

## Solving a System of Equations Using the Elimination Method

Steps:

1. **Arrange** the equations with **like terms** in columns.
2. Multiply one or both of the equations by a number to **get coefficients** that are **opposites** for one of the variables.
3. **Add** the **equations** thus eliminating one of the variables. Solve for the remaining variable.
4. **Substitute** the numerical value obtaining in step 3 **into either equation and solve** for the remaining variable.
5. Check



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### Examples:

1.  $x + y = 2$

$+ 2x - y = 2$

$$\begin{array}{r} \hline 3x \quad = 4 \\ \hline \frac{3x}{3} \quad = \frac{4}{3} \end{array}$$

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



$$\begin{array}{r} x + y = 2 \\ \frac{1}{3} + y = 2 \\ \hline -\frac{1}{3} \quad -\frac{1}{3} \\ \hline \boxed{y = \frac{2}{3}} \end{array}$$

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2.  $x + y = 12$   
 $+ x - y = 4$   


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 $\frac{2x}{2} = \frac{16}{2}$   
 $x = 8$

$x + y = 12$   
 $8 + y = 12$   
 $-8 \quad -8$   


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 $y = 4$

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 0110-1104-0116-0555  
 $2 + 2 =$   
 $5 + 6 =$



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3.  $2d = -14 + c$   
 $c + 3d = 9$   
 $-c + 2d = -14$   



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 $\frac{5d}{5} = \frac{-5}{5}$   
 $d = -1$

$2d = -14 + c$   
 $2(-1) = -14 + c$   
 $-2 = -14 + c$   
 $+14 \quad +14$   


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 $12 = c$



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4.  $x - 8 = -2y$

$x - 2y = 4$   
 $-4 + 2y - 4 + 2y$

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$x - 4 = 2y$

+  $x - 8 = -2y$

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$2x - 12 = 0$   
 $+12 +12$


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$2x = 12$   
 $\frac{2x}{2} = \frac{12}{2}$   
 $x = 6$

$x - 2y = 4$   
 $6 - 2y = 4$   
 $-6 -6$

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



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5.  $2(2m + n) = 12 \rightarrow -4m - 2n = -24$

$m + 2n = 9$     +  $m + 2n = 9$

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$-3m = -15$   
 $\frac{-3m}{-3} = \frac{-15}{-3}$

$m = 5$

$m + 2n = 9$   
 $5 + 2n = 9$   
 $-5 -5$

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$2n = 4$   
 $\frac{2n}{2} = \frac{4}{2}$   
 $n = 2$



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6.  $5r + 3m = 30$   
 $2r = 12 - 3m$   
 $\quad \quad \quad \underline{+3m \quad +3m}$   
 $- 2r + 3m = -12$   
 $\quad \quad \quad \underline{5r + 3m = 30}$   
 $\quad \quad \quad \frac{3r}{3} = \frac{18}{3}$   
 $\quad \quad \quad \boxed{r = 6}$

$5r + 3m = 30$   
 $5(6) + 3m = 30$   
 $30 + 3m = 30$   
 $\quad \quad \quad \underline{-30 \quad -30}$   
 $\quad \quad \quad \frac{3m}{3} = \frac{0}{3}$   
 $\quad \quad \quad \boxed{m = 0}$



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$3(5x - 2y) = 3(20)$   
 $2(2x + 3y) = 2(27)$

$15x - 6y = 60$   
 $\underline{4x + 6y = 54}$   
 $\frac{19x}{19} = \frac{114}{19}$   
 $\boxed{x = 6}$

$5x - 2y = 20$   
 $5(6) - 2y = 20$   
 $30 - 2y = 20$   
 $\quad \quad \quad \underline{-30 \quad -30}$   
 $\quad \quad \quad \frac{-2y}{-2} = \frac{-10}{-2} \quad \boxed{y = 5}$

Jan 22-12:46 PM

$$\begin{array}{r}
 x - 2y = 8 \\
 2y = 3x - 16 \\
 \underline{-3x \quad -3y} \\
 -3x + 2y = -16 \\
 \rightarrow +x - 2y = 8 \\
 \hline
 -2x \qquad = -8 \\
 \underline{-2} \qquad \underline{-2} \\
 \boxed{x = 4}
 \end{array}$$

$$\begin{array}{r}
 x - 2y = 8 \\
 4 - 2y = 8 \\
 \underline{-4 \qquad -4} \\
 -2y = 4 \\
 \underline{-2 \qquad -2} \\
 \boxed{y = -2}
 \end{array}$$

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$$\begin{array}{r}
 5(5a + 3b) = 17 \\
 3(4a - 5b) = 21 \\
 25a + 15b = 51 \\
 12a - 15b = 63 \\
 \hline
 37a \qquad = 114 \\
 \underline{37} \qquad \underline{37} \\
 \boxed{a = 4}
 \end{array}$$

$$\begin{array}{r}
 5a + 3b = 17 \\
 5(4) + 3b = 17 \\
 20 + 3b = 17 \\
 \underline{-20 \qquad -20} \\
 3b = -3 \\
 \underline{3 \qquad 3} \\
 \boxed{b = -1}
 \end{array}$$

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