

Essential Question: How do we solve a quadratic-linear system?

Do Now:

A linear-quadratic system contains a linear equation and a quadratic equation:  $\begin{cases} y = mx + b \\ y = ax^2 + bx + c \end{cases}$

Graph the system of equations and find the common solution(s).

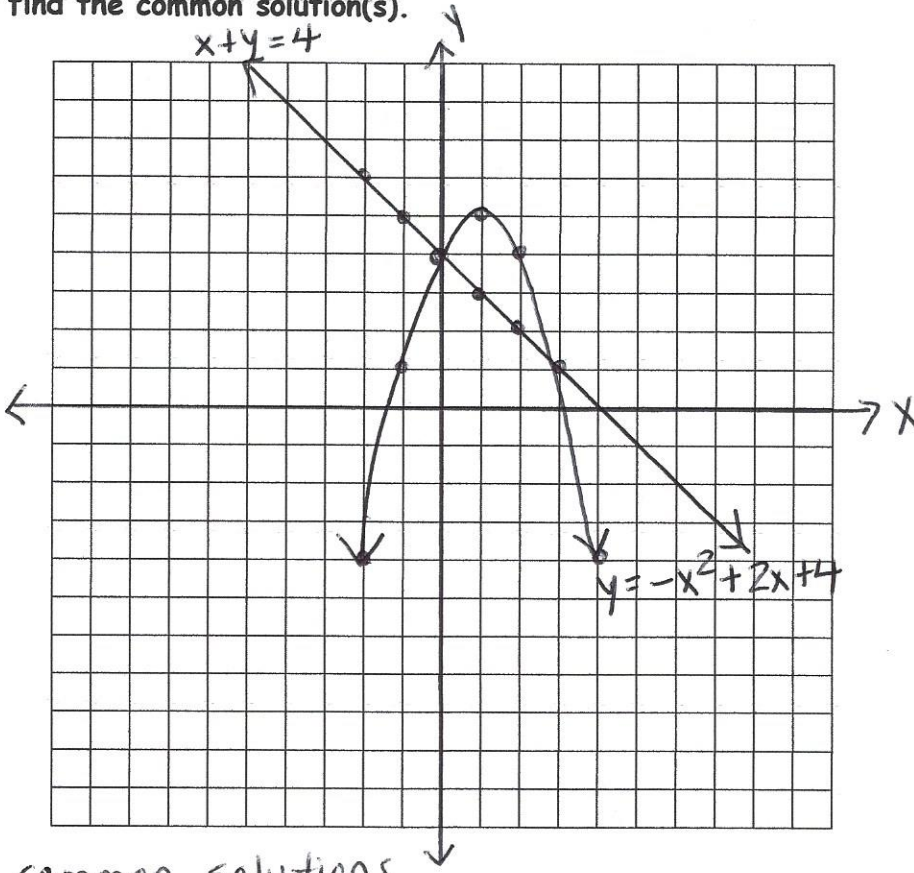
$$y = -x^2 + 2x + 4$$

$$x + y = 4$$

$$y = -x + 4$$

$$m = -\frac{1}{1} \quad b = 4$$

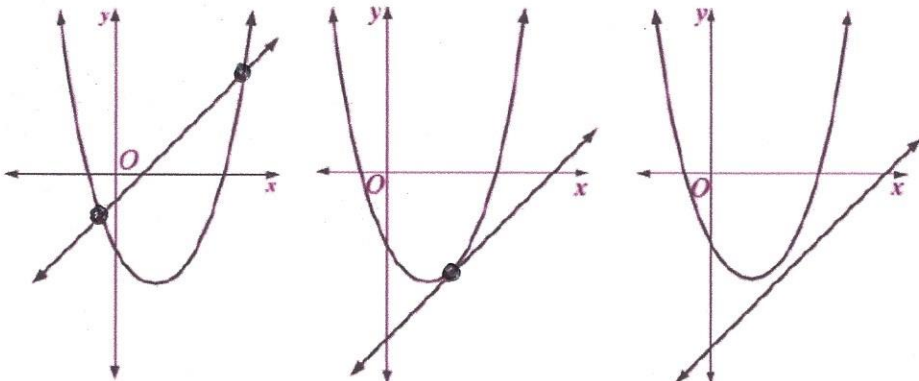
$x = \frac{-b}{2a}$	x	y
	-2	-4
$x = \frac{-2}{2(-1)}$	-1	1
	0	4
$x = \frac{-2}{-2}$	1	5
	2	4
$x = 1$	3	1
	4	-4



common solutions  
(0, 4) (3, 1)

How many solutions are possible when solving a linear-quadratic system?

- The solution(s) to a system of equations are the coordinates where the equations intersect.
- In a Quadratic-Linear system, there could be 0, 1 or 2 solutions.



## Solving a Linear Quadratic System Algebraically

- Solve for  $y$  in the linear equation
- Substitute the expression into the quadratic equation and solve for  $x$
- Find  $y$  by substituting the value for  $x$  into the linear equation
- Check solutions with both equations

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

$2y + 4 = 4x$

$2y = 4x - 4$

$y = 2x - 2$

common solutions

$(4, 6)$

$(-1, -4)$

2.  $y = x^2 + 4x + 3$

$2x - y = -6$

$-y = -2x - 6$

$y = 2x + 6$

common solutions

$(-3, 0)$

$(1, 8)$

Finding x values of solution

$$\begin{array}{r} x^2 - x - 6 = 2x - 2 \\ -2x + 2 \quad -2x + 2 \\ \hline \end{array}$$

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

$(x - 4)(x + 1) = 0$

$$\begin{array}{l|l} x - 4 = 0 & x + 1 = 0 \\ \hline x = 4 & x = -1 \end{array}$$

$x^2 + 4x + 3 = 2x + 6$

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

$(x + 3)(x - 1) = 0$

$$\begin{array}{l|l} x + 3 = 0 & x - 1 = 0 \\ \hline x = -3 & x = 1 \end{array}$$

Finding y value

$2y + 4 = 4(4)$

$2y + 4 = 16$

$2y = 12$

$y = 6$

$2y + 4 = 4(-1)$

$2y + 4 = -4$

$2y = -8$

$y = -4$

3.  $y = 5 - x^2$

$y - 3 = x$

$y = x + 3$

$5 - x^2 = x + 3$

$-5 + x^2 = -5 + x + 3$

$0 = x^2 + x - 2$

$0 = (x + 2)(x - 1)$

$$\begin{array}{l|l} x + 2 = 0 & x - 1 = 0 \\ \hline x = -2 & x = 1 \end{array}$$

$y - 3 = -2$

$y = 1$

$y - 3 = 1$

$y = 4$

common solutions

$(-2, 1)$

$(1, 4)$

check  $(-2, 1)$

$y - 3 = x$

$1 - 3 = -2$

$-2 = -2$

✓

$y = 5 - x^2$

$1 = 5 - (-2)^2$

$1 = 5 - 4$

$1 = 1$

✓

check  $(1, 4)$

$y - 3 = x$

$4 - 3 = 1$

$1 = 1$

✓

$y = 5 - x^2$

$4 = 5 - (1)^2$

$4 = 5 - 1$

$4 = 4$

✓