

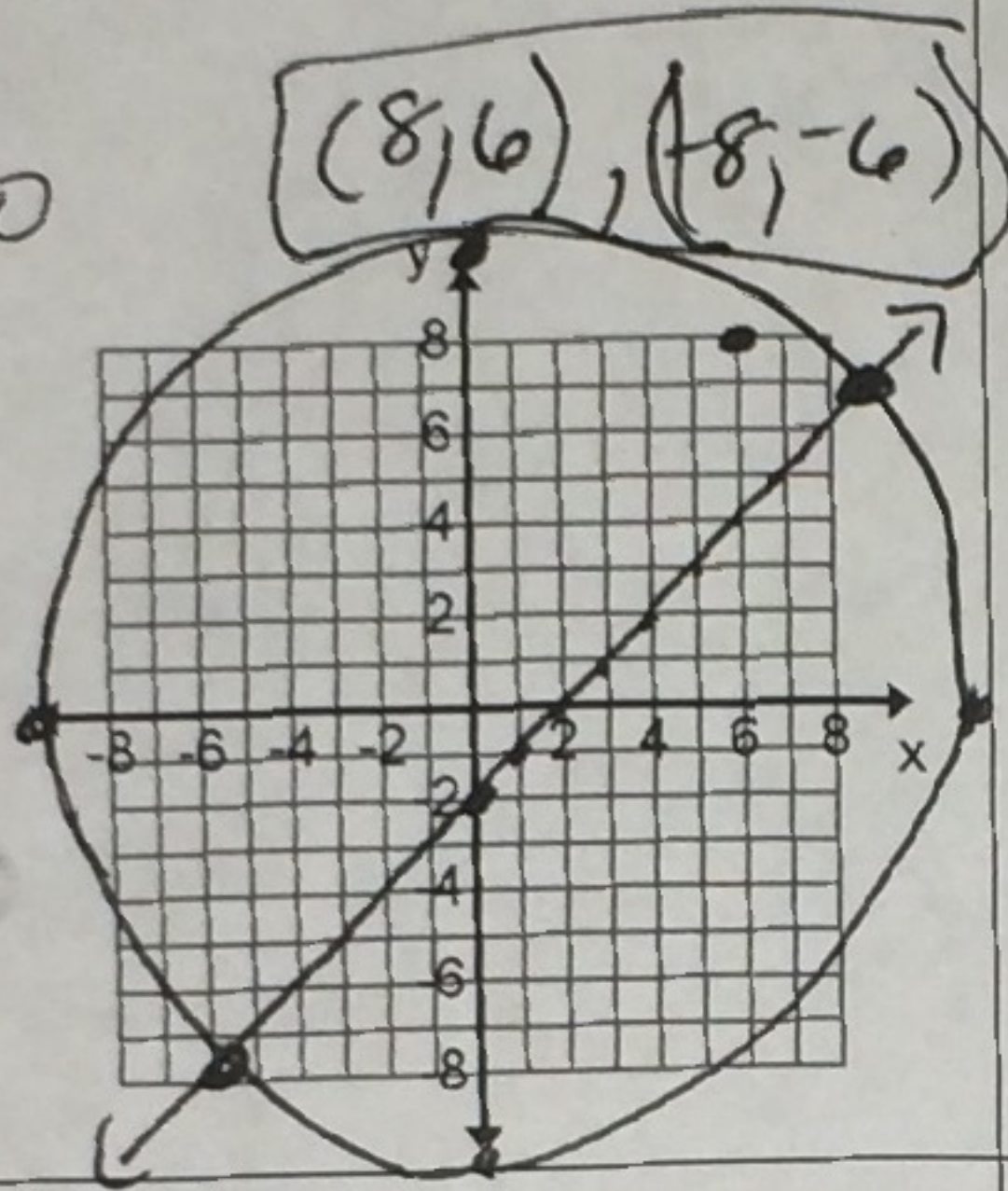
#13 Solving Systems of Conics

Name Key

Solve each system algebraically, then graph to confirm your results.

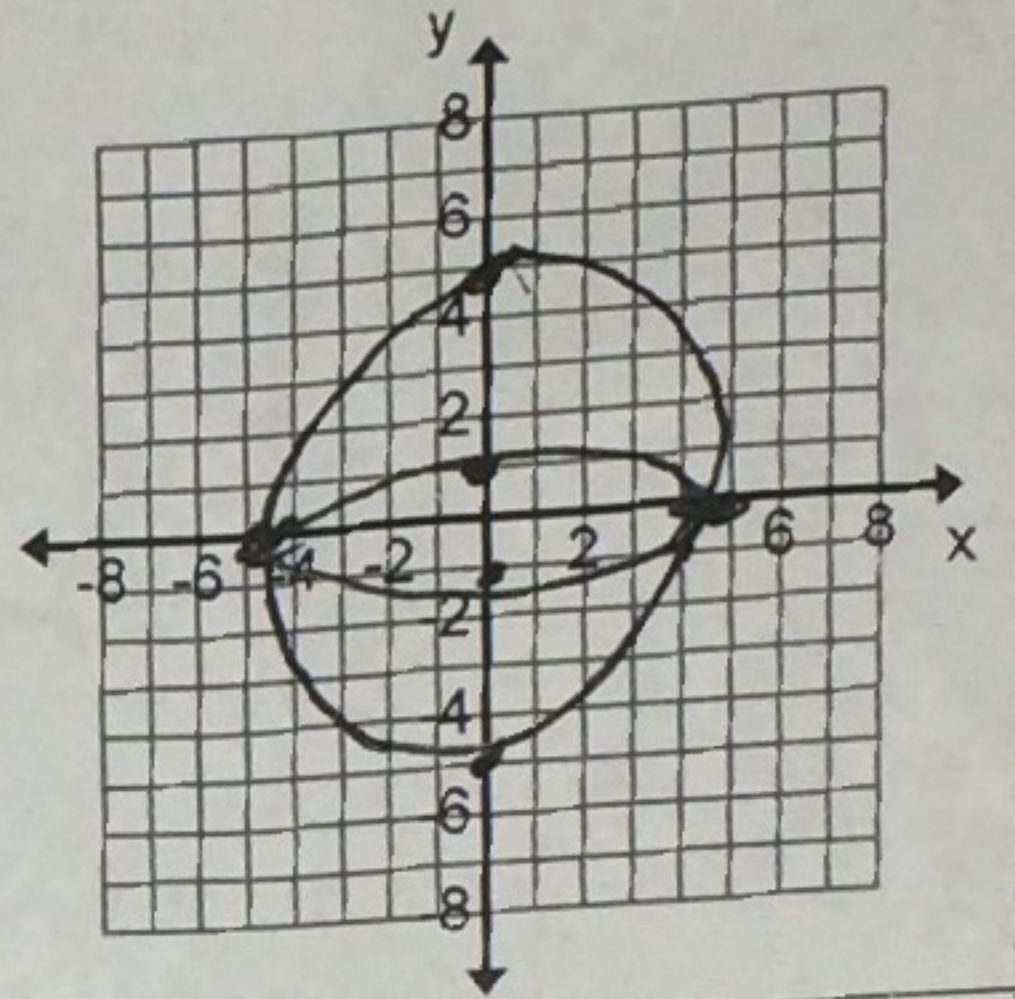
1.  $x = 2 + y$   
 $x^2 + y^2 = 100$

$(2+y)^2 + y^2 = 100$   
 $4 + 4y + y^2 + y^2 = 100$   
 $2y^2 + 4y - 96 = 0$   
 $y^2 + 2y - 48 = 0$   
 $(y-6)(y+8) = 0$   
 $y = 6 \text{ or } -8$



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

$x^2 + 25y^2 = 25$   
 $x^2 = 25 - 25y^2$   
 $25 - 25y^2 + y^2 = 25$   
 $-24y^2 = 0$   
 $y = 0$   
 $x^2 = 25$   
 $x = \pm 5$   
 $(-5, 0), (5, 0)$

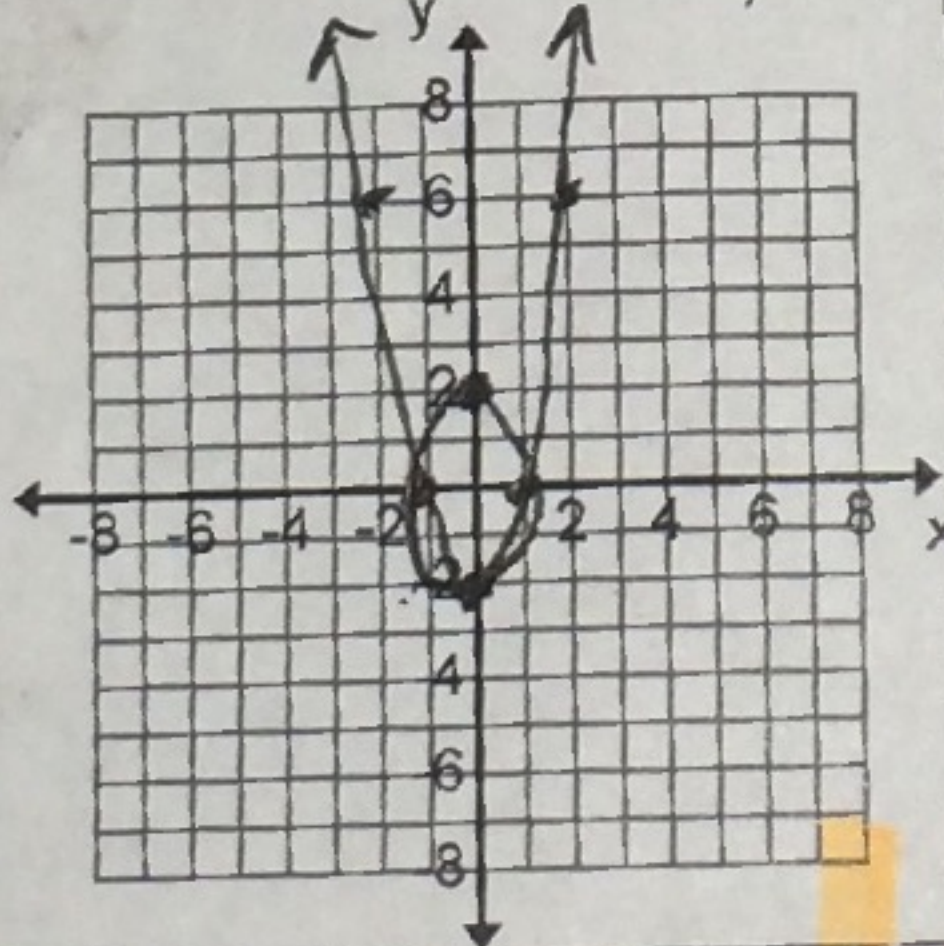


3.  $4x^2 + y^2 = 4$   
 $y = 2x^2 - 2$   
 $\frac{y+2}{2} = x^2$

$0 = 2x^2 - 2$   
 $1 = x^2$   
 $\pm 1 = x$

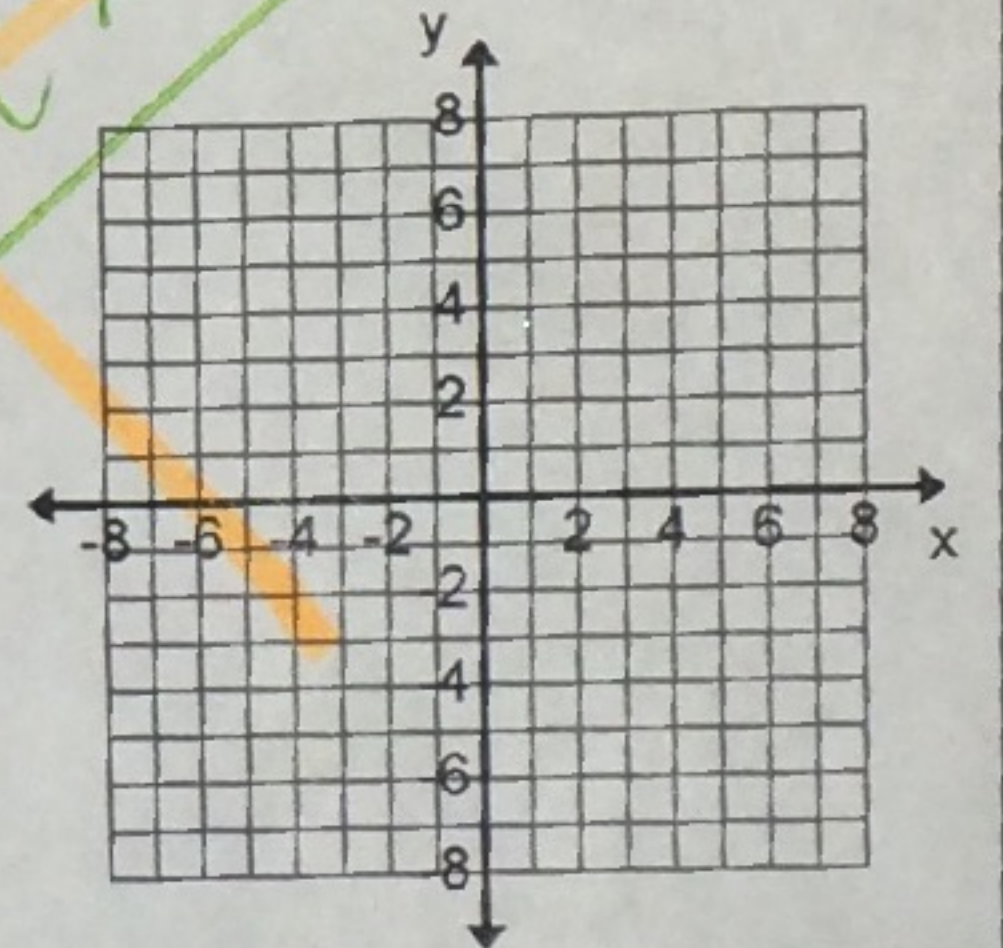
$4\left(\frac{y+2}{2}\right) + y^2 = 4$   
 $2y + 4 + y^2 - 4 = 0$   
 $y^2 + 2y = 0$   
 $y(y+2) = 0$   
 $y = 0, -2$

$(-1, 0), (1, 0), (-2, 0)$



4.  $x^2 - 5y^2 = -44$   
 $xy = -24$   
 $x = \frac{-24}{y}$

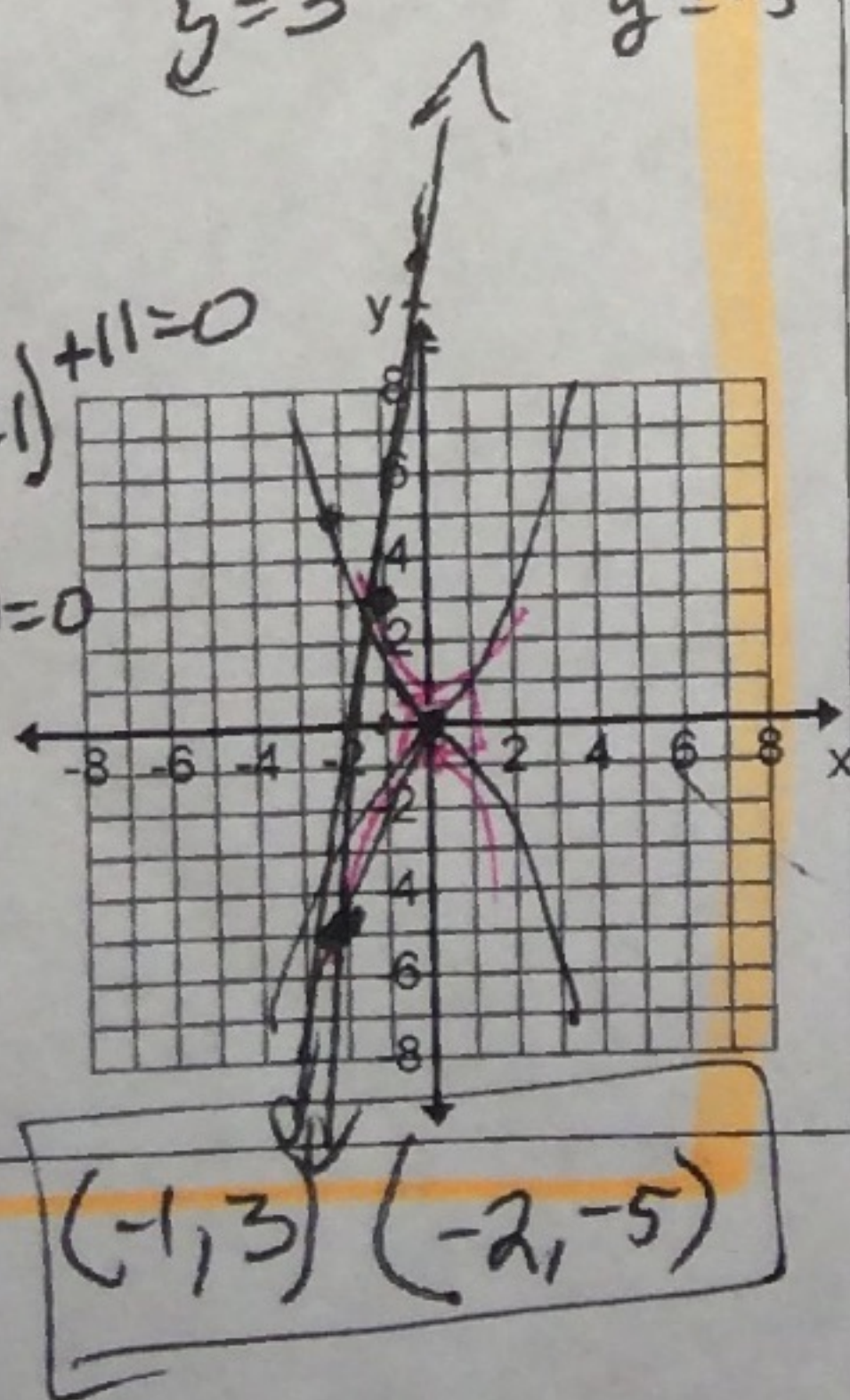
$\left(\frac{-24}{y}\right)^2 - 5y^2 = -44$   
 $\frac{576}{y^2} - 5y^2 = -44$



\* hard  
 5.  $16x^2 - 3y^2 = -11$   
 $8x - y = -11$   
 $y = 8x + 11$

$-8 - y = -11 \quad -16 - y = -11$   
 $-y = -3 \quad -y = 5$   
 $y = 3 \quad y = -5$

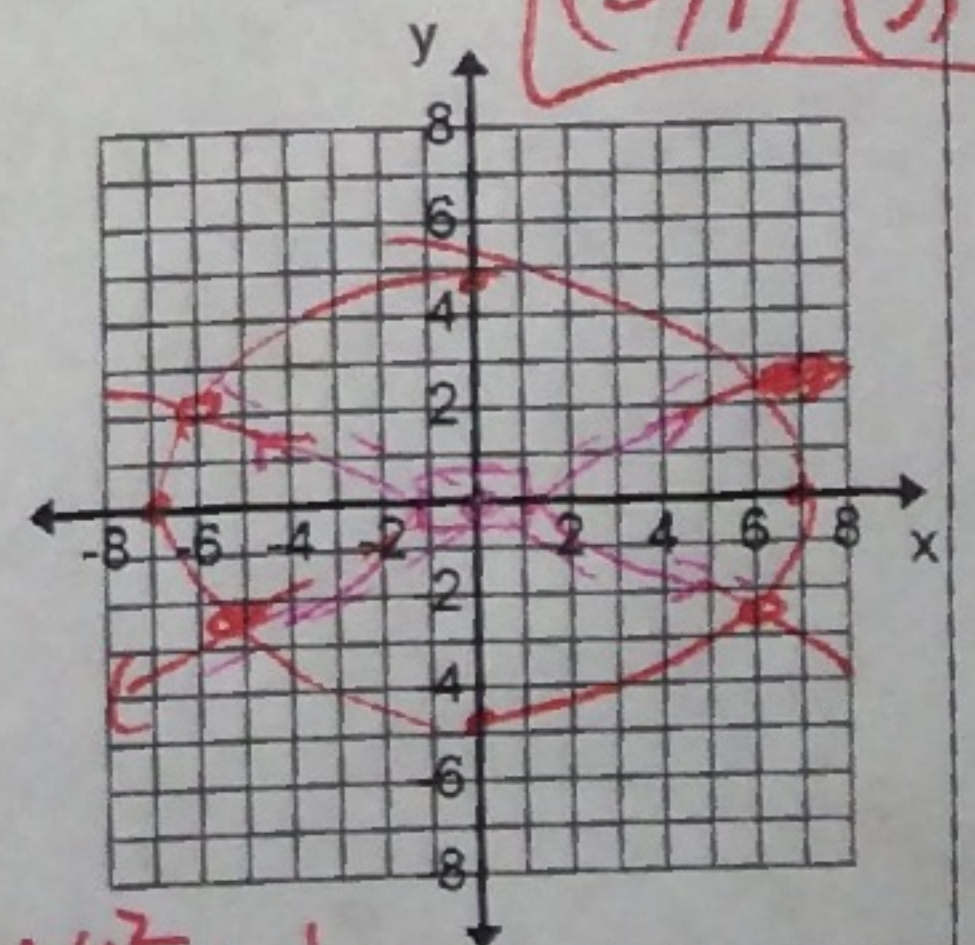
$16x^2 - 3(8x+11)^2 = -11$   
 $16x^2 - 3(64x^2 + 176x + 121) + 11 = 0$   
 $16x^2 - 192x^2 - 528x - 363 + 11 = 0$   
 $-176x^2 - 528x - 352 = 0$   
 $x^2 + 3x + 2 = 0$   
 $(x+2)(x+1) = 0$   
 $x = -1 \quad x = -2$



6.  $2x^2 + 5y^2 = 98$   
 $2x^2 - y^2 = 2$   
 $2x^2 = y^2 + 2$

$y^2 + 2 + 5y^2 = 98$   
 $6y^2 = 96$   
 $y^2 = 16$   
 $y = \pm 4$

$2x^2 - 16 = 2 \quad x^2 + y^2 = 1$   
 $2x^2 = 18 \quad x^2 = 9$   
 $x = \pm 3$   
 $(-3, 4), (-3, -4)$   
 $(3, 4), (3, -4)$



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

$\frac{x^2}{49} + \frac{y^2}{49} = 1$

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



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

$y - x^2 = -5$

$y + 5 = x^2$

$x^2 = 0$

$x = 0$

$x^2 = 4 + 5$

$x = \pm 3$

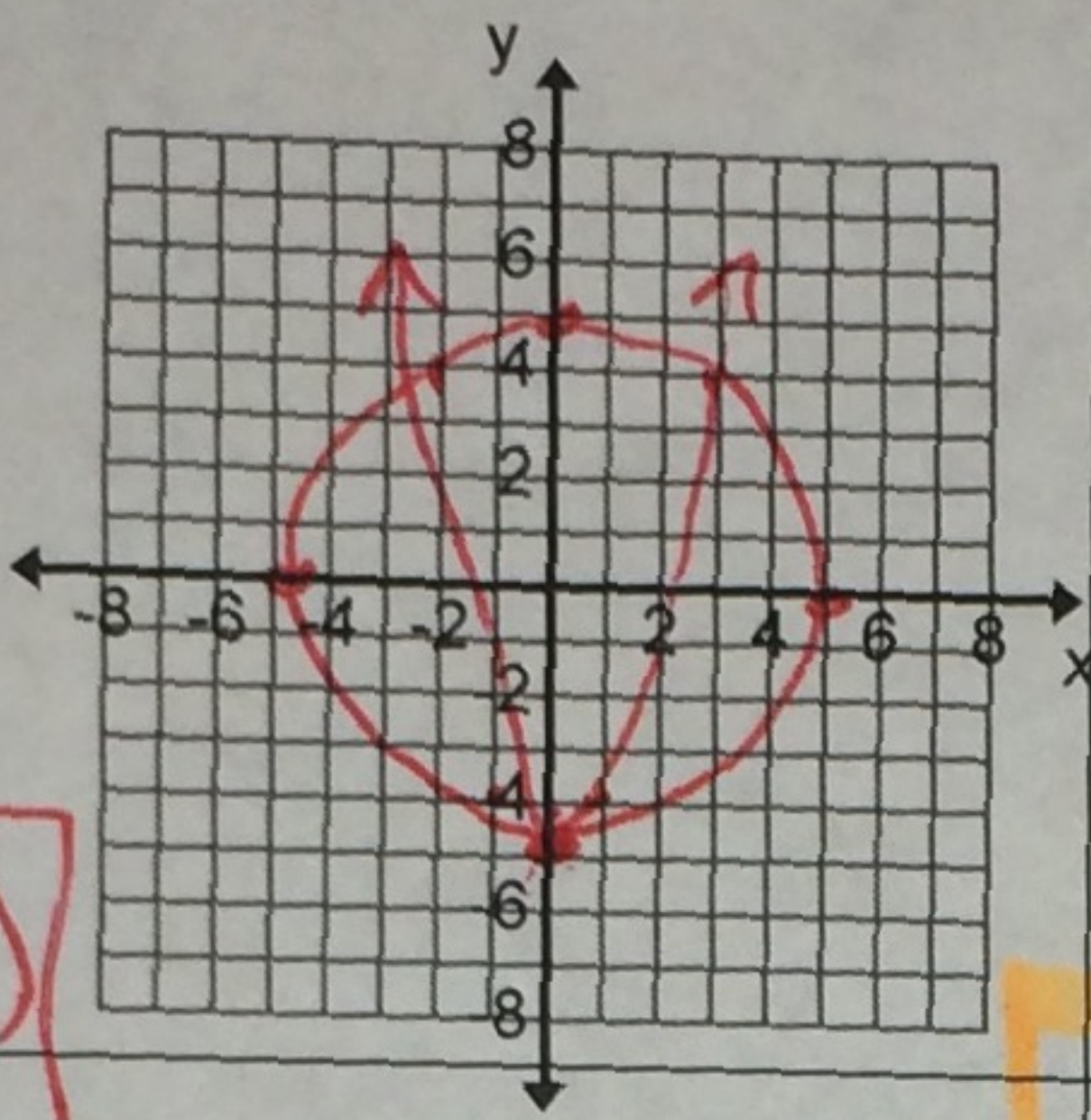
$(y + 5) + y^2 = 25$

$y^2 + y - 20 = 0$

$(y + 5)(y - 4) = 0$

$y = -5 \text{ or } 4$

$(0, -5)(3, 4)(-3, 4)$



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

$2y = x - 2$

$2y + 2 = x$

$\frac{x^2}{4} - \frac{y^2}{9} = 1$   $x = 2 + 0$

$y = \frac{1}{2}x - 1$   $+ 2(-2.25) + 2 = x$

$9(2y + 2)^2 - 4y^2 = 36$

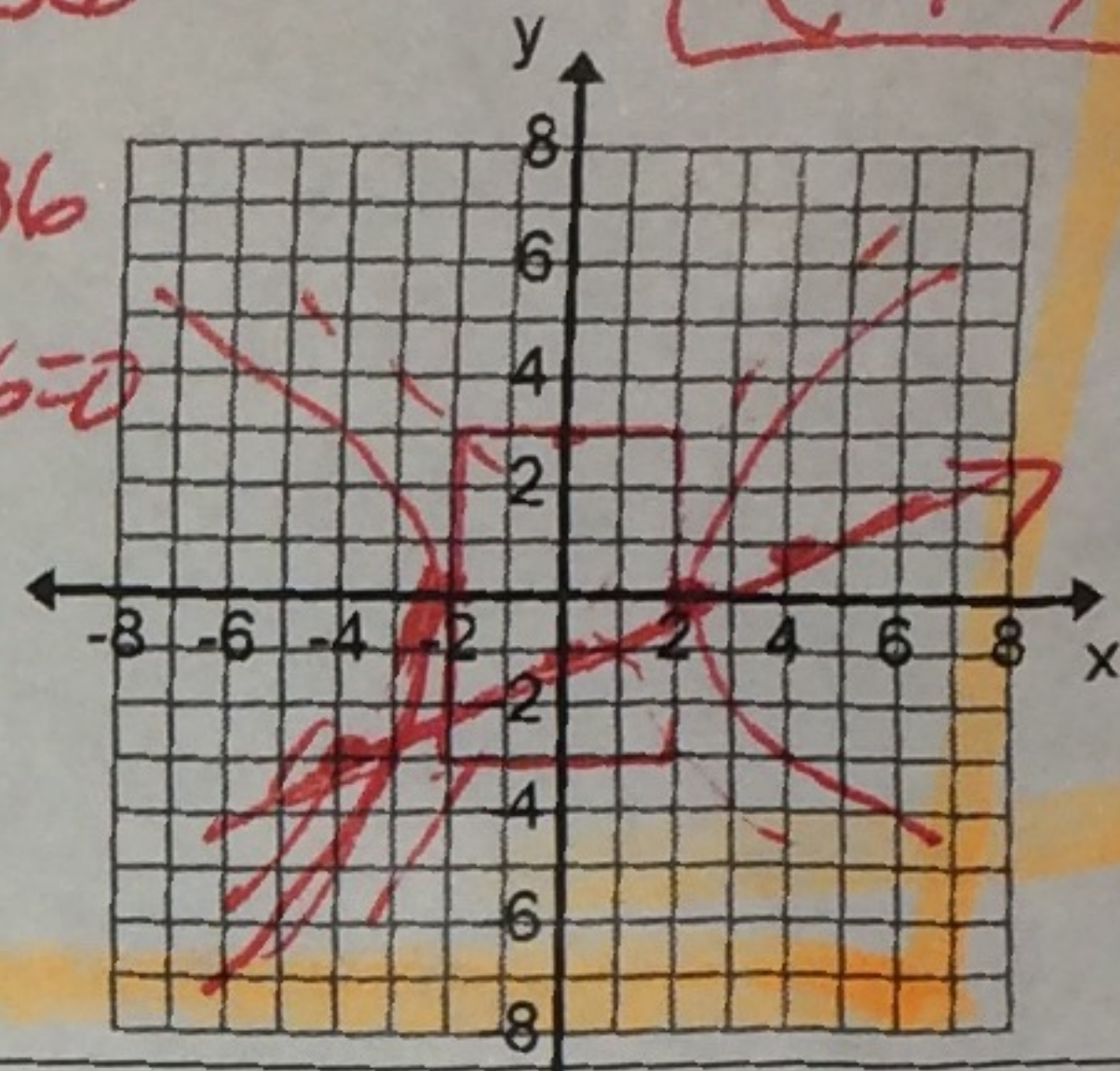
$9(4y^2 + 8y + 4) - 4y^2 = 36$

$36y^2 + 72y + 36 - 4y^2 - 36 = 0$

$32y^2 + 72y = 0$

$32y(y + 2.25) = 0$

$y = 0$   $y = -2.25$



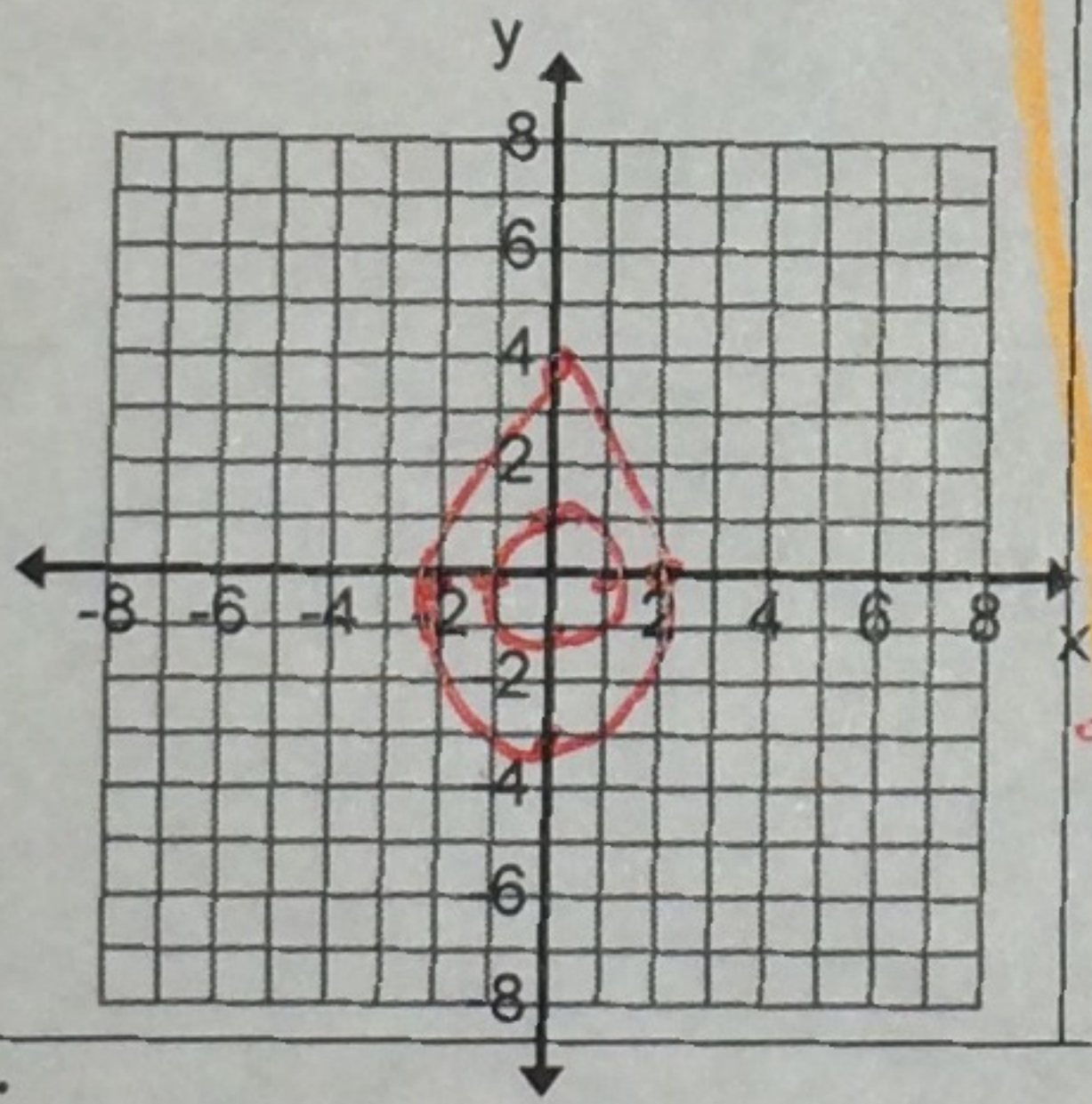
9.  $\frac{x^2}{4} + \frac{y^2}{16} = 1$

$x^2 + y^2 = 1$

$-\frac{y^2 + 1}{4} + \frac{y^2}{16} = 1$

$-\frac{4y^2 + 4 + y^2}{16} = 1$

$-5y^2 + 4 = 16$   
 $-3y^2 = 12$   
 $y^2 = -4$   
N.S.



10.  $x^2 + 9y^2 - 10x + 36y = 20$

$x - 3y = 2$

$x = 3y + 2$

$9(y^2 + 4y + \frac{4}{9}) + 9(y^2 + 36y + 36) = 20 + 35 + 36$

$(x - 5)^2 + 9(y + 2)^2 = 81$

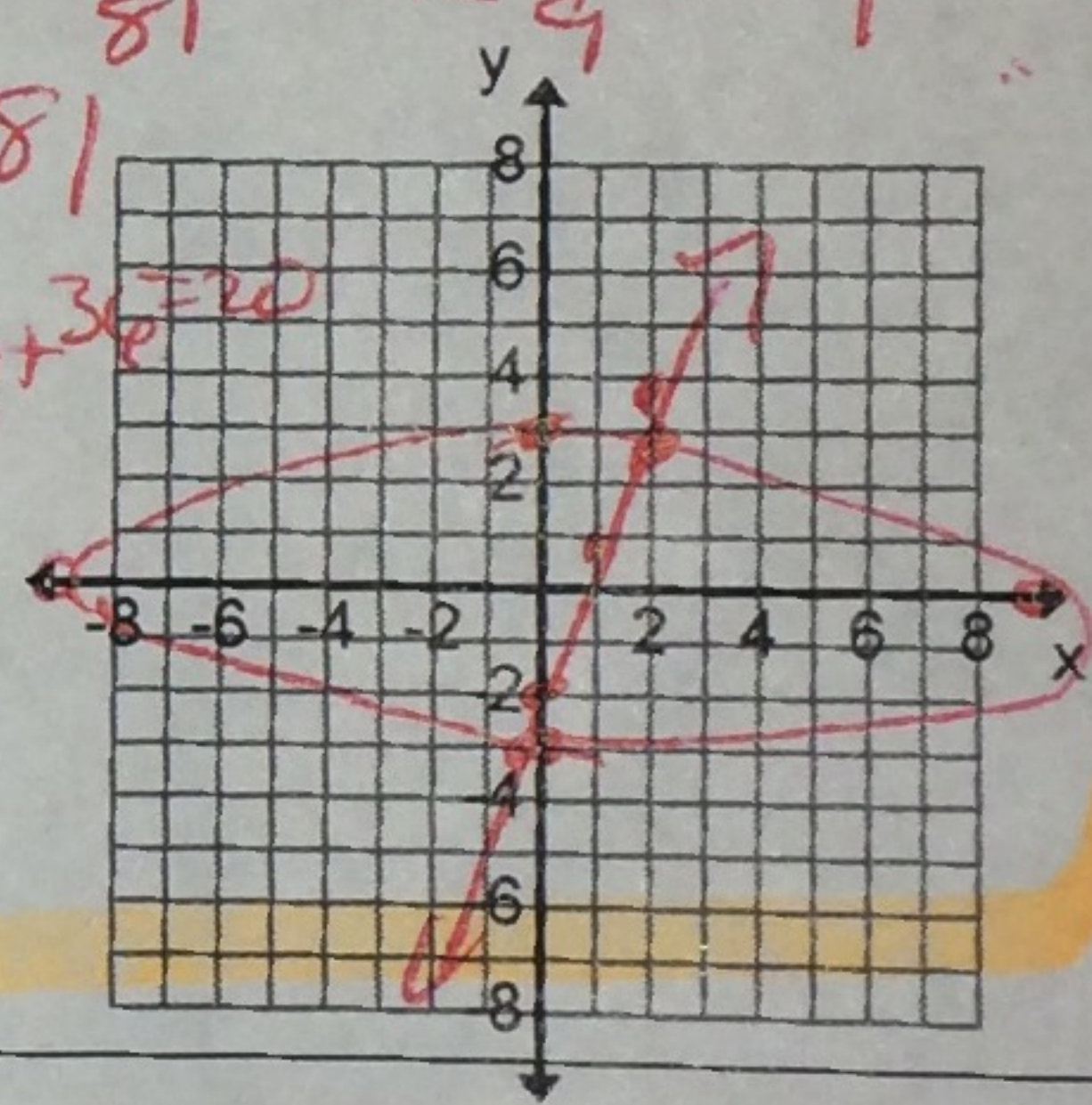
$\frac{(x - 5)^2}{81} + \frac{(y + 2)^2}{9} = 1$

$(3y + 2)^2 + 9(y + 2)^2 = 81$

$(9y^2 + 12y + 4) + 9y^2 + 36y + 36 = 81$

$18y^2 + 48y + 40 = 0$

$2(9y^2 + 24y + 20) = 0$

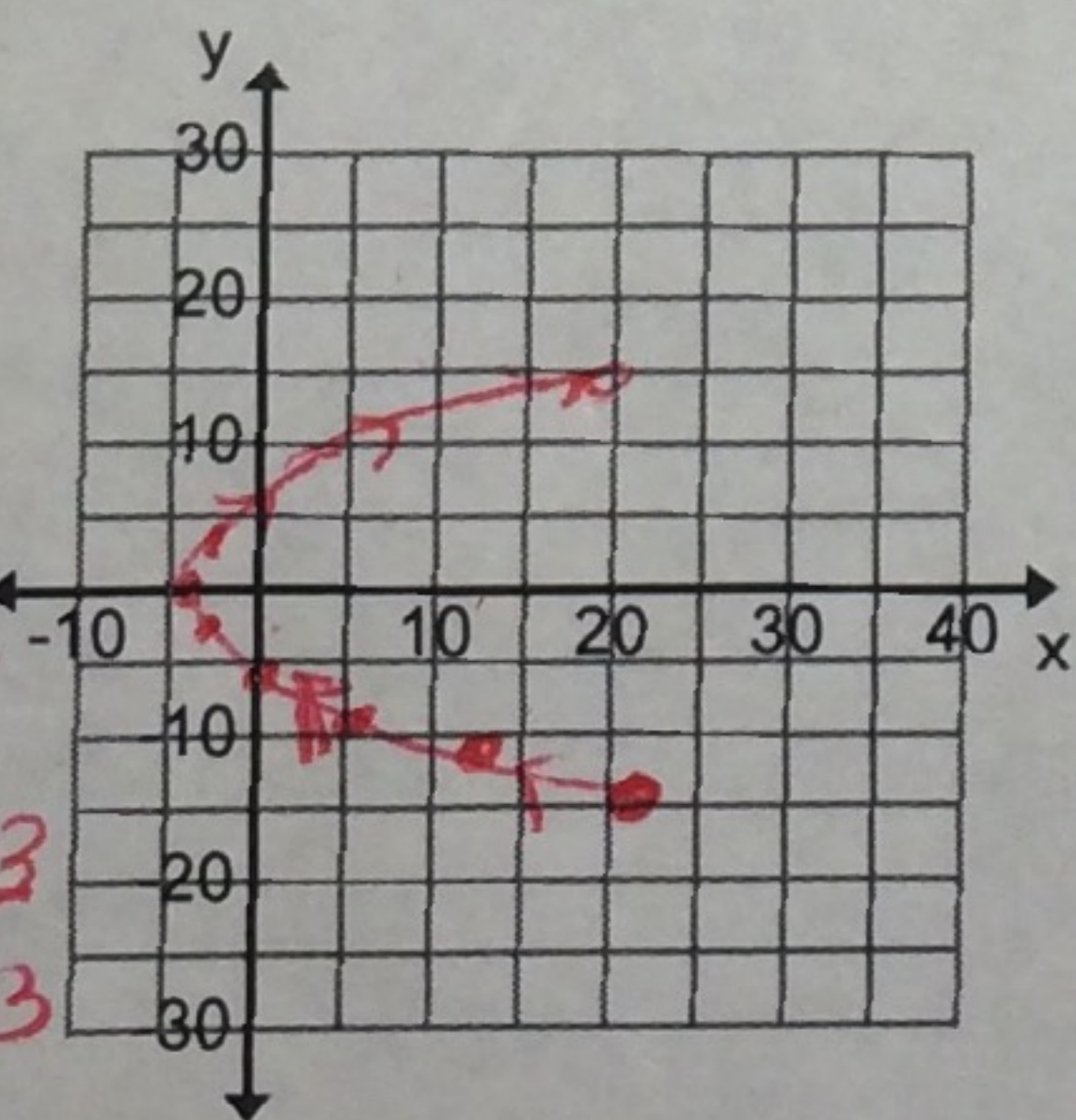


Graph the parametric equation:

$x = t^2 - 4$

11.  $y = 3t$

$-5 \leq t \leq 5$



Eliminate the parameter:

$x = t - 4$

12.  $y = t^2 + 1$

$t = x + 4$   
 $y = (x + 4)^2 + 1$   
 $y = x^2 + 4x + 17$

$x = 3 \cos T + 5$

14.  $y = 2 \sin T - 1$

$\frac{x - 5}{3} = \cos T$   $\frac{y + 1}{2} = \sin T$   
 $\frac{(x - 5)^2}{9} + \frac{(y + 1)^2}{4} = 1$

$x = 5t - 4$

13.  $y = \sqrt{t} - 1$

$\frac{x + 4}{5} = t$   
 $y = \sqrt{\frac{x + 4}{5}} - 1$

$x = \sqrt{3} \cos T + 2$

15.  $y = \sqrt{3} \sin T - 7$

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

16. Mrs. E's dog, Coco, sees a squirrel in the back yard. The squirrel and Coco are both 100 feet away from the same tree that the squirrel is attempting to take refuge in, not knowing Coco just wants to play and race to the tree. Coco:  $x_1 = 16(t - 1)$ ;  $y_1 = 2$  Squire:  $x_1 = 12t$ ;  $y_1 = 3$

After 3 seconds, \_\_\_\_\_ is ahead by \_\_\_\_\_ feet.

After 7 seconds, \_\_\_\_\_ is ahead by \_\_\_\_\_ ft.

\_\_\_\_\_ wins the race by \_\_\_\_\_ feet with a winning time of \_\_\_\_\_ seconds.