



Math Virtual Learning

Algebra 1 S2

May 1st, 2020



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Lesson: May 1st, 2020

Learning Target:

Students will solve a system of equations involving a linear and quadratic function algebraically.

Warm-Up

The graphs of the equations $y = x^2 - 5x + 6$ and $x + y = 6$ are drawn on the same set of axes. At what point do the graphs intersect?

A) (2,4)

B) (5,1)

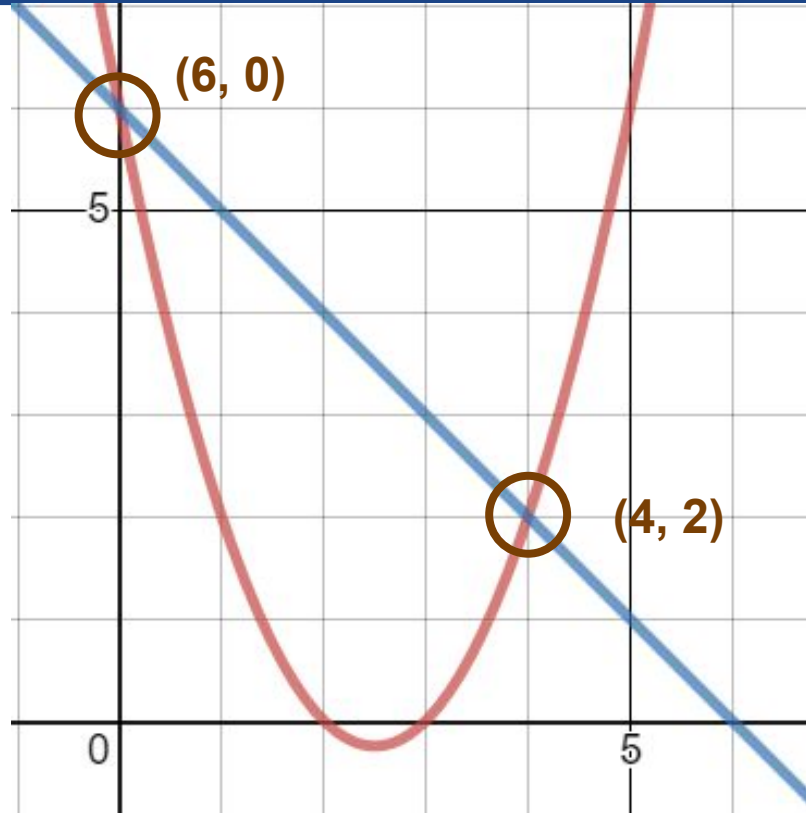
C) (3,3)

D) (4,2)

Warm-Up

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B) (5,1) **D) (4,2)**



Warm-Up

The graphs of the equations $y = x^2 + 4x - 1$ and $y + 3 = x$ are drawn on the same set of axes. At which point do the graphs intersect?

A) (1,-2)

C) (-2,1)

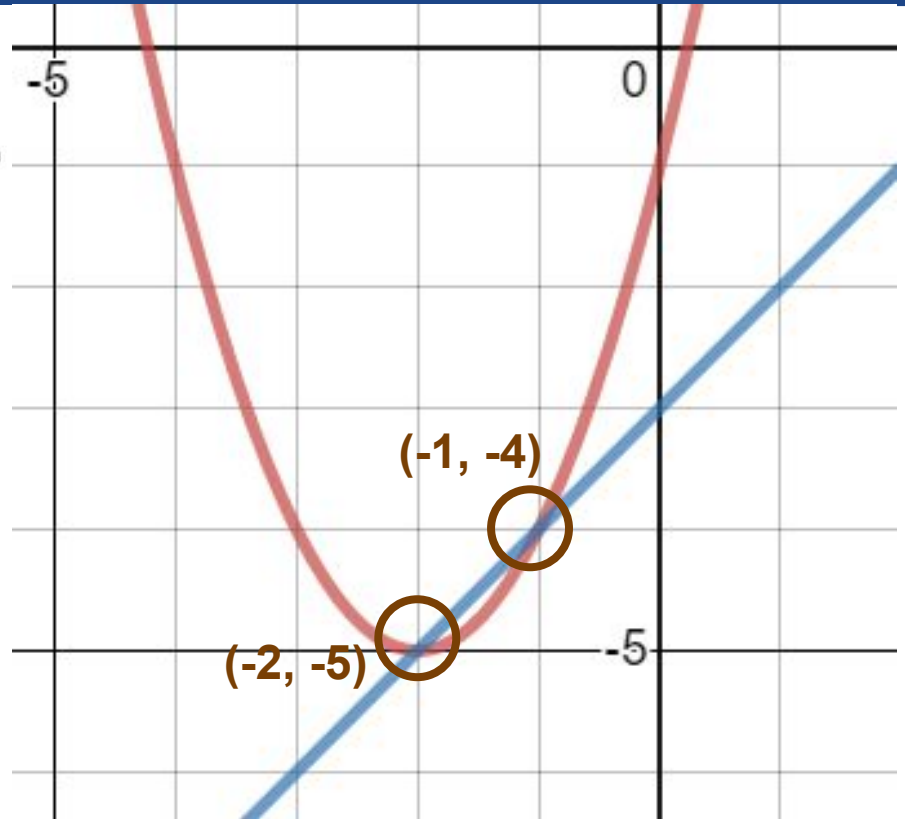
B) (1,4)

D) (-2,-5)

Warm-Up

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- A) (1,-2) C) (-2,1)
B) (1,4) D) (-2,-5)





Today's Lesson

In today's lesson we will be solving a system of equations with a linear and quadratic function algebraically.

Watch today's [Video](#) to practice along with a few examples before the independent practice.

Examples:

$$1) \begin{aligned} y &= (x+2)^2 - 6 \\ y &= 4x - 2 \end{aligned}$$

$$2) \begin{aligned} y &= x^2 - 2x - 3 \\ y &= -5 \end{aligned}$$

$$3) \begin{aligned} y &= -x^2 + 2x + 7 \\ 2x + 7 &= 2 \end{aligned}$$

Practice #1

Solve the system by substitution.

$$\begin{cases} y = x^2 + 5x - 2 \\ y = 3x - 2 \end{cases}$$

Practice #1 Answer

$$\begin{cases} y = x^2 + 5x - 2 \\ y = 3x - 2 \end{cases} \text{ set = to each other}$$

$$\begin{array}{r} x^2 + 5x - 2 \\ -3x + 2 \\ \hline x^2 + 2x \end{array} \neq \begin{array}{r} 3x - 2 \\ -3x + 2 \\ \hline 0 \end{array} \left. \vphantom{\begin{array}{r} x^2 + 5x - 2 \\ -3x + 2 \\ \hline x^2 + 2x \end{array}} \right\} \text{zero out one side}$$

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

GC F \rightarrow $x=0 \quad x=-2$ } Factor + solve for x

Plug each x-value into the linear equation + solve for y.

$$\begin{aligned} y &= 3x - 2 \\ y &= 3(0) - 2 \\ y &= -2 \end{aligned}$$

$$\begin{aligned} y &= 3(-2) - 2 \\ y &= -6 - 2 \\ y &= -8 \end{aligned}$$

Solutions: $(0, -2)$ and $(-2, -8)$

Practice #2

Solve the system by substitution.

$$\begin{cases} y = -x^2 - 3x + 2 \\ y = x + 6 \end{cases}$$

Practice #2 Answer

$$\begin{cases} y = -x^2 - 3x + 2 \\ y = x + 6 \end{cases}$$

$$\begin{array}{r|l} -x^2 - 3x + 2 & = x + 6 \\ -x & -6 \\ \hline -x^2 - 4x - 4 & = 0 \end{array}$$

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

$$-(x^2 + 4x + 4) = 0$$

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

$$x = -2$$

$$\begin{aligned} y &= x + 6 \\ y &= (-2) + 6 \\ y &= 4 \end{aligned}$$

Solution: $(-2, 4)$

Practice #3

Solve the system by substitution.

$$\begin{cases} y = -2x^2 - 4x - 1 \\ y = 2x + 4 \end{cases}$$

Practice #3 Answer

$$\begin{cases} y = -2x^2 - 4x - 1 \\ y = 2x + 4 \end{cases}$$

$$\begin{array}{r|l} -2x^2 - 4x - 1 & = 2x + 4 \\ -2x - 4 & -2x - 4 \end{array}$$

$$-2x^2 - 6x - 5 = 0$$

$$-(2x^2 + 6x + 5) = 0$$

$a=2$ $b=6$ $c=5$

$$\frac{-6 \pm \sqrt{(6)^2 - 4(2)(5)}}{2(2)}$$

$$\frac{-6 \pm \sqrt{36 - 40}}{4}$$
$$\frac{-6 \pm \sqrt{-4}}{4}$$

can't take
 $\sqrt{\text{negative \#}}$

No solution

Practice #4

Solve the system by substitution.

$$\begin{cases} x + y = 5 \\ y + 1 = 3x^2 + 2x \end{cases}$$

Practice #4 Answer

$$\left\{ \begin{array}{l} x + y = 5 \\ -x \end{array} \right. \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{rewrite} \\ \left\{ \begin{array}{l} y + 1 = 3x^2 + 2x \\ -1 \end{array} \right. \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{in } y = \text{form}$$

$$\left. \begin{array}{l} y = -x + 5 \\ y = 3x^2 + 2x - 1 \end{array} \right\} \text{now set} \\ \text{them} =$$

$$3x^2 + 2x - 1 = -x + 5$$

$+x \quad -5 \quad +x \quad -5$

$$3x^2 + 3x - 6 = 0$$

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

\uparrow GCF

$$3(x+2)(x-1) = 0$$

$$3(x+2)(x-1) = 0$$

$x = -2 \quad x = 1$

↓

$$y = -x + 5$$
$$y = -(-2) + 5$$
$$y = 2 + 5$$

$y = 7$

$$y = -x + 5$$
$$y = -(1) + 5$$

$y = 4$

Solutions:
 $(-2, 7) + (1, 4)$

Practice #5

Solve the system by substitution.

$$\begin{cases} x^2 + y - 8 = 0 \\ x + y - 2 = 0 \end{cases}$$

Practice #5 Answer

$$\begin{cases} x^2 + y - 8 = 0 \\ -x^2 + 8 \end{cases}$$
$$\begin{cases} x + y - 2 = 0 \\ -x + 2 \end{cases}$$

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

$$y = -x + 2$$

$$\begin{array}{r} -x^2 + 8 \\ +x - 2 \\ \hline -x^2 + x + 6 \end{array} \begin{array}{r} -x + 2 \\ +x - 2 \\ \hline 0 \end{array}$$

$$-x^2 + x + 6 = 0$$

$$-(x^2 - x - 6) = 0$$

$$-(x-3)(x+2) = 0$$

$$x = 3 \quad x = -2$$



$$y = -x + 2$$

$$y = -(3) + 2$$

$$y = -3 + 2$$

$$y = -1$$

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

$$y = 2 + 2$$

$$y = 4$$

Solutions: $(3, -1)$ and $(-2, 4)$

Practice #6

Solve the system by substitution.

$$\begin{cases} 5x + y = 2x^2 + 6 \\ y + 4x = 7x - 2 \end{cases}$$

Practice #6 Answer

$$\begin{cases} 5x + y = 2x^2 + 6 & -5x \\ y + 4x = 7x - 2 & -4x \end{cases}$$

$$y = 2x^2 - 5x + 6$$

$$y = 3x - 2$$

$$\begin{array}{r|l} 2x^2 - 5x + 6 & 3x - 2 \\ -3x & +2 \\ \hline & -3x + 2 \end{array}$$

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

$$2(x^2 - 4x + 4) = 0$$

GCF

$$\begin{aligned} 2(x^2 - 4x + 4) &= 0 \\ 2(x-2)(x-2) &= 0 \end{aligned}$$

$$x = 2$$

↓

$$y = 3x - 2$$

$$y = 3(2) - 2$$

$$y = 6 - 2$$

$$y = 4$$

Solution:
(2, 4)



Additional Practice:

Click on the links below to get additional practice and to check your understanding!

Click [here](#) to get additional practice with hints and worked out answers.

Click [here](#) for additional worked-out examples and explanations.