"Systems of Equations"

Name: _____ *Period:* _____

For problems #1-2 Solve the systems of equations by substitution. Then check your answer.

1. $\begin{cases} x = 5 - y \\ y - 2x = 11 \end{cases}$

$x = 5 - 7 = -2$

$y - 2(5 - y) = 11$

$y - 10 + 2y = 11$ $\therefore (-2, 7)$

$3y = 21$

$y = 7$ $\quad -2 = 5 - 7$, $-2 = -2$ ✓

Check $7 - 2(-2) = 11$ ✓

$11 = 11$

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

$\frac{-y}{-1} = \frac{6 - 2x}{-1}$ $\quad y = -6 + 2x$

$4x - 2(-6 + 2x) = 8$

$4x + 12 - 4x = 8$

$12 \neq 8$

$\therefore$ no solution. Lines are parallel

For problems #3-4 solve the systems of equations by elimination. Then check your answer.

3. $\begin{cases} -x + 2y = 12 \\ x + 6y = 20 \end{cases}$

$+$

$8y = 32$ $\quad \therefore (-4, 4)$

$\frac{8y}{8} = \frac{32}{8}$

$y = 4$

$x + 6(4) = 20$

$x + 24 = 20$

$x = -4$

Check

$-(-4) + 2(4) = 12$

$12 = 12$ ✓

$-4 + 6(4) = 20$

$-4 + 24 = 20$

$20 = 20$ ✓

4. $\begin{cases} 2x + 3y = 18 \\ 3(5x - y = 11) \end{cases}$ $\quad \therefore (3, 4)$

$15x - 3y = 33$

$+ \; 2x + 3y = 18$

$17x = 51$

$x = 3$

$2(3) + 3y = 18$

$3y = 12$

$y = 4$

Check

$5(3) - 4 = 11$

$11 = 11$ ✓

$2(3) + 3(4) = 18$

$6 + 12 = 18$

$18 = 18$ ✓

For problems #5-8, use the best method. Then check your answer.

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

$+ \; -2x + 6y = 2$

$2y = 4$

$y = 2$

$2x - 4(2) = 2$

$2x - 8 = 2$

$2x = 10$

$x = 5$

$(5, 2)$

Check

$5 - 3(2) = -1$

$5 - 6 = -1$

$-1 = -1$ ✓

$2(5) - 4(2) = 2$

$10 - 8 = 2$

$2 = 2$ ✓

6. $\begin{cases} 2x + 5y = 3 \\ 4x = -10y + 6 \end{cases}$

$\frac{4}{4} \quad \frac{4}{4}$

$x = -\frac{5}{2}y + \frac{3}{2}$

$2(-\frac{5}{2}y + \frac{3}{2}) + 5y = 3$

$-5y + 3 + 5y = 3$

$3 = 3$

$\therefore$ infinite solutions same line!

7. $\begin{cases} y = -5 - 3x \\ x - 2y = 3 \end{cases}$ $\therefore (-1, -2)$

$x - 2(-5 - 3x) = 3$

$x + 10 + 6x = 3$

$7x = -7$

$x = -1$

$y = -5 - 3(-1)$

$y = -2$

Check

$-1 - 2(-2) = 3$

$3 = 3$ ✓

$-2 = -5 - 3(-1)$

$-2 = -2$ ✓

8. $\begin{cases} -2x + 3y = 14 \\ (x + 2y = 7) + 2 \end{cases}$

$-2x + 3y = 14$

$+2x + 4y = +14$

$7y = 28$

$y = 4$

$x + 2(4) = 7$

$x = -1$

$\therefore (-1, 4)$

Check

$-2(-1) + 3(4) = 14$

$2 + 12 = 14$

$14 = 14$ ✓

$-1 + 2(4) = 7$

$-1 + 8 = 7$

$7 = 7$ ✓

For problems #9-10 Define variables and write a system of equations for each situation and then solve them algebraically to answer the questions.

9. Joyce runs to the gym (burning 150 calories). She does a workout on the treadmill burning 10 cal/min. Josiah drives to the gym (burning 0 calories… except for maybe two when he busts a move to Justin Bieber tunes) and does a cross-fit workout burning 40 cal/min. How long will it take for Joyce and Josiah to burn the same number of calories and how much will that be?

y: total calories burned

x: # of minutes

Joyce: $y = 150 + 10x$

Josiah: $y = 40x$

$150 + 10x = 40x$

$150 = 30x$

$x = 5$

$y = 40(5)$

$y = 200$

After 5 mins they will both burn 200 calories

10. Ms. Zimmerman enjoys Bon Appétit and Martha Stewart magazines. She has a collection of 30 magazines total. Bon Appétit costs $3.29 per magazine and Martha Stewart costs $4.50 per magazine. Ms. Zimmerman has spent $113.22 total. How many of each magazine does she own?

B = Bon Appetit magazine

M = martha Stewart magazine

$B + M = 30$

$3.29B + 4.50M = 113.22$

$(B + M = 30) -3.29$

$-3.29B - 3.29M = -98.7$

$+ 3.29B + 4.50M = 113.22$

$+1.21M = +14.52$

$M = 12$

$B + 12 = 30$

$-12 \quad -12$

$B = 18$

Ms. Zimmerman owns 18 Bon Appetit and 12 martha stewart magazines.