1. Find the vertex of
   a) \( y = -2(x+4)^2 - 5 \)  
   b) \( y = -\frac{1}{3}(x-7)^2 + 6 \)

2. State the line of symmetry for
   a) \( y = -5(x-3)^2 + 2 \)  
   b) \( y = 4(x+1)^2 - 5 \)

3. State the line of symmetry for
   a) \( y = 3x^2 - 12x + 7 \)  
   b) \( y = -4x^2 + 24x - 11 \)

4. State the vertex for
   a) \( y = -2x^2 - 28x + 13 \)  
   b) \( y = 4x^2 - 32x - 25 \)

5. Graph the following by finding the line of symmetry and vertex.
   a) \( y = x^2 + 6x + 10 \)  
   b) \( y = -3x^2 - 12x - 17 \)

6. Find the radius of
   a) \( x^2 + y^2 + 8x = 9 \)  
   b) \( x^2 + y^2 - 4x + 10y - 7 = 0 \)

7. Find the equation of a circle with center \((2, -5)\)
   a) \( (x+2)^2 + (x-5)^2 = 16 \)  
   b) \( (x-2)^2 + (x-5)^2 = 4 \)  
   c) \( (x+2)^2 + (x+5)^2 = 49 \)  
   d) \( (x-2)^2 + (x+5)^2 = 1 \)

8. Find the center of
   a) \( x^2 + y^2 - 6x + 14y - 6 = 0 \)  
   b) \( x^2 + y^2 - 4x + 10y - 7 = 0 \)
9. Write the equation of the graph shown below.

a. 

b. 

10. State the vertices of

a) \( \frac{x^2}{36} + \frac{y^2}{49} = 1 \)  

b) \( \frac{x^2}{25} + \frac{y^2}{9} = 1 \)

11. State the vertices of

a) \( \frac{(x-2)^2}{9} + \frac{(x+1)^2}{4} = 1 \)  

b) \( \frac{(x+3)^2}{16} + \frac{(x-4)^2}{25} = 1 \)

12. Find the vertices of

a) \( \frac{y^2}{9} - \frac{x^2}{64} = 1 \)  

b) \( \frac{x^2}{25} - \frac{y^2}{25} = 1 \)

13. Find the asymptotes of

a) \( \left( \frac{x}{4} \right)^2 - \left( \frac{y}{5} \right)^2 = 1 \)  

b) \( \left( \frac{y}{7} \right)^2 - \left( \frac{x}{3} \right)^2 = 1 \)

14. Identify what conic shape is represented by

a) \( x^2 = y^2 + 6x + 25 \)  

b) \( 5x^2 = -3y^2 + 12y + 40 \)

15. Graph the following:

a) \( (x+2)^2 + (y-5)^2 = 1 \)  

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

16. Write the equation that would result if the equation \( x^2 + y^2 = 25 \) is translated

a) 3 units up and 2 units left  

b) 1 unit down and 4 units right
17. Identify what conic shape is represented by
   a) \( x^2 = 20 - y^2 \)  
   b) \( 3x^2 = 20 - 2y^2 \)

18. State what shape the following equation represents and then write it in standard form.
   a) \( 6x^2 + 4y^2 + 12x - 40y + 70 = 0 \)  
      \[ 6(x^2 + 2x + 1) + 4(y^2 - 10y + 25) = 6 + 100 \] 
      \[ 6(x + 1)^2 + 4(y - 5)^2 = 100 \] 
   b) \( 9x^2 + 5y^2 - 54x + 20y + 11 = 0 \)  
      \[ 9(x^2 - 6x + 9) + 5(y^2 + 4y + 4) = 11 - 81 - 20 \] 
      \[ 9(x - 3)^2 + 5(y + 2)^2 = -30 \] 

19. Find the line of symmetry, and the vertex. Graph, labeling all of the above parts on your graph.
   a) \( y = \frac{1}{16}(x + 1)^2 \)  
      \[ y = -\frac{1}{20}(x - 2)^2 \] 
   b) 

20. Find the center and radius of
   a) \( x^2 + y^2 + 14x - 8y - 35 = 0 \)  
      \[ (x + 7)^2 + (y - 4)^2 = 100 \]  
      \[ (h, k) = (-7, 4) \]  
      \[ r = 10 \] 
   b) \( x^2 + y^2 - 16x + 10y - 32 = 0 \)  
      \[ (x - 8)^2 + (y + 5)^2 = 121 \]  
      \[ (h, k) = (8, -5) \]  
      \[ r = 11 \]

21. Find the center, vertices, and asymptotes, and sketch the graph.
   a) \( \frac{x^2}{16} - \frac{y^2}{49} = 1 \)  
      \[ h = 0, k = 0 \]  
      \[ V_1 = (4, 0), V_2 = (-4, 0) \]  
      \[ a = 4, b = 7 \]  
      \[ \text{Asymptotes: } y = \pm \frac{7}{4}x \] 
   b) \( \frac{y^2}{25} - \frac{x^2}{4} = 1 \)  
      \[ h = 0, k = 0 \]  
      \[ V_1 = (0, 5), V_2 = (0, -5) \]  
      \[ a = 5, b = 2 \]  
      \[ \text{Asymptotes: } y = \pm \frac{5}{2}x \] 

22. Write in standard form.
   a) \( 4x^2 + 24x - 9y^2 - 18y - 9 = 0 \)  
      \[ 4(x + 3)^2 - 9(y + 1)^2 = 9 \] 
   b) \( y^2 - 5x^2 - 60x + 8y - 184 = 0 \)  
      \[ (y + 4)^2 - 5(x + 3)^2 = 25 \]