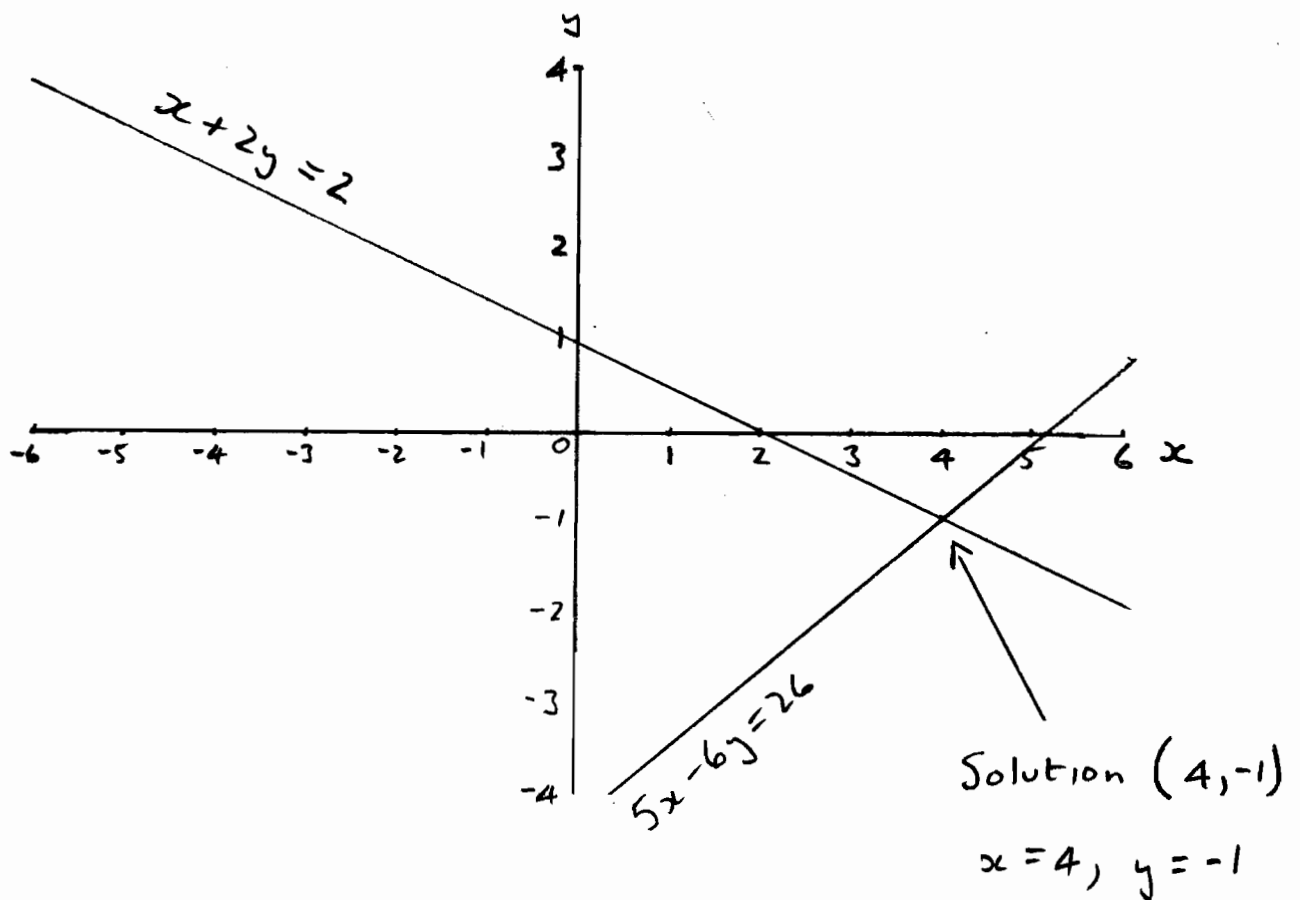


SIMULTANEOUS LINEAR EQUATIONSTRANSCRIPT

Simultaneous linear equations can be solved graphically or algebraically.

Graphical solution

Example  $\begin{cases} x + 2y = 2 \\ 5x - 6y = 26 \end{cases}$



The solution is given by the coordinates of the point of intersection of the two straight line graphs.

In this example  $x = 4, y = -1$

---

We turn now to the algebraic solution of simultaneous linear equations.

Example 1

$$\begin{cases} 5x + 2y = 19 & \textcircled{1} \\ 4x + 3y = 18 & \textcircled{2} \end{cases}$$

$$\textcircled{1} \times 3 \quad 15x + 6y = 57 \quad \textcircled{3}$$

$$\textcircled{2} \times 2 \quad 8x + 6y = 36 \quad \textcircled{4}$$

$$\textcircled{3} - \textcircled{4} \quad 7x = 21$$

$$x = \frac{21}{7}$$

$$\underline{x = 3}$$

Subst for  $x$  in  $\textcircled{1}$

$$5(3) + 2y = 19$$

$$15 + 2y = 19$$

$$2y = 19 - 15$$

$$2y = 4$$

$$y = \frac{4}{2}$$

$$\underline{y = 2}$$

Solution:  $\begin{cases} x = 3 \\ y = 2 \end{cases}$

Example 2

$$\begin{cases} 3x - 4y = 26 & \textcircled{1} \\ 4x - 2y = 18 & \textcircled{2} \end{cases}$$

$$\textcircled{2} \times 2 \quad 8x - 4y = 36 \quad \textcircled{3}$$

$$\textcircled{3} - \textcircled{1} \quad 5x = 10$$

$$x = \frac{10}{5}$$

$$\underline{x = 2}$$

Subst for  $x$  in  $\textcircled{1}$

$$3(2) - 4y = 26$$

$$6 - 4y = 26$$

$$-4y = 26 - 6$$

$$-4y = 20$$

$$y = \frac{20}{-4}$$

$$\underline{y = -5}$$

Solution:  $\begin{cases} x = 2 \\ y = -5 \end{cases}$

Example 3

$$\begin{cases} 4x - 3y = 0 & \textcircled{1} \\ 2x + 5y = 13 & \textcircled{2} \end{cases}$$

$$\textcircled{1} \times 5 \quad 20x - 15y = 0 \quad \textcircled{3}$$

$$\textcircled{2} \times 3 \quad 6x + 15y = 39 \quad \textcircled{4}$$

$$\textcircled{3} + \textcircled{4} \quad 26x = 39$$

$$x = \frac{39}{26}$$

$$x = \frac{13}{26} = \frac{1}{2}$$

Subst for  $x$  in  $\textcircled{2}$ 

$$2\left(\frac{1}{2}\right) + 5y = 13$$

$$1 + 5y = 13$$

$$5y = 13 - 1$$

$$5y = 12$$

$$y = \frac{12}{5}$$

$$\underline{y = 2}$$

Solution:  $\begin{cases} x = \frac{1}{2} \\ y = 2 \end{cases}$

Example 4

$$\begin{cases} x + 2y = 2 & \textcircled{1} \\ 5x - 6y = 26 & \textcircled{2} \end{cases}$$

$$\textcircled{1} \times 3 \quad 3x + 6y = 6 \quad \textcircled{3}$$

$$\textcircled{2} + \textcircled{3} \quad 8x = 32$$

$$x = \frac{32}{8}$$

$$\underline{x = 4}$$

Subst for  $x$  in  $\textcircled{1}$ 

$$4 + 2y = 2$$

$$2y = 2 - 4$$

$$2y = -2$$

$$y = \frac{-2}{2}$$

$$\underline{y = -1}$$

Solution:  $\begin{cases} x = 4 \\ y = -1 \end{cases}$

Summary:

1. Multiply equations as necessary to get same amount of  $y$  in each.
2. If amounts of  $y$  have same sign then subtract to eliminate  $y$   
If amounts of  $y$  have opposite signs then add to eliminate  $y$
3. Solve resulting equation to find  $x$
4. Substitute for  $x$  in any equation and solve to find  $y$

