6-3 Solve Systems of Linear Equations by Elimination

Name _____ Date _____

Solve: $\begin{cases} 5a + 3b = 113 \\ 7a - 3b = 7 \end{cases}$

1 Add the equations.

$$\begin{array}{rl} 5a + 3b = 113 & \leftarrow 3b \text{ and } -3b \text{ are opposites.} \\ +\ 7a - 3b = \ \ 7 & \leftarrow \text{Use the Addition Property of Equality.} \\ \hline 12a \quad\ = 120 & \end{array}$$

$$\frac{12a}{12} = \frac{120}{12} \leftarrow \text{Use the Division Property of Equality.}$$

$$a = 10$$

2 Substitute 10 for a in one of the original equations. Solve for b.

$$5(10) + 3b = 113 \leftarrow \text{Solve for } b \text{ by substituting 10 for } a.$$

$$50 - 50 + 3b = 113 - 50 \leftarrow \text{Use the Subtraction Property of Equality.}$$

$$\frac{3b}{3} = \frac{63}{3} \leftarrow \text{Use the Division Property of Equality.}$$

$$b = 21$$

Check: Substitute 10 for a and 21 for b in both of the original equations to check.

$$\begin{array}{r} 5a + 3b = 113 \\ 5(\mathbf{10}) + 3(\mathbf{21}) \stackrel{?}{=} 113 \\ \mathbf{50} + \mathbf{63} = 113 \\ 113 = 113 \ \textbf{True} \end{array} \qquad \begin{array}{r} 7a - 3b = 7 \\ 7(\mathbf{10}) - 3(\mathbf{21}) \stackrel{?}{=} 7 \\ \mathbf{70} - \mathbf{63} = 7 \\ 7 = 7 \ \textbf{True} \end{array}$$

So the solution of the system of equations is (10, 21).

Solve each system of equations by addition or subtraction.
Check your answer on a separate sheet of paper.

1. $\begin{cases} 4x + y = 56 \\ 2x + y = 34 \end{cases}$

$$\begin{array}{r} \mathbf{4x + y = 56} \\ \mathbf{-\ (2x + y = 34)} \\ \hline \mathbf{2x \quad\ = 22} \\ \mathbf{x = 11} \\ \mathbf{4(11) + y = 56} \\ \mathbf{44 + y = 56} \\ \mathbf{y = 12} \\ \mathbf{(11, 12)} \end{array}$$

2. $\begin{cases} 5x + y = 62 \\ 3x + y = 44 \end{cases}$

3. $\begin{cases} -4x + 5y = 36 \\ 4x + 6y = 52 \end{cases}$

4. $\begin{cases} 3x + 2y = 45 \\ -3x + 6y = 3 \end{cases}$

5. $\begin{cases} 2x - 0.7 = 5y \\ 0.3 + 5y = 3x \end{cases}$

6. $\begin{cases} -2y = 6x + 3.8 \\ 5x + 2.8 = 2y \end{cases}$

7. $\begin{cases} a + b = \frac{9}{10} \\ 5a + b = \frac{5}{2} \end{cases}$

8. $\begin{cases} 6c + d = \frac{4}{3} \\ c + d = \frac{1}{2} \end{cases}$

Solve each system of equations by addition or subtraction. Check your answer on a separate sheet of paper.

9. $\begin{cases} 4p - 8q = -2 \\ 8p + 3 = -8q \end{cases}$

10. $\begin{cases} 12v - 6w = 6 \\ 24v + 3 = -6w \end{cases}$

11. $\begin{cases} -2t = u \\ 2u = 2t + 14.4 \end{cases}$

12. $\begin{cases} -3m = n \\ 2n = 3m - 13.5 \end{cases}$

Solve. Show your work.

13. Wie spent \$7.75 for x apples at \$1.25 per pound and y oranges at \$2 per pound. Jason spent \$8.25 for x apples at \$1.25 per pound and y oranges at \$2.25 per pound. How many pounds of fruit did each person buy?

14. Exercise Holly spends 30.5 min on an exercise bike and 45.5 min on an elliptical trainer, and she burns 504.25 cal. Kate spends 23 min on the exercise bike and 45.5 min on the elliptical trainer, and she burns 472 cal. How many cal per min are burned on each machine?

15. The sum of two numbers is $\frac{31}{35}$, and their difference is $\frac{11}{35}$. What are the numbers?

16. The sum of two numbers is -12.43 and their difference is 117.77. What are the numbers?

TEST PREPARATION

17. If $-2y = x$ and $3x + 2y = -4$, then what is xy?

A. 6 **B.** -2 **C.** -4 **D.** -12

18. If $-\frac{1}{2}x + 5 = y$ and $\frac{1}{2}x - \frac{1}{3}y = 1$, then what is $x \div y$?

F. 0.75 **G.** 1 **H.** $\frac{4}{3}$ **J.** 12