

Algebra 2 // Practice 3

aka "Jeremy"

$$\begin{aligned} \text{① } x - 2y - 3z &= 1 \\ y - 3z &= -10 \\ 2z &= 6 \end{aligned}$$

$$\begin{aligned} \frac{2z}{2} &= \frac{6}{2} \\ z &= 3 \end{aligned}$$

$$\begin{aligned} y - 3(3) &= -10 \\ y - 9 &= -10 \\ \frac{+9}{+9} & \quad \frac{+9}{+9} \\ y &= -1 \end{aligned}$$

$$\begin{aligned} x - 2y - 3z &= 1 \\ x - 2(-1) - 3(3) &= 1 \\ x + 2 - 9 &= 1 \\ x - 7 &= 1 \\ \frac{+7}{+7} & \quad \frac{+7}{+7} \\ x &= 8 \end{aligned}$$

(8, -1, 3)

$$\begin{aligned} \text{② } z &= 7 \\ y + 2z &= 17 \\ x - 3y - 4z &= -32 \end{aligned}$$

$$\begin{aligned} y + 2(7) &= 17 & x - 3y - 4z &= -32 \\ y + 14 &= 17 & x - 3(3) - 4(7) &= -32 \\ \frac{-14}{-14} & \quad \frac{-14}{-14} & & \\ y &= 3 & x - 9 - 28 &= -32 \\ & & x - 35 &= -32 \\ & & \frac{+35}{+35} & \quad \frac{+35}{+35} \\ & & x &= 3 \end{aligned}$$

(3, 3, 7)

$$\begin{aligned} \text{③ } 2x - 3y + z &= -4 \\ 2y + 3z &= 9 \\ -2z &= -2 \end{aligned}$$

$$\begin{aligned} \frac{-2z}{-2} &= \frac{-2}{-2} \\ z &= 1 \end{aligned}$$

$$\begin{aligned} 2y + 3(1) &= 9 \\ 2y + 3 &= 9 \\ \frac{-3}{-3} & \quad \frac{-3}{-3} \\ 2y &= 6 \\ \frac{2y}{2} &= \frac{6}{2} \\ y &= 3 \end{aligned}$$

$$\begin{aligned} 2x - 3(3) + (1) &= -4 \\ 2x - 9 + 1 &= -4 \\ 2x - 8 &= -4 \\ \frac{+8}{+8} & \quad \frac{+8}{+8} \\ 2x &= 4 \\ \frac{2x}{2} &= \frac{4}{2} \rightarrow x = 2 \end{aligned}$$

(2, 3, 1)

Hints for 1-3:
 ↳ these are pretty straight forward. You can quickly solve for one variable. Plug in, and get second. Plug in both to get the last.

$$\boxed{4} \quad \textcircled{1} \quad 4x + 2y = 12$$

$$\textcircled{2} \quad -x + z = -2$$

$$\textcircled{3} \quad y + z = -4$$

$$\begin{array}{r} \textcircled{2} \quad -x + z = -2 \\ \textcircled{3} \quad -1(y + z = -4) \\ \hline -y - z = 4 \\ \hline -x + z = -2 \end{array}$$

$$\textcircled{4} \quad -x - y = 2$$

$$\textcircled{1} \quad 4x + 2y = 12$$

$$\textcircled{4} \quad +(-x - y = 2)$$

$$\begin{array}{r} -4x - 4y = 8 \\ \hline 4x + 2y = 12 \end{array}$$

$$\begin{array}{r} -2y = 20 \\ \hline -2 \quad -2 \end{array}$$

$$y = -10$$

$$\textcircled{3} \quad y + z = -4$$

$$\begin{array}{r} -10 + z = -4 \\ \hline +10 \quad +10 \end{array}$$

$$z = 6$$

$$\textcircled{2} \quad -x + z = -2$$

$$\begin{array}{r} -x + 6 = -2 \\ \hline -6 \end{array}$$

$$\begin{array}{r} -x = -8 \\ \hline -1 \quad -1 \end{array}$$

$$x = 8$$

$$\boxed{(8, -10, 6)}$$

$$\boxed{5} \quad \textcircled{1} \quad 2x - 5y = 23$$

$$\textcircled{2} \quad x - z = 9$$

$$\textcircled{3} \quad y + z = -8$$

$$\textcircled{2} \quad x - z = 9$$

$$\textcircled{3} \quad y + z = -8$$

$$\textcircled{4} \quad x + y = 1$$

$$\textcircled{1} \quad 2x - 5y = 23$$

$$\textcircled{4} \quad 5(x + y = 1)$$

$$5x + 5y = 5$$

$$2x - 5y = 23$$

$$\begin{array}{r} 7x = 28 \\ \hline 7 \end{array}$$

$$x = 4$$

$$\textcircled{2} \quad x - z = 9$$

$$\begin{array}{r} 4 - z = 9 \\ \hline -4 \end{array}$$

$$\begin{array}{r} -z = 5 \\ \hline -1 \quad -1 \end{array}$$

$$z = -5$$

$$\textcircled{3} \quad y + z = -8$$

$$\begin{array}{r} y - 5 = -8 \\ \hline +5 \quad +5 \end{array}$$

$$y = -3$$

$$\boxed{(4, -3, -5)}$$

$$\begin{array}{l} \textcircled{1} \quad 3x + 2y = 4 \\ \textcircled{2} \quad 2x \quad -6z = -14 \\ \textcircled{3} \quad \quad y + 3z = 8 \end{array}$$

$$\begin{array}{l} \textcircled{2} \quad 2x \quad -6z = -14 \\ \textcircled{3} \quad 2(y + 3z = 8) \\ \hline \quad \quad 2y + 6z = 16 \\ \quad \quad \cancel{2y} + \cancel{6z} = \cancel{16} \\ \hline \textcircled{4} \quad 2x + 2y = 2 \end{array}$$

$$\begin{array}{l} 3x + 2y = 4 \\ -1(2x + 2y = 2) \\ \hline -2x - 2y = -2 \\ \quad \quad \cancel{3x} + \cancel{2y} = 4 \\ \hline \quad \quad \quad x = 2 \end{array}$$

$$\begin{array}{l} \textcircled{2} \quad 2x - 6z = -14 \\ 2(2) - 6z = -14 \end{array}$$

$$\begin{array}{r} 4 - 6z = -14 \\ \quad \quad \quad -4 \\ \hline -6z = -18 \\ \quad \quad \quad -6 \\ \hline \quad \quad \quad z = 3 \end{array}$$

$$\begin{array}{l} \textcircled{3} \quad y + 3z = 8 \\ y + 3(3) = 8 \\ y + 9 = 8 \\ \quad \quad \quad -9 \\ \hline \quad \quad \quad y = -1 \end{array}$$

$$\boxed{(2, -1, 3)}$$

Hints for 4-6

↳ These are the most missed questions on the exam. Choose two and eliminate. This new equation should be cancelled with the last equation not used yet. Then plug back in.

$$\begin{aligned} \text{7} \quad & \textcircled{1} \quad 3(2x + 6y - 4z = 8) \rightarrow 6x + 18y - 12z = 24 \quad \textcircled{1} \\ & \textcircled{2} \quad 2(3x + 10y - 7z = 12) \rightarrow 6x + 20y - 14z = 24 \quad \textcircled{2} \\ & \textcircled{3} \quad 3(-2x - 6y + 5z = -3) \rightarrow -6x - 18y + 15z = -9 \quad \textcircled{3} \end{aligned}$$

$$\begin{array}{r} \downarrow \\ \textcircled{1} \quad 6x + 18y - 12z = 24 \\ \textcircled{3} \quad -6x - 18y + 15z = -9 \\ \hline \end{array} \qquad \begin{array}{r} \downarrow \\ \textcircled{2} \quad 6x + 20y - 14z = 24 \\ \textcircled{3} \quad -6x - 18y + 15z = -9 \\ \hline \end{array}$$

$$\textcircled{4} \quad \frac{3z}{3} = \frac{15}{3}$$

$$\hookrightarrow \underline{\underline{z = 5}} \rightarrow$$

$$\begin{aligned} 2x + 6y - 4z &= 8 \\ 2x + 6(5) - 4(5) &= 8 \\ 2x + 30 - 20 &= 8 \end{aligned}$$

$$2x + 10 = 8$$

$$\underline{-10} \quad \underline{-10}$$

$$\frac{2x}{2} = \frac{-2}{2} \rightarrow \underline{\underline{x = -1}}$$

$$\textcircled{5} \quad 2y + z = 15$$

$$2y + (5) = 15$$

$$2y + 5 = 15$$

$$\underline{-5} \quad \underline{-5}$$

$$\frac{2y}{2} = \frac{10}{2} \rightarrow \underline{\underline{y = 5}}$$

$$\boxed{(-1, 5, 5)}$$

$$\begin{aligned} \text{8} \quad & 2x - y + 3z = 8 \\ & 2(x - 6y - z = 0) \rightarrow 2x - 12y - 2z = 0 \\ & -2x + y - 3z = 8 \end{aligned}$$

$$\begin{array}{r} \downarrow \\ 2x - y + 3z = 8 \\ -2x + y - 3z = 8 \\ \hline \end{array}$$

$$0 = 16$$

$\hookrightarrow ?$, this is not true

dn
 \hookrightarrow

$\boxed{\text{no solution}}$

remember:
not true = no sol.
true = ∞ many

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$$\begin{aligned} \textcircled{1} & 2(-x + y - 3z = -4) \rightarrow -2x + 2y - 6z = -8 \\ \textcircled{2} & 3x - 2y + 8z = 14 \\ \textcircled{3} & 2x - 2y + 5z = 7 \end{aligned}$$

$$\begin{aligned} \textcircled{1} & -2x + 2y - 6z = -8 \\ \textcircled{2} & 3x - 2y + 8z = 14 \end{aligned}$$

$$\begin{aligned} \textcircled{1} & -2x + 2y - 6z = -8 \\ \textcircled{3} & 2x - 2y + 5z = 7 \end{aligned}$$

$$\textcircled{4} \quad x + 2z = 6$$

$$\textcircled{5} \quad \frac{-z}{-1} = \frac{-1}{-1} \rightarrow \underline{z = 1}$$

$$\hookrightarrow x + 2(1) = 6$$

$$\begin{aligned} x + 2 &= 6 \\ -2 & \quad -2 \\ \hline x &= 4 \end{aligned}$$

$$\begin{aligned} \rightarrow -x + y - 3z &= -4 \\ -(4) + y - 3(1) &= -4 \\ -4 + y - 3 &= -4 \\ \underline{-4 + y - 3} &= -4 \\ y - 7 &= -4 \\ \underline{+7} \quad \underline{+7} & \\ y &= 3 \end{aligned}$$

(4, 3, 1)

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$$\begin{aligned} x - 2y + 3z &= -1 & 6(x - 2y + 3z = -1) \\ 2 + 2x &= -6z + 4y & \rightarrow 2x - 4y + 6z = -2 \\ 3x - 6y + 9z &= -3 & -2(3x - 6y + 9z = -3) \end{aligned}$$

$$\begin{aligned} 2 + 2x &= -6z + 4y \\ \underline{+6z - 4y} \quad \underline{-2} & & \underline{+6z - 4y} \quad \underline{-2} \\ 2x - 4y + 6z &= -2 \end{aligned}$$

$$\begin{aligned} \textcircled{1} & 6x - 12y + 18z = -6 \\ \textcircled{2} & 6x - 12y + 18z = -6 \\ \textcircled{3} & -6x + 12y - 18z = 6 \end{aligned}$$

$$\begin{aligned} \textcircled{1} & 6x - 12y + 18z = -6 \\ \textcircled{3} & -6x + 12y - 18z = 6 \end{aligned}$$

$$\begin{aligned} \textcircled{2} & 6x - 12y + 18z = -6 \\ \textcircled{3} & -6x + 12y - 18z = 6 \end{aligned}$$

0 = 0

0 = 0

↳ True
↳ same line

∞ many solutions

↑ "thought cloud"
← red flag
two are identical and one has opposite signs...

$$\begin{aligned} \text{11} \quad & \textcircled{1} 2(x + y + z = -4) \rightarrow 2x + 2y + 2z = -8 \quad \textcircled{1} \\ & \textcircled{2} 2(2x - 3y + z = 17) \rightarrow 4x - 6y + 2z = 34 \quad \textcircled{2} \\ & \textcircled{3} x + 2y - 2z = -9 \rightarrow x + 2y - 2z = -9 \quad \textcircled{3} \end{aligned}$$

$$\begin{array}{l} \downarrow \\ \textcircled{1} 2x + 2y + 2z = -8 \\ \textcircled{3} x + 2y - 2z = -9 \\ \hline \textcircled{4} 3x + 4y = -17 \end{array} \qquad \begin{array}{l} \downarrow \\ \textcircled{2} 4x - 6y + 2z = 34 \\ \textcircled{3} x + 2y - 2z = -9 \\ \hline \textcircled{5} 5x - 4y = 25 \end{array}$$

$$\begin{array}{l} \textcircled{4} 3x + 4y = -17 \\ \textcircled{5} 5x - 4y = 25 \\ \hline 8x = 8 \rightarrow x = 1 \end{array}$$

$$\begin{array}{l} 5x - 4y = 25 \\ 5(1) - 4y = 25 \\ -5 - 4y = 25 \\ -4y = 30 \\ y = -\frac{30}{4} = -\frac{15}{2} \end{array}$$

$$\begin{array}{l} x + 2y - 2z = -9 \\ (1) + 2(-\frac{15}{2}) - 2z = -9 \\ 1 - 15 - 2z = -9 \\ -14 - 2z = -9 \\ -2z = 5 \\ z = -\frac{5}{2} \end{array}$$

$$\boxed{(1, -5, 0)}$$

$$\begin{aligned} \text{12} \quad & -2(x + y - 2z = 5) \rightarrow -2x - 2y + 4z = -10 \quad \textcircled{1} \\ & 2(x + 2y + z = 8) \rightarrow 2x + 4y + 2z = 16 \quad \textcircled{2} \\ & 2x + 3y - z = 13 \quad \textcircled{3} \end{aligned}$$

$$\begin{array}{l} \downarrow \\ \textcircled{1} -2x - 2y + 4z = -10 \\ \textcircled{2} 2x + 4y + 2z = 16 \\ \hline \textcircled{4} 2y + 6z = 6 \end{array} \qquad \begin{array}{l} \downarrow \\ \textcircled{1} -2x - 2y + 4z = -10 \\ \textcircled{3} 2x + 3y - z = 13 \\ \hline \textcircled{5} y + 3z = 3 \end{array}$$

$$\begin{array}{l} \textcircled{4} 2y + 6z = 6 \\ -2(\textcircled{5} y + 3z = 3) \rightarrow -2y - 6z = -6 \\ \hline 0 = 0 \end{array}$$

$0 = 0 \rightarrow$ True

\rightarrow same line \rightarrow

∞ many solutions

$$\boxed{13} \quad \begin{aligned} -2(x + y - 2z = 5) &\rightarrow -2x - 2y + 4z = -10 & \textcircled{1} \\ -2(x + 2y + z = 8) &\rightarrow -2x - 4y - 2z = -16 & \textcircled{2} \\ 2x + 3y - z &= 1 & \textcircled{3} \end{aligned}$$

$$\begin{array}{r} \textcircled{1} \downarrow -2x - 2y + 4z = -10 \\ \textcircled{3} \quad 2x + 3y - z = 1 \\ \hline \textcircled{4} \quad \quad y + 3z = -9 \end{array} \qquad \begin{array}{r} -2x - 4y - 2z = -16 \downarrow \textcircled{2} \\ 2x + 3y - z = 1 \textcircled{3} \\ \hline -y - 3z = -15 \textcircled{5} \end{array}$$

$$\begin{array}{r} \rightarrow y + 3z = -9 \\ -y - 3z = -15 \\ \hline \end{array}$$

$$0 = -24$$

\rightarrow Not True \downarrow

No Solutions

Hints

- \rightarrow (1) Take your time!
- (2) Stay organized
- (3) Be careful of simple mistakes, like negatives...

