

**Example 2**

Solve the equations  $2x - 5y = 9$  and  $3x + 2y = 4$ .

*Eliminate xs*

$$\begin{array}{r} 3 \textcircled{1} \\ -2 \textcircled{2} \\ \hline 6x - 15y = 27 \\ -6x - 4y = -8 \\ \hline -19y = 19 \end{array} \Rightarrow y = -1$$

*Sub  $y = -1$  into  $\textcircled{1}$*

$$\begin{array}{r} 2x - 5(-1) = 9 \\ 2x + 5 = 9 \\ -5 \\ \hline 2x = 4 \\ \div 2 \\ \hline x = 2 \end{array}$$

Intersection pt  $(2, -1)$

**Example 3****2. Solving simultaneous equations with three variables**

Solve the simultaneous equations:

- $\textcircled{A}$   $x + y + z = 6$
- $\textcircled{B}$   $2x + y - z = 1$
- $\textcircled{C}$   $4x - 3y + 2z = 4$

*lets eliminate zs*

$$\begin{array}{r} \textcircled{A} \\ \textcircled{B} \\ \hline x + y + z = 6 \\ 2x + y - z = 1 \\ \hline 3x + 2y = 7 \end{array} \textcircled{1}$$

$$\begin{array}{r} \textcircled{C} \\ 2 \textcircled{B} \\ \hline 4x - 3y + 2z = 4 \\ 4x + 2y - 2z = 2 \\ \hline 8x - y = 6 \end{array} \textcircled{2}$$

*Solve  $\textcircled{1}$  &  $\textcircled{2}$*   
*Eliminate ys*

$$\begin{array}{r} \textcircled{1} \\ +2 \textcircled{2} \\ \hline 3x + 2y = 7 \\ 16x - 2y = 12 \\ \hline 19x = 19 \end{array} \Rightarrow x = 1$$

*Sub  $x = 1$  into  $\textcircled{1}$*

$$\begin{array}{r} 3(1) + 2y = 7 \\ 3 + 2y = 7 \\ -3 \\ \hline 2y = 4 \\ \div 2 \\ \hline y = 2 \end{array} \Rightarrow y = 2$$

*Sub  $x = 1, y = 2$  into  $\textcircled{A}$*

$$1 + 2 + z = 6 \Rightarrow z = 3$$

2. Solve each of the following pairs of simultaneous equations.

(i)  $4x - 5y = 22$   
 $7x + 3y - 15 = 0$

(ii)  $\frac{x}{2} - \frac{y}{6} = \frac{1}{6}$   
 $x - 2y = -8$

(iii)  $\frac{4x - 2}{5} = \frac{8y}{10}$  (1)  
 $18x - 20y = 4$  (2)

(ii)

$x$  (1) by LCD is 10

$-8y + 4$   
 $\div 4$

$2(4x - 2) = 8y$   
 $8x - 4 = 8y$   
 $8x - 8y = 4$   
 $2x - 2y = 1$  (1\*)

Eliminate  $ys$

$\div 2$

$18x - 20y = 4$   
 $9x - 10y = 2$  (2\*)

$-5$  (1\*)  
 $(2*)$

$-10x + 10y = -5$   
 $9x - 10y = 2$   
 $-x = -3 \Rightarrow x = 3$

Sub  $x=3$  into (1\*)

$2(3) - 2y = 1$   
 $6 - 2y = 1$   
 $-2y = -5 \Rightarrow y = \frac{5}{2}$

$-6$   
 $\div -2$

Intersection pt  $(3, \frac{5}{2})$

5. Solve the following equations with three unknowns. (i)  $2x + y + z = 8$  (1)

$5x - 3y + 2z = 3$  (2)  
 $7x + y + 3z = 20$  (3)

let's eliminate the  $ys$

$(2)$   
 $+3(1)$   
 $5x - 3y + 2z = 3$   
 $+6x + 3y + 3z = 24$   
 $11x + 5z = 27$  (4)

$(3)$   
 $-(1)$   
 $7x + y + 3z = 20$   
 $-2x - y - z = -8$   
 $5x + 2z = 12$  (5)

Solve (3) & (4)  
 Eliminate  $zs$

$2(4)$   
 $-5(5)$

$22x + 10z = 54$   
 $-25x - 10z = -60$   
 $-3x = -6 \Rightarrow x = 2$

Sub  $x=2$  into (5)

$5(2) + 2z = 12$   
 $10 + 2z = 12$   
 $2z = 2 \Rightarrow z = 1$

Sub  $x=2, z=1$   
 into (1)

$2(2) + y + 1 = 8$   
 $4 + y + 1 = 8$   
 $5 + y = 8 \Rightarrow y = 3$