

Point of Intersection of Two lines.

Let $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ be two non-parallel lines. If (x', y') be the co-ordinates of their point of intersection, then $a_1x' + b_1y' + c_1 = 0$ and $a_2x' + b_2y' + c_2 = 0$

$$\text{Solving these equation, we get } (x', y') = \left(\frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}, \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1} \right) = \left(\frac{\begin{vmatrix} b_1 & b_2 \\ c_1 & c_2 \end{vmatrix}}{\begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}}, \frac{\begin{vmatrix} c_1 & c_2 \\ a_1 & a_2 \end{vmatrix}}{\begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}} \right)$$

Note: Here lines are not parallel, they have unequal slopes, then $a_1b_2 - a_2b_1 \neq 0$.

In solving numerical questions, we should not remember the co-ordinates (x', y') given above, but we solve the equations directly.