SM2H

Name:________________________________ Period:________

Unit 5 – Conic Sections Test Review

Identify each equation as a parabola (p), hyperbola (h), ellipse (e), or circle (c).

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

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

e 3. $\frac{x^2}{4}+\frac{y^2}{36}=1$

h 4. $y^2-x^2=4$

c 5. $(x-6)^2+(y-6)^2=144$

h 6. $\frac{x^2}{121}-\frac{y^2}{9}=1$

e 7. $\frac{x^2}{169}+\frac{y^2}{144}=1$

p 8. $(y-1)^2=4(x+2)$

h 9. $\frac{y^2}{9}-\frac{x^2}{16}=1$

p 10. $(x-1)^2=12(y+3)$

p 11. vertex (2, 6); opens up; focus (2,7) directrix is y = 5

h 12. center is (0, 0); asymptotes $y=\pm\frac{2}{3}x$. Vertices (5, 0) & (-5, 0).

e 13. center is (3, 4);foci at (5, 4)&(1,4); vertices at (8, 4) and (-2, 4)

c 14. center is (-2, -6); r = 4

Determine the direction of opening, vertex, focus, focal width, the value of a, and directrix, then graph the parabola.

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

Direction of opening up

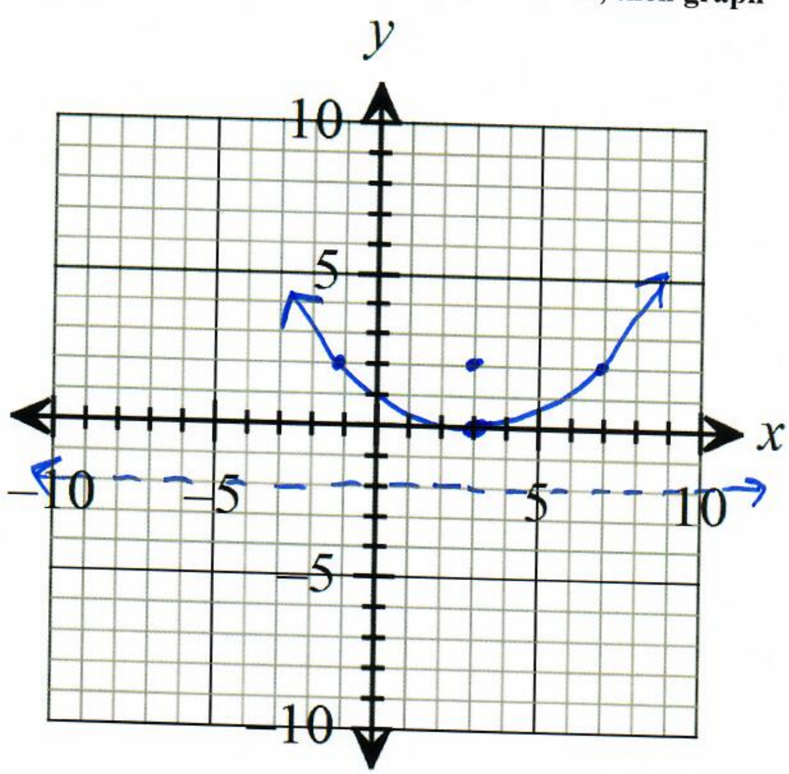
Vertex (3, 0)

Focal Width 8

a= 2

Focus (3, 2)

Directrix y = -2



16. $(y-5)^2 = 12(x-4)$

Direction of opening right

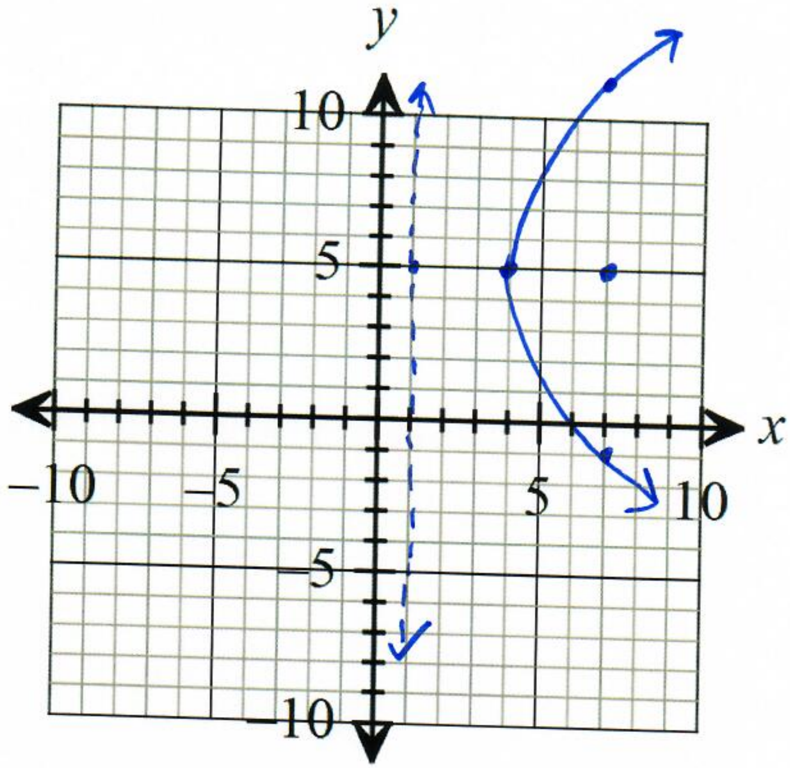
Vertex (4, 5)

Focal Width 12

a= 3

Focus (7, 5)

Directrix $x = 1$



Write an equation in standard form for each of the following parabolas (DRAW A GRAPH FOR HELP).

17. vertex at (3, -1), focus at (3, 2)

Direction of opening up

Which equation should you use?

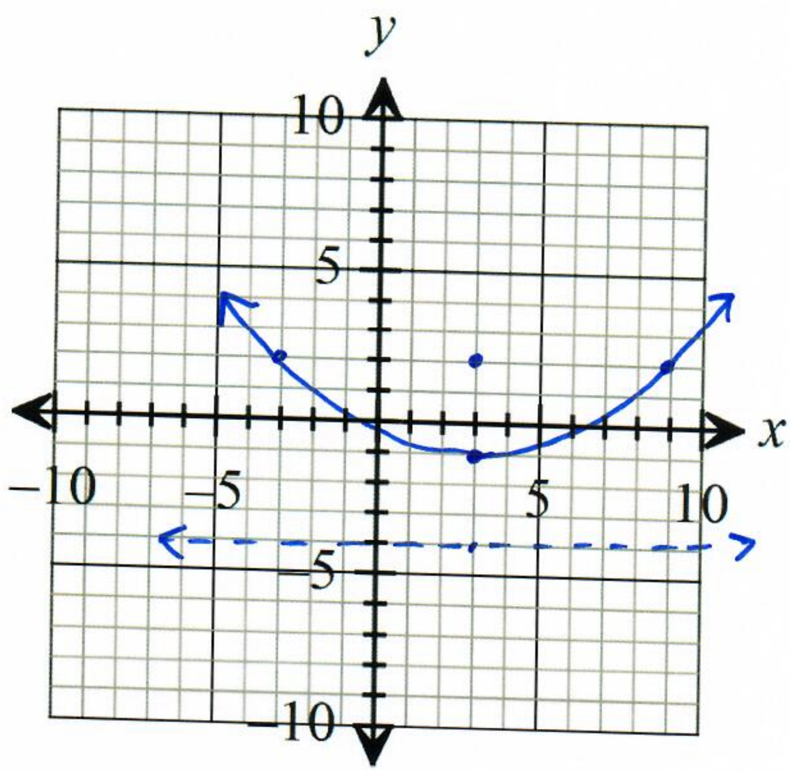
$(x-h)^2 = 4a(y-k)$

Vertex (h,k) (3, -1)

Focus (3, 2)

a= 3

Focal Width 12



Equation $(x-3)^2 = 12(y+1)$

18. focus at (-3, -1), directrix x=5

Direction of opening left

Which equation should you use?

$(y-k)^2 = 4a(x-h)$

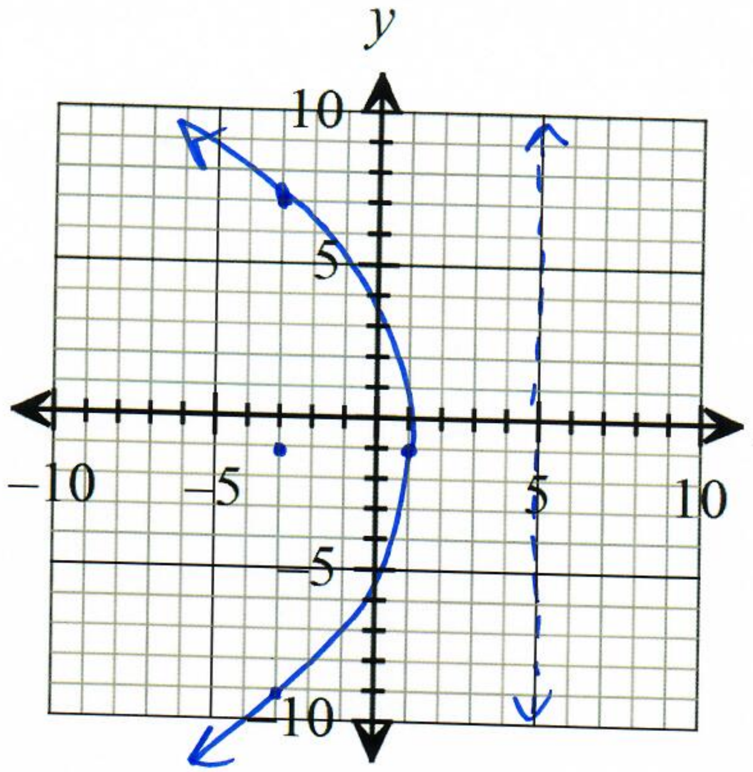
Vertex (h,k) (1, -1)

Focus (-3, -1)

a= -4

Focal Width 16

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



Find the center, vertices, foci and the slope of the asymptotes of each hyperbola, then graph.

19. $\frac{x^2}{49} - \frac{y^2}{4} = 1$

Center: (0, 0)

a= 7

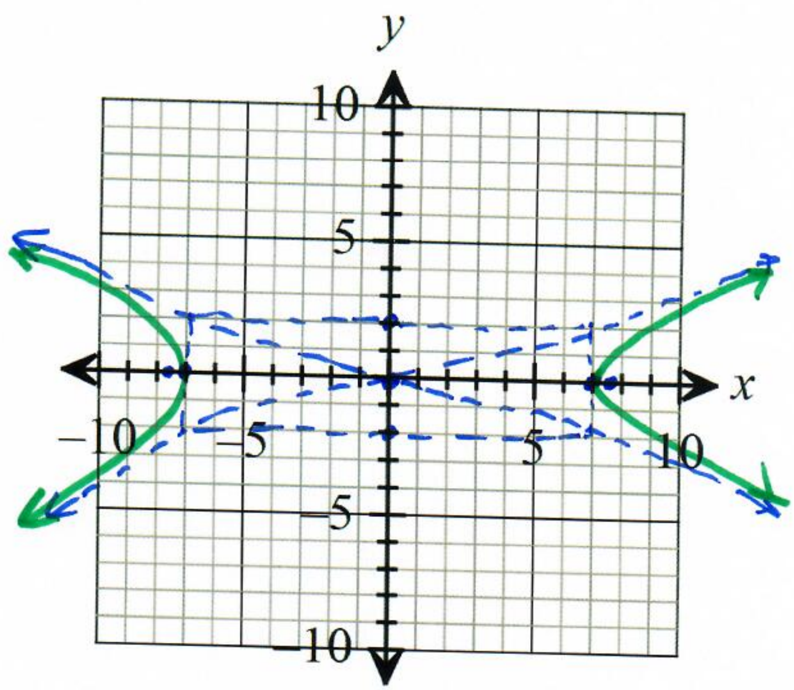
b= 2

c= $c^2 = 49 + 4 = 53$ $c = \sqrt{53} = 7.28$

Vertices: (-7, 0); (7, 0)

Foci: $(-\sqrt{53}, 0)$; $(\sqrt{53}, 0)$

Slope of the Asymptotes: $\frac{2}{7}, -\frac{2}{7}$



20. $\dfrac{25(y+2)^2}{25} - \dfrac{(x-4)^2}{25} = \dfrac{25}{25}$ $\qquad \dfrac{(y+2)^2}{1} - \dfrac{(x-4)^2}{25} = 1$

Center: $(4, -2)$

a= 1

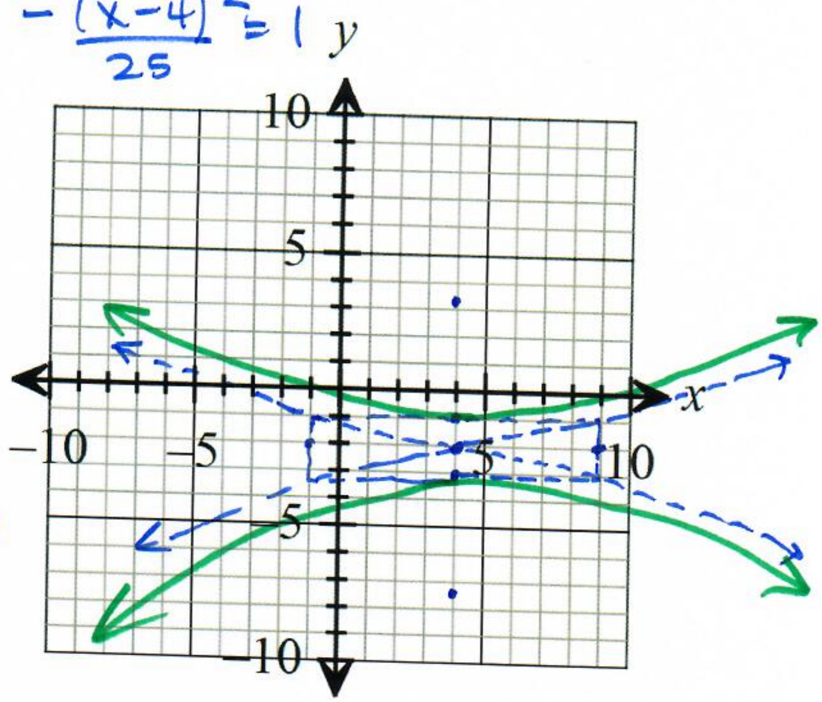
b= 5

c= $c^2 = 1 + 25 = 26$ $\quad c = \sqrt{26} = 5.10$

Vertices: $(4, -1)$; $(4, -3)$

Foci: $(4, -2+\sqrt{26})$; $(4, -2-\sqrt{26})$

Slope of the Asymptotes: $\frac{1}{5}, -\frac{1}{5}$



21. $\dfrac{(x-2)^2}{4} - \dfrac{(y+3)^2}{9} = 1$

Center: $(2, -3)$

a= 2

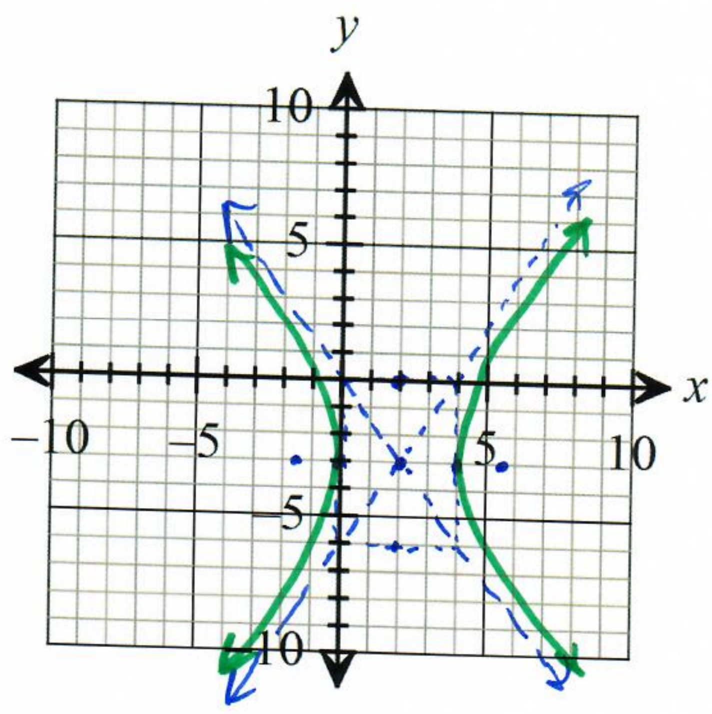
b= 3

c= $c^2 = 4 + 9 = 13$ $\quad c = \sqrt{13}$ 3.61

Vertices: $(0, -3)$; $(4, -3)$

Foci: $(2-\sqrt{13}, -3)$; $(2+\sqrt{13}, -3)$

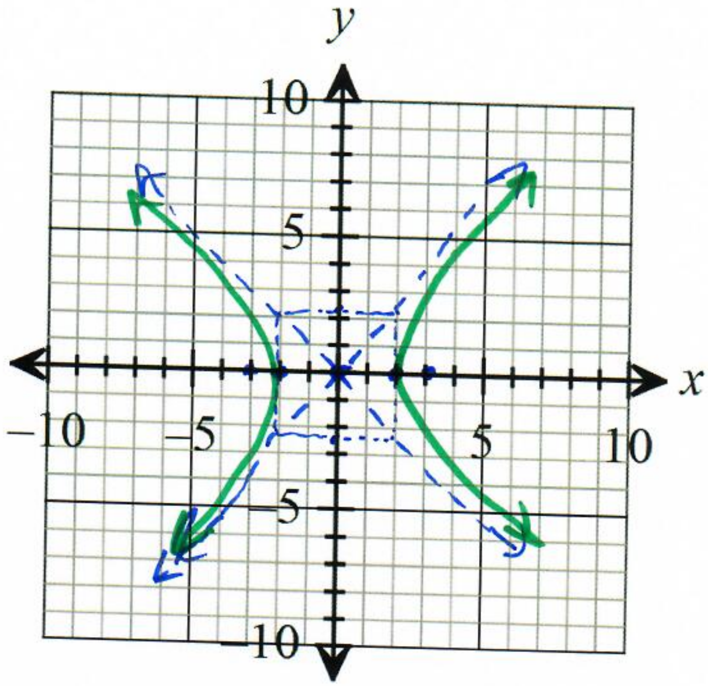
Slope of the Asymptotes: $\frac{3}{2}, -\frac{3}{2}$



Write an equation in standard form for the hyperbola that satisfies the given conditions.

22. Center at (0,0); Focus at (3, 0); Vertex at (2,0)

opens left/right



Which equations should you use? $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

Center: (0,0)

a= 2

b= $9 = 4 + b^2$ $\quad b^2 = 5$ $\quad b = \sqrt{5}$ 2.24

c= 3

Vertices: (−2,0) ; (2,0)

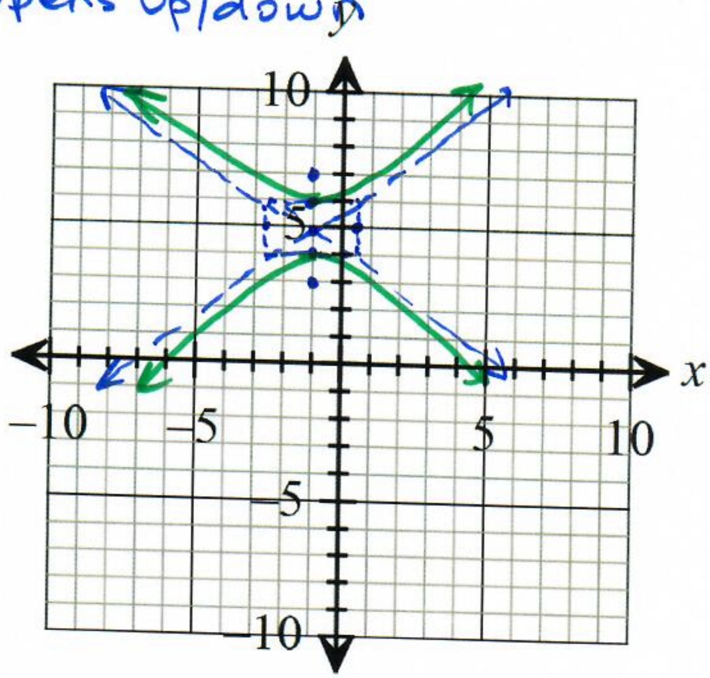
Foci: (−3,0) ; (3,0)

Slope of the Asymptotes: $\frac{\sqrt{5}}{2}, -\frac{\sqrt{5}}{2}$

Equation $\frac{x^2}{4} - \frac{y^2}{5} = 1$

23. Foci at (-1, 3) and (-1,7); Vertex at (-1, 6)

opens up/down



Which equations should you use? $\frac{(y-k)^2}{a^2} - \frac{(x-k)^2}{b^2} = 1$

Center: (−1, 5)

a= 1

b= $4 = 1 + b^2$ $\quad b^2 = 3$ $\quad b = \sqrt{3}$ 1.73

c= 2

Vertices: (−1, 4) ; (−1, 6)

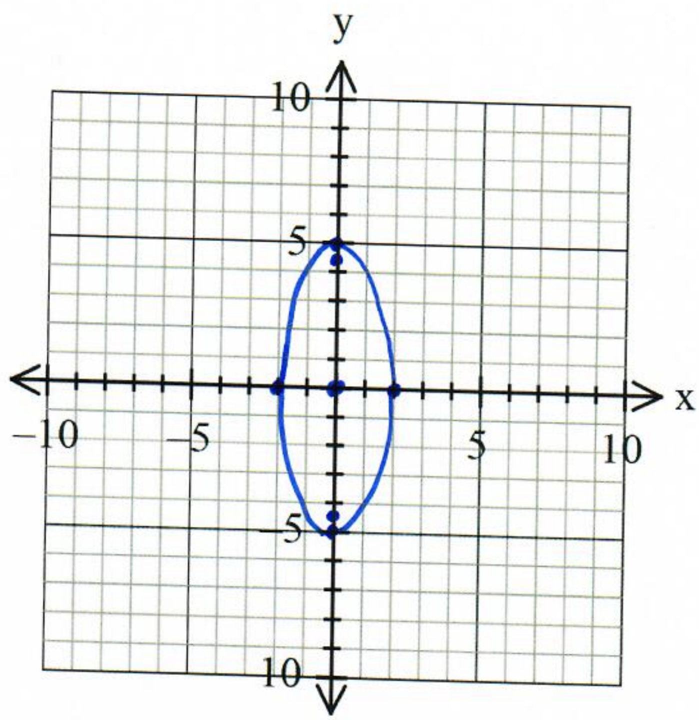
Foci: (−1, 3) ; (−1, 7)

Slope of the Asymptotes: $\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}$

Equation: $\frac{(y-5)^2}{1} - \frac{(x+1)^2}{3} = 1$

Locate the vertices and foci of the ellipse, then graph.

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



Center: $(0,0)$

a= 5

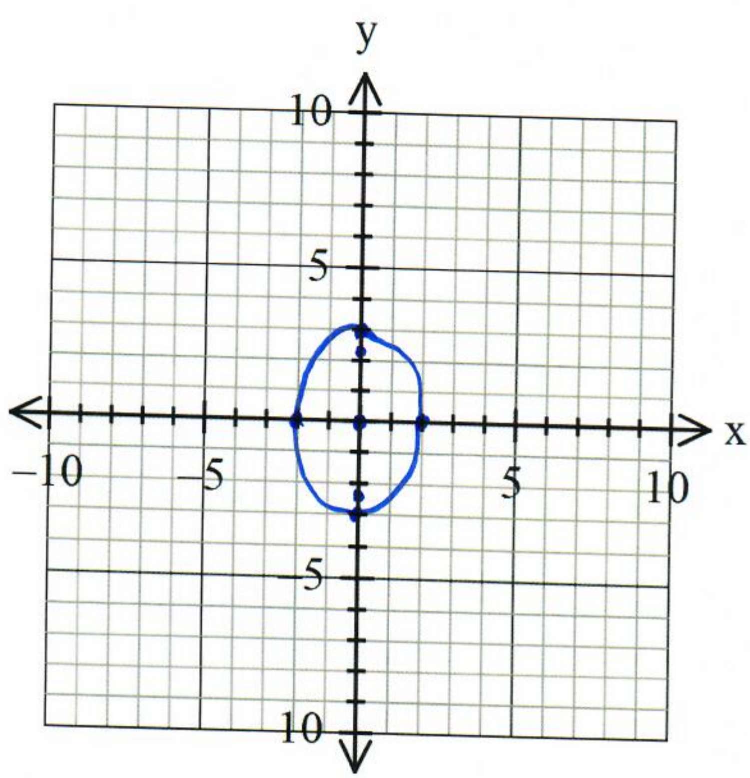
b= 2

c= $c^2=25-4=21$ $c=\sqrt{21}$ 4.58

vertices: $(0,5)$; $(0,-5)$

foci: $(0,\sqrt{21})$; $(0,-\sqrt{21})$

25. $\frac{9x^2}{36}+\frac{4y^2}{36}=\frac{36}{36}$ $\frac{x^2}{4}+\frac{y^2}{9}=1$



Center: $(0,0)$

a= 3

b= 2

c= $c^2=9-4=5$ $c=\sqrt{5}$ 2.24

vertices: $(0,3)$; $(0,-3)$

foci: $(0,\sqrt{5})$; $(0,-\sqrt{5})$

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

Center: $(2,-3)$

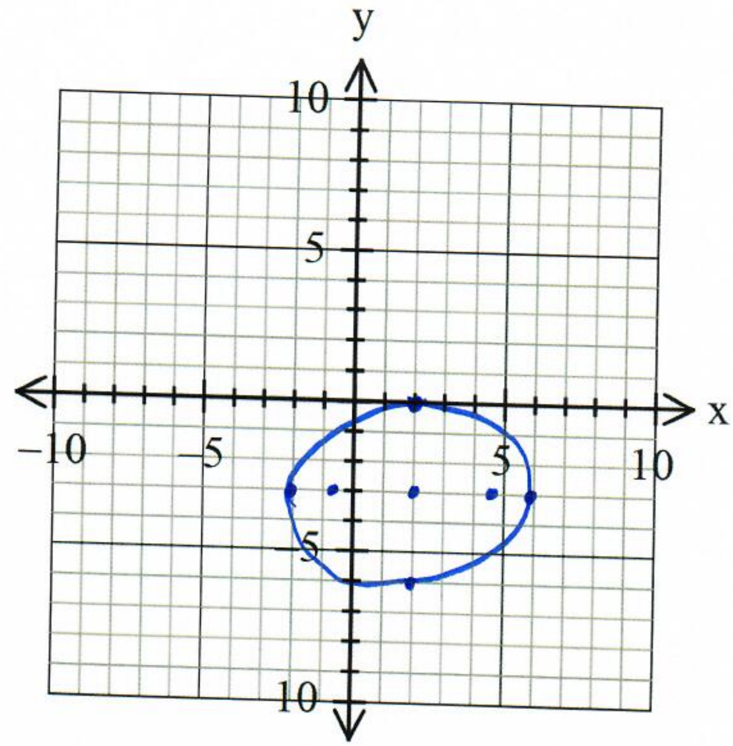
a= 4

b= 3

c= $c^2=16-9=7$ $c=\sqrt{7}$ $=2.65$

vertices: $(-2,-3);(6,-3)$

foci: $(2-\sqrt{7},-3);(2+\sqrt{7},-3)$



Write an equation in standard form for the ellipse that satisfies the given conditions.

27. Foci: (-5,0) and (5, 0); Vertices: (-8,0) and (8,0)

Which equation should you use?

$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$

Center: $(0,0)$

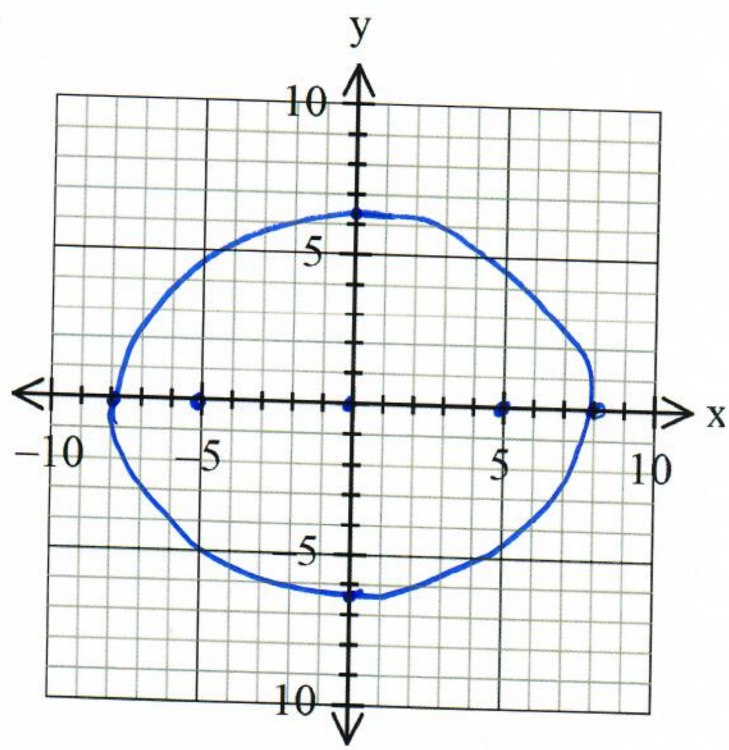
a= 8

b= $25=64-b^2$ $b^2=39$ $b=\sqrt{39}$ 6.24

c= 5

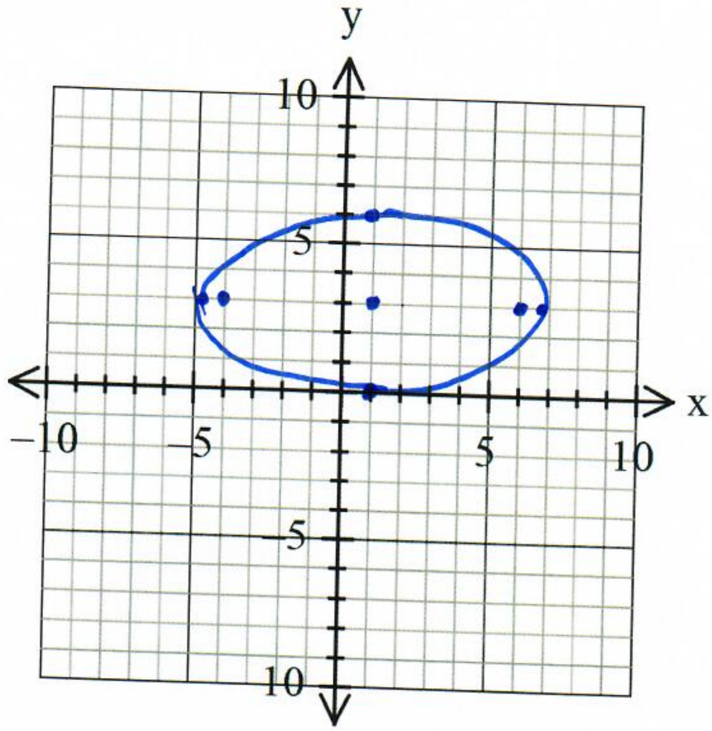
vertices: $(-8,0);(8,0)$

foci: $(-5,0);(5,0)$



Equation: $\frac{x^2}{64}+\frac{y^2}{39}=1$

28. Foci: (-4,3) and (6,3); Minor axis length is 6.



Which equation should you use?

$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

Center: $(1,3)$

a= $25 = a^2 - 9 \quad a^2 = 34 \quad a = \sqrt{34}$
5.83

b= 3

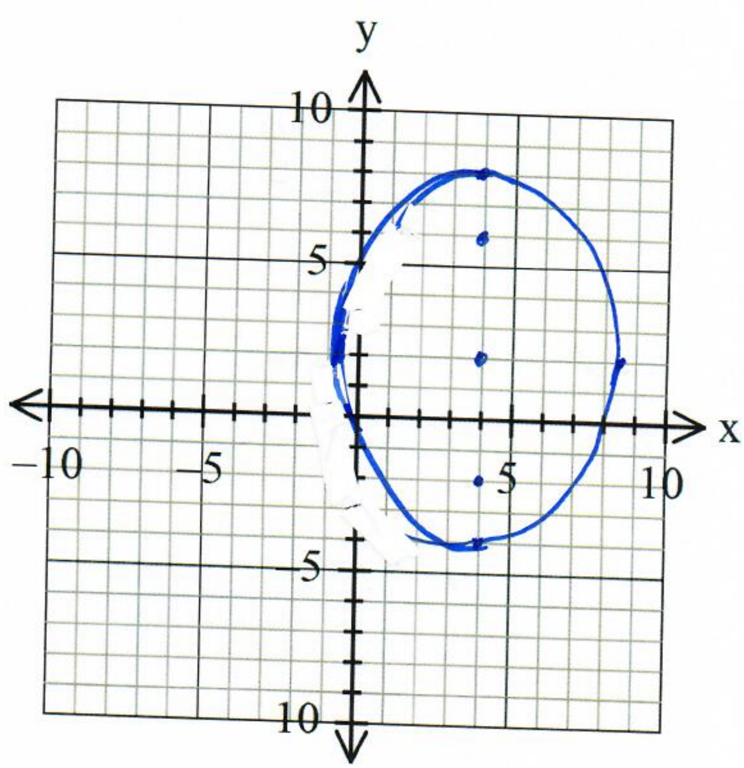
c= 5

vertices: $(1-\sqrt{34}, 3)$; $(1+\sqrt{34}, 3)$

foci: $(-4,3)$; $(6,3)$

Equation: $\frac{(x-1)^2}{34} + \frac{(y-3)^2}{9} = 1$

29. Foci: (4,-2) and (4,6); Vertices: (4,-4) and (4,8)



Which equation should you use?

$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$

Center: $(4,2)$

a= 6

b= $16 = 36 - b^2 \quad b^2 = 20 \quad b = \sqrt{20} = 2\sqrt{5} = 4.47$

c= 4

vertices: $(4-4)$; $(4,8)$

foci: $(4,-2)$; $(4,6)$

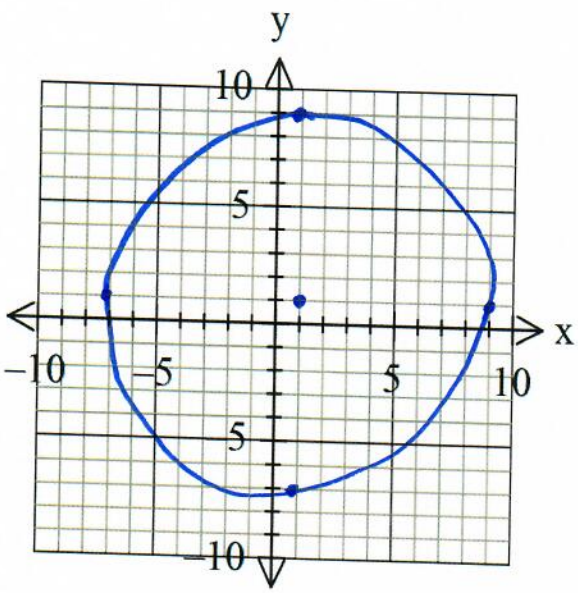
Equation: $\frac{(x-4)^2}{20} + \frac{(y-2)^2}{36} = 1$

Given the standard form of a circle, identify the center and the radius of each circle. Then graph the circle.

30. $x^2+(y-1)^2=64$

center: (0, 1)

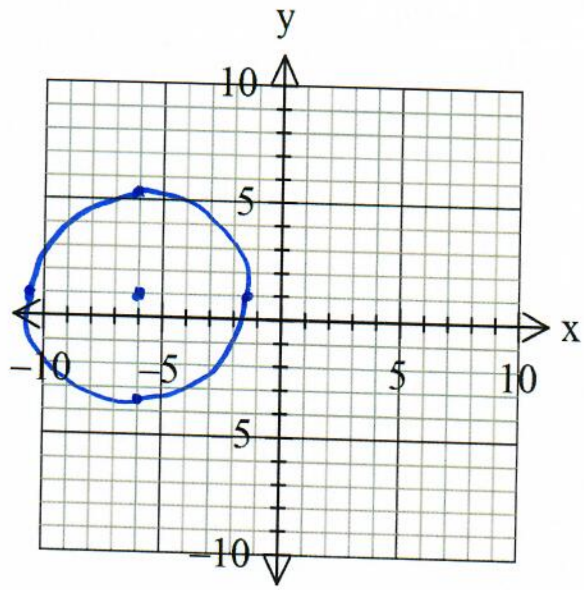
radius: 8



31. $(x+6)^2+(y-1)^2=20$

center: (-6, 1)

radius: $\sqrt{20}$; $2\sqrt{5}$; 4.47

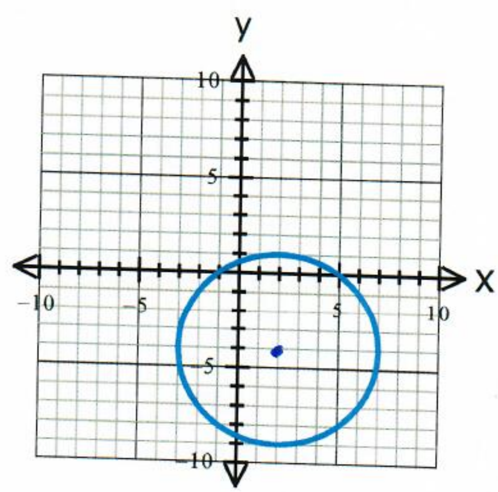


32. Write the standard form of the equation for the circle.

Center: (2, -4)

Radius: 5

Equation: $(x-2)^2+(y+4)^2=25$



Write the standard form of a circle with the given characteristics.

33. A circle centered at the origin with a radius of 7.

Center: (0, 0)

Radius: 7

Equation: $x^2+y^2=49$

34. A circle with diameter of 12 centered at $(2,-4)$

Center: (2, -4)

Radius: 6

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

Find the midpoint.

35. $P_1 = (2,-4)$ *and* $P_2 = (-5,8)$

$$\left(\frac{2+-5}{2}, \frac{-4+8}{2}\right) = \left(\frac{-3}{2}, \frac{4}{2}\right) = \left(\frac{-3}{2}, 2\right)$$

Find the distance between the two points.

36. $P_1 = (1,-6)$ *and* $P_2 = (-7,4)$

$$d = \sqrt{(-7-1)^2 + (4--6)^2} = \sqrt{(-8)^2 + (10)^2} = \sqrt{64+100} = \sqrt{164} = 12.81$$

Write the standard form of a circle with the given characteristics. (hint: draw a picture of the circle)

37. A circle with center at (0, -2) and a point on the circle at (3, 0)

Center: $(0,-2)$

Radius: $\sqrt{13}$

$$d = \sqrt{(3-0)^2 + (0--2)^2} = \sqrt{9+4} = \sqrt{13} = 3.61$$

Equation: $x^2 + (y+2)^2 = 13$

38. A circle with diameter endpoints at $(2,-12)$ and (-4, -12)

Center: $(-1,-12)$

Radius: 3

$$\left(\frac{-4+2}{2}, \frac{-12+-12}{2}\right) = \left(\frac{-2}{2}, \frac{-24}{2}\right) = (-1,-12)$$

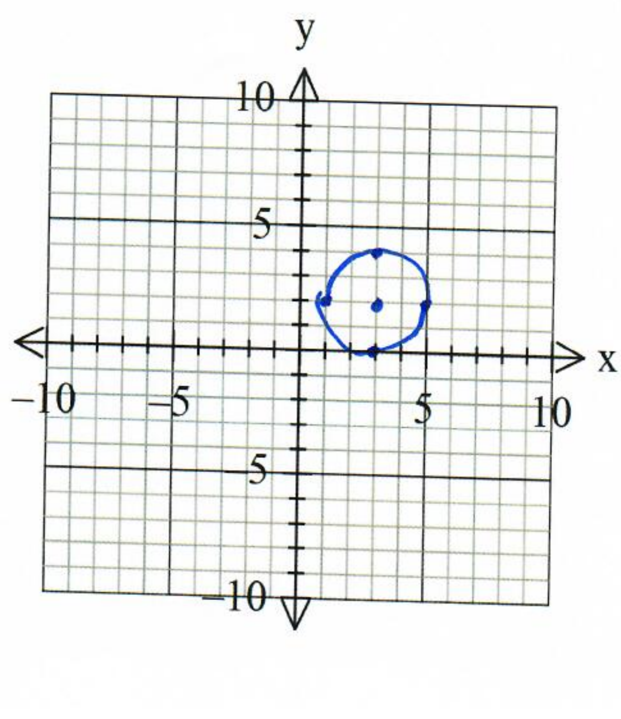
Equation: $(x+1)^2 + (y+12)^2 = 9$

Complete the square to rewrite the equation in standard form. Find the center and the radius of a circle given by each equation and then draw the graph.

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

$$x^2 \underset{-3}{-6x} + 9 + y^2 \underset{-2}{-4y} + 4 = -9 + 9 + 4$$

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



Equation: $(x-3)^2 + (y-2)^2 = 4$

Center: $(3, 2)$

Radius: 2