9.7 Solve Quadratic Systems

TEKS a.5, 2A.3.A, 2A.3.B, 2A.3.C

Before You solved linear systems.

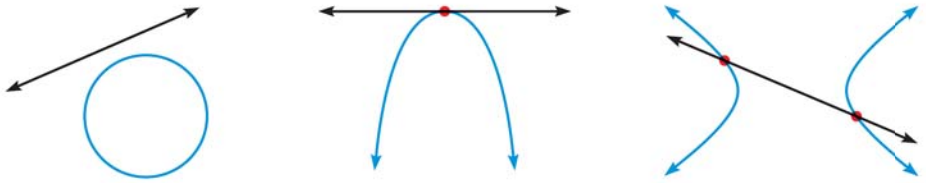
Now You will solve quadratic systems.

Why? So you can find intersections involving conics, as in Ex. 40.

Key Vocabulary
- **quadratic system**

In Chapter 3, you solved systems of linear equations by graphing, substitution, and elimination. You can use the same techniques to solve systems that include one or more equations of conics. These systems are called **quadratic systems**.

If the graphs of the equations in a system are a line and a conic section, the graphs can intersect in zero, one, or two points, and so the system can have zero, one, or two solutions. Three possible scenarios are shown below.



No solution | One solution | Two solutions

EXAMPLE 1 Solve a linear-quadratic system by graphing

Solve the system using a graphing calculator.

$y^2 - 7x + 3 = 0$ Equation 1
$2x - y = 3$ Equation 2

Solution

STEP 1 **Solve** each equation for y.

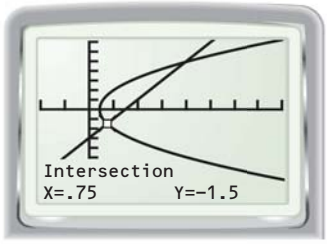
$y^2 - 7x + 3 = 0$
$y^2 = 7x - 3$
$y = \pm\sqrt{7x - 3}$ Equation 1

$2x - y = 3$
$-y = -2x + 3$
$y = 2x - 3$ Equation 2

AVOID ERRORS
To graph Equation 1, be sure to enter both $y = \sqrt{7x - 3}$ and $y = -\sqrt{7x - 3}$ into the graphing calculator.

STEP 2 **Graph** the equations $y = \sqrt{7x - 3}$, $y = -\sqrt{7x - 3}$, and $y = 2x - 3$.

Use the calculator's *intersect* feature to find the coordinates of the intersection points. The graphs of $y = -\sqrt{7x - 3}$ and $y = 2x - 3$ intersect at $(0.75, -1.5)$. The graphs of $y = \sqrt{7x - 3}$ and $y = 2x - 3$ intersect at $(4, 5)$.



▶ The solutions are $(0.75, -1.5)$ and $(4, 5)$. Check the solutions by substituting the coordinates of the points into each of the original equations.