

Section 6.1 Linear Systems

Section 1: Determine whether the given values of x and y are a solution to the system of equations.

1. $x = -1, y = 3$
$$\begin{cases} 2x + y = 1 \\ -3x + 2y = 9 \end{cases}$$

2. $x = 2, y = -1$
$$\begin{cases} \frac{1}{3}x + \frac{1}{2}y = \frac{1}{6} \\ \frac{1}{2}x + \frac{1}{3}y = \frac{2}{3} \end{cases}$$

3. $x = \frac{1}{2}, y = 3, z = -1$
$$\begin{cases} 2x - y + 4z = -6 \\ 3y + 3z = 6 \\ 2z = 2 \end{cases}$$

Section 2: Use substitution to solve system.

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

6.
$$\begin{cases} r + s = 0 \\ r - s = 5 \end{cases}$$

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

7.
$$\begin{cases} x + y = c + d \\ x - y = 2c - d \end{cases}$$

(c, d are constants)

Section 3: Use Elimination method to solve the system.

8.
$$\begin{cases} 2x - 2y = 12 \\ -2x + 3y = 10 \end{cases}$$

10.
$$\begin{cases} 3x - 2y = 4 \\ 6x - 4y = 8 \end{cases}$$

9.
$$\begin{cases} x + 3y = -1 \\ 2x - y = 5 \end{cases}$$

11.
$$\begin{cases} 9x - 3y = 1 \\ 6x - 2y = -5 \end{cases}$$

$$12. \begin{cases} \frac{x}{3} - \frac{y}{2} = -3 \\ \frac{2x}{5} + \frac{y}{5} = -2 \end{cases}$$

$$13. \begin{cases} \frac{x+y}{4} - \frac{x-y}{3} = 1 \\ \frac{x+y}{4} + \frac{x-y}{2} = 9 \end{cases}$$

$$14. \begin{cases} 2x - 4y + z = 14 \\ -2x + y - 6z = -31 \\ x - 3y + 2z = 14 \end{cases}$$

15. **Challenge Problem:** Find the values of c and d for which both given points lie on the line. Hint: Create a system using the given points.

$$cx + dy = 2 \text{ given points } (0, 4) \text{ and } (2, 16)$$

Section 4: Applications of Linear Systems

16. A store sells deluxe tape recorders for \$150. The regular model costs \$120. The total tape recorder inventory has a value of \$43,800. During a recent month the store sold half of its deluxe model and two-thirds of its regular model and made \$26,700. Determine how many of each kind of tape recorder was in their inventory at the beginning of the month.

17. How many grams of a 50% silver alloy should be mixed with a 75% silver alloy to obtain 40 grams of a 60% silver alloy?

18. A machine takes 3 minutes to form a bowl and 2 minutes to form a plate. The material for a bowl costs \$0.25 and the material for a plate costs \$0.20. If the machine runs for exactly 8 hours continuously and \$44 is spent for material, how many bowls and plates are produced?

Section 5: More practice with 3 x 4 systems

$$19. \begin{cases} -x + 3y + 2z = 0 \\ -2x - 3y - 2z = 3 \\ x + 2y + 3z = 0 \end{cases}$$

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

$$21. \begin{cases} x - 2y + 4z = 6 \\ x + y + 13z = 6 \\ -2x + 6y - z = -10 \end{cases}$$

$$22. \begin{cases} 11x + 10y + 9z = 5 \\ x + 2y + 3z = 1 \\ 3x + 2y + z = 1 \end{cases}$$