

Coefficients  
the same  
and same  
sign

Sometimes the numbers in front are the same and when you add, no terms get eliminated.

When this happens multiply one of the equations by -1 so that ALL the signs change, and now when you add them they will cancel.

Step 1:  $3x - 4y = -1$   
 $-1(3x - y) = (-4) \cdot -1$   
 $-3x + y = 4$   
 $+ 3x - 4y = -1$

Step 2: Add  
 $-3y = 3$   
 $-3 \quad -3$   
 $y = -1$

Step 3: Solve  
 $3x - 4(-1) = -1$   
 $3x + 4 = -1$   
 $-4 \quad -4$   
 $3x = -5$   
 $\frac{3x}{3} = \frac{-5}{3}$   
 $x = -\frac{5}{3}$

Step 4: Sub in + Solve  
 $3x - 4y = -1$   
 $3(-\frac{5}{3}) - 4(-1) = -1$   
 $-5 + 4 = -1$   
 $-1 = -1$

Step 5:  $(-\frac{5}{3}, -1)$

Board Work

$-1(2x + y) = (34) \cdot -1$   
 $x + y = 24$   
 $+ -2x - y = -34$   
 $-x = -10$   
 $x = 10$   
 $(10) + y = 24$   
 $-10 \quad -10$   
 $y = 14$   
 $(10, 14)$

$-1(7m + 4n) = (2) \cdot -1$   
 $+ 7m + 2n = 8$   
 $-7m - 4n = -2$   
 $-2n = 6$   
 $-2 \quad -2$   
 $n = -3$   
 $7m + 4n = 2$   
 $7m + 4(-3) = 2$   
 $7m - 12 = 2$   
 $+12 \quad +12$   
 $7m = 14$   
 $\frac{7m}{7} = \frac{14}{7}$   
 $m = 2$   
 $(m, n) \rightarrow (2, -3)$

$2x + y = 25$   
 $-3x + y = -20$   
 $(9, 7)$

$$\begin{array}{r}
 5) \quad 3x + 4y = 19 \\
 -1 \cdot (3x + 6y - 33) \rightarrow -3x - 6y = -33 \\
 \hline
 3x + 4y = 19 \\
 -3x - 6y = -33 \\
 \hline
 -2y = -14 \\
 \frac{-2}{-2} \quad \frac{-14}{-2} \\
 y = 7
 \end{array}$$

$$\begin{array}{r}
 17) \quad 3x + 6y = 33 \\
 \quad x + y = 28 \\
 + \quad x - y = 4 \\
 \hline
 2x = 32 \\
 x = 16
 \end{array}$$

$$\begin{array}{r}
 16 + y = 28 \\
 -16 \quad -16 \\
 \hline
 y = 12
 \end{array}$$

$$\begin{array}{r}
 21) \quad 2x + y = 25 \\
 + 3x - y = 20 \\
 \hline
 5x = 45 \\
 \frac{5x}{5} = \frac{45}{5} \\
 x = 9
 \end{array}$$

$$\begin{array}{r}
 2(9) + y = 25 \\
 18 + y = 25 \\
 -18 \quad -18 \\
 \hline
 y = 7
 \end{array}$$

$$\begin{array}{r}
 21) \quad 2x + y = 25 \\
 + 3x - y = 20 \\
 \hline
 5x = 45 \\
 \frac{5x}{5} = \frac{45}{5} \\
 x = 9
 \end{array}$$

$$\begin{array}{r}
 2x + y = 25 \\
 2(9) + y = 25 \\
 18 + y = 25 \\
 -18 \quad -18 \\
 \hline
 y = 7
 \end{array}$$

(9, 7)

$$\begin{array}{r}
 20) \quad x + y = 54 \\
 + x - y = 4 \\
 \hline
 2x = 58 \\
 \frac{2x}{2} = \frac{58}{2} \\
 x = 29
 \end{array}$$

$$\begin{array}{r}
 x - y = 4 \\
 (29) - y = 4 \\
 -29 \quad -29 \\
 \hline
 -y = -25 \\
 \frac{-y}{-1} = \frac{-25}{-1} \\
 y = 25
 \end{array}$$

15)

$$\begin{array}{r} 7m + 4n = 2 \\ (7m + 2n = 8)(-1) \end{array} + \begin{array}{r} 7m + 4n = 2 \\ -7m - 2n = -8 \end{array}$$

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$$\begin{array}{r} 2n = -6 \\ \frac{2n}{2} = \frac{-6}{2} \\ n = -3 \end{array}$$

## Summary

**Objective:** To be able to determine the solution types of a system of equations as well as what the solutions are using elimination.

**Virtue:** If a solution works for you and it works for some one else then it works for both of you and is THE solution to your problem.

**Skill:** This method is why standard form is really important.

Many real world problems can be solved by a system of equations and if you are good at them then you can bust it out to easily find the solution. The more variables that you must solve for the more equations you need to solve them with, and they can be linear, quadratic, cubic, or anything.

Assignment: Workbooks 5-3

pg. 251

#3,4,5,7,9, and:

$$3x + 4y = 19 \text{ and } 3x + 6y = 33$$

## Homework Answers pg. 251:

3. (1,6) 4. (-3,29) 5. (4,5)

7. (-1,2) 9.(0, -10)

$$3x + 4y = 19$$

$$3x + 6y = 33$$

$$(-3,7)$$