Name _____ Date _____

5.2 Notetaking with Vocabulary

I can describe different methods for solving systems of linear equations.
I can solve linear systems by substitution.
I can use systems of linear equations to solve real-life problems.

Core Concepts

Solving a System of Linear Equations by Substitution

(either x or y)

Step 1 Solve one of the equations for one of the variables. get a variable alone

look for a coefficient of -1/1

Step 2 Substitute the expression from Step 1 into the other equation and solve for the other variable. → get a #

Step 3 Substitute the value from Step 2 into one of the original equations and solve. → get a 2nd #

Step 4 Check the solution by substituting for x and y in each equation of the original system.

Practice: In Exercises 1–4, solve the system of linear equations by substitution. Check your solution.

1. $2x + 2y = 10$

$y = 5 + x$ y is alone

$2x + 2(5 + x) = 10$

$2x + 10 + 2x = 10$

$4x + 10 = 10$

$-10 \quad -10$

$4x = 0$

$x = 0$

$y = 5 + (0)$ x

$y = 5$

$(0, 5)$

Check: $2(0) + 2(5) \stackrel{?}{=} 10$

$10 = 10$ ✓

$5 = 5 + 0$

$5 = 5$ ✓

2. $2x - y = 3$

$x = -2y - 1$

3. $x - 3y = -1$

$x = y$

$y - 3y = -1$

$-2y = -1$

$y = \frac{1}{2}$

$x = \frac{1}{2}$

$(\frac{1}{2}, \frac{1}{2})$

Check:

$\frac{1}{2} - 3(\frac{1}{2}) \stackrel{?}{=} -1$

$\frac{1}{2} - \frac{3}{2} \stackrel{?}{=} -1$

$-\frac{2}{2} = -1$

$-1 = -1$ ✓

$\frac{1}{2} = \frac{1}{2}$ ✓

4. $y = \frac{3}{4}x + 1$

$y = \frac{1}{4}x + 3$

$\frac{1}{4}x + 3 = \frac{3}{4}x + 1$

$-\frac{1}{4}x \quad -\frac{1}{4}x$

$3 = \frac{1}{2}x + 1$

$-1 \quad -1$

$2 \cdot 2 = \frac{1}{2}x \cdot 2$

$x = 4$

$y = \frac{3}{4}(4) + 1$

$y = 3 + 1$

$y = 4$

$(4, 4)$

Check

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5.2 Notetaking with Vocabulary (continued)

In Exercises 5 - 7, solve the system of linear equations by substitution. Check your solution.

5. $2x - 3y = 0$
$y = 4$

-2
$\frac{-4}{1} \cdot \frac{1}{2}$
-2
$\frac{-4}{1} \cdot \frac{-5}{2}$

6. $7x - 4y = 8$
$5x - y = 2$

If possible look for -1 or 1 as coefficient.

choose →
$-5x \quad -5x$
$\frac{-y}{-1} = \frac{-5x}{-1} + \frac{2}{-1}$
$y = 5x - 2$

7. $3x - 4y = -1$
$5x + 2y = 7$

$5x + 2y = 7$
$-5x \quad -5x$
$\frac{2y}{2} = \frac{-5x}{2} + \frac{7}{2}$
$y = -\frac{5}{2}x + \frac{7}{2}$

$3x - 4\left(-\frac{5}{2}x + \frac{7}{2}\right) = -1$
$3x + 10x - 14 = -1$
$13x - 14 = -1$
$+14 \quad +14$
$13x = 13$
$x = 1$

8. An adult ticket to a museum costs \$3 more than a children's ticket. When 200 adult tickets and 100 children's tickets are sold, the total revenue is \$2100. What is the cost of a children's ticket? Use your understanding of linear systems to solve this problem. Be sure to define your variables.

x = cost of adult ticket
y = cost of children's ticket
$y + 3 = x$