Algebra 11-5 Solving Systems by Multiplication

Warm-Up

Solve.

1. $2x + 3 = 7$

$\quad\quad -3 \; -3$

$\quad\dfrac{2x}{2} = \dfrac{4}{2}$

$\boxed{x = 2}$

2. $4x + 6 = 14$

$\quad\quad -6 \; -6$

$\quad\dfrac{4x}{4} = \dfrac{8}{4}$

$\boxed{x = 2}$

3. What do you notice about the equations you just solved? __Same solution__

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$2(2x + 3 = 7)$

$\quad 4x + 6 = 14$

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Goal: To have opposite coefficients in front of the same variable. Then, add the equations **together to** eliminate **a variable.**

Examples

Solve each system of equation.

$a \quad b$

$(-3, 0)$

$-3 \left(\begin{array}{l} 5x + 2y = 11 \\ x + 6y = 19 \end{array}\right.$ 1.

$(1, 3)$
x, y

2. $-5 \left(\begin{array}{l} 5a + 3b = -15 \\ a + .5b = -3 \end{array}\right.$

$-15x - 6y = -33$
$1x + 6y = 19$
_____
$-14x = -14$
$\overline{-14} \quad \overline{-14}$

$x = 1$

$5x + 2y = 11$
$5 \cdot 1 + 2y = 11$
$5 + 2y = 11$
$ -5$
_____
$\dfrac{2y}{2} = \dfrac{6}{2}$

$y = 3$

$5a + 3b = -15$
$-5a - 2.5b = 15$
_____
$\dfrac{.5b}{.5} = \dfrac{0}{.5}$

$b = 0$

$5a + 3b = -15$
$5a + 3(0) = -15$
$\dfrac{5a}{5} = \dfrac{-15}{5} \quad a = -3$

Assignment: 11-5 #'s 9-16, 18, 20

$$9. \quad 4\left\{ \begin{array}{l} 5x + y = 30 \\ 3x - 4y = 41 \end{array} \right.$$

$$20x + 4y = 120$$
$$3x - 4y = 41$$
$$\overline{\qquad\qquad}$$
$$\frac{23x}{23} = \frac{161}{23}$$

$$\boxed{x = 7}$$

$$\boxed{(7,-5)}$$

$$5x + y = 30$$
$$5 \cdot 7 + y = 30$$
$$-35 + y = 30$$
$$\ -35 \quad -35$$
$$\overline{\qquad\qquad\qquad}$$
$$y = -5$$

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$$12 \cdot 7 \left[6m - 7n = 6 \right]$$
$$-6 \left[7m - 8n = 15 \right]$$

$$42m - 49n = 42$$
$$-42m + 48n = -90$$

$$\frac{-1n}{-1} = \frac{-48}{-1}$$
$$n = 48$$

$$6m - 7n = 6$$
$$6m - 7(48) = 6$$
$$6m - 336 = 6$$
$$+336 \quad +336$$
$$\frac{6m}{6} = \frac{342}{6} \qquad m = 57$$

$$\overset{m}{(} 57, \overset{n}{48})$$

$$10.\ ^{-3}(4a + b = 38$$
$$2a + 3b = 24$$

$$-12a + -3b = -114$$
$$2a + 3b = 24$$

$$\frac{-10a = -90}{-10 \quad -10}$$

$$a = 9$$

$$(9, 2)$$
$$\ \ a \ \ b$$

$$2(9) + 3b = 24$$
$$18 + 3b = 24$$
$$+18 \qquad -18$$
$$\frac{3b}{3} = \frac{6}{3}$$
$$b = 2$$