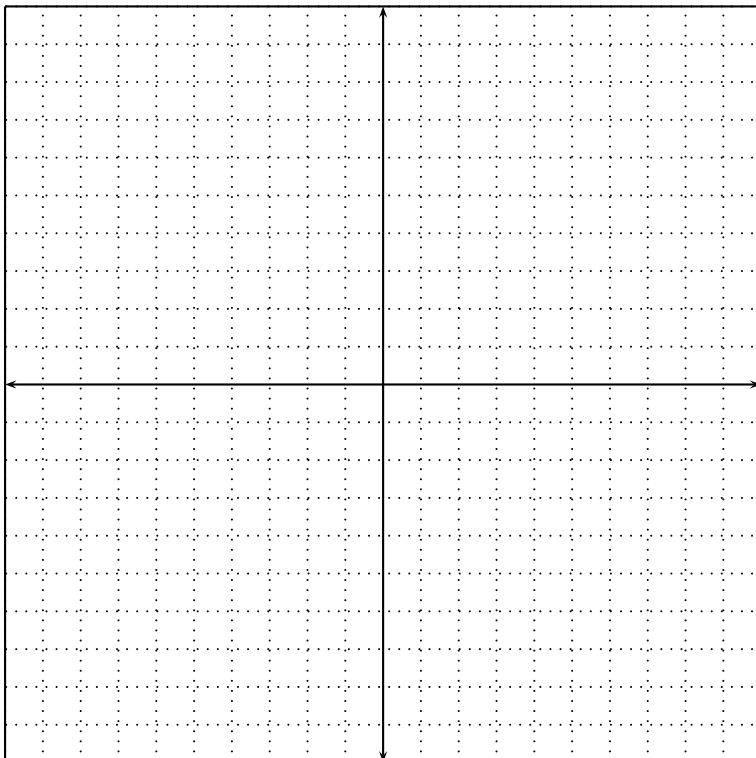


1. Find an equation of the parabola that has vertex  $V(5, -2)$  and focus  $F(5, -4)$ .
2. Find an equation of the parabola that has vertex  $V(3, 7)$ , directrix perpendicular to the  $x$ -axis, and that passes through the point  $(1, 9)$ .
3. Find the vertex, focus, and directrix of the parabola described by the equation below. Sketch its graph, showing the focus and directrix.

$$3y^2 - 4x - 12y = 0$$

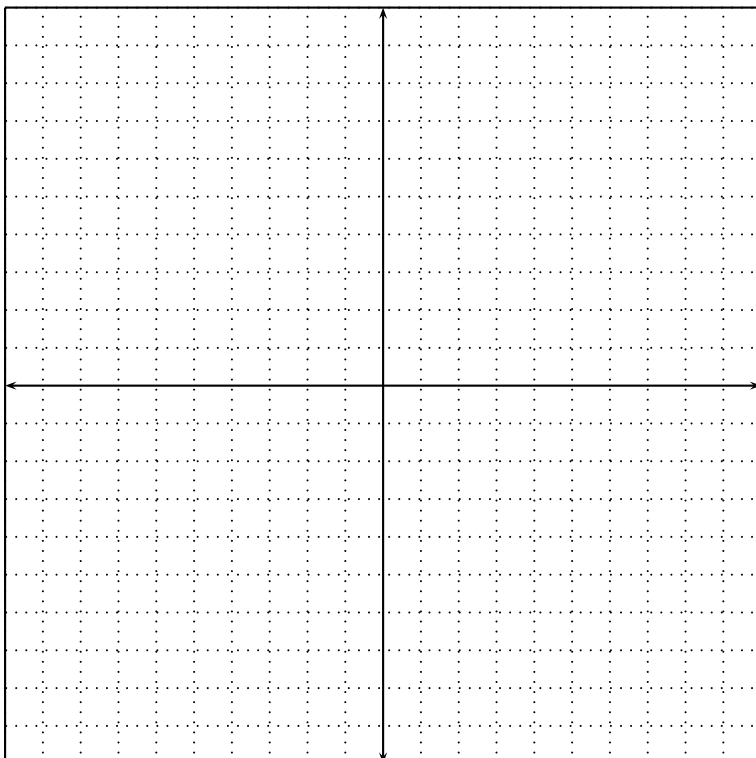


4. Find an equation of the ellipse that has foci  $F(3, 0)$  and  $F'(9, 0)$ , and minor axis of length 4.

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

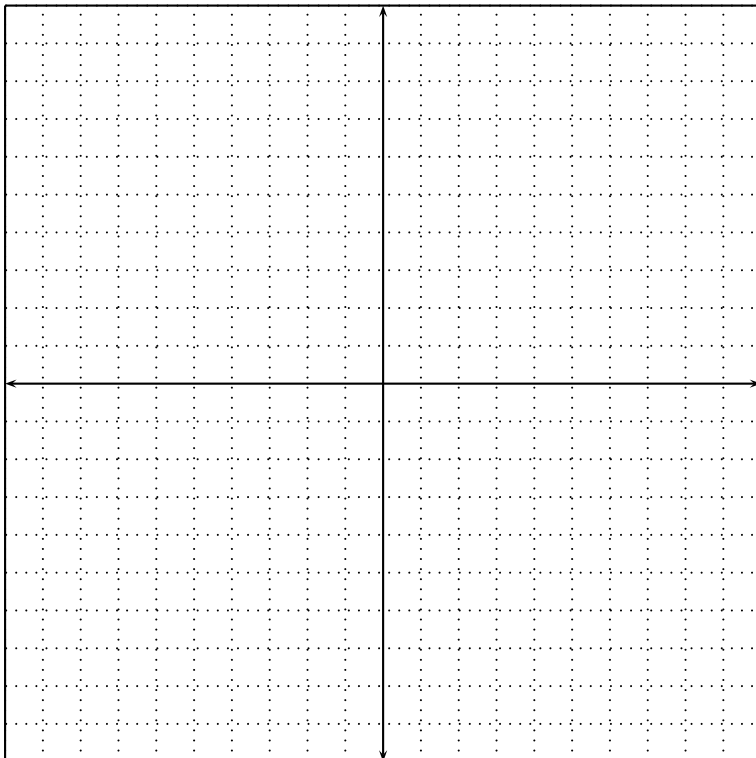
6. Find the vertices and foci of the ellipse given by the equation below. Sketch its graph, showing the foci.

$$x^2 + 4y^2 + 8x - 40y + 80 = 0$$



7. Find an equation of the hyperbola that has foci  $F(4, -2)$  and  $F'(4, 8)$  and a vertex at  $V(4, 5)$ .
8. Find an equation of the hyperbola that has vertices  $V(-1, -5)$ ,  $V'(5, -5)$ , and that passes through the point  $(8, -2)$ .
9. Find the vertices and foci of the hyperbola given by the equation below. Sketch its graph, showing the asymptotes and foci.

$$4x^2 - 9y^2 + 24x + 18y - 9 = 0$$



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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  $A$  and  $B$ , 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  $B$  than  $A$ . Where is the ship?