Principles of Algebra Name/Date Clee / Today

ALL PROBLEMS CAN BE COMPLETED ON THIS WORKSHEET

WS 9B.1 – Solving Systems of Equations by Substitution

#1-7, Solve each system of equations by the substitution method.

1. $\begin{cases} y = x + 1 \\ 2x + y = 7 \end{cases}$

$2x + y = 7$
$2x + (x+1) = 7$
$2x + x + 1 = 7$
$3x + 1 = 7$
$3x = 6$
$x = 2$

$y = x + 1$
$y = 2 + 1$
$y = 3$

The solution is $(2, 3)$.

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

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

$x = y - 3$
$x = 3 - 3$
$x = 0$

The solution is $(0, 3)$.

3. $\begin{cases} 4x - y = 0 \\ 12x - 6y = 24 \end{cases}$ → $4x - y = 0$
$-y = -4x$
$y = 4x$

$12x - 6y = 24$
$-6(4x) = 24$
$12x - 24x = 24$
$-12x = 24$
$x = -2$

$y = 4x$
$y = 4(-2)$
$y = -8$

The solution is $(-2, -8)$.

4. $\begin{cases} 2x - 5y = -28 \\ 3x + 15y = 3 \end{cases}$ → $3x + 15y = 3$
$3x = 3 - 15y$
$x = 1 - 5y$

$2x - 5y = -28$
$2(1-5y) - 5y = -28$
$2 - 10y - 5y = -28$
$2 - 15y = -28$
$-15y = -30$
$y = 2$

$x = 1 - 5y$
$x = 1 - 5(2)$
$x = 1 - 10$
$x = -9$

The solution is $(-9, 2)$.

5. $\begin{cases} 2x = 4y \\ 7x + 2y = -8 \end{cases}$ → $2x = 4y$, $x = 2y$

$7x + 2y = -8$
$7(2y) + 2y = -8$
$14y + 2y = -8$
$16y = -8$
$y = -\frac{1}{2}$

$x = 2y$
$x = 2\left(-\frac{1}{2}\right)$
$x = -1$

The solution is $\left(-1, -\frac{1}{2}\right)$.

6. $\begin{cases} 4y = 8x - 12 \\ 2x - y = -5 \end{cases}$ → $2x - y = -5$

$-y = -2x - 5$
$y = 2x + 5$

$4y = 8x - 12$
$4(2x + 5) = 8x - 12$
$8x + 5 = 8x - 12$
$5 \neq -12$

This system has no solution.

(These lines are parallel.)

7. $\begin{cases} -4x - y = 5 \\ 12x + 3y = -15 \end{cases}$ → $-4x - y = 5$

$-y = 4x + 5$
$y = -4x - 5$

$12x + 3y = -15$
$12x + 3(-4x - 5) = -15$
$12x - 12x - 15 = -15$
$-15 = -15$

Infinitely many solutions. All points on $y = -4x - 5$ are solutions to the system.

(These two lines are the same line.)

8. Mando has three times as many quarters as dimes. If the sum of the number of dimes and twice the number of quarters is 21, how many of each type of coin does he have?

let d = number of dimes

let q = number of quarters

$\begin{cases} q = 3d \\ d + 2q = 21 \end{cases}$

$d + 2q = 21$
$d + 2(3d) = 21$
$d + 6d = 21$
$7d = 21$
$d = 3$

$q = 3d$
$q = 3(3)$
$q = 9$

Mando has 3 dimes and 9 quarters.