One equation containing more than one unknown number cannot be solved. There must be as many simultaneous equations as there are unknown numbers.

ILLUS. 1. Solve $\begin{cases} x + 3y = 17, \\ 2x + y = 9. \end{cases}$

Multiply the first equation by 2;

$$\begin{aligned} \text{then} \quad & 2x + 6y = 34, \\ \text{but} \quad & 2x + y = 9 \\ \hline \text{Subtracting,} \quad & 5y = 25 \\ & y = 5. \end{aligned}$$

To find the value of x, substitute the value of y in the second equation:

$$2x + 5 = 9, 2x = 4, x = 2.$$

$$Ans. \begin{cases} x = 2, \\ y = 5 \end{cases}$$

ILLUS. 2. Solve $\begin{cases} 3x + 4y = 12, \\ 5x - 6y = 1. \end{cases}$

Multiply the first equation by 3, and the second equation by 2,

$$\begin{aligned} & 9x + 12y = 36 \\ & 10x - 12y = 2 \\ \hline \text{Adding,} \quad & 19x \qquad\quad 38 \therefore x = 2. \end{aligned}$$

Substituting, $6 + 4y = 12$, $4y = 6$, $y = 1\frac{1}{2}$.

Multiply one or both of the equations by such a number that one of the unknown numbers shall have like coefficients. If the signs of the terms having like coefficients are alike, subtract one equation from the other; if unlike, add the equations.

Exercise 55.

Solve:

1. $\begin{cases} x + y = 4, \\ 3x - 2y = 7. \end{cases}$

2. $\begin{cases} x - y = 2, \\ 2x + 5y = 18. \end{cases}$

3. $\begin{cases} 5x + 2y = 47, \\ 2x - y = 8. \end{cases}$

4. $\begin{cases} 4x - 3y = 10, \\ 6x + 4y = 49. \end{cases}$

5. $\begin{cases} 8x - 2y = 6, \\ 10x + 7y = 36. \end{cases}$

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

7. $\begin{cases} 7x - 3y = 41, \\ 2x + \ y = 12. \end{cases}$

8. $\begin{cases} 2x + \ 9y = -5, \\ 11x + 15y = 7. \end{cases}$

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

10. $\begin{cases} 3x - 5y = 15, \\ 5x + 3y = 8. \end{cases}$

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

12. $\begin{cases} 3x + 2y = 11, \\ 7x - 5y = 190. \end{cases}$

13. $\begin{cases} \frac{1}{2}x + \frac{1}{3}y = 11, \\ 8x + \frac{3}{5}y = 102. \end{cases}$

14. $\begin{cases} 5x + 2y = 66, \\ \frac{x}{3} + \frac{3y}{4} = 15\frac{1}{2}. \end{cases}$

15. $\begin{cases} \frac{3x}{5} - \frac{2y}{7} = 35, \\ x + 2y = -63. \end{cases}$

16. $\begin{cases} x - \frac{3y}{5} = 6, \\ \frac{2x}{3} + 7y = 189. \end{cases}$

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

18. $\begin{cases} \frac{x+2y}{x-2} = -5\frac{2}{3}, \\ \frac{2y-4x}{3-y} = -6. \end{cases}$

19. $\begin{cases} y - \frac{2y+x}{3} = \frac{2x+y}{4} - 8\frac{3}{4}, \\ \frac{3x+y}{2} - \frac{y}{3} = \frac{109}{10} + \frac{4y-x}{5}. \end{cases}$

20. $\begin{cases} x + y = a, \\ x - y = b. \end{cases}$