Solving Linear Systems in 3-Space (ALG.SYS.06)

Solve each system.

1. $\begin{cases} -2a - 2b - 3c = 20 \\ 6a - 6b + 4c = -6 \\ -5a + 4b + c = -19 \end{cases}$

2. $\begin{cases} 5x + y - 3z = -8 \\ 6x - y - 3z = 5 \\ -6x + 2y + 3z = -10 \end{cases}$

3. $\begin{cases} 5x - 3y = -12 \\ 6x - z = 0 \\ 3y + 4z = 12 \end{cases}$

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

5. $\begin{cases} x - 5y + 4z = 12 \\ -3x + 4y - 2z = -8 \\ z = -6x + 3y + 11 \end{cases}$

6. $\begin{cases} -2r - 2s + 6t = 14 \\ -2r = -4 \\ r - s + 3t = 9 \end{cases}$

7. $\begin{cases} -2x - 2y + 4z = 0 \\ 5x + 2y + 2z = -13 \\ x + 2y - 6z = -14 \end{cases}$

8. $\begin{cases} -2r - s + 4t = 10 \\ 4r + 6s - 4t = 20 \\ -2r + 3s - 4t = 2 \end{cases}$

9. $\begin{cases} a + b + c = 4 \\ a - c = 4 \\ -7b - 2a = 4 \end{cases}$

10. $\begin{cases} -2x + 3y + 4z = 1 \\ 5x - 5y - 4z = -20 \\ -3x - 5y - 6z = 14 \end{cases}$

11. $\begin{cases} 18x + 3y - 15z = 26 \\ -18x - 12y + 24z = -11 \\ -6x - 2y + 6z = -7 \end{cases}$

12. $\begin{cases} 4a + 2b + 4c = -10 \\ 3a - 5b + 3c = -27 \\ b - a + 2c = -11 \end{cases}$

13. $\begin{cases} 7a - 2b + 2c = -5 \\ -2a + 5b - 2c = -6 \\ -3a - 8b + 2c = 17 \end{cases}$

14. $\begin{cases} 5x + 3y + 2z = 1 \\ -2x - 3y + 3z = 15 \\ 4x + 6y - 2z = -10 \end{cases}$

15. $\begin{cases} 3(2a - c) + b = 27 \\ -2(b + 2a) - 7c = -14 \\ a + 2b + 5c = -1 \end{cases}$

16. $\begin{cases} -6x - 2y + 2z = -8 \\ 3x - 2y - 4z = 8 \\ 6x - 2y - 6z = -18 \end{cases}$

17. $\begin{cases} 9a + 5b - 4c = 13 \\ -6a + 6b + 5c = 3 \\ 12a - 8b - 7c = -7 \end{cases}$

18. $\begin{cases} 18r + 6s - 3t = 11 \\ 6t - 2r - 2s = -7 \\ 18s - 15r + 15t = 17 \end{cases}$

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19. $\begin{cases} \dfrac{2}{3}x + \dfrac{1}{2}y = 1 \\ \dfrac{5}{6}y + \dfrac{1}{2}z = 4 \\ \dfrac{x+z}{5} = -1 \end{cases}$

20. $\begin{cases} 15a - 12b - 12c = -7 \\ -10a + 6b - 2c = -3 \\ 36a - 30b + 18c = 5 \end{cases}$

21. $\begin{cases} 4x + 2y + 3z = -2 + 5\sqrt{3} \\ -2x + 3y + 5z = -3 - 9\sqrt{3} \\ 3x - 5y + 2z = 5 + 4\sqrt{3} \end{cases}$

22. $\begin{cases} \sqrt{2}a - 2b + 3c = 22 - 4\sqrt{2} \\ 5a - 3\sqrt{2}b + c = 13 + 7\sqrt{2} \\ 2a + 4b - \sqrt{2}c = 8(\sqrt{2} + 1) \end{cases}$

For each word problem, define necessary variables, then write and solve a system of linear equations.

23. Joan, Ana, and Natalie went shopping for Christmas decorations at the same store. Joan purchased four boxes of lights, seven ornaments, and two candles for $57. Ana purchased six boxes of lights, three ornaments, and one candle for $34. Natalie purchased 5 boxes of lights, four ornaments, and two candles for $44. Determine the unit cost of each item.

24. At Archie's Arcade, Alan won 3 red tickets, 6 blue ticket, and 2 yellow tickets for a total of 770 points. Daniel won 5 red tickets, 3 blue tickets, and 2 yellow tickets for a total of 625 points. Jennifer won 9 red tickets, 4 blue tickets, and 1 yellow ticket for a total of 760 points. Determine the point value for each type of ticket.

25. George, Eduardo, and Simon are selling baked goods to raise money for their baseball team. Each boy is selling cookies, brownies, and cakes. George sold 8 dozen cookies, 3 dozen brownies, and 4 cakes for a total of $75. Eduardo sold 11 dozen cookies, 5 dozen brownies, and 3 cakes for $90. Simon sol 5 dozen cookies, 6 dozen brownies, and 5 cakes for $85. Determine the cost of a dozen cookies, a dozen brownies, and one cake.

26. At a regional music contest, competitors are judged in three categories: technique, tone quality, and interpretation. Each of these categories is weighted differently and participants can early up to ten points in each category. The table shows three students competing in the competition along with their scores. Determine the weight of each category toward the overall score.

Musician	Technique	Tone Quality	Interpretation	Final Score
Allison	7	8	9	**8.15**
Toby	9	8	7	**7.85**
Jonathan	6	10	8	**8.2**