warm up:

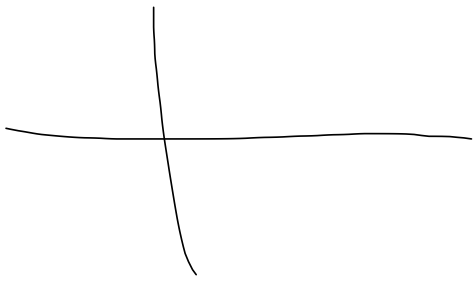
Is (6, 4) a solution to the system of equations?

x = -2y
x - y = -12

$6 = -2(4)$
false

$6 - 4 = -12$
false

Not a solution



$y = mx + b$

answers HW page 60-61 odd

1. Mindy opens a bank account with $55 and starts saving $5 per week. Sean's grandma gives him $100 for his birthday, but he spends $10 every week. After how many weeks will they have the same amount of money, and how much will that be?

Let x = weeks
Let y = total savings

Mindy: $y = 5x + 55$
Sean: $y = -10x + 100$

$5x + 55 = -10x + 100$
$+10x \quad\quad -55$
$15x = 45$
$x = 3$

$y = 5(3) + 55$
$15 + 55$
$y = 70$ ✓

$y = -10(3) + 100$
$-30 + 100$
$y = 70$ ✓

Sentence: In 3 weeks they will both have 70 dollars saved.

3. Ryan and Carlos are getting in shape for football season. Ryan starts at 140 pounds, and gains two pounds per week. Carlos starts at 195 pounds, but loses three pounds per week. In how many weeks will they both weigh the same amount, and what will that weight be?

Let x = weeks
Let y = total weight/pounds

Ryan: $y = 2x + 140$
Carlos: $y = -3x + 195$

$2x + 140 = -3x + 195$
$+3x \quad\quad -140$
$\frac{5x}{5} = \frac{55}{5}$
$x = 11$

$y = 2(11) + 140$
$22 + 140$
$y = 162$ ✓

$y = -3(11) + 195$
$-33 + 195$
$y = 162$ ✓

Sentence: In 11 weeks they will both weigh 162 pounds.

5. A caterpillar is sitting on a wall 4 inches above ground, and then begins crawling down the wall at a rate of one inch per minute. An ant starts climbing up the wall from one inch above ground at a rate of half an inch per minute. How long will it be until both bugs are the same distance above the ground and how far will that be?

Let x = minutes
Let y = inches above ground

Caterpillar: $y = -x + 4$
Ant: $y = \frac{1}{2}x + 1$

$-x + 4 = \frac{1}{2}x + 1$ (2) (2) (2) (2)
$-2x + 8 = x + 2$
$-x \quad -8$
$\frac{-3x}{-3} = \frac{-6}{-3}$
$x = 2$

$y = -2 + 4$
$y = 2$ ✓

$y = \frac{1}{2}(2) + 1$
$y = 1 + 1$
$y = 2$ ✓

Sentence: In 2 minutes both bugs will be at 2 inches above ground.

7. The average number of people who watched the original season of Survivor was 62 million, but has since dropped by 8 million per season. That same year, American Idol debuted with only 20 million viewers, but since has been gaining viewers at a rate of 6 million viewers per season. How many years did it take before Survivor and American Idol had the same number of viewers and how many was it?

Let x = seasons / years
Let y = total viewers

Survivor: $y = -8x + 62$
American Idol: $y = 6x + 20$

$-8x + 62 = 6x + 20$
$-6x \quad -62$
$-14x = -42$
$x = 3$

$y = -8(3) + 62$
$y = -24 + 62$
$y = 38$ ✓

$y = 6(3) + 20$
$y = 18 + 20$
$y = 38$ ✓

Sentence: After 3 years both shows had 38 million viewers.

page 109

6–3 Solving Systems Using Elimination

Extending the Addition and Subtraction Properties of Equality can be used to solve a system of equations by the elimination or addition method.

Example 1: Adding Equations

Solve by elimination.

$$\begin{cases} 5x - 6y = -32 \\ 3x + 6y = 48 \end{cases}$$

Step 1 : Add the lines.

$$8x = 16$$

Step 2: Solve for x.

$$x = 2$$

Step 3: Find y.

$$5(2) - 6y = -32$$
$$10 - 6y = -32$$
$$-6y = -42$$
$$y = 7$$

Step 4: Write the solution as a coordinate.

The solution to the system is (2 , 7)

Step 5: Check.

√ Understanding Check:

Solve the system using elimination. Check your solution.

a. $\begin{cases} 5x - 2y = 4 \\ x + 2y = 8 \end{cases}$

$6x = 12$

$x = 2$

$2 + 2y = 8$

$2y = 6$

$y = 3$

$(2, 3)$

b. $\begin{cases} 2x + 3y = 11 \\ -2x + 9y = 1 \end{cases}$

$12y = 12$

$y = 1$

$2x + 3(1) = 11$

$2x + 3 = 11$

$2x = 8$

$x = 4$

$(4, 1)$

$5x - 2y = 4$

$-1x - 10y = -40$

$-12y = -36$

$y = 3$

109

$-32 = -32$ ✓ $48 = 4$

√ Understanding Check:

Solve the system using elimination. Check your solution.

a. $\begin{cases} 5x - 2y = 4 \\ x + 2y = 8 \end{cases}$ (+)

$6x = 12$

$\frac{6x}{6} = \frac{12}{6}$

$x = 2$

$(2) + 2y = 8$

$\hookrightarrow -2$

$2y = 6$

$\frac{2y}{2} = \frac{6}{2}$

$y = 3$

$(2, 3)$

b. $\begin{cases} 2x + 3y = 11 \\ -2x + 9y = 1 \end{cases}$ (+)

$12y = 12$

$\frac{12y}{12} = \frac{12}{12}$

$y = 1$

$2x + 3(1) = 11$

$2x + 3 = 11$

$\hookrightarrow -3$

$2x = 8$

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$

$(4, 1)$

page 111

Example 4: Multiplying One Equation First to Solve a System

Elimination method only works when one set of variables adds up to zero. Sometimes you must first use the distributive property of equality with one or both of the equations to get a set of variable equal in number, but opposite in sign.

Solve by the elimination method.

$$\begin{cases} 2x + 5y = -22 \\ 10x + 3y = 22 \end{cases}$$

-5

Step 1: Choose a variable to eliminate.

Step 2: Multiply one equation by a factor that will get the terms equal but opposite.

Step 3: Add and solve.

Step 4: Find other variable.

Step 5: Write the solution as a coordinate.

$$-10x - 25y = 110$$
$$+\ 10x + 3y = 22$$
$$-22y = 132$$
$$y = -6$$

$10x + 3(-6) = 22$

$10x - 18 = 22$

$10x = 40$

$x = 4$

$(4, -6)$

√ Understanding Check:
Solve by elimination:

a. $\begin{cases} -2x + 15y = 28 \\ 7x + 5y = 17 \end{cases}$ -3

$-2x + 15y = 28$
$+ \quad -21x - 15y = -51$
$-23x = -23$
$x = 1$

$-2(1) + 15y = 28$
$-2 + 15y = 28$
$15y = 30$
$y = 2$
$(1, 2)$

b. $\begin{cases} 3x + 6y = -6 \\ 5x - 2y = 14 \end{cases}$ 3

$3x + 6y = -6$
$15x - 6y = 42$
$18x = 36$
$x = 2$

$3(2) + 6y = -6$
$6 + 6y = -6$
$6y = -12$
$y = -2$
$(2, -2)$

√ Understanding Check:

Solve by elimination:

a. $\begin{cases} -2x + 15y = 28 \\ 7x + 5y = 17 \end{cases}$

$-3(7x + 5y = 17)$

$+ \quad -2x + 15y = 28$

$\quad -21x - 15y = -51$

$\quad -23x = -23$

$\quad \frac{-23x}{-23} = \frac{-23}{-23}$

$x = 1$

$7(1) + 5y = 17$

$7 + 5y = 17$

$\quad -7 \quad -7$

$5y = 10$

$y = 2$

$(1, 2)$

b. $\begin{cases} 3x + 6y = -6 \\ 5x - 2y = 14 \end{cases}$

$3(5x - 2y = 14)$

$+ \quad 3x + 6y = -6$

$\quad 15x - 6y = 42$

$\quad \frac{18x}{18} = \frac{36}{18}$

$x = 2$

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

$6 + 6y = -6$

$\quad -6 \quad -6$

$6y = -12$

$y = -2$

$(2, -2)$

page 112

Example 5: Multiplying Both Equations to Solve a System

Sometimes you have to multiply _____ equations before you can eliminate a variable:

Solve by elimination.

$$\begin{cases} 4x + 2y = 14 \\ 7x - 3y = -8 \end{cases}$$

Step 1: Choose a variable to eliminate.

Step 2: Multiply each equation by factors that will get the terms equal but opposite.

Step 3: Add and solve.

Step 4: Find other variable.

Step 5: Write the solution as a coordinate.

$3(4x + 2y = 14) \rightarrow 12x + 6y = 42$

$2(7x - 3y = -8) \rightarrow 14x - 6y = -16$

$+$

$26x = 26$

$x = 1$

$7(1) - 3y = -8$

$7 - 3y = -8$

$-3y = -15$

$y = 5$

$(1, 5)$

√ Understanding Check:

Solve by elimination.

a. $\begin{cases} 15x + 3y = 9 \\ 10x + 7y = -4 \end{cases}$

b. $\begin{cases} 7x - 3y = -5 \\ 3x + 2y = 11 \end{cases}$

√ Understanding Check:

Solve by elimination.

a. $2(15x + 3y = 9)$

$-3(10x + 7y = -4)$

$30x + 6y = 18$

$+ \quad -30x - 21y = 12$

$-15y = 30$

$y = -2$

$10x + 7(-2) = -4$

$10x - 14 = -4$

$\hookrightarrow +14$

$10x = 10$

$x = 1$

$(1, -2)$

b. $2(7x - 3y = -5)$

$3(3x + 2y = 11)$

$14x - 6y = -10$

$9x + 6y = 33$

$23x = 23$

$x = 1$

$3(1) + 2y = 11$

$3 + 2y = 11$

$\hookrightarrow -3$

$2y = 8$

$y = 4$

$(1, 4)$

112

Homework:

HW page 62 #1-6 ONLY
and
HW page 63 ALL