

Advanced Challenge Level 2 Problem #6

Given: any line, d (directrix)
any point F not on line d (focus)

Consider the set of all points $P(x, y)$ in the plain such that the ratio of the distance from point F to the distance from line d is a constant, called e . Now, if $0 < e < 1$, then the set of points is an ellipse. If $e = 1$, then the set of points is a parabola. Finally, if $e > 1$, then the set of points is a hyperbola. In this problem, you will confirm these facts using three examples. For each one, you must (a) graph the set of points being described, and (b) write the equation of the curve in standard form. Make sure that you show all of your work neatly organized.

1. line d : $x = -16$; point $F(-9, 0)$; $e = 0.75$
2. line d : $y = -2$; point $F(0, 2)$; $e = 1$
3. line d : $y = 1$; point $F(0, 4)$; $e = 2$