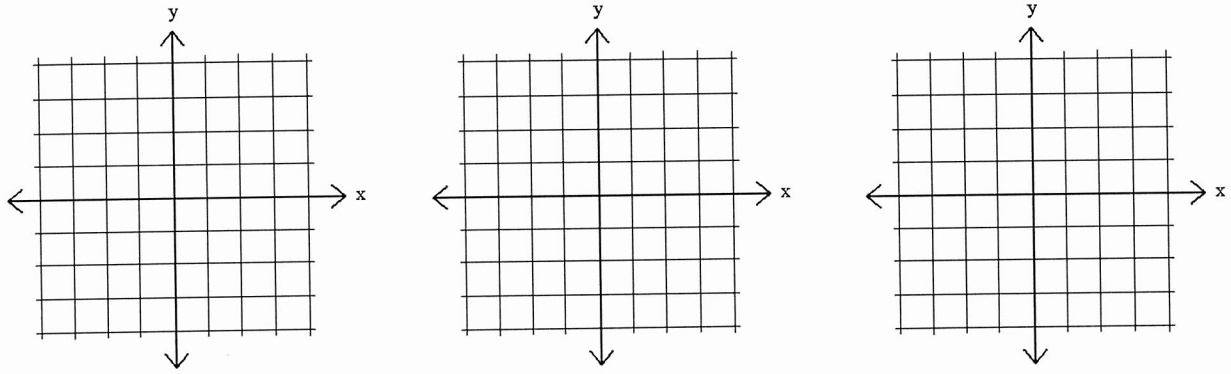
Pre-Calculus 20 Chapter 8 Notes

8.1 – Solving Systems of Equations Graphically

Linear-Quadratic System:

The solution to a Linear-Quadratic System is _____

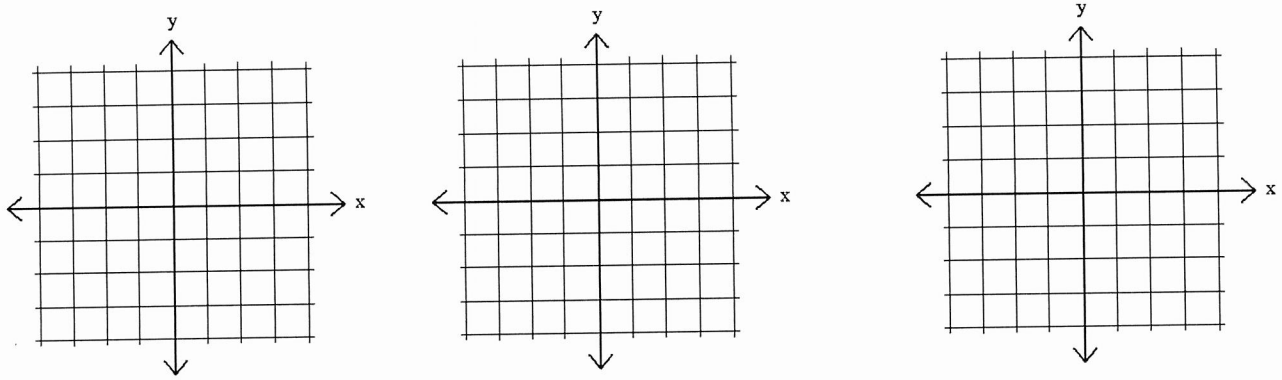
Possible Solutions:



Quadratic-Quadratic System:

The solution to a Quadratic-Quadratic System is _____

Possible Solutions:



Example

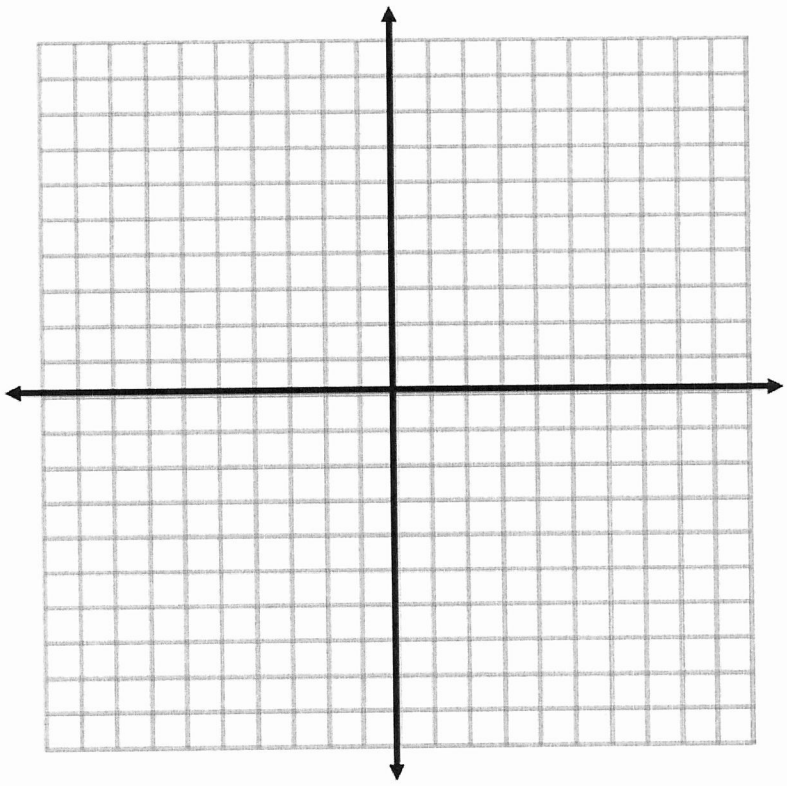
Solve the following system of equations graphically:

$4x - y + 3 = 0$

$2x^2 + 8x - y + 3 = 0$

To graph the linear equations, use $y = mx + b$ or graph the intercepts.

To graph the quadratic equation, complete the square.



Determine the coordinates point(s) of intersection.

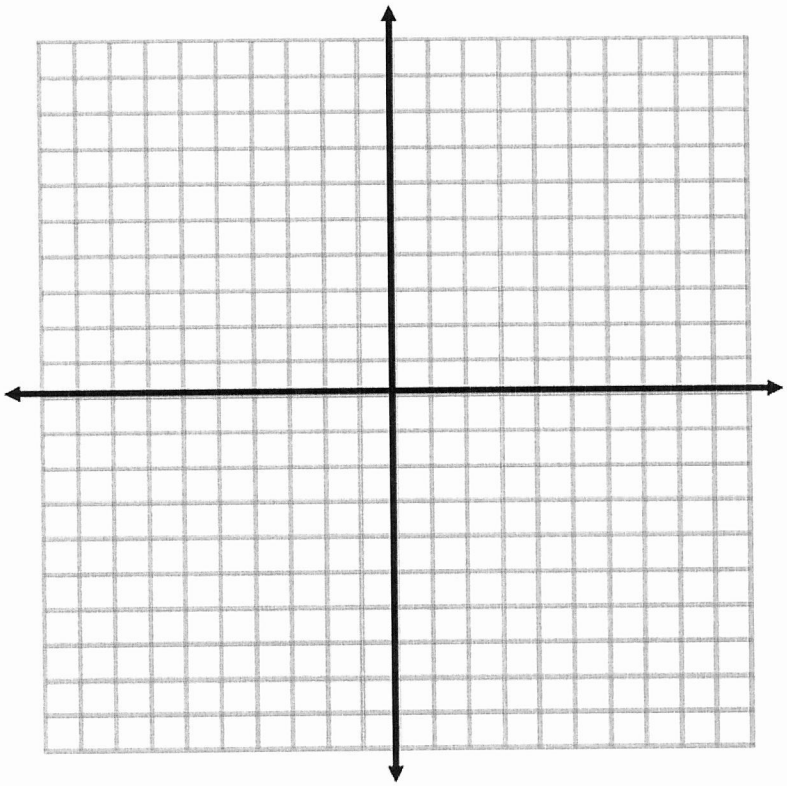
Verify the solution into both of the original equations.

Example

Solve the following system graphically:

$2x^2 - 8x + 7 - y = 0$

$y + x^2 - 4x + 2 = 0$



Solve the following system:

$y - x^2 + 4 = 0$

$-2y + 2x^2 - 8 = 0$

What do you notice? How many solutions is there?

8.2 – Solving Systems of Equations Algebraically

Solve the following linear-quadratic system using **substitution:**

$3x + y = -9$

$4x^2 - x + y = -9$

Solve the linear equation for "y".

Substitute into the quadratic equation and solve.

Solve by factoring or quadratic formula.

Substitute the resulting "x" value(s) into the original linear equation to determine the corresponding "y" values.

Verify into both original equations.

Solve: $y = x^2 - 3x - 4$

$2x - y = 4$

Solve the following linear-quadratic system using **elimination:**

$5x - y = 10$

$x^2 + x - 2y$

Align the terms with the same degree.

Since the squared term is "x", eliminate the "y" variable.

Multiply through by the LCM of the coefficients of the "y" variables to make them the same.

Add or subtract to eliminate "y".

Solve the resulting quadratic equation by factoring or quadratatic formula to find "x".

Substitute the "x" value in the original linear equation to determine the corresponding "y" value.

Verify into both of the original equations.

Solve the following quadratic-quadratic using elimination.

$6x^2 - x - y = -1$

$4x^2 - 4x - y = -6$

Word Problems

1. A Canadian cargo plane drops a crate of emergency supplies to aid-workers on the ground. The crate drops freely first, before a parachute opens to bring the crate gently to the ground. The crate's height, h, in metres, above the ground t seconds after leaving the aircraft is given by the following two equations. $h = -4{,}9t^2 + 900$ represents the height of the crate during free fall. $h = -4t + 500$ represents the height of the crate with the parachute open.

a) How long after the crate leaves the aircraft does the parachute open?

b) What height above the ground is the crate when the parachute opens?

c) Verify your solution.

2. Determine two integers such that the sum of the smaller number and twice the larger number is 46. Also, when the square of the smaller number is decreased by three times the larger, the result is 93. Determine the two numbers.

3. Mike hits a baseball and it travels on a path modeled by $h = -0.1x^2 + 2x$. John is in the outfield directly in line with the path of the ball. He runs toward the ball and jumps to try and catch it. His jump is modeled by the equation $h = -x^2 + 39x - 378$. In both equations, x, is the horizontal distance in metres from home plate and h is the height of the ball above the ground in metres.

a) Solve the system algebraically.

b) What does the point of intersection represent?