

Solving Linear Systems by Comparison

In some situations it may be easier to isolate a variable **with** a coefficient.

To solve a linear system by comparison means to isolate the **same** variable with the **same** coefficient in **each** equation. When we “compare” the results we notice that the two equations are equal to each other.

Steps to Solve a Linear System by Comparison

1. Rearrange both equations to isolate the same variable with the same coefficient (so that they are both equal to ax or both equal to by).
2. Set the equations equal to each other (so that $ax = ax$ or $by = by$).
3. Solve for the unknown variable.
4. Use this solution to solve for the other variable.
5. State the point of intersection.

Example – Solve the linear system below using the method of comparison.

$$2x - 5y = -17 \quad \text{and} \quad 2x + 3y = 15$$

Example – Solve each of the following linear systems by comparison.

a)
$$\begin{aligned} 8x + y + 16 &= 0 \\ -3x + y + 5 &= 0 \end{aligned}$$

b)
$$\begin{aligned} -2x - 9y &= 11 \\ -4x + 9y &= -23 \end{aligned}$$

Example – Solve the linear system below by comparison. Then check the solution.

$$10x + 4y + 1 = 0 \quad \text{and} \quad 8x - 2y - 7 = 0$$

Homework – Please complete questions #1 – 3 below and #2ae, 9, 10 on page 26 and #6acd on page 40.

1. Solve each of the following linear systems by comparison.

a)
$$\begin{aligned} 7x + 2y &= 24 \\ 8x + 2y &= 30 \end{aligned}$$

b)
$$\begin{aligned} 2x - 6y &= 5 \\ 7x + 6y &= 13 \end{aligned}$$

2. Solve each of the following linear systems by comparison.

a)
$$\begin{aligned} 3x + y &= 6 \\ 3x - 2y &= -6 \end{aligned}$$

b)
$$\begin{aligned} -6x + 5y - 7 &= 0 \\ 6x + 4y + 25 &= 0 \end{aligned}$$

3. Solve the linear system below by comparison. Then check the solution.

$$5x - 8y - 15 = 0 \quad \text{and} \quad 10x - 7y + 6 = 0$$

Answers:

1. a) The solution is $(x, y) = (6, -9)$.

b) The solution is $(x, y) = \left(2, -\frac{1}{6}\right)$.

2. a) The solution is $(x, y) = \left(\frac{2}{3}, 4\right)$.

b) The solution is $(x, y) = \left(-\frac{17}{6}, -2\right)$.

3. The solution is $(x, y) = \left(-\frac{17}{5}, -4\right)$.