

Systems of Equations by Elimination

Goal make coefficients the same – opposite in sign

Algorithm

1. If necessary, multiply either or both equations by numbers which will make the coefficients of one of the variables the same but opposite in sign
2. Add the two equations together
3. Solve the resulting equation
4. Substitute that value into one of the given equations to find the value of the other variable
5. Write the solution as an ordered pair.

Example Solve by elimination

$$\begin{array}{r} 5x + 6y = -8 \\ 2x + 3y = -5 \end{array}$$

1.
$$\begin{array}{r} 5x + 6y = -8 \\ 2x + 3y = -5 \Rightarrow (-2) \quad \underline{-4x - 6y = +10} \\ \hline x = 2 \end{array}$$
- 2.
3. **solved**
4.
$$\begin{array}{r} 5(2) + 6y = -8 \Rightarrow 10 + 6y = -8 \\ 6y = -18 \\ y = -3 \end{array}$$
5. **(2, -3)**

Solve the following systems of equations by elimination.

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

2.
$$\begin{array}{r} 4x + 2y = 14 \\ 5x - 2y = 4 \end{array}$$

3.
$$\begin{array}{r} -2x + 3y = -7 \\ 2x + 5y = -1 \end{array}$$

4.
$$\begin{array}{r} 2x - y = 6 \\ 3x + y = 9 \end{array}$$

5. $3y = 4x - 10$
 $2y = -4x$

6. $2x + y = 11$
 $3x - y = 4$

7. $2x + y = 4$
 $3x - 2y = -1$

8. $3x + y = 6$
 $5x - 3y = -4$

9. $3x - y = 2$
 $x + 2y = 10$

10. $2x + 5y = 11$
 $4x + 2y = 14$

11. $3x + 4y = -5$
 $2x + 8y = -14$

12. $3x + 5y = -20$
 $9x + 2y = -8$

13. $3x + 2y = 7$
 $4x - 3y = -2$

14. $-2x + 3y = -6$
 $3x + 4y = -8$

15. $4x + 5y = 3$
 $3x - 2y = 8$

16. $2x + 3y = 5$
 $3x + 4y = 7$

17. $3x + 4y = -1$
 $5x + 2y = -11$

18. $5x + 3y = 19$
 $2x + 4y = 16$

19. How are exercises 1–6 different from exercises 7–12?
20. Which Property of Real Numbers allows you to multiply both sides of an equation by the same number?
21. When you multiply both sides of an equation by the same number, what effect does that have on the graph?