#15 Pre-Calculus Review TEST 5.2 Conics Name Key

Identify each conic as a circle, an ellipse, a hyperbola, or a parabola. **Explain your answer.**

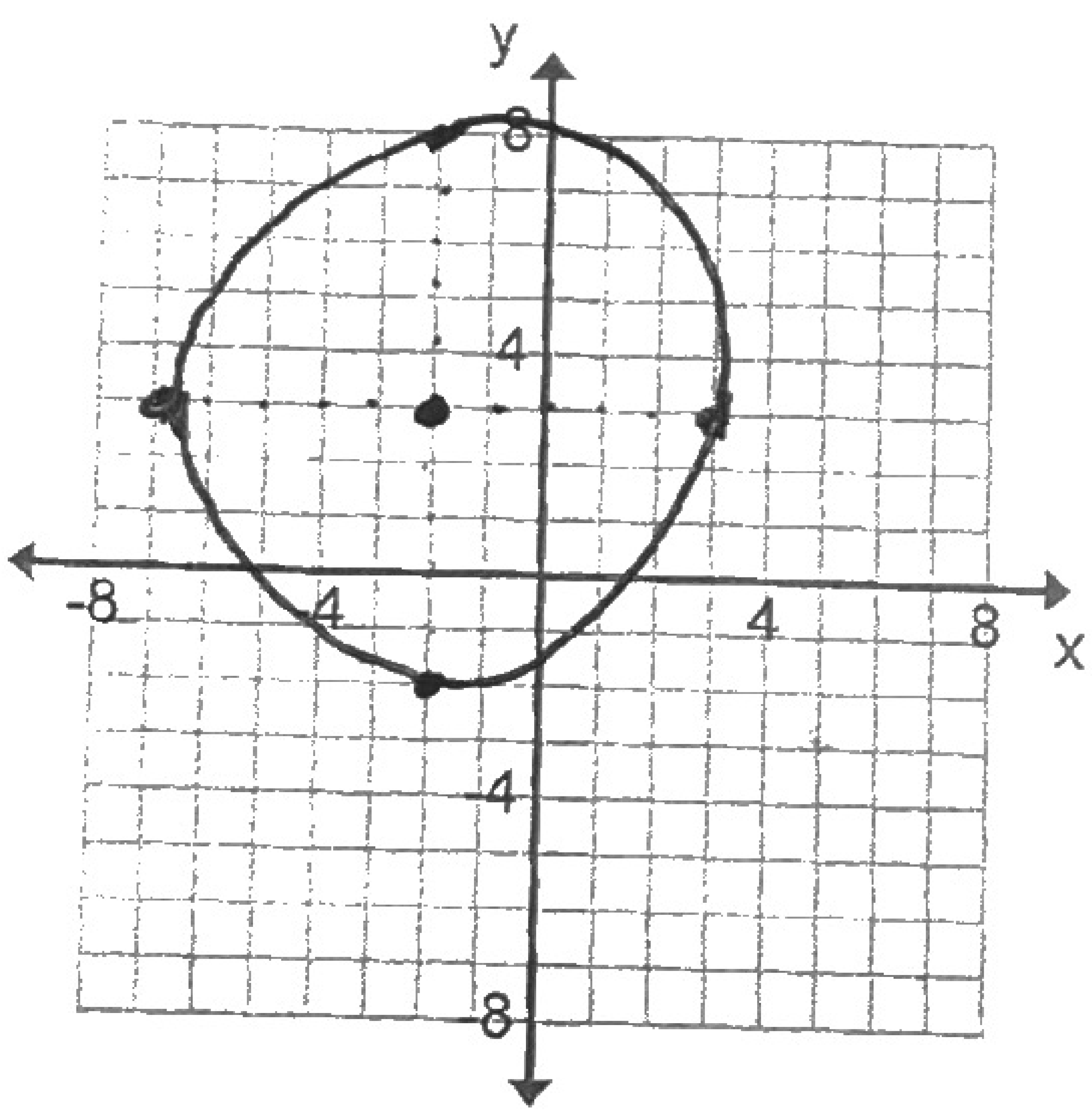
1. $3x^2 - 3y^2 + 6x = 0$ Hyperbola	2. $x^2 + 2y^2 = 17$ ellipse	3. $x^2 - y - 4x + 3 = 0$ parabola
4. $x = 2\cos T + 3$ $y = 4\sin T - 1$ Ellipse	5. $x = 3\sec T$ $y = 5\tan T$ Hyperbola	6. $x = 2\tan T - 1$ $y = 3\sec T + 4$ hyperbola
7. $4x^2 + 4y^2 - 8x + 12y - 16 = 0$ circle	8. $9x^2 + 126x - 16y^2 + 192y - 297 = 0$ Hyperbola	9. $4x^2 - 3x - 2y + 8 = 0$ parabola

Identify each conic, then complete the square to determine the center, and then GRAPH.

10. $3x^2 + 3y^2 + 12x - 18y - 36 = 0$ circle

$(x^2 + 4x + 2^2) + (y^2 - 6y + 3^2) = 12 + 4 + 9$

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



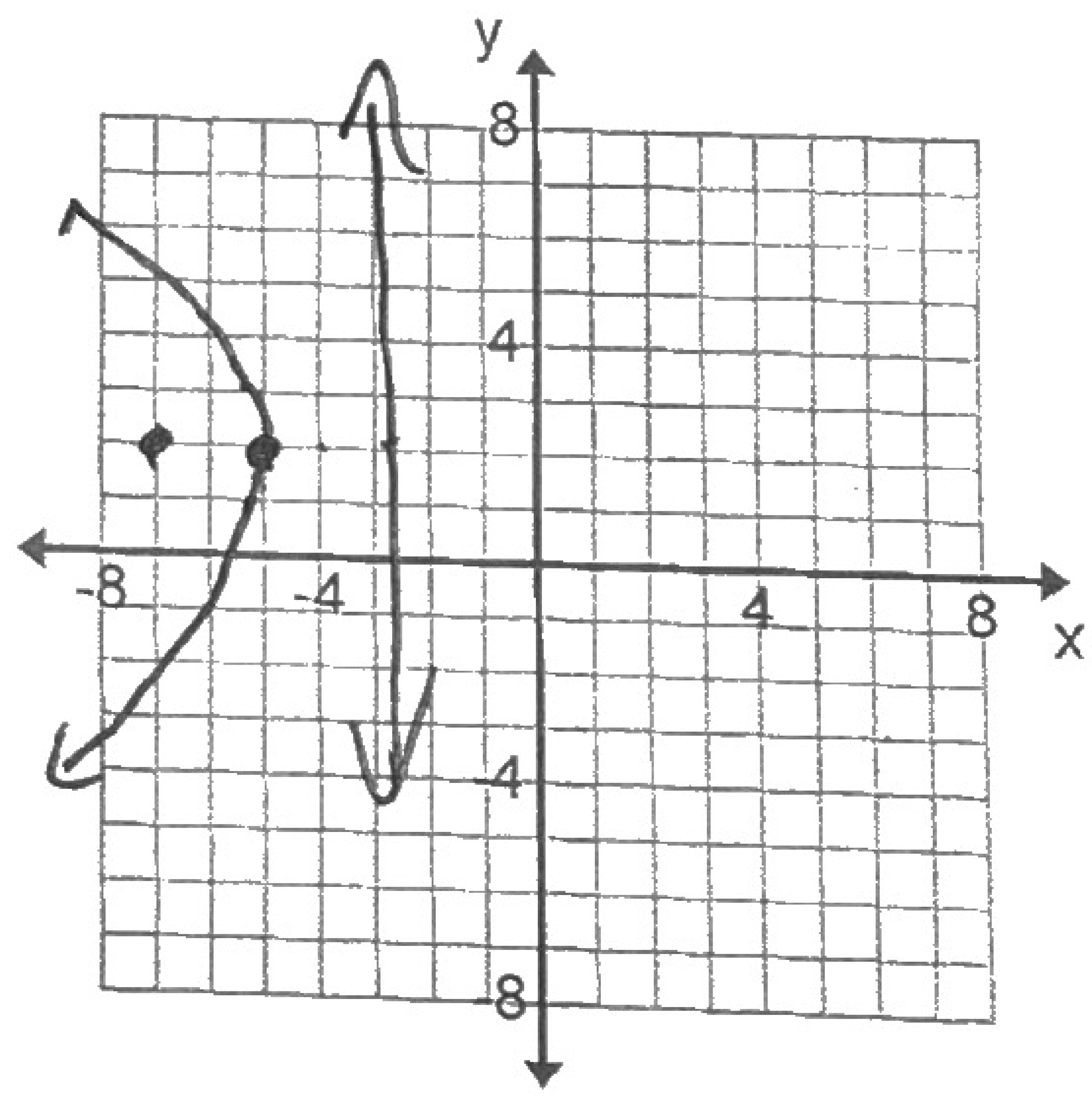
c: $(-2, 3)$

11. $y^2 - 4y + 8x + 44 = 0$ parabola

$(y^2 - 4y + 2^2) + 44 - 4 = -8x$

$\dfrac{(y-2)^2 + 40}{-8} = \dfrac{-8x}{-8}$

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



V: $(-5, 2)$

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

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

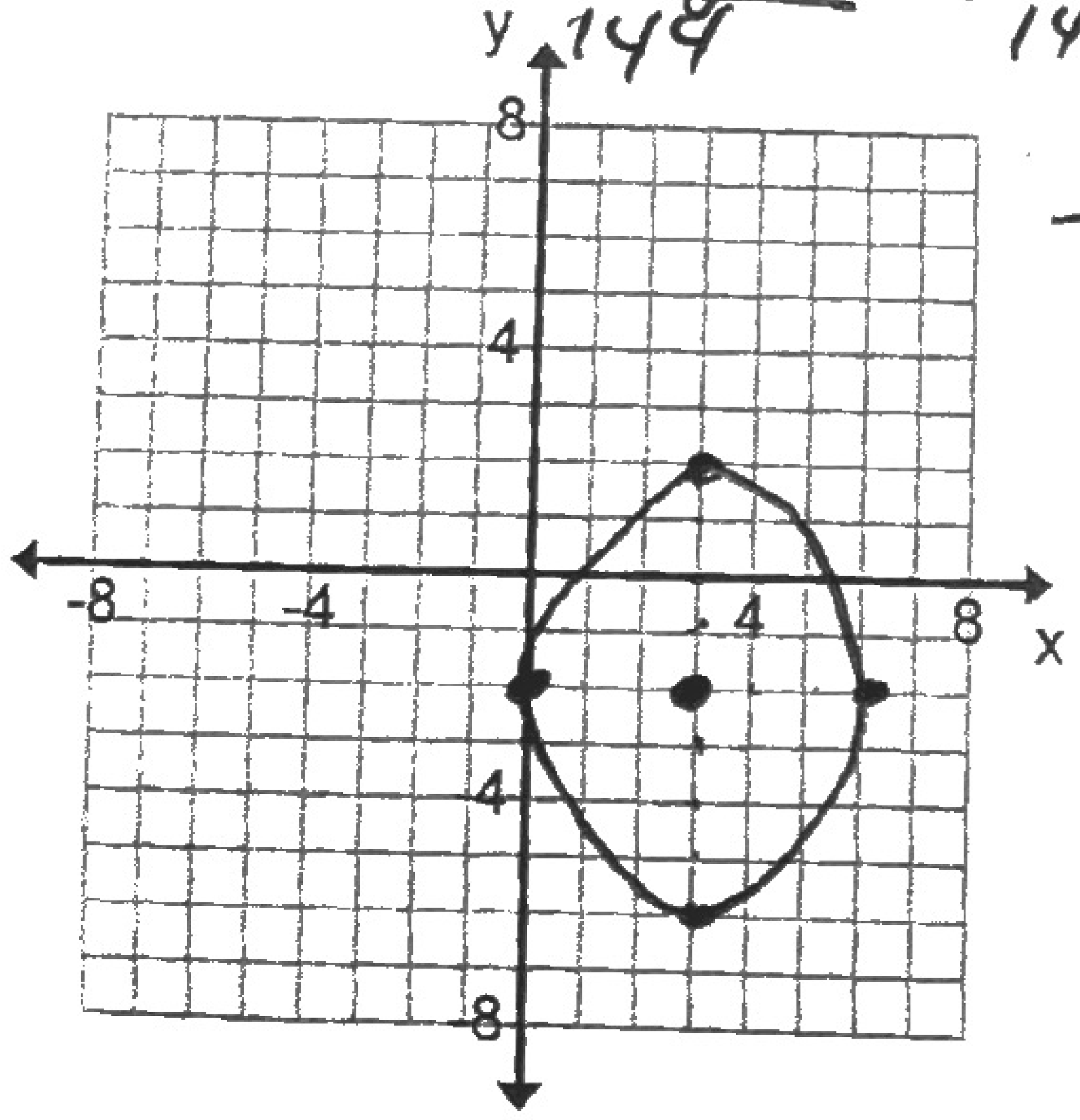
$2 = p$

12. $16x^2 + 9y^2 - 96x + 36y + 36 = 0$ Ellipse

$(16x^2 - 96x + \_\_) + (9y^2 + 36y + \_\_) = -36 + \_\_ + \_\_$

$16(x^2 - 6x + 3^2) + 9(y^2 + 4y + 2^2) = -36 + 144 + 36$

$\dfrac{16(x-3)^2 + 9(y+2)^2}{144} = \dfrac{144}{144}$



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

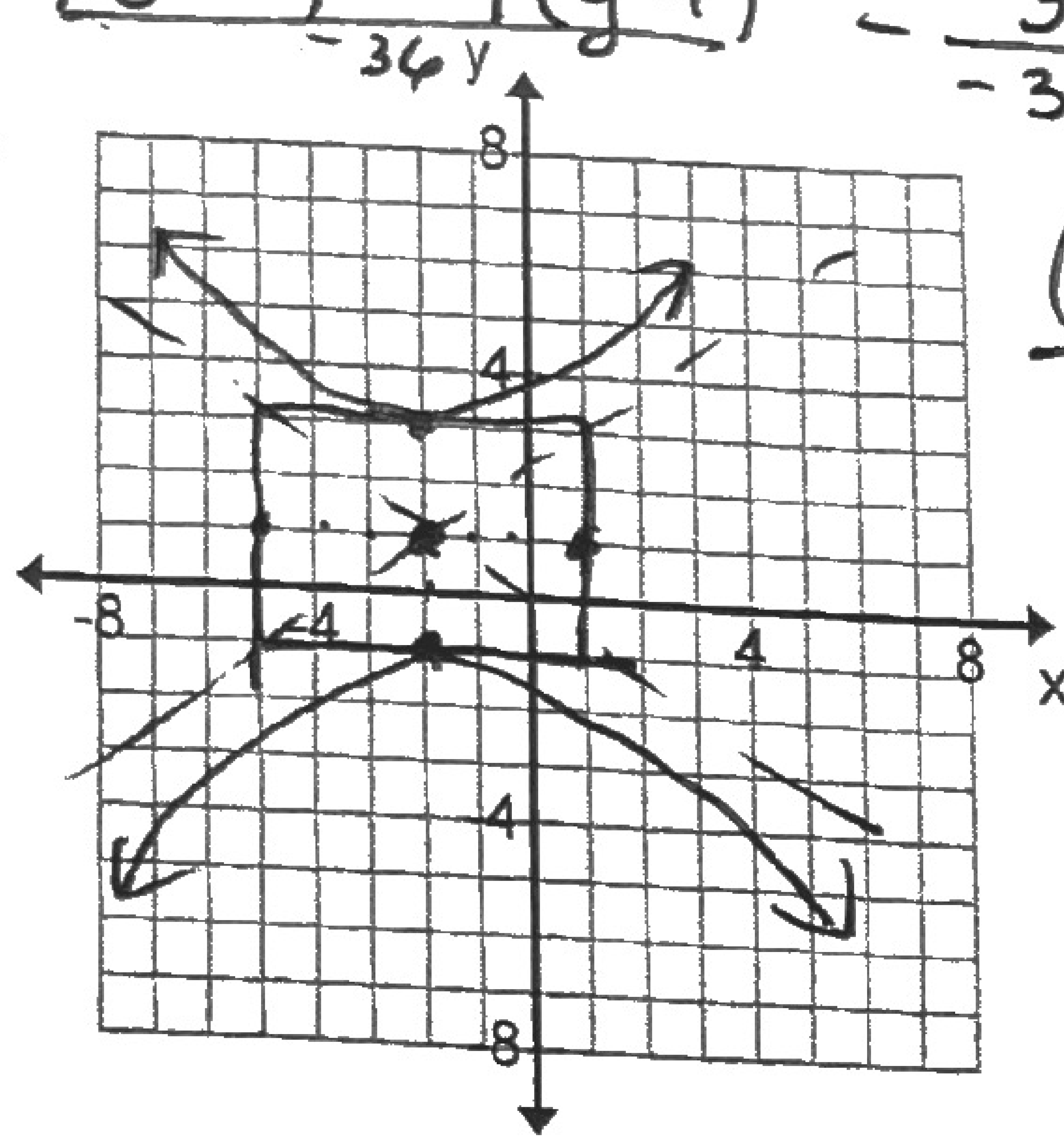
c: $(3, -2)$

13. $4x^2 - 9y^2 + 16x + 18y + 43 = 0$

$(4x^2 + 16x + \_\_) + (-9y^2 + 18y + \_\_) = -43$

$4(x^2 + 4x + 2^2) - 9(y^2 - 2y + 1^2) = -43 + 16 + -9$

$\dfrac{4(x+2)^2 - 9(y-1)^2}{-36} = \dfrac{-36}{-36}$

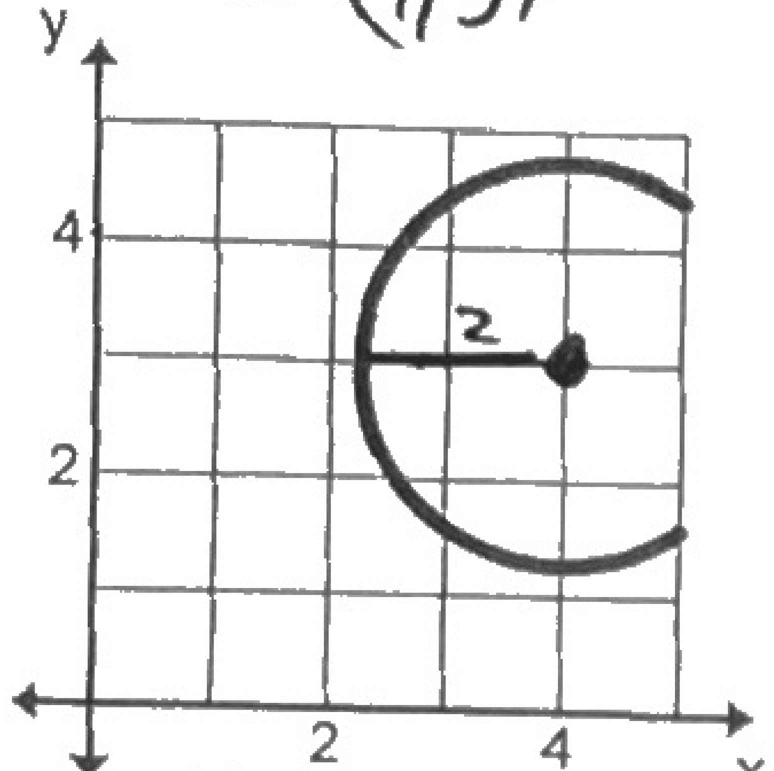


$\dfrac{(y-1)^2}{4} - \dfrac{(x+2)^2}{9} = 1$

c: $(-2, 1)$

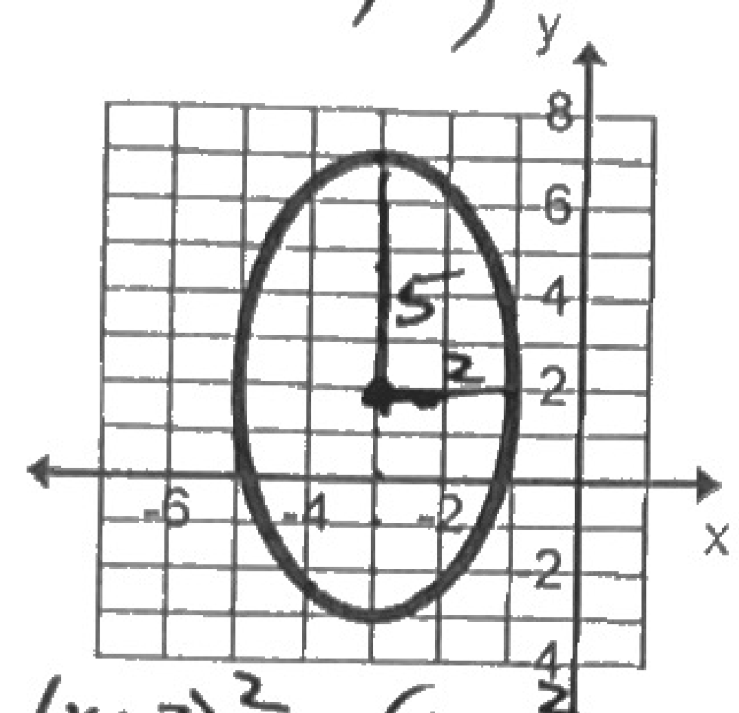
Write the equation for these conics in rectangular (standard) form.

14. c:(4,3)



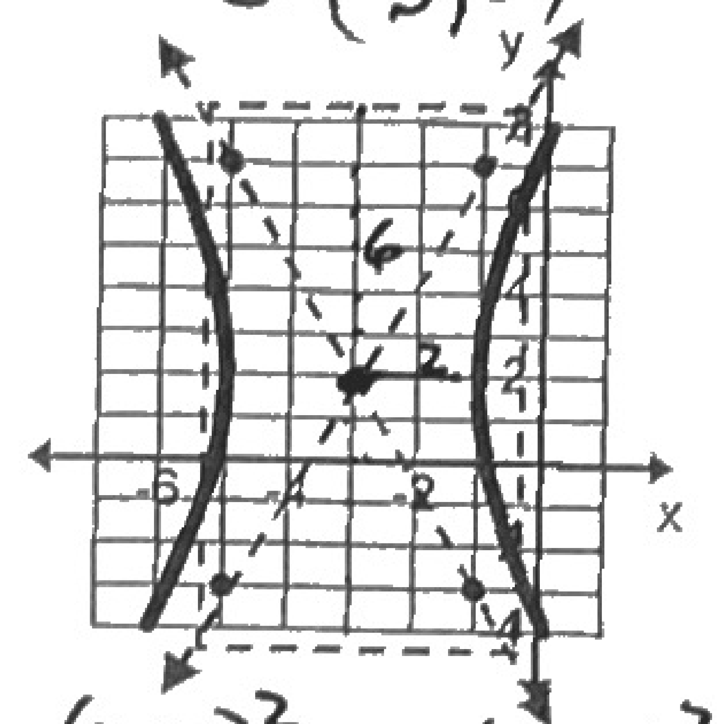
$(x-4)^2+(y-3)^2=16$

15. C: (−3,2)



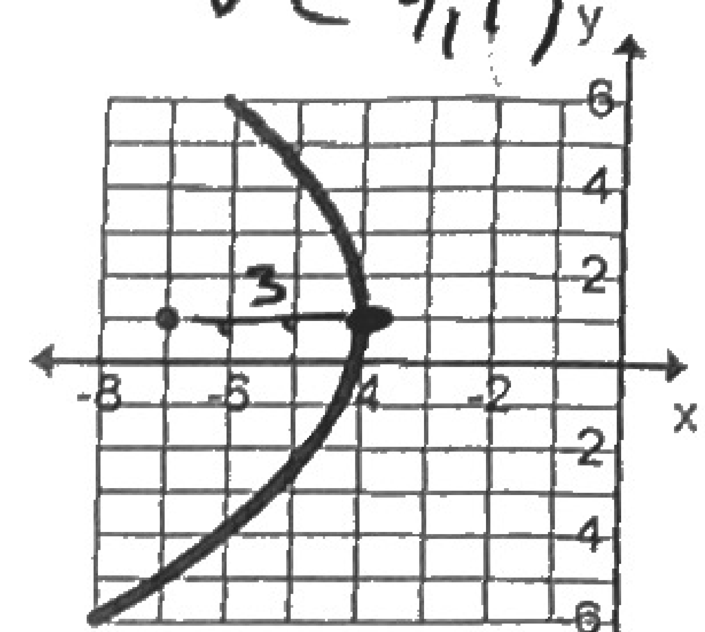
$\frac{(x+3)^2}{4}+\frac{(y-2)^2}{25}=1$

16. C:(−3,2)



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

17. V(−4,1)



$x=\frac{-1}{12}(y-1)^2-4$

18. Write the equation of the circle with center $(-5,4)$ and radius $7\sqrt{2}$.

$(x+5)^2+(y-4)^2=98$

19. Write the equation of the parabola with focus at $(3,-5)$ and directrix at $y=-1$.

V:(3,−3)

$\boxed{y=-\frac{1}{8}(x-3)^2-3}$

20. Write the equation of the parabola with focus of $(2,3)$ and vertex $(2,1)$.

F V

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

21. Write the equation of the ellipse that is tangent to both axes and has a center of $(5,-3)$.

$\boxed{\frac{(x-5)^2}{25}+\frac{(y+3)^2}{9}=1}$

22. Write the equation of an ellipse with foci of $(3,4)$ and $(3,-6)$, and minor axis endpoints of $(0,-1)$ and $(6,-1)$.

(3,−6)

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

23. Write the equation of the hyperbola with vertices $(4,-6)$ and $(-2,-6)$ & length of conjugate axis 10.

C(1,−2)

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

24. Write the equation of the hyperbola with a vertical transverse axis of length 8, a conjugate axis of length 12, and a center of $(4,-3)$.

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

25. Write the equation of a hyperbola with a vertical transverse axis of length 10, and an eccentricity of 2.6. (0,0)

$\boxed{\frac{y^2}{25}-\frac{x^2}{144}=1}$

$2.6=\frac{c}{5}$ $\quad 13^2=25+b^2$

$144=b^2$

$c=13$

Eliminate the parameters and write the equation in terms of x and y.

26. $x=4t-7$
$y=2-4t$

$\frac{x+7}{4}=t$ $\quad y=2-4\left(\frac{x+7}{4}\right)$

$y=2-(x+7)$

$\boxed{y=-x-5}$

27. $x=3t-1$
$y=t^2+2$

$\frac{x+1}{3}=t$ $\quad y=\left(\frac{x+1}{3}\right)^2+2$

$\boxed{y=\frac{1}{9}(x+1)^2+2}$

28. $x=5\sqrt{t}-3$
$y=9t+1$

solve for y

$\frac{y-1}{9}=t$ $\quad x=5\sqrt{\frac{y-1}{9}}-3$

$\frac{3(x+3)}{5}=\sqrt{y-1}$

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

29. $x=3\cos t-1$
$y=5\sin t+4$

$\frac{(x+1)^2}{9}+\frac{(y-4)^2}{25}=1$

30. $x=\sec t-7$
$y=5\tan t+4$

$\frac{(x+7)^2}{1}-\frac{(y-4)^2}{25}=1$

31. $x=\sqrt{3}\cos t-1$
$y=\sqrt{3}\sin t+4$

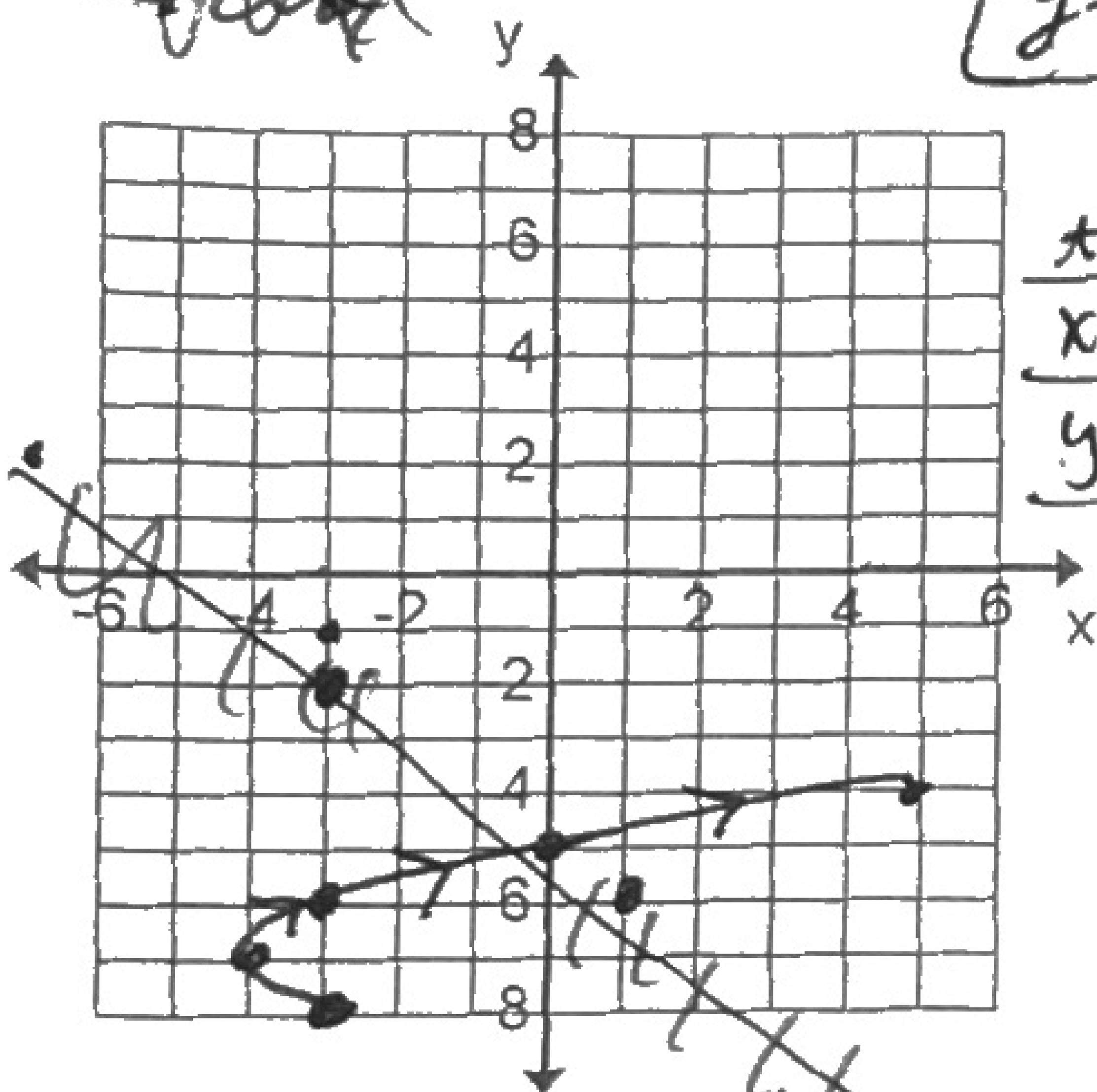
$(x+1)^2+(y-4)^2=3$

Graph each:

32. interval $[-1, 3]$

$x = t^2 - 4$

$y = t - 7$



t	-1	0	1	2	3
x	-3	-4	-3	0	5
y	-8	-7	-6	-5	-4

t	-3	-2	-1	0	1	2	3
x	-19	-15	-11	-7	-3	1	5
y	14	10	6	2	-2	-6	-10

33. Macy can run at the rate of 25 feet per second. Jenny sprints at 20 feet per second. Macy gives Jenny a 30-foot head start. Write the parametric equations that can be used to model the race. Find a viewing window to simulate a 100-yard dash 300 ft

MACY: $x_1 =$ $25t$ and $y_1 =$ 1

JENNY: $x_2 =$ $20t + 30$ and $y_2 =$ 2

Who is ahead after 2 seconds and by how many feet?

M 50
J 70 Jenny by 20 ft

Who is ahead after 3 seconds, and by how many feet?

M 75
J 90 Jenny 15 ft

Who is ahead after 5 seconds and by how many feet?

M 125
J 130 Jenny 5 ft

Who wins the race? What is the winning time to the nearest tenth of a second? How far behind (to the nearest foot) is the loser?

→ Macy

$25t = 300$

$\boxed{t = 12 \text{ sec}}$

$20t + 30 = J_D$

$20(12) + 30 = J_D$

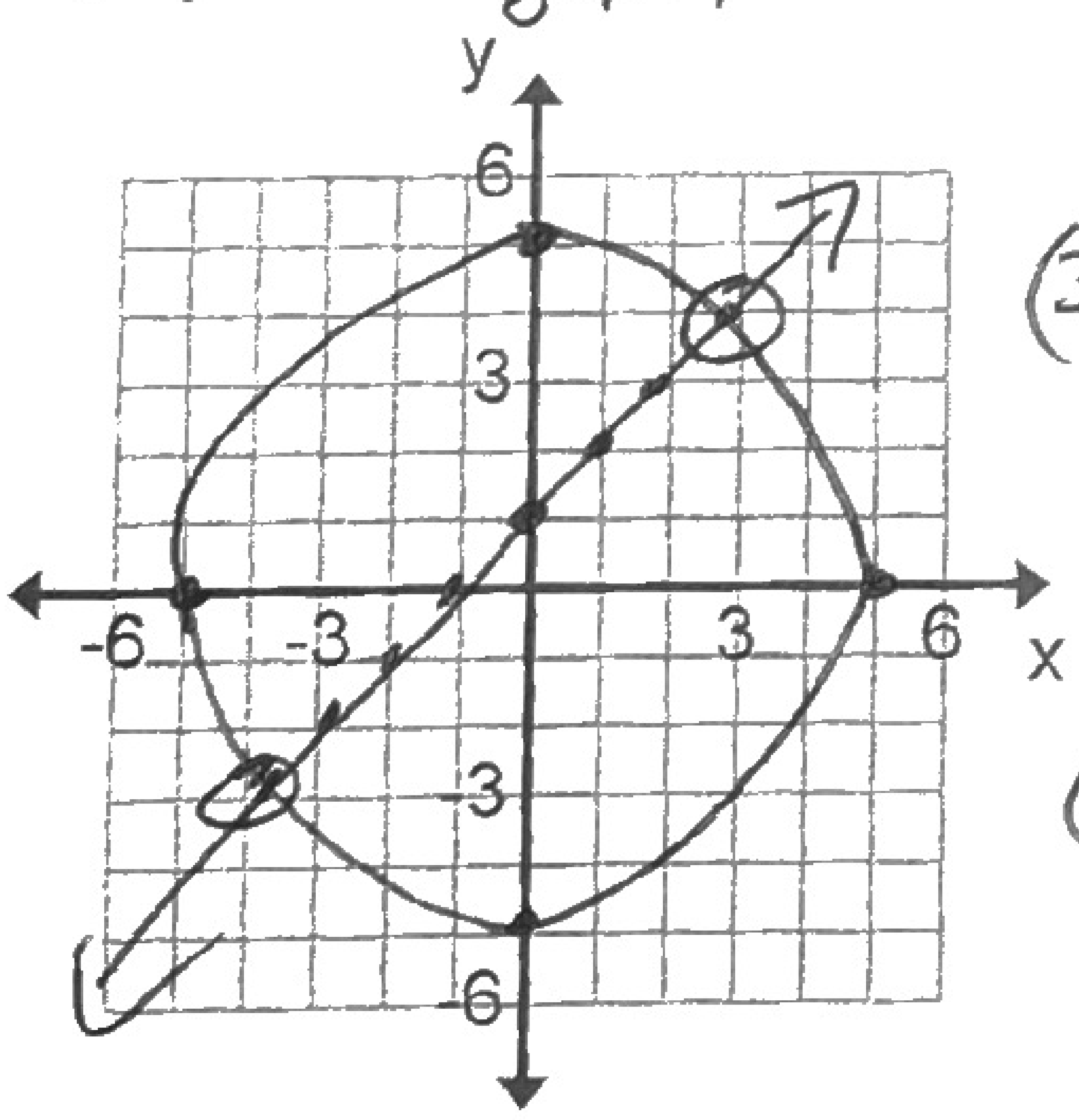
$270 = J_D$

— Jenny is 30 ft behind

Solve each System by GRAPHING:

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

$x - y = -1$ $y = x + 1$

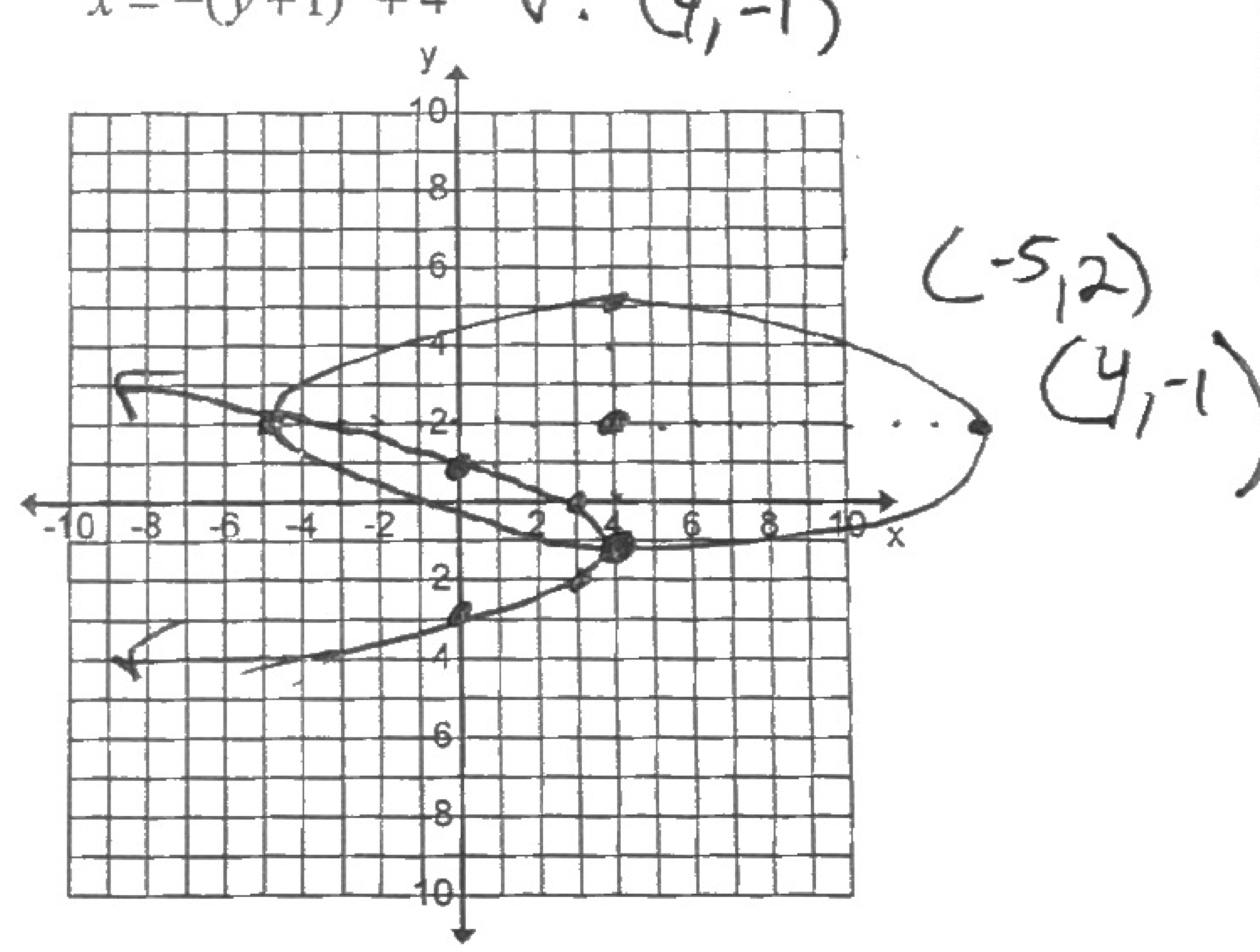


$(3, 4)$

$(-4, -3)$

35. $\frac{(x-4)^2}{81} + \frac{(y-2)^2}{9} = 1$ C: $(4, 2)$

$x = -(y+1)^2 + 4$ V: $(4, -1)$



$(-5, 2)$

$(4, -1)$

Solve each System by ~~GRAPHING~~: Algebraically

36. $x^2 + y^2 = 8$

$x^2 - y^2 = 2$

$x^2 = 2 + y^2$

$2 + y^2 + y^2 = 8$

$2y^2 = 6$

$y^2 = 3$

$y = \pm\sqrt{3}$

$x^2 + (\sqrt{3})^2 = 8$

$x^2 = 5$

$x = \pm\sqrt{5}$

$(\sqrt{5}, \sqrt{3})$

$(\sqrt{5}, -\sqrt{3})$

$(-\sqrt{5}, \sqrt{3})$

$(-\sqrt{5}, -\sqrt{3})$

37. $x^2 + y^2 = 20$

$x + y = 2$

$y = 2 - x$

$x^2 + (2-x)^2 = 20$

$x^2 + x^2 - 4x + 4 - 20 = 0$

$2x^2 - 4x - 16 = 0$

$2(x^2 - 2x - 8) = 0$

$2(x-4)(x+2) = 0$

$x = 4$ or -2

$y = 2 - 4$ $\quad y = 2 - (-2)$

$y = -2$ $\quad y = 4$

$(4, -2)$

$(2, 4)$