Algebra 2 3.1-3.7 Worksheet

Tell whether the linear system has infinitely many solutions, one solution, or no solution.

1. \(x - 4y = 2\)
   \(2x - 8y = 5\)

2. \(\frac{1}{2}x - 2y = \frac{1}{3}\)
   \(3x - 12y = 2\)

Sketch the graph of the system. Estimate the solution.

3. \(3x - 2y = -7\)
   \(x + y = 1\)

4. A rental car agency charges $12 per day plus 14 cents per mile to rent a certain car. Another agency charges $15 per day plus 9 cents per mile to rent the same car. How many miles per day will have to be driven for the cost of a car from the first agency to equal the cost of a car from the second agency?

Solve the linear system.

5. \(y = -4x + 4\)
   \(y = -x - 5\)

6. \(3x + 4y = -3\)
   \(2x + y = 8\)

7. A group of 68 people attend a ball game. There were three times as many children as adults in the group. Write a system of equations that you could use to set up this problem, where \(a\) is the number of adults and \(c\) is the number of children in the group. Solve the system of equations for \(c\), the number of children in the group.

Graph the system of inequalities.

8. \(y \leq -x + 4\)
   \(y \leq 2x + 4\)
   \(y \geq -2\)

9. \(4x + 5y \geq 15\)
   \(x \geq y\)
   \(x \leq 5\)

Sketch the graph of the system of linear inequalities.

10. \(x \geq -2\)
    \(y < 4\)
Solve the system of equations.

11. \[ \begin{align*} 2x + 3y - z &= 1 \\ x + y + z &= 3 \\ 3x - y + z &= 15 \end{align*} \]

12. \[ \begin{align*} x + 4y + 2z &= 5 \\ 3x + 12y + 6z &= 7 \\ 2x - 3y + z &= 12 \end{align*} \]

True or False:

13. The solution of a system of three equations in three variables can be a plane.

14. Find \( A + B \).
\[
A = \begin{bmatrix} -8 & -8 & -2 \\ 2 & -3 & 9 \end{bmatrix} \quad B = \begin{bmatrix} 5 & 8 & -4 \\ 0 & 1 & -9 \end{bmatrix}
\]

Perform the indicated matrix operation, if possible.

15. \[
\begin{bmatrix} 5 & -1 & 2 \\ 4 & 0 & 7 \\ 2 & -1 & 5 \end{bmatrix} + \begin{bmatrix} 5 & 0 & 9 \\ -2 & 4 & 10 \\ 4 & -2 & 3 \end{bmatrix}
\]

16. Derek asked the students in two history classes how many students went to a movie, went to a concert, or went shopping last weekend. He recorded the results in two matrices. Find the total for the two classes.

\[
\begin{array}{ccc} 
M & C & S \\
\text{Males} & 1 & 7 & 7 \\
\text{Females} & 6 & 8 & 1 \\
\end{array} = P
\]

\[
\begin{array}{ccc} 
M & C & S \\
\text{Males} & 3 & 2 & 1 \\
\text{Females} & 4 & 7 & 3 \\
\end{array} = Q
\]

Perform the matrix operation, if possible.

17. \[
\begin{bmatrix} 2 & 5 \\ -1 & 7 \end{bmatrix} \begin{bmatrix} 2 & 1 & -4 \end{bmatrix}
\]
18. \[
\begin{bmatrix}
2 & -3 \\
6 & 5 \\
1 & 4 \\
\end{bmatrix}
\begin{bmatrix}
2 & 4 \\
3 & -2 \\
\end{bmatrix}
\]

19. Given \(A = \begin{bmatrix} -9 & -4 & -5 \\ -3 & 3 & 4 \end{bmatrix}\) and \(B = \begin{bmatrix} -7 & -7 \\ 1 & 4 \\ -6 & -2 \end{bmatrix}\), find \(AB\).

Evaluate the determinant of the matrix.

20. \[
\begin{bmatrix}
2 & 4 & 1 \\
1 & 4 & 2 \\
3 & 3 & 5 \\
\end{bmatrix}
\]

21. \[
\begin{bmatrix}
5 & 8 \\
-2 & 3 \\
\end{bmatrix}
\]

22. \[
\begin{bmatrix}
6 & -7 \\
5 & 8 \\
\end{bmatrix}
\]

23. \[
\begin{bmatrix}
2 & -1 & 3 \\
1 & 2 & 2 \\
-2 & 1 & 0 \\
\end{bmatrix}
\]

24. \[
\begin{bmatrix}
3 & 4 \\
2 & 6 \\
\end{bmatrix}
\]
Find the area of the triangle.

25.

Find the coefficient matrix and evaluate its determinant.

26. \[ 9x - 2y = 15 \]
   \[ 3x + 6y = 5 \]

Use Cramer's Rule to solve the linear system.

27. \[ 2x + y = 1 \]
   \[ 5x + 2y = 5 \]

28. \[ 3x - 5y = -2 \]
   \[ 4x + 3y = 5 \]
   \[ 3x + 2y = 0 \]

29. \[ 2x - y + 2z = 3 \]
   \[ 5y + 6z = 0 \]

30. Walt has three investments totaling $120,000. These investments earn interest at 4%, 6%, and 8% respectively. Walt's total income from these investments is $7600. The income from the 8% investment exceeds the total income from the other two investments by $400. Find how much Walt has invested at 8%.