Warm Up

3/23

Solve the following system of equations:

$$\begin{cases} -y = 3 - x \\ 7x - y = -3 \end{cases}$$

$7x + (3 - x) = -3$

$-y = 3 - x \rightarrow x - y = 3$

$7x - y = -3$

$$\begin{cases} x - y = 3 \\ -1(7x - y = -3) \end{cases}$$

$$\begin{array}{r} x - y = 3 \\ -7x + y = -3 \\ \hline -6x = 6 \end{array}$$

Homework Questions?

Elimination Practice

1. $x - y = 1$
$+\ x + y = -9$

$2x = -8$
$\frac{2x}{2} = \frac{-8}{2}$
$x = -4$

$x + y = -9$
$-4 + y = -9$
$+4 \quad +4$
$y = -5$

$(-4, -5)$

2. $p + q = -2$
$+\ p - q = 8$

$2p = 6$
$\frac{2p}{2} = \frac{6}{2}$
$p = 3$

$p + q = -2$
$3 + q = -2$
$-3 \quad -3$
$q = -5$

$(3, -5)$

3. $4x + y = 23$
$+\ 3x - y = 12$

$7x = 35$
$\frac{7x}{7} = \frac{35}{7}$
$x = 5$

$4x + y = 23$
$4(5) + y = 23$
$20 + y = 23$
$-20 \quad -20$
$y = 3$

$(5, 3)$

4. $2x + 5y = -3$
$-\ 2x + 2y = 6$

$3y = -9$
$\frac{3y}{3} = \frac{-9}{3}$
$y = -3$

$2x + 5y = -3$
$2x + 5(-3) = -3$
$2x - 15 = -3$
$+15 \quad +15$
$2x = 12$
$\frac{2x}{2} = \frac{12}{2}$
$x = 6$

$(6, -3)$

5. $3x + 2y = -1$
$-\ 4x + 2y = -6$

$-x = 5$
$\frac{-x}{-1} = \frac{5}{-1}$
$x = -5$

$3x + 2y = -1$
$3(-5) + 2y = -1$
$-15 + 2y = -1$
$+15 \quad +15$
$2y = 14$
$\frac{2y}{2} = \frac{14}{2}$
$y = 7$

$(-5, 7)$

6. $5x + 3y = 22$
$-\ 5x - 2y = 2$

$5y = 20$
$\frac{5y}{5} = \frac{20}{5}$
$y = 4$

$5x + 3y = 22$
$5x + 3(4) = 22$
$5x + 12 = 22$
$-12 \quad -12$
$5x = 10$
$\frac{5x}{5} = \frac{10}{5}$
$x = 2$

$(2, 4)$

7. $5x + 2y = 7$
$-\ -2x + 2y = -14$

$\frac{7x}{7} = \frac{21}{7}$

$x = 3$

$5(3) + 2y = 7$
$15 + 2y = 7$
$-15 \quad -15$

$\frac{2y}{2} = \frac{-8}{2}$

$y = -4$

$(3, -4)$

8. $3x - 9y = -12$
$-\ 3x - 15y = -6$

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

$y = -1$

$3x - 9(-1) = -12$
$3x + 9 = -12$
$-9 \quad -9$

$\frac{3x}{3} = \frac{-21}{3}$

$x = -7$

$(-7, -1)$

9. $-4c - 2d = -2$
$-\ 2c - 2d = -14$

$\frac{-6c}{-6} = \frac{12}{-6}$

$c = -2$

$-4c - 2d = -2$
$-4(-2) - 2d = -2$
$8 - 2d = -2$
$-8 \quad -8$

$\frac{-2d}{-2} = \frac{-10}{-2}$

$d = 5$

$(-2, 5)$

10. $2x - 6y = 6$
$-\ 2x + 3y = 24$

$\frac{-9y}{-9} = \frac{-18}{-9}$

$y = 2$

$2x - 6y = 6$
$2x - 6(2) = 6$
$2x - 12 = 6$
$+12 \quad +12$

$\frac{2x}{2} = \frac{18}{2}$

$x = 9$

$(9, 2)$

11. $7x + 2y = 2$
$-\ 7x - 2y = -30$

$\frac{4y}{4} = \frac{32}{4}$

$y = 8$

$7x + 2(8) = 2$
$7x + 16 = 2$
$-16 \quad -16$

$\frac{7x}{7} = \frac{-14}{7}$

$x = -2$

$(-2, 8)$

12. $4.25x - 1.28y = -9.2$
$+\ x + 1.28y = 17.6$

$\frac{5.25x}{5.25} = \frac{8.4}{5.25}$

$x = 1.6$

$4.25(1.6) - 1.28y = -9.2$
$6.8 - 1.28y = -9.2$
$-6.8 \quad -6.8$

$\frac{-1.28y}{-1.28} = \frac{-16}{-1.28}$

$y = 12.5$

$(1.6, 12.5)$

More Challenging

Use elimination to solve each system of equations.

1. $\begin{cases} x + y = -9 \\ 5x - 2y = 32 \end{cases}$

$5[x + y = -9] \rightarrow 5x + 5y = -45$

$5x - 2y = 32$

$7y = -77$

$y = -11$

$x + y = -9$

$x + (-11) = -9$

$x = 2$

$(2, -11)$

2. $\begin{cases} 3x + 2y = -9 \\ x - y = -13 \end{cases}$

$2[x - y = -13] \rightarrow 2x - 2y = -26$

$3x + 2y = -9$

$5x = -35$

$x = -7$

$x - y = -13$

$-7 - y = -13$

$-y = -6$

$y = 6$

$(-7, 6)$

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

$2[-x + 3y = -7] \rightarrow -2x + 6y = -14$

$2x + 5y = 3$

$11y = -11$

$y = -1$

$-x + 3(-1) = -7$

$-x - 3 = -7$

$-x = -4$

$x = 4$

$(4, -1)$

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

$2[2x + y = 3] \rightarrow 4x + 2y = 6$

$-4x - 4y = -8$

$-2y = -2$

$y = 1$

$2x + (1) = 3$

$2x = 2$

$x = 1$

$(1, 1)$

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

$2[3x - y = -8] \rightarrow 6x - 2y = 16$

$4x - 2y = -14$

$-2x = 2$

$x = -1$

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

$-3 - y = -8$

$-y = -5$

$y = 5$

$(-1, 5)$

6. $\begin{cases} 2x + y = 0 \\ 5x + 3y = 2 \end{cases}$

$3[2x + y = 0] \rightarrow 6x + 3y = 0$

$5x + 3y = 2$

$x = -2$

$2(-2) + y = 0$

$-4 + y = 0$

$y = 4$

$(-2, 4)$

7. $3[5x + 3y = -10]$
$5[3x + 5y = -6]$

$15x + 9y = -30$
$-15x + 25y = -30$
$-16y = 0$
$\frac{-16y}{-16} = \frac{0}{-16}$
$y = 0$

$5x + 3(0) = -10$
$5x + 0 = -10$
$\frac{5x}{5} = \frac{-10}{5}$
$x = -2$

$(-2, 0)$

8. $4[2x + 3y = 14]$
$3[3x - 4y = 4]$

$8x + 12y = 56$
$+ 9x - 12y = 12$
$\frac{17x}{17} = \frac{68}{17}$
$x = 4$

$2(4) + 3y = 14$
$8 + 3y = 14$
$-8 \quad -8$
$\frac{3y}{3} = \frac{6}{3}$
$y = 2$

$(4, 2)$

9. $-2[2x - 3y = 21]$
$3[5x - 2y = 25]$

$-4x + 6y = -42$
$+ 15x - 6y = 75$
$\frac{11x}{11} = \frac{33}{11}$
$x = 3$

$2(3) - 3y = 21$
$6 - 3y = 21$
$-6 \quad -6$
$\frac{-3y}{-3} = \frac{15}{-3}$
$y = -5$

$(3, -5)$

10. $5[3x + 2y = -26]$
$2[4x - 5y = -4]$

$15x + 10y = -130$
$+ 8x - 10y = -8$
$\frac{23x}{23} = \frac{-138}{23}$
$x = -6$

$3(-6) + 2y = -26$
$-18 + 2y = -26$
$+18 \quad +18$
$\frac{2y}{2} = \frac{-8}{2}$
$y = -4$

$(-6, -4)$

11. $2[3x - 6y = -3]$
$3[2x + 4y = 30]$

$6x - 12y = -6$
$+ 6x + 12y = 90$
$\frac{12x}{12} = \frac{84}{12}$
$x = 7$

$3(7) - 6y = -3$
$21 - 6y = -3$
$-21 \quad -21$
$\frac{-6y}{-6} = \frac{-24}{-6}$
$y = 4$

$(7, 4)$

12. $3[5x + 2y = -3]$
$-2[3x + 3y = 9]$

$15x + 6y = -9$
$+ -6x - 6y = -18$
$\frac{9x}{9} = \frac{-27}{9}$
$x = -3$

$3(-3) + 3y = 9$
$-9 + 3y = 9$
$+9 \quad +9$
$\frac{3y}{3} = \frac{18}{3}$
$y = 6$

$(-3, 6)$

Pick a Practice Sheet

DID YOU HEAR ABOUT the antelope who was getting dressed when he was trampled by a herd of buffalo?

Well,	1	2	3	4	5	6
7	8	9	10	11	12	13

Solve each system of equations by the substitution method. Write the word next to the correct answer in the box containing the exercise number.

1. $y = 3x$
$5x + 2y = 44$

2. $x = 5y - 1$
$x + 2y = 13$

3. $y = 2x + 7$
$3x - y = -9$

4. $-2x + 3y = 11$
$x = 4y - 3$

5. $y = 6x - 5$
$y = -x + 9$

6. $-3x + y = 7$
$5x + 2y = 3$

7. $x - y = 11$
$3x + 10y = -6$

8. $-4x + y = 4$
$2x + 2y = 13$

9. $x + y = 1$
$5x - 4y = -7$

10. $-5x + 3y = 11$
$x - 2y = 2$

11. $x + 9y = -1$
$2x + 4y = 5$

12. $-5x + y = 35$
$3x + 2y = -21$

13. A math test is worth 100 points and has 30 problems. Each problem is worth either 3 points or 4 points. How many 4-point problems are there?

$(-2, 2)$ OFTEN
$\left(\frac{1}{2}, -3\right)$ RANGE
$(9, 2)$ FAR
$(-7, 0)$ STAMPED
$(2, 7)$ KNOW
$\left(-\frac{1}{3}, \frac{4}{3}\right)$ FIRST
$(4, 12)$ AS
$(-1, -3)$ HOME
$(8, -3)$ WAS
$\left(\frac{7}{2}, -\frac{1}{2}\right)$ DRESSED
14 WESTERN
$(-7, -1)$ WE
$\left(-\frac{1}{3}, -1\right)$ BIGGEST
$(-1, 4)$ THIS
10 ANTELOPE
$(-4, -3)$ SELF
$(-2, 3)$ AS
$(2, 1)$ COWBOYS
$\left(\frac{1}{2}, 6\right)$ THE
$\left(-7, -\frac{1}{2}\right)$ DEFENSE

OBJECTIVE 6–d: To solve systems of equations by the addition method (multiplication by −1 may be required).

What Kind of Shoes Does a Frog Wear?

Solve each system of equations by the addition method. (You may first have to multiply both sides of one equation by −1.) Find your answer below and cross out the letter above it. When you finish, the answer to the title question will remain.

(1) $5x - 2y = 4$
$x + 2y = 8$

(2) $-3x + 2y = 11$
$3x - 4y = -19$

(3) $3x + y = 13$
$x + y = 3$

(4) $6x - 2y = 10$
$x - 2y = -5$

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

(6) $7x - 4y = -10$
$4y = x - 2$

(7) $x = 5 - 9y$
$4x + 9y = -7$

(8) $3x = 5y - 9$
$2y = 3x + 3$

(9) $x + 2y = -2$
$4x + 2y = -17$

(10) $-6x - 5y = 20$
$-y = 6x + 4$

(11) $-3x + y = -2$
$-2 = 7x - y$

(12) $10x - 5 = 3y$
$2x - 3y = 1$

S	H	O	L	D	P	R	E	S	A	N	T	I	O	E	N	A	I	D	R
$(0, -4)$	$(\frac{1}{2}, 0)$	$(3, 7)$	$(\frac{1}{3}, 2)$	$(-2, -1)$	$(-5, 3)$	$(3, 4)$	$(\frac{1}{2}, 2)$	$(2, 3)$	$(-4, 1)$	$(2, -4)$	$(-2, 2)$	$(-1, -5)$	$(-1, 6)$	$(-1, 4)$	$(-5, \frac{3}{2})$	$(5, -3)$	$(5, -2)$	$(-5, 4)$	$(1, -3)$

What Does Cate Often Call Her Twin Sister?

Solve the system of equations using multiplication with the addition method. Then cross out the letter next to the correct answer. When you finish, the answer to the title question will remain.

N	(3, 1)
E	(1, −5)
I	(2, −3)
O	(2, −1)
W	(−2, 4)
T	56, 44
A	(4, 0)
R	(−2, −5)
E	(1, 4)
C	(−1, 1)
S	65, 35
I	(0, 2)
E	(5, −2)
L	(5, −3)
B	(−1, −3)
U	(0, −4)
P	(−2, −2)
U	(3, −6)
R	(4, 3)
O	(−2, 1)
D	72, 28
A	(5, 0)

1. $3x + 2y = 11$
   $7x - y = 3$

2. $3x - 4y = 18$
   $x + 3y = -7$

3. $5x + 2y = -8$
   $9x - 4y = -22$

4. $x - 5y = 15$
   $4x - 3y = 26$

5. $2x + 5y = 11$
   $-3x + 8y = -1$

6. $7x - 3y = 2$
   $5x + 4y = -17$

7. $4x - 5y = -28$
   $-9x - 2y = 10$

8. $2x + 3y = 10$
   $3x - 10y = 15$

9. $-7x + 4y = -6$
   $2x - 5y = 21$

10. $8x + 3y = -12$
    $6x + 5y = -20$

11. $-4x - 9y = 1$
    $-x + 2y = -4$

12. $5x - 12y = -16$
    $-3x + 4y = 0$

13. An algebra teacher drove by a farmyard full of chickens and pigs. The teacher happened to notice that there were a total of 100 heads and 270 legs. How many chickens were there? How many pigs were there?

Homework

Finish classwork