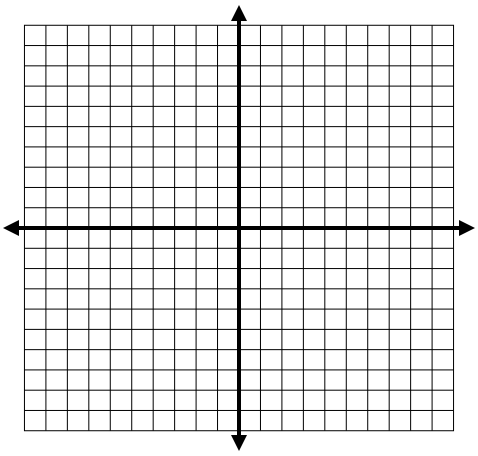
3. $(y+7)^2 = -4(x+3)$

Facing_____

Vertex_____

Foci _____

Directrix _____



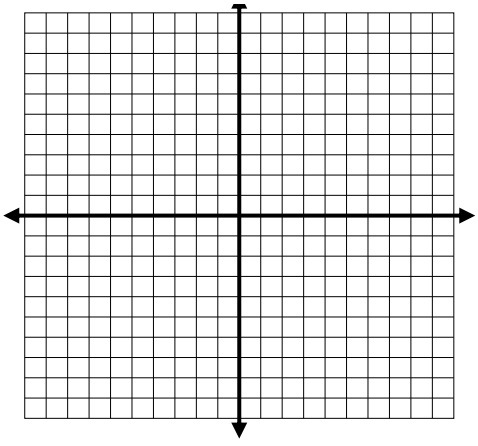
4. $(x+2)^2 = -8(y-5)$

Facing_____

Vertex_____

Foci _____

Directrix _____



Write in standard form. Identify the vertex, p, focus, and directrix.

5. $16y = x^2 - 8x - 48$

Vertex_____ p=_____

Foci _____ Directrix_____

6. $4y = x^2 + 12x + 20$

Vertex_____ p=_____

Foci _____ Directrix_____

7. $8x = y^2 - 10y - 39$

Vertex_____ p=_____

Foci _____ Directrix_____

8. $4x = y^2 - 6y - 11$

Vertex_____ p=_____

Foci _____ Directrix_____

9. Find the equation of the parabola with a focus at (1, -2) and vertex of (-3, -2).

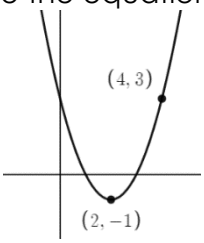
10. Find the equation of the parabola with a focus at (1, 4) and vertex (1, 1).

11. Find the equation of the parabola with focus (2,8) and directrix x = -4.

12. Find the equation of the parabola with focus (1, -1) and directrix y = 5

Write the equation of each graph.

13.



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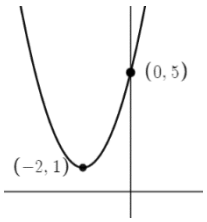

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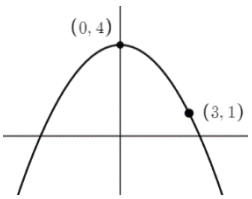

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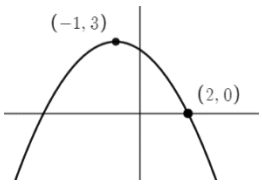
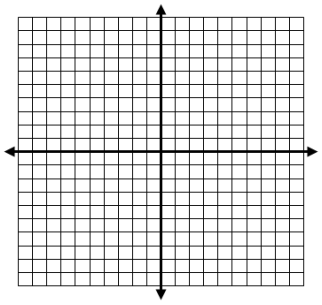


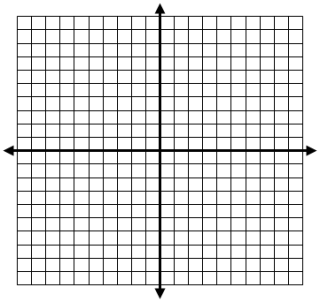
WS #4 – Review for Quiz

Find the center and radius of the following circles. Then graph.

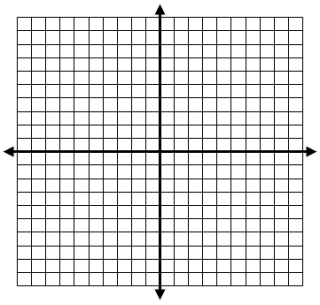
1. $x^2 + y^2 = 121$



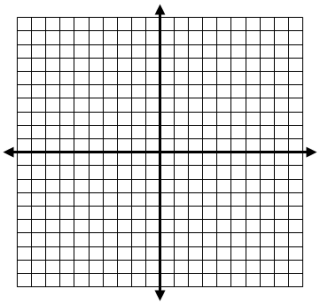
2. $(x-2)^2 + (y-5)^2 = 20$



3. $x^2 + y^2 + 2x - 8y - 83 = 0$



4. $x^2 + y^2 + 6y - 51 = 0$



5. Write the equation of the circle with center (-2, 3) and radius $3\sqrt{6}$.

6. Write the equation of the circle with center (1, -2) and passing through (-5, 7).

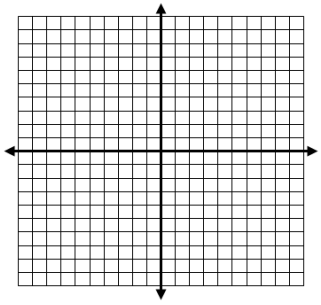
Find the vertex, focus and directrix of the following parabolas. Then graph.

7. $(x-2)^2 = -8(y+1)$

Vertex_____

Focus_____

Directrix_____

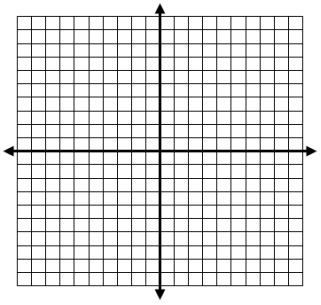


8. $(y+1)^2 = 12(x-5)$

Vertex_____

Focus_____

Directrix_____

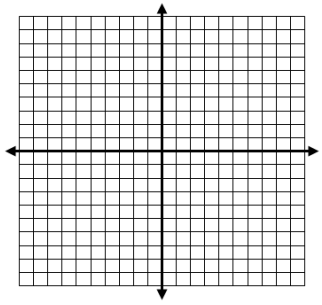


9. $y^2 - 6y + 4x + 17 = 0$

Vertex_____

Focus_____

Directrix_____

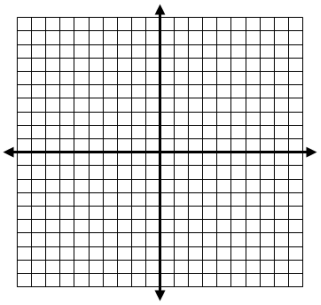


10. $x^2 - 20y + 40 = 0$

Vertex_____

Focus_____

Directrix_____



11. Write the equation of the parabola with vertex (4,2) and a focus (4,-4).

12. Write the equation of the parabola with vertex (-1,1) & passing through (-4,3) opening to the left.

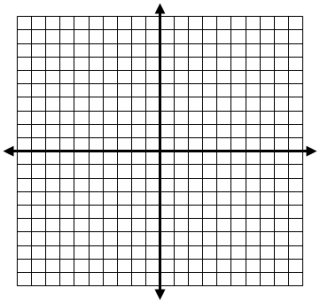
Find the center, vertices and foci of the following ellipses. Then graph.

13. $\frac{(x-3)^2}{16} + \frac{(y+1)^2}{25} = 1$

Center_____

Vertices_____

Foci_____

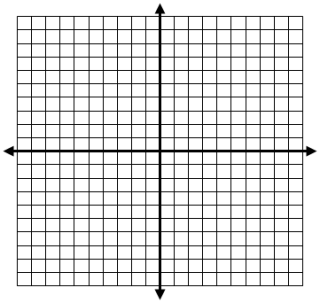


14. $\frac{x^2}{4} + y^2 = 1$

Center_____

Vertices_____

Foci_____

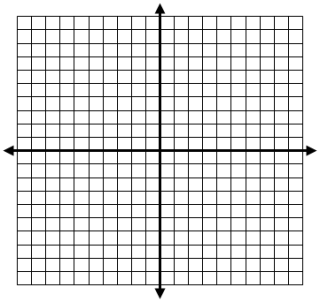


15. $25x^2 + 9y^2 + 100x - 72y + 19 = 0$

Center_____

Vertices_____

Foci_____

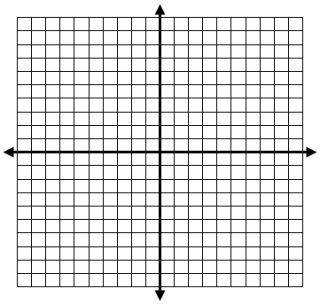


16. $16x^2 + 4y^2 - 32x - 40y + 52 = 0$

Center_____

Vertices_____

Foci_____



17. Write the equation of the ellipse with vertices (-1,4), (1, -1), (-1, -6), and (-3, -1).

WS #5 – Hyperbolas

Find the center, vertices, foci, and asymptotes of the hyperbola. Graph each hyperbola.

1. $\frac{y^2}{16} - \frac{x^2}{49} = 1$

Center _____ Asym_____

Vertices_____ _____

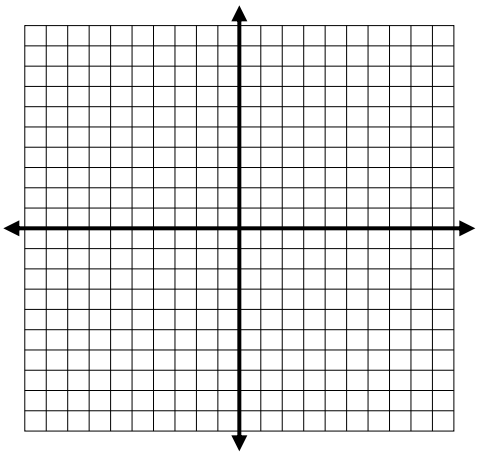
Foci _____ _____

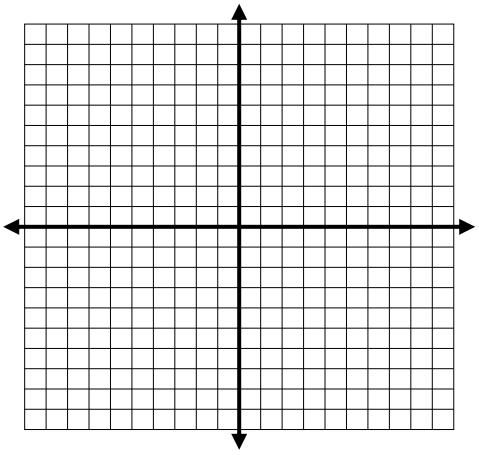
2. $\frac{x^2}{64} - \frac{y^2}{16} = 1$

Center _____ Asym_____

Vertices_____ _____

Foci _____ _____





3. $\frac{(x+2)^2}{25} - \frac{(y-3)^2}{4} = 1$

Center _____ Asym_____

Vertices_____ _____

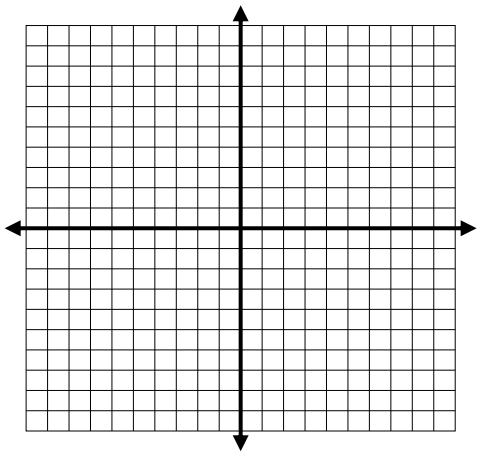
Foci _____ _____

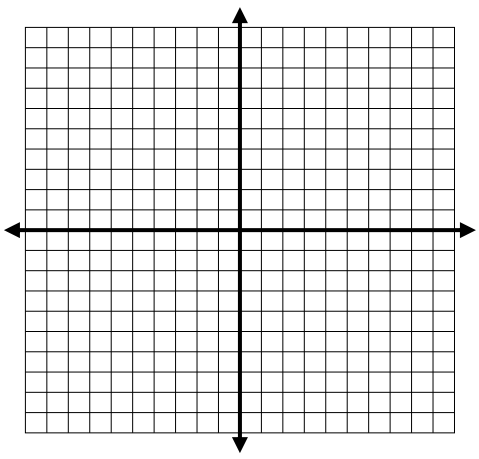
4. $\frac{(y+5)^2}{49} - \frac{(x-9)^2}{100} = 1$

Center _____ Asym_____

Vertices_____ _____

Foci _____ _____





Write in standard form and identify the center, vertices, foci, and asymptotes of each hyperbola.

5. $36y^2 - 9x^2 = 324$

Center _____ Asym_____

Vertices_____ _____

Foci _____ _____

6. $4x^2 - 25y^2 - 8x + 250y - 721 = 0$

Center _____ Asym_____

Vertices_____ _____

Foci _____ _____

7. $16y^2 - 9x^2 - 192y + 54x + 351 = 0$

Center _____ Asym_____

Vertices_____ _____

Foci _____ _____

8. $9x^2 - 4y^2 - 8y = 40$

Center _____ Asym_____

Vertices_____ _____

Foci _____ _____

Tell which conic is represented by the equation. (circle, parabola, ellipse, or hyperbola)

9. $6y^2 - 5x - 2y + 5 = 0$

10. $6x^2 + 9y^2 + 14x - 75 = 0$

11. $6x^2 + 6y^2 - 3x + 4y = 0$

12. $-6x^2 + 5y^2 + 3x - 7y + 2 = 0$

13. $-6x^2 + 4y^2 + 9x + y + 7 = 0$

14. $6x^2 - 2x - y - 25 = 0$

15. $-4x^2 - 20y^2 + 50 = 0$

16. $7x^2 + 7y^2 + 12x - 5y = 0$

WS #6 – Classifying Conics

Classify each conic section as circle, parabola, ellipse, hyperbola or none of these.

_____1. $x^2 + (y-3)^2 = 9$

_____2. $16x^2 - 9y^2 = 144$

_____3. $(x+2)^2 = -8(y-3)$

_____4. $(x+4)^2 + (y-1)^2 = 7$

_____5. $\frac{(y-2)^2}{4} - \frac{(x+3)^2}{9} = `1$

_____6. $x^2 - 4x + y^2 + 6y - 5 = 0$

_____7. $y^2 - 4x^2 + 32x - 6y + 1 = 80$

_____8. $y^2 + 2y + 2x - 1 = 0$

_____9. $\frac{(x-1)^2}{9} + \frac{(y-3)^2}{25} = `1$

_____10. $\frac{(y-2)^2}{25} - \frac{(x+3)^2}{4} = `1$

_____11. $x^2 + y^2 - 18x - 18y + 53 = 0$

_____12. $4x^2 + 9y^2 + 24x - 90y = -225$

_____13. $x^2 - 4y^2 - 4x + 24y - 36 = 0$

_____14. $3x^2 + 3y^2 + 18x - 6y + 3 = 0$

_____15. $\frac{(y-2)^2}{25} - \frac{(x+3)^2}{4} = `1$

_____16. $(y + 4)^2 = 12(x + 1)$

_____17. $9x^2 - 4y^2 + 36x - 8y - 40 = 0$

_____18. $9x^2 + 4y^2 + 36x - 8y + 4 = 0$

_____19. $9x^2 - 8y - 40 = -4y^2 + 36x$

_____20. $x^2 - 18x + 53 = y^2 - 18y$

WS #7 – Conic Systems

1. $y = x^2$
   $y = 3x - 2$

2. $y - 2x - 3 = 0$
   $x^2 - y = 0$

3. $y^2 = 5 - x$
   $x + 5y = 11$

4. $y = x^2 + 1$
   $x + y = 3$

5. $x - 2y = 1$
   $X = 3y^2 + 1$

6. $y^2 = 1 - x$
   $x + 2y = 1$

7. $x - y = 4$
   $3x^2 - x + y = 8$

8. $x - 2y^2 = 0$
   $y = x - 1$

9. $3x^2 + y^2 = 48$

$X^2 = 2y^2 + 16$

10. $y^2 + 3 = 3x$

$2x^2 + y^2 = 41$

11. $x^2 + y^2 = 25$

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

12. $-2x^2 + 2y^2 – 8x – 2 = 0$

$x^2 – 5y^2 + 4x + 5 = 0$

13. $y^2 = 7 - (x - 1)^2$

$x^2 + y^2 = 4$

14. $x^2 + y^2 = 16$

$x^2 - y^2 = 16$

15. $y^2 - 4x^2 = 25$

$4x^2 + y^2 = 25$

16. $2x^2 +3y^2 = 19$

$x^2 + y^2 = 9$

17. $x^2 +y^2 = 25$

$X = y^2 - 5$

18. $x^2 + y^2 = 25$

$\frac{x^2}{16} + \frac{y^2}{25} = 1$

WS #8 – Test Review #1

Classify the conic section represented by the equation. (circle, ellipse, parabola, hyperbola, none)

____**1.** $4x^2 + 2x - 2y + 16 = 0$

____**2.** $4x^2 - y^2 + 72x - 2y + 136 = 0$

____**3.** $16x^2 - 16x + 16y^2 + 24y - 3 = 0$

____**4.** $x^2 - 18y + 10x + 25 + 9y^2 = 0$

Circles: Put in standard form if necessary. List the center and radius. Graph.

5. $(x-5)^2 + (y-6)^2 = 25$

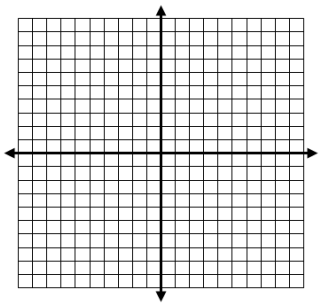
Center: _____ **Radius**_____

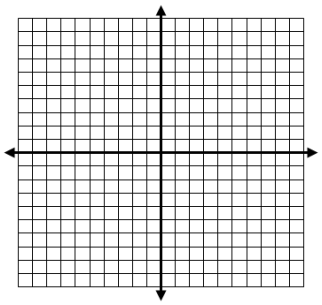
6. $x^2 + y^2 - 8x + 6y = 0$

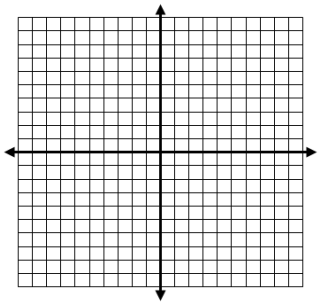
Center: _____ **Radius**_____

7. $2x^2 + 2y^2 - 12x + 8y + 4 = 0$

Center: _____ **Radius**_____







Ellipses. Put in standard form if necessary. List center, vertices, & foci. Graph.

8. $4x^2 + 9y^2 - 24x = 0$

C=_____ V=_____

F=_____

9. $9x^2 + 25y^2 = 225$

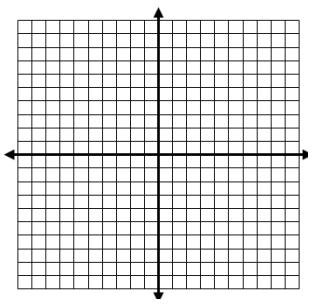
C=_____ V=_____

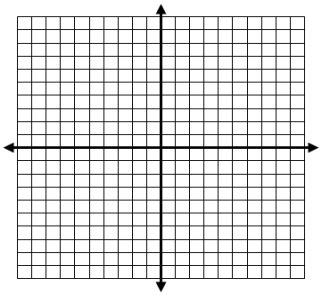
F=_____

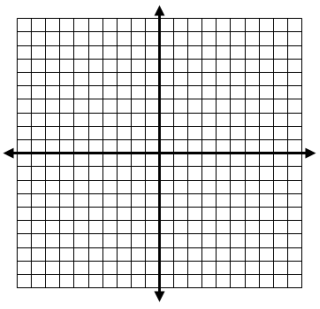
10. $y^2 + 4x^2 + 2y + 16x = -1$

C=_____ V=_____

F=_____







Hyperbola. Put in standard form if necessary. List center, vertices, foci & asymptotes. Graph.

11. $9x^2 - 4(y-2)^2 = 36$

C=_____ V=_____

F=_____A=_____

12. $4x^2 - y^2 + 24x + 4y + 28 = 0$

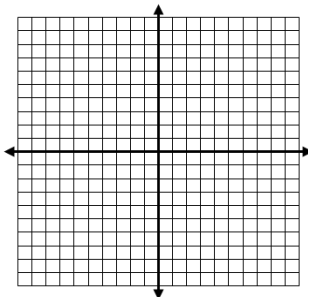
C=_____ V=_____

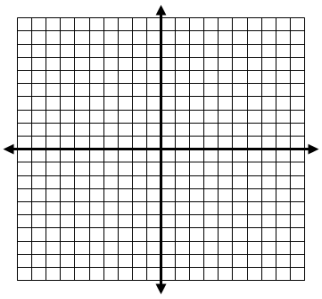
F=_____A=_____

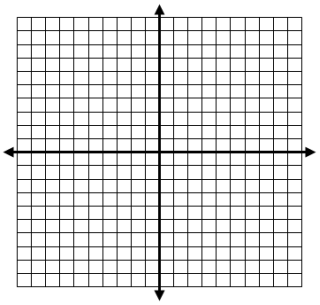
13. $4x^2 - 25y^2 - 8x - 100y = 196$

C=_____ V=_____

F=_____A=_____







Parabolas. Put in standard form if necessary. List vertex, focus & directrix. Graph.

14. $4x^2 + 9y^2 - 24x = 0$

V=_____ D=_____

F=_____

15. $9x^2 + 25y^2 = 225$

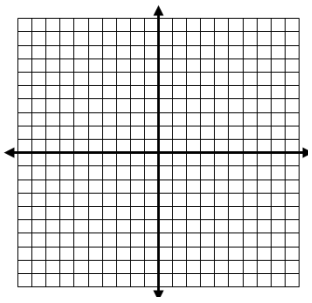
V=_____ D=_____

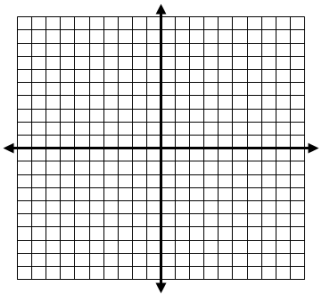
F=_____

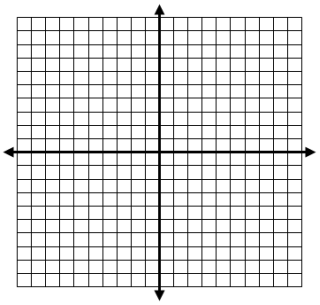
16. $y^2 + 4x^2 + 2y + 16x = -1$

V=_____ D=_____

F=_____







Write the equation given the following information.

17. Find the equation of the circle with center (-2, 4) and radius r = $3\sqrt{7}$.

18. Find the equation of the circle with center (-3,7) and passing through (1,2).

19. Find the equation of the parabola with focus (-3, 6) and vertex (-3, 1).

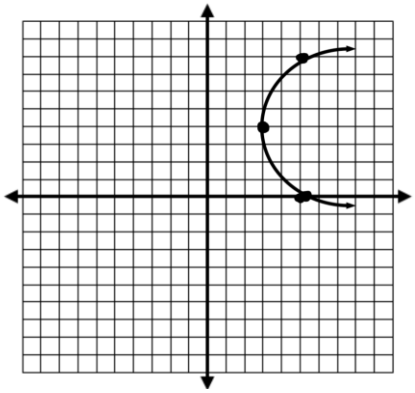
20. Find the equation of the ellipse with vertices (5, -3), (-3, -3), (1,0) and (1, -6).

21. Write the standard form of an equation of an ellipse with center at (0,0) vertex at (0, 6) and (3, 0)

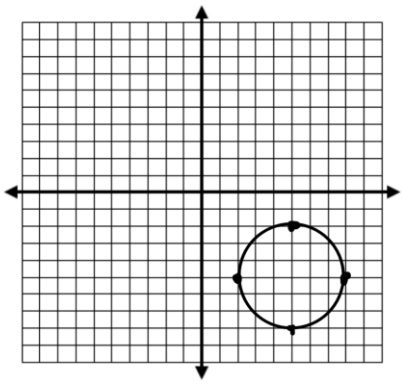
22. The capitol dome sits atop the capitol building in Washington, DC. The base of the dome is a circle with a diameter of 96 feet. Write an equation for the base of the dome. Assume that the center of the dome is at the origin.

Write the equation of the following conic.

23. _____



24._____



Solve the systems of conics.

25. $3x^2 + y2 = 55$

$x^2 = 2y^2 + 16$

26. $x^2 + y = 16$

$y = -2x + 1$

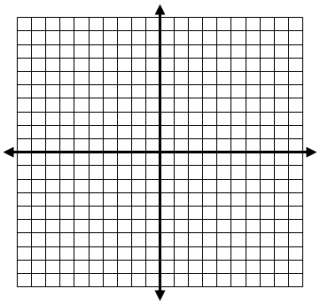
WS #9 – Test Review #2

Graph the circle. List the center and radius.

1. $x^2 + y^2 = 16$

Center: _____

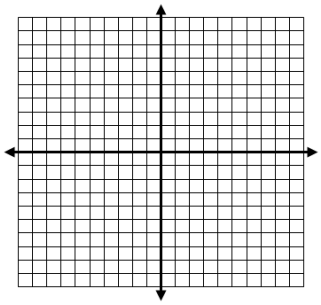
Radius_____



2. $x^2 + y^2 = 17$

Center: _____

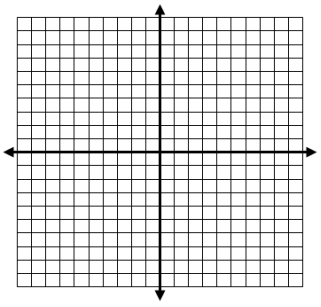
Radius_____



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

Center: _____

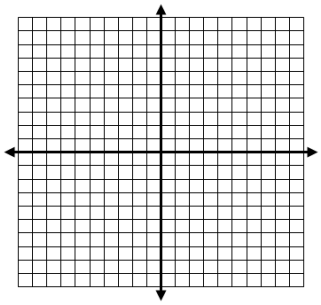
Radius_____



4. $x^2 + y^2 - 10x - 12y + 45 = 0$

Center: _____

Radius_____



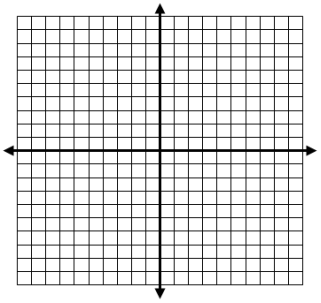
Graph the parabola. List the vertex, focus & directrix.

5. $(x-3)^2 = 4(y+6)$

Vertex _____

Focus _____

Directrix _____

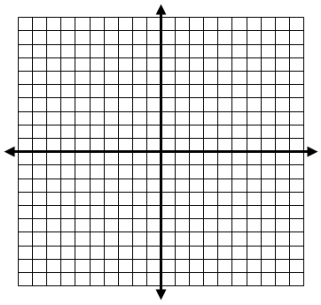


6. $(y+6)^2 = 8(x-4)$

Vertex _____

Focus _____

Directrix _____

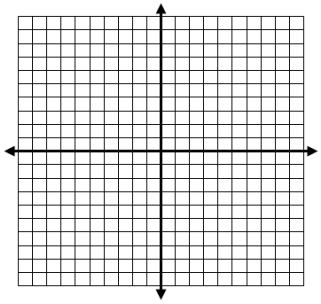


7. $(x+2)^2 = -8(y-5)$

Vertex _____

Focus _____

Directrix _____

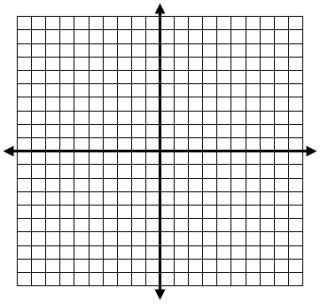


8. $4x = y^2 - 6y - 11$

Vertex _____

Focus _____

Directrix _____



Graph the ellipse. List the center, vertices, & foci.

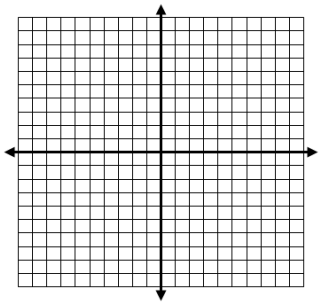
9. $\frac{x^2}{25}+\frac{y^2}{4}=1$

Center _____

Vertices _____

_____

Foci _____



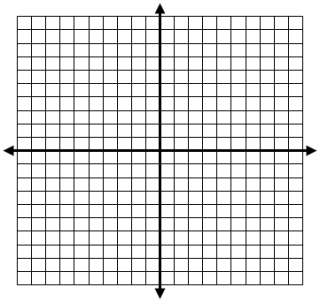
10. $\frac{(x-3)^2}{49}+\frac{(y-7)^2}{36}=1$

Center _____

Vertices _____

_____

Foci _____



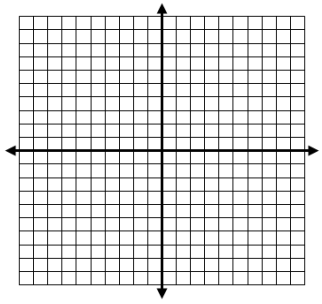
11. $x^2+4y^2=1$

Center _____

Vertices _____

_____

Foci _____



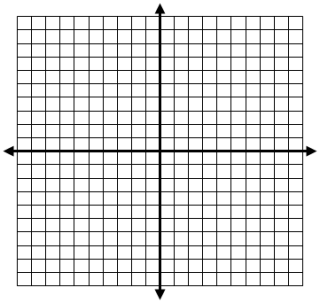
12. $9x^2+16y^2-54x+32y-47=0$

Center _____

Vertices _____

_____

Foci _____



Graph the hyperbola. List the center, vertices, foci, & asymptotes.

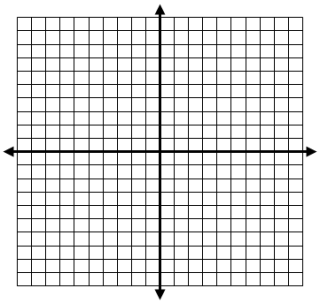
13. $\frac{(x-6)^2}{16}-\frac{(y+7)^2}{16}=1$

Center _____

Vertices _____

Foci _____

Asymptotes _____



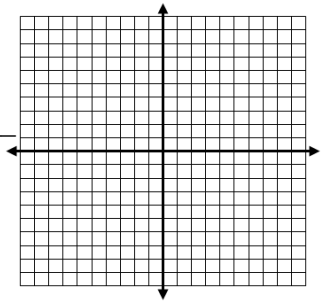
14. $\frac{y^2}{64}-\frac{x^2}{4}=1$

Center _____

Vertices _____

Foci _____

Asymptotes _____



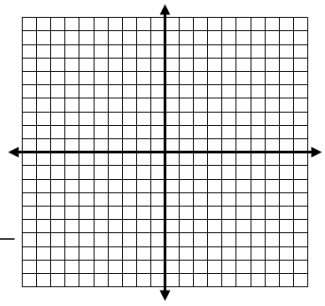
15. . $\frac{(y+2)^2}{25} - \frac{(x+11)^2}{4} = 1$

Center _____

Vertices _____

Foci _____

Asymptotes _____



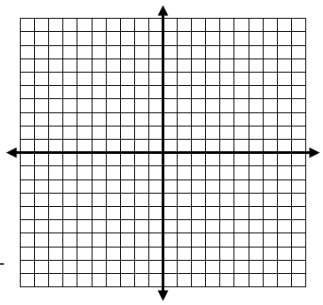
16. $9x^2 - 16y^2 - 36x + 32y - 24 = 0$

Center _____

Vertices _____

Foci _____

Asymptotes _____

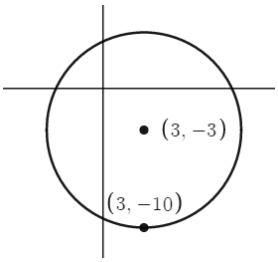


Write the equation of the conic given the following information

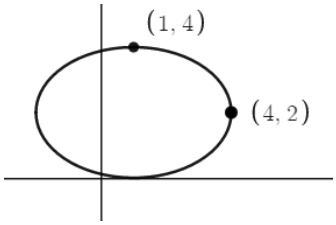
17. Find the equation of the parabola with focus (-2, -3) & vertex (4, -3).

18. Find the ellipse with vertices (2, 0), (-2, 0), (0, 4), and ((0, -4).

19.



20.



Tell which conic is represented by the equation.

21. $2x^2 + 6y - 9 = 0$	22. $15x^2 + 5y^2 + 4x + 9y - 16 = 0$
23. $-12x^2 + 8y^2 - 9x + 7y - 5 = 0$	24. $7y^2 - 4x + 6 = 0$
25. $5x^2 + 5y^2 + 6x + 4y + 2 = 0$	26. $3x^2 + 53 - 2x + 10y - 1 = 0$
27. $-4x^2 - 4y^2 - 3x + 2y + 1 = 0$	28. $-8x^2 + 6y^2 = 24$