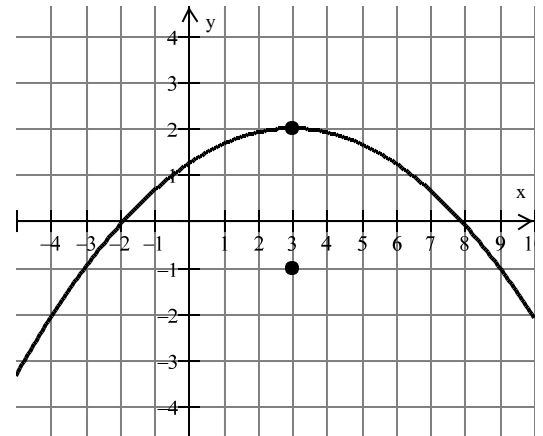


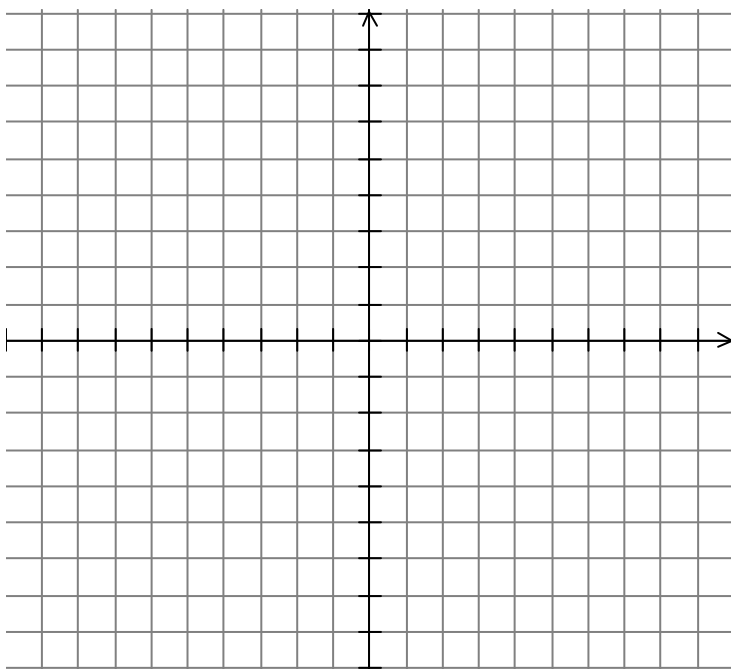
*Show all work for credit. Also, give exact answers unless otherwise noted.*

1. Find an equation of the given parabola where the focus and vertex are shown.

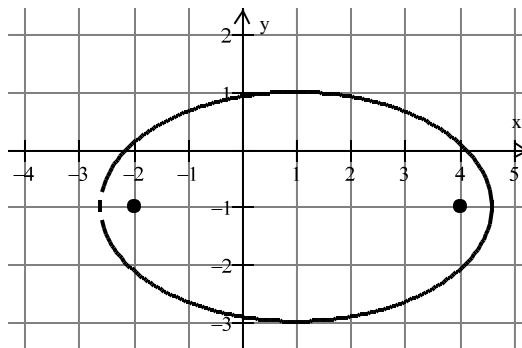


2. Find an equation of the parabola that has a vertex  $V(3, 7)$ , directrix perpendicular to the  $x$ -axis, and that passes through the point  $(1, 9)$ .

3. Find the vertex, focus, and directrix of the parabola described by  $3y^2 - 4x - 12y = 0$ . Sketch its graph, showing the focus and directrix.

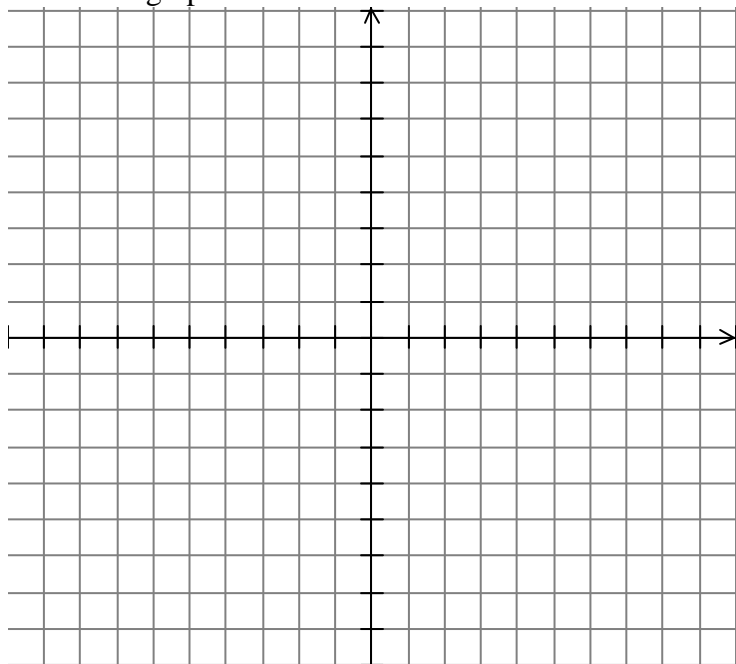


4. Find an equation of the given ellipse with the given foci.

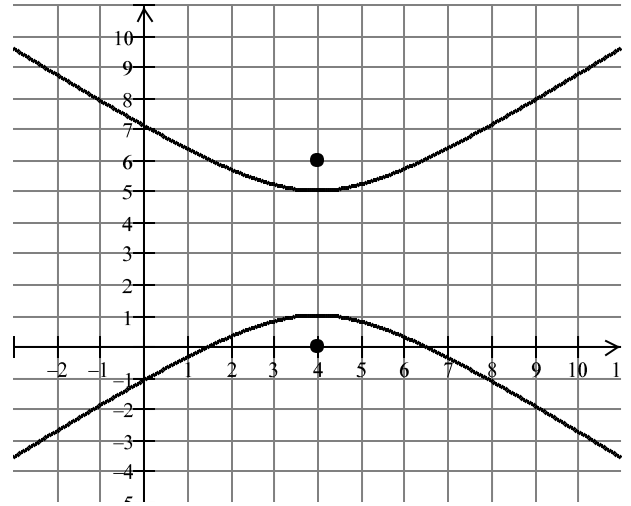


5. Find an equation of the ellipse that has vertices  $V(1, 2)$  and  $V'(1, -14)$ , and a focus  $F(1, -1)$ .

6. Find the vertices and foci of the ellipse given by the equation  $x^2 + 4y^2 + 8x - 40y + 80 = 0$ . Sketch the graph and show the foci.

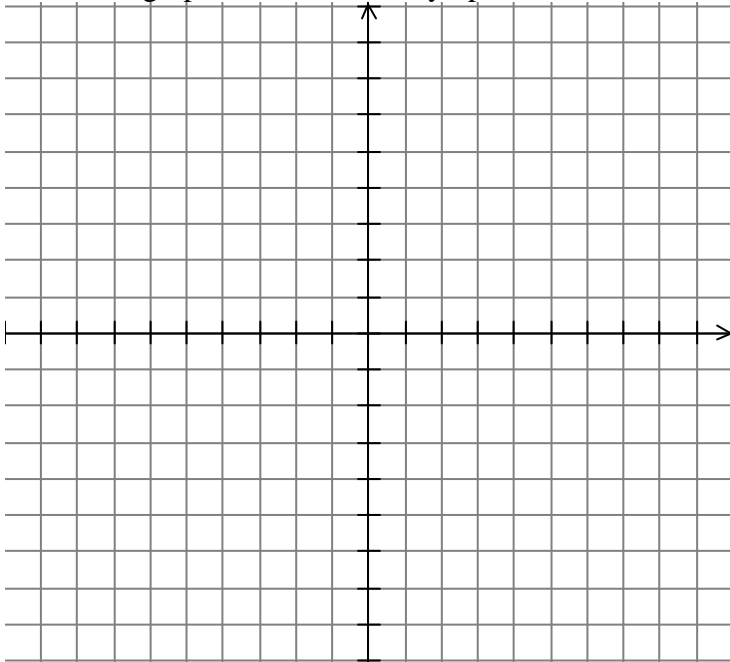


7. Find an equation of the given hyperbola with the given foci.



8. Find an equation of the hyperbola that has vertices  $V(-1, -5)$  and  $V'(5, -5)$ , and that passes through the point  $(8, -2)$ .

9. Find the vertices and foci of the hyperbola given by the equation  $4x^2 - 9y^2 + 24x + 18y - 9 = 0$ . Sketch the graph and show the asymptotes and foci.



10. A parabolic arch has a center height of  $k$  feet. Prove that the height of the rectangle with the largest area that can fit under the arch is  $\frac{2}{3}k$  feet.
11. A cruise ship is traveling a course that is 100 miles east of, and parallel to, a straight north/south shoreline. The ship sends out a distress signal, which is received by two Coast Guard stations Alpha and Beta, located 200 miles apart on the shore. By measuring the difference in signal reception times, officials determine that the ship is 160 miles closer to Beta than Alpha. Where is the ship?