

Warm-up 11-27

Solve the following systems by substitution.

1. $y = -3x + 2$
 $3x + y = 2$

2. $-x - 4y = -6$
 $x + 4y = 12$

Warm-up 11-27

Solve the following systems by substitution.

$$1. \begin{array}{l} y = -3x + 2 \\ 3x + y = 2 \end{array}$$

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

$$3x - 3x + 2 = 2$$

$$2 = 2$$

infinite solutions

$$2. \begin{array}{l} -x - 4y = -6 \\ x + 4y = 12 \end{array}$$

$$-x - 4y = -6$$

$$x = -4y + 12$$

$$-(-4y + 12) - 4y = -6$$

$$4y - 12 - 4y = -6$$

$$-12 = -6$$

no solution

Growth Mindset:

Growth Mindset is a belief that, despite obstacles and/or challenges, a person can develop abilities and achieve goals through motivation, hard work, and practice.



Fixed Mindset:

Fixed mindset is the belief that talent and intelligence can't be changed despite dedication and hard work.



It's History

Growth Mindset History:

The concept of growth mindset was developed by psychologist Carol Dweck. Her research suggests that students who believe that their intelligence is fixed learn less or at a slower rate. They also tend to avoid challenges. Students who have a growth mindset may learn more and at a faster rate. They also view challenges and failures as opportunities to improve.

What do you think? Can people get smarter when they work hard or is intelligence something that you either have or you don't have? Explain.

5.2

Today's Goal



I can...

- solve systems of equations by using substitution

Section 5.2 : Solving Systems of equations by Substitution

What does "substitution" mean?

Replacing a value with something that is equal

Examples:



If $x=12$

What does $3x - 4 = ?$

If $x = 2w$

What does $-4x + 2w = ?$

We use the same idea with the systems of equations.
Use the following steps.

$$\begin{aligned} y &= 2x + 3 \\ 4x + 2y &= -2 \\ 4x + 2(2x + 3) &= -2 \end{aligned}$$

$$4x + 4x + 6 = -2$$

$$\begin{array}{r} 8x + 6 = -2 \\ -6 \quad -6 \\ \hline 8x = -8 \\ \frac{8x}{8} = \frac{-8}{8} \\ x = -1 \end{array}$$

$$\begin{aligned} y &= 2(-1) + 3 \\ &= -2 + 3 \\ y &= 1 \end{aligned}$$

$$\boxed{(-1, 1)} \quad (x, y)$$

Step #1: Pick the equation that is the simplest or the one that already has a variable by itself. (circle it)

Step #2: Solve for one of the variables in that equation (if it isn't already done for you)

Step #3: Now substitute into the second equation

Step #4: There should only be one variable in the equation now. Solve for that variable.

Step #5: Now substitute that value into the first equation

Step #6: Solve for the variable that remains in the equation.

Step #7: Write the solution as an ordered pair.

We use the same idea with the systems of equations.
Use the following steps.

$$\begin{array}{l}
 \textcircled{y = 2x + 3} \\
 \hookrightarrow 4x + 2y = -2 \\
 4x + 2(2x + 3) = -2 \\
 \textcircled{4x} + \textcircled{4x} + 6 = -2 \\
 8x + 6 = -2 \\
 \begin{array}{r}
 -6 \quad -6 \\
 \hline
 8x = -8 \\
 \frac{8x}{8} = \frac{-8}{8} \\
 x = -1
 \end{array}
 \end{array}$$

$$\begin{array}{l}
 y = 2(-1) + 3 \\
 = -2 + 3 \\
 = 1
 \end{array}$$

$$\textcircled{(-1, 1)}$$

Step #1: Pick the equation that is the simplest or the one that already has a variable by itself. (circle it)

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Step #6: Solve for the variable that remains in the equation.

Step #7: Write the solution as an ordered pair.

Solve the following by substitution. Be sure to check your answers.

1. $y = 2x$
 $2x + y = -12$

2. $x = y - 4.2$
 $2x - 3y = -9$

3. $2x + 5y = -7$
 $3x - y = -2$

Solve the following by substitution. Be sure to check your answers.

1. $y = 2x$
 $2x + y = -12$

$2x + 2x = -12$
 $\frac{4x}{4} = \frac{-12}{4}$
 $x = -3$

$y = 2(-3)$
 $y = -6$

$(-3, -6)$

2. $2x + 5y = -7$
 $3x - y = -2$

$\begin{array}{r} +4 \quad +4 \\ \hline 3x = y - 2 \\ +2 \quad +2 \\ \hline 3x + 2 = y \end{array}$

$2x + 5(3x + 2) = -7$
 $(2x) + (15x) + 10 = -7$
 $17x + 10 = -7$
 $\begin{array}{r} -10 \quad -10 \\ \hline 17x = -17 \\ \frac{17x}{17} = \frac{-17}{17} \end{array}$
 $x = -1$

$y = 3(-1) + 2$
 $y = -3 + 2$
 $y = -1$

$(-1, -1)$

3. $x = y - 4.2$
 $2x - 3y = -9$

$2(y - 4.2) - 3y = -9$
 $(2y - 8.4) - 3y = -9$
 $-y - 8.4 = -9$
 $\begin{array}{r} +8.4 \quad +8.4 \\ \hline -y = -0.6 \\ \frac{-y}{-1} = \frac{-0.6}{-1} \end{array}$
 $y = 0.6$

$x = 0.6 - 4.2$
 $x = -3.6$

$(-3.6, 0.6)$

$$y = \underline{2x + 8}$$

$$\underline{y} = -3x - 7$$

$$y = 2x + 8$$

$$y = -3x - 7$$

$$2x + 8 = -3x - 7$$

$$+3x$$
$$+3x$$

$$5x + 8 = -7$$

$$-8 \quad -8$$

$$5x = -15$$

$$\frac{5x}{5} = \frac{-15}{5}$$
$$\frac{-15}{5}$$

$$x = -3$$

$$x = 2y - 8$$

$$2y + 3x = 10$$

$$y = 2(-3) + 8$$

$$= -6 + 8$$

$$= 2$$

$$(-3, 2)$$

Recreation Casey wants to buy a gym membership. One gym has a \$150 joining fee and costs \$35 per month. Another gym has no joining fee and costs \$60 per month.

$$\begin{aligned} \textcircled{1} \quad y &= 150 + 35x \\ \textcircled{2} \quad y &= \underline{60x} \end{aligned}$$

x - month
 y - cost (\$)

$$\begin{array}{r} 60x = 150 + 35x \\ -35x \qquad \qquad -35x \\ \hline 25x = 150 \\ \underline{25} \quad \underline{25} \end{array}$$

$$x = 6$$

Recreation Casey wants to buy a gym membership. One gym has a \$150 joining fee and costs \$35 per month. Another gym has no joining fee and costs \$60 per month.

$$\begin{aligned} \textcircled{1} & y = 150 + 35x \\ \textcircled{2} & y = \underline{60x} \end{aligned}$$

x - months
y - total cost

$$\begin{array}{r} 60x = 150 + 35x \\ -35x \quad \quad -35x \\ \hline \end{array}$$

$$\frac{25x}{25} = \frac{150}{25}$$

$$x = 6$$

Recreation Casey wants to buy a gym membership. One gym has a \$150 joining fee and costs \$35 per month. Another gym has no joining fee and costs \$60 per month.

- a. In how many months will both gym memberships cost the same? What will that cost be? **6 months; \$360**
- b. If Casey plans to cancel in 5 months, which is the better option for him? Explain. **The second Gym; Gym one's service costs \$325, while Gym two's costs only \$300**

$$150 + 35x = y$$

$$60x = y$$



Landscaping The gardeners at Middleton Place Gardens want to plant a total of 45 white and pink hydrangeas in one flower bed. In another flower bed, they want to plant 120 hydrangeas. In this bed, they want 2 times the number of white hydrangeas and 3 times the number of pink hydrangeas as in the first bed. Use a system of equations to find how many white and how many pink hydrangeas the gardeners should buy altogether.

45 white; 120 pink

$$w + p = 45$$

$$2w + 3p = 120$$



Fitness Rusty burns 5 Calories per minute swimming and 11 Calories per minute jogging. In the morning, Rusty burns 200 Calories walking and swims for x minutes. In the afternoon, Rusty will jog for x minutes. How many minutes must he jog to burn at least as many Calories y in the afternoon as he did in the morning? Round your answer up to the next whole number of minutes.

34 minutes

$$200 + 5x = y$$
$$11x = y$$



Homework

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