SM2H

5.5 Circles

Name_____

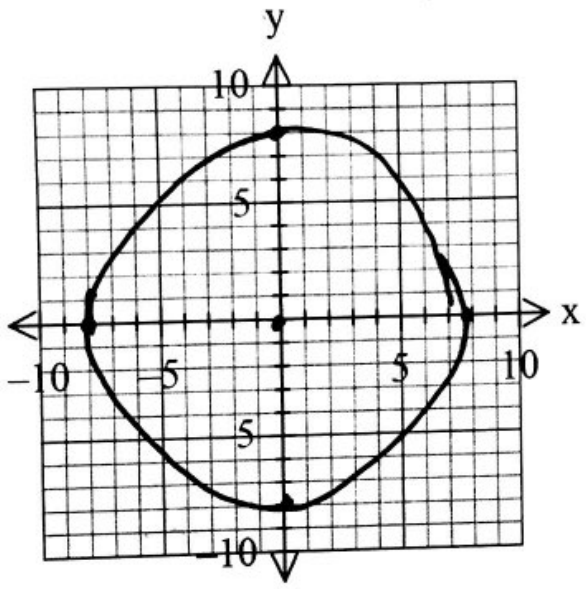
Date_____ Period____ Key

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

1. $x^2 + y^2 = 64$

center: (0,0)

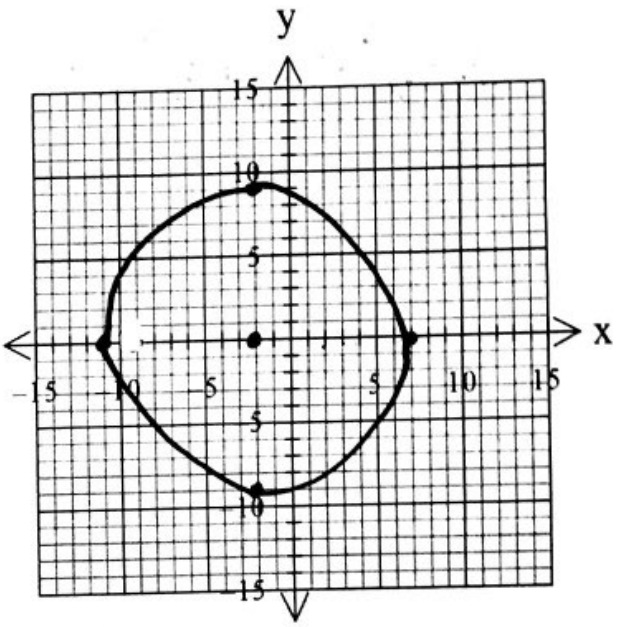
radius: 8



2. $(x+2)^2 + y^2 = 81$

center: (−2,0)

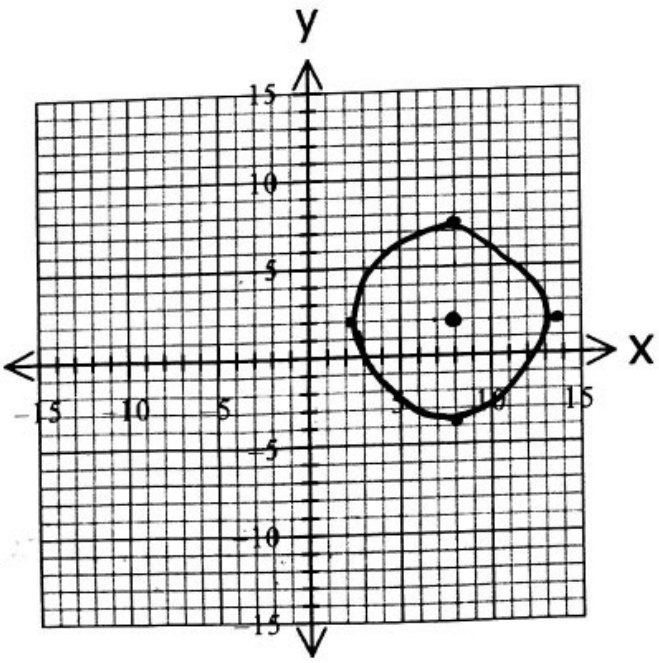
radius: 9



3. $(x-8)^2 + (y-2)^2 = 32$ 2.2.2.2.2

center: (8,2)

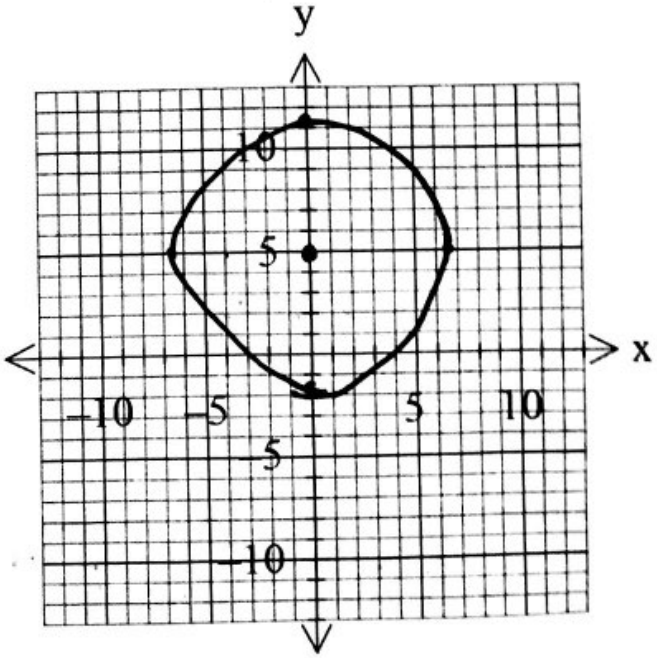
radius: $4\sqrt{2}$ or 5.7



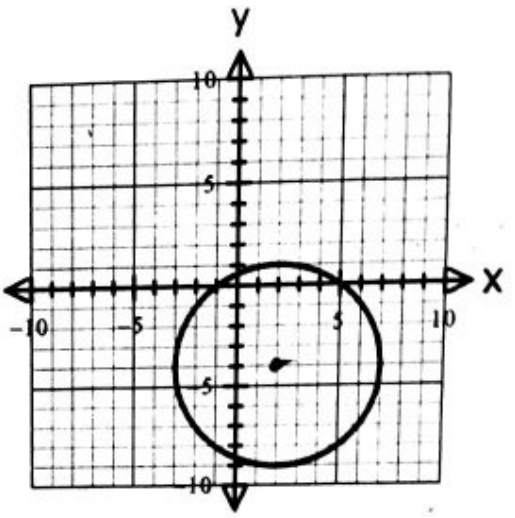
4. $x^2 + (y-5)^2 = 40$ 2.2.2.5

center: (0,5)

radius: $2\sqrt{10}$ or 6.3



5. 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.

6. A circle centered at the origin with a diameter of 14.

Center: $(0,0)$

Radius: $r=7$

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

7. A circle with radius 10 centered at $(8,-6)$

Center: $(8,-6)$

Radius: $r=10$

Equation: $(x-8)^2+(y+6)^2=100$

8. A circle with diameter of 8 centered at (3, -2)

Center: $(3,-2)$

Radius: 4

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

9. A circle with diameter of $\sqrt{10}$ centered at (-2, -7)

Center: $(-2,-7)$

Radius: $\sqrt{10}/2$

Equation: $(x+2)^2+(y+7)^2=\frac{5}{2}$

ind the midpoint.

10. $P_1 = (3, -6)$ *and* $P_2 = (-7, 8)$

$\frac{3+-7}{2}$ $\frac{-6+8}{2}$ (-4, 2)

$(-2, 1)$

11. $P_1 = (10, 15)$ *and* $P_2 = (-8, 3)$

$\frac{10+-8}{2}$ $\frac{15+3}{2}$ (2, 18)

$(1, 9)$

Find the distance between the two points.

12. $P_1 = (3, -6)$ *and* $P_2 = (-7, 8)$

$\sqrt{(-7-3)^2 + (8+6)^2}$

$\sqrt{(-10)^2 + (14)^2}$

$\sqrt{100 + 196}$

$\sqrt{296}$ $2 \cdot 2 \cdot 2 \cdot 37$

$2\sqrt{74}$

same problem

13. $P_1 = (3, -6)$ *and* $P_2 = (-7, 8)$

$\sqrt{(-7-3)^2 + (8+6)^2}$

$\sqrt{(-10)^2 + 14^2}$

$\sqrt{100 + 196}$

$\sqrt{296}$ $2 \cdot 2 \cdot 2 \cdot 37$

$2\sqrt{74}$

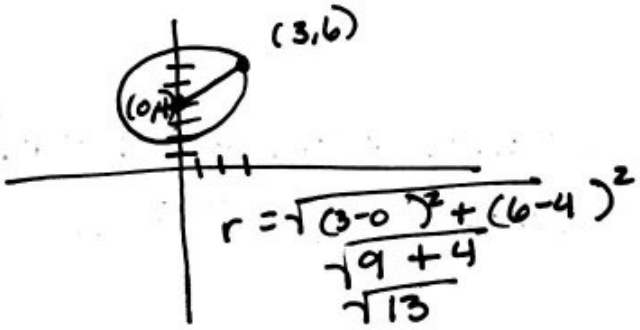
Write the standard form of a circle with the given characteristics. (hint: draw a picture of the circle)

14. A circle with center at (0, 4) and a point on the circle at (3, 6)

Center: (0, 4)

Radius: $\sqrt{13}$

Equation: $x^2 + (y-4)^2 = 13$

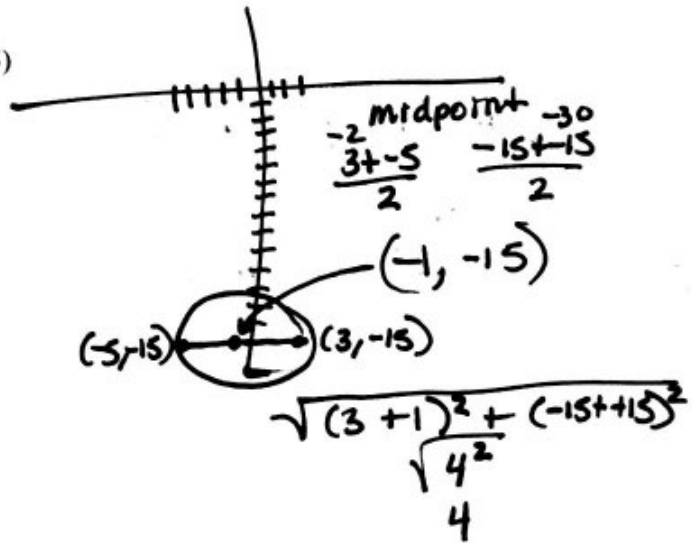


15. A circle with diameter endpoints at $(3, -15)$ and (-5, -15)

Center: (-1, -15)

Radius: 4

Equation: $(x+1)^2 + (y+15)^2 = 16$

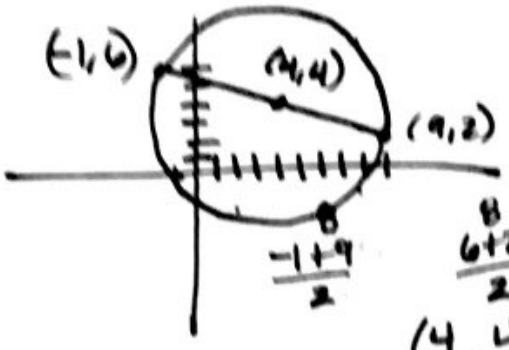


16. A circle with diameter endpoints at $(9, 2)$ and $(-1, 6)$

Center: $(4,4)$

Radius: $\sqrt{29}$

Equation: $(x-4)^2+(y-4)^2=29$



$\sqrt{(9-4)^2+(2-4)^2}$

$25+4$

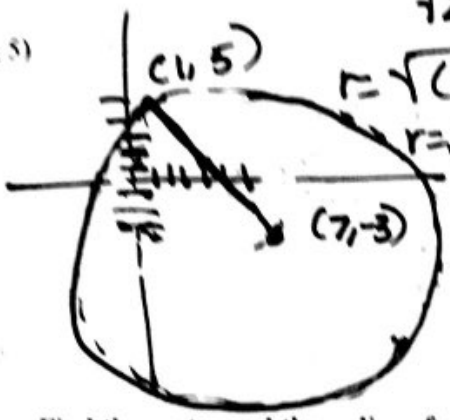
$\sqrt{29}$

17. A circle with center at $(7, -3)$ and a point on the circle at $(1, 5)$

Center: $(7,-3)$

Radius: 10

Equation: $(x-7)^2+(y+3)^2=100$



$r=\sqrt{(7-1)^2+(-3-5)^2}$

$r=\sqrt{36+64}$

$r=\sqrt{100}=10$

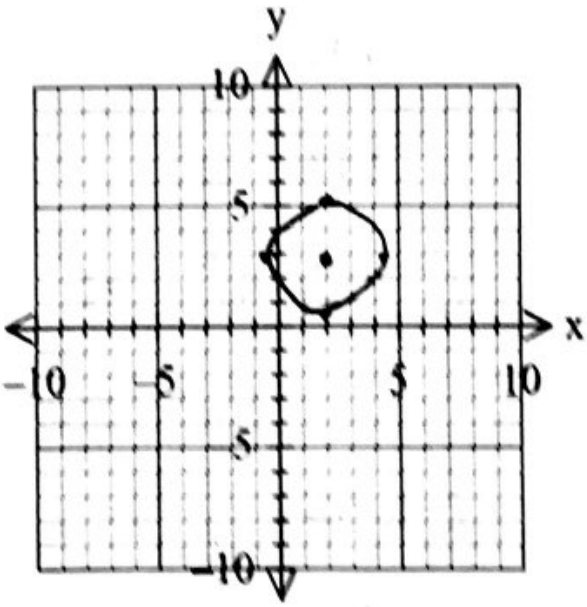
$r=10$

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.

18. $x^2+y^2-4x-6y+8=0$

$x^2-4x+2^2+y^2-6y+3^2=-8+2^2+3^2$

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



Equation: $(x-2)^2+(y-3)^2=5$

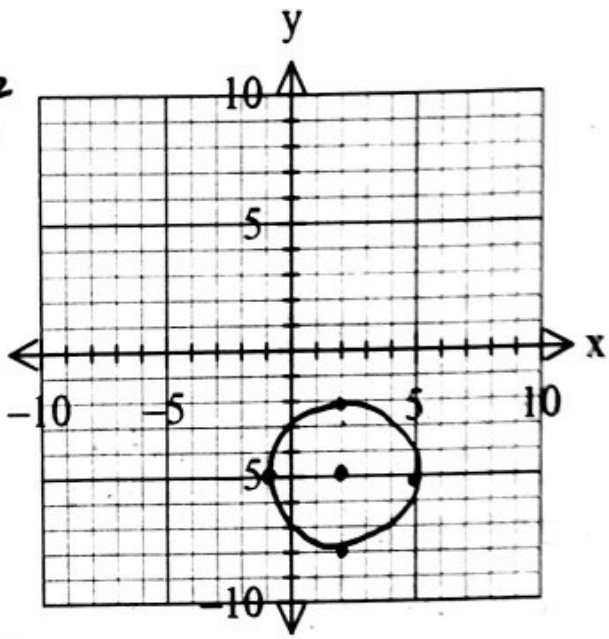
Center: $(2,3)$

Radius: $\sqrt{5}$ or 2.2

19. $x^2 + y^2 - 4x + 10y + 20 = 0$

$x^2 - 4x + 2^2 + y^2 + 10y + 5^2 = -20 + 2^2 + 5^2$

$(x-2)^2 + (y+5)^2 = 9$



Equation: $(x-2)^2 + (y+5)^2 = 9$

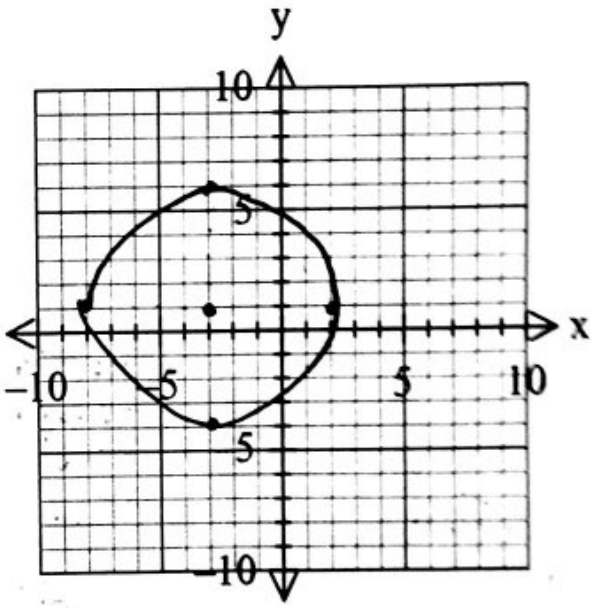
Center: $(2, -5)$

Radius: 3

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

$x^2 + 6x + 3^2 + y^2 - 2y + 1^2 = 15 + 3^2 + 1^2$

$(x+3)^2 + (y-1)^2 = 25$



Equation: $(x+3)^2 + (y-1)^2 = 25$

Center: $(-3, 1)$

Radius: 5

Review

21. **Identify each equation as a parabola, hyperbola, ellipse or circle.**

a. $(y-9) = 8(x-7)^2$ P

b. $(x+2)^2 + (y-3)^2 = 1$ C

c. $9(y-7)^2 - 4(x-9)^2 = 36$ H

d. $\frac{x^2}{25} + \frac{(y-8)^2}{3} = 1$ E

e. $x = 3y^2 + 15$ P

f. $x^2 + y^2 = 4$ C

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

22. $(y+2)^2 = 9(x-4)$

Direction of opening right

Vertex (4, -2)

Focal Width 9

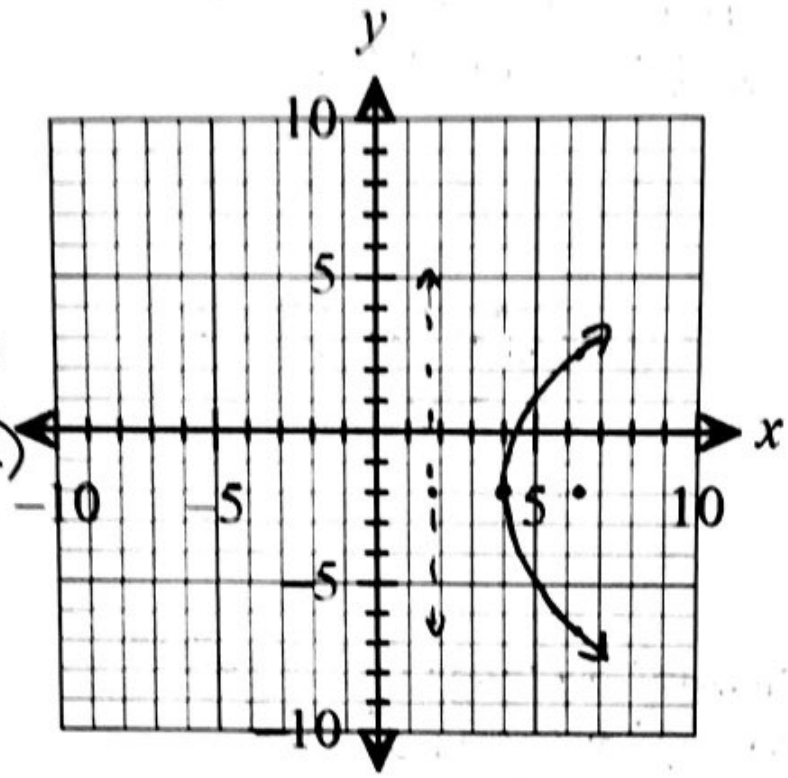
a= 9/4 or 2.25

Focus (6.25, -2) or (6 1/4, -2)

Directrix x = 1.75 or x = 1 3/4

$4a = 9$

$a = 9/4$



Locate the center, vertices, foci and asymptotes of the hyperbola, then graph.

23. $\frac{(x+5)^2}{16} - \frac{(y-2)^2}{9} = 1$

a^2 b^2

$c^2 = a^2 + b^2$

$c^2 = 16 + 9$

$c^2 = 25$

$c = 5$

Center: (-5, 2)

a= 4

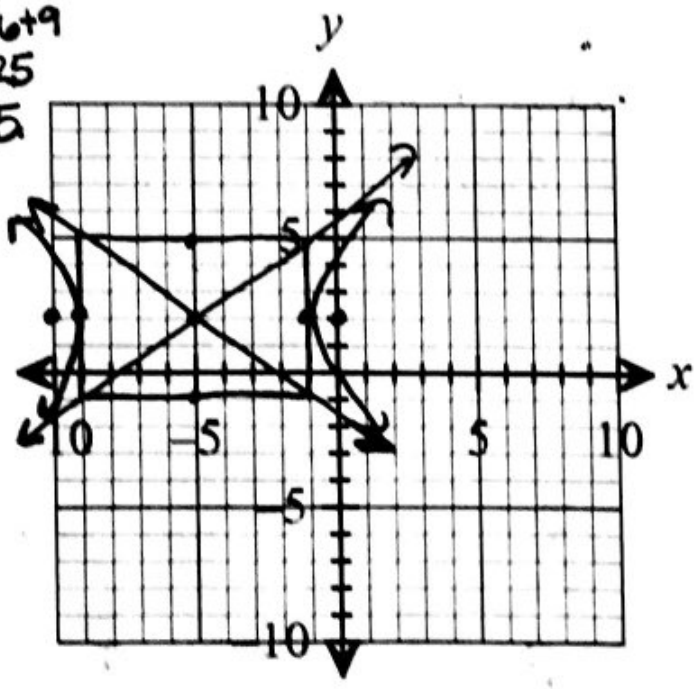
b= 3

c= 5

Vertices: (-1, 2) (-9, 2)

Foci: (0, 2) (-10, 2)

Slope of the Asymptotes: ± 3/4



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

24. $\frac{(x+2)^2}{9} + \frac{(y-3)^2}{16} = 1$ ($9 = b^2$, $16 = a^2$)

$c^2 = a^2 - b^2$

$c^2 = 16 - 9$

$c^2 = 7$

$c = \sqrt{7}$

Center: $(-2, 3)$

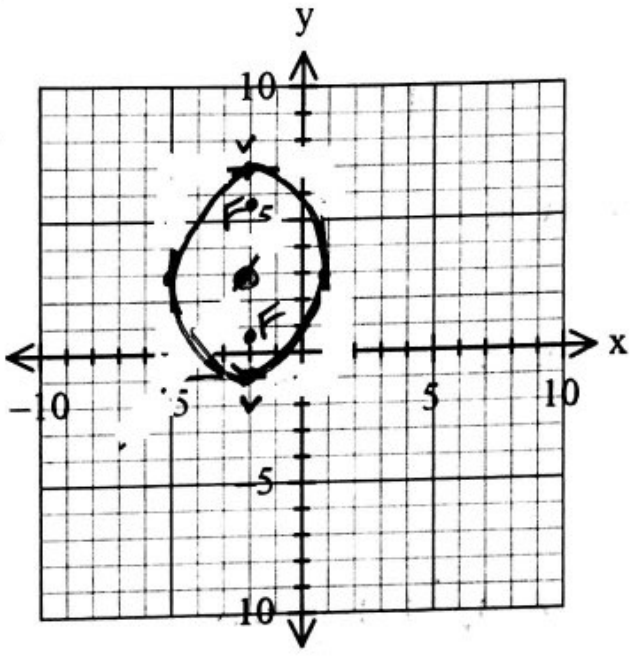
a= 4

b= 3

c= $\sqrt{7}$ or 2.6

vertices: $(-2, -1)$ $(-2, 7)$

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



Write an equation in standard form for the ellipse, hyperbola, or parabola that satisfies the given conditions.

25. Foci: (3,-6) and (3,2) Vertices: (3,-7) and (3,3)

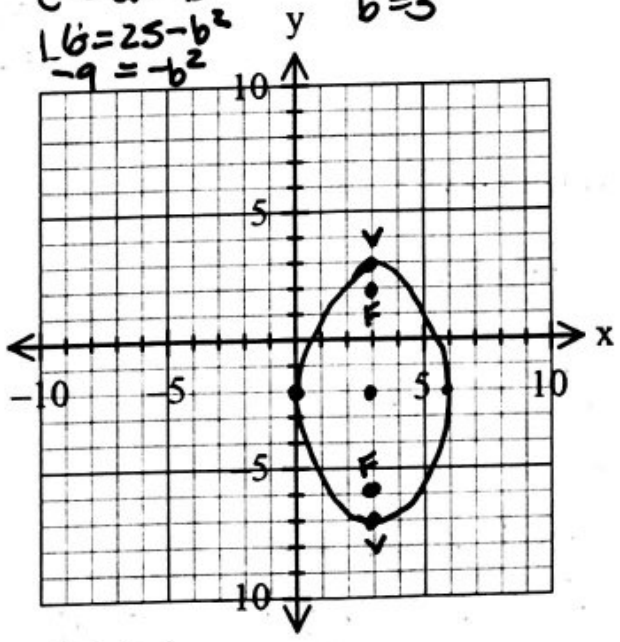
$c^2 = a^2 - b^2$

$16 = 25 - b^2$

$-9 = -b^2$

$b^2 = 9$

$b = 3$



Which equation should you use?

ellipse

Center: $(3, -2)$

a= 5

b= 3

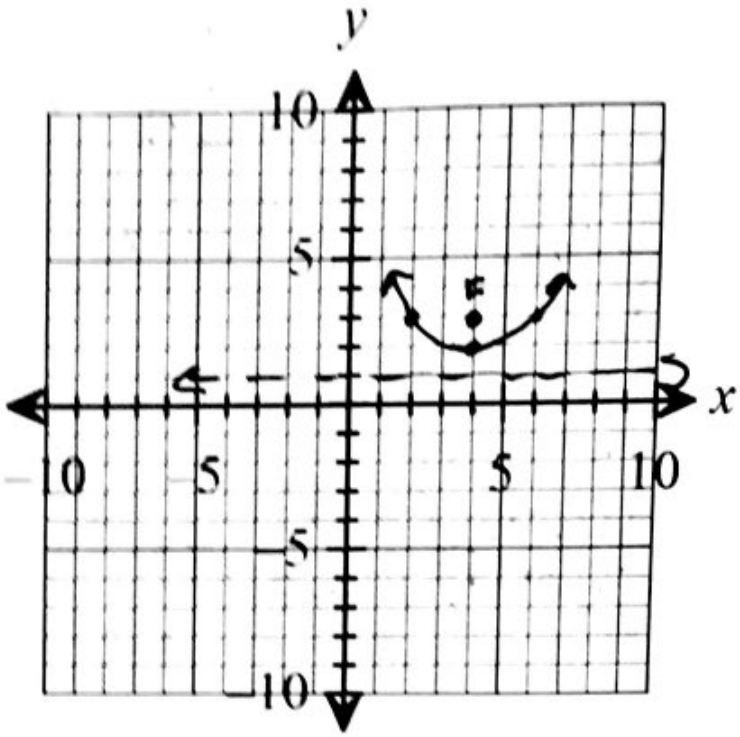
c= 4

vertices: $(3, -7)$ $(3, 3)$

foci: $(3, -6)$ $(3, 2)$

Equation: $\frac{(x-3)^2}{9} + \frac{(y+2)^2}{25} = 1$

26. focus=(4, 3), directrix y=1



Direction of opening up

Which equation should you use

parabola

Vertex (h,k) (4,2)

Focus (4,3)

a= 1

Focal Width 4 4(1)

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

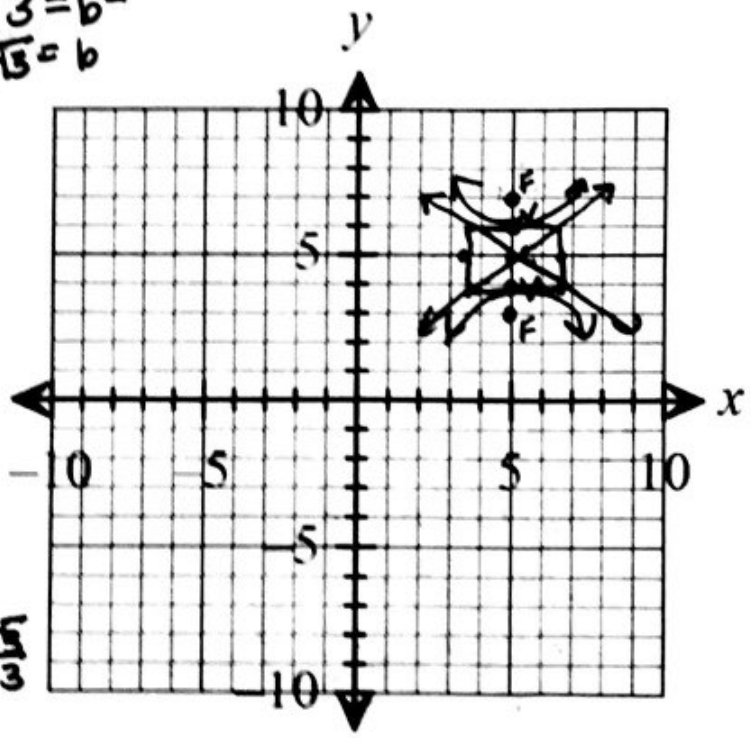
$c^2 = a^2 + b^2$

$4 = 1 + b^2$

$3 = b^2$

$\sqrt{3} = b$

27. Foci at (5, 3) and (5,7); Vertex at (5, 6)



Which equations should you use?

hyperbola

Center: (5,5)

a= 1

b= $\sqrt{3}$ or 1.7

c= 2

Vertices: (5,4) (5,6)

Foci: (5,3) (5,7)

Slope of the Asymptotes: $\pm\frac{\sqrt{3}}{3}$ or $\pm\frac{1}{\sqrt{3}}$ $\frac{1}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\frac{\sqrt{3}}{3}$

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