Exploration 12-2b: Cartesian Equations of Conic Sections
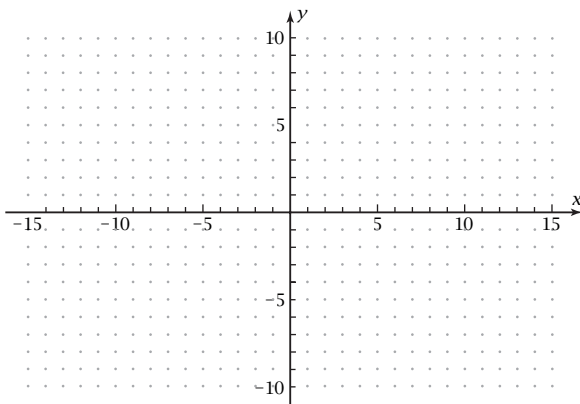
Objective: Sketch graphs of dilated and translated conic sections, and confirm by plotting parametrically.

1. For the equation

$$\left(\frac{x-7}{2}\right)^2 + \left(\frac{y+4}{5}\right)^2 = 1$$

   which conic section will it be? _____

2. Sketch the graph of the conic section in Problem 1.

3. Write parametric equations for the conic section in Problem 1.

4. Put your grapher in parametric and radian modes. Set the *t*-range from 0 to 2π, and use the window shown in Problem 2. Plot the graph. Does it agree with your sketch in Problem 2? _____

5. Transform the equation in Problem 1 to the form
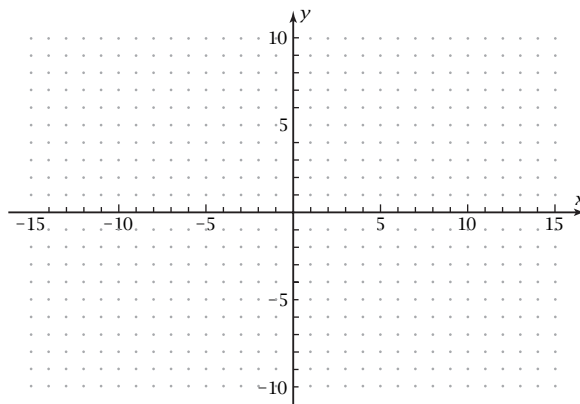
   $$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

6. Return your grapher to function mode. Plot the transformed equation in Problem 5 using the program CONIC. Does the graph agree with those in Problems 2 and 4? _____

7. For the equation

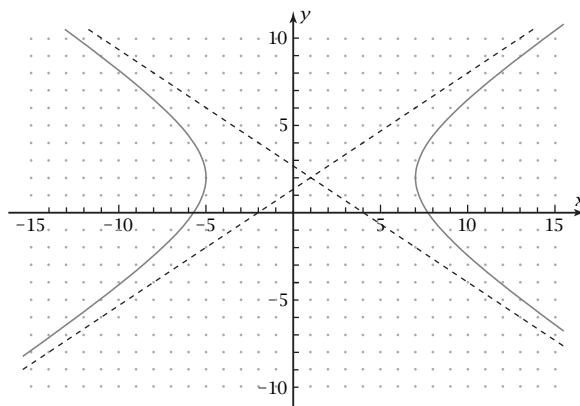$$-\left(\frac{x+6}{4}\right)^2 + \left(\frac{y-1}{3}\right)^2 = 1$$

   which conic section will it be? _____

8. Sketch the graph of the conic section in Problem 7.

9. Write parametric equations for the conic section in Problem 6. Plot on your grapher. Does the graph agree with your sketch in Problem 8? _____

10. Write parametric equations for the hyperbola graphed here. Do the parametric equations give this graph? _____

11. Write a Cartesian equation for the hyperbola.

12. What did you learn as a result of doing this Exploration that you did not know before?