Pair of linear equations in two variables

$x' + 3 = 0$

linear equation in one variable

$x + y + 4 = 0$

linear equation in two variable

$ax + by + c = 0$

→ Graph → straight line.

$a_1x + b_1y + c_1 = 0$ → Straight line

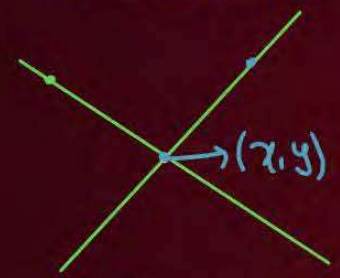
$a_2x + b_2y + c_2 = 0$ → Straight line

Solution = no of common point

Consistent → having atleast one solution

Inconsistent → having no solution

Case I



Intersecting line

Unique solution

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Case II ×

Parallel lines

No solution

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

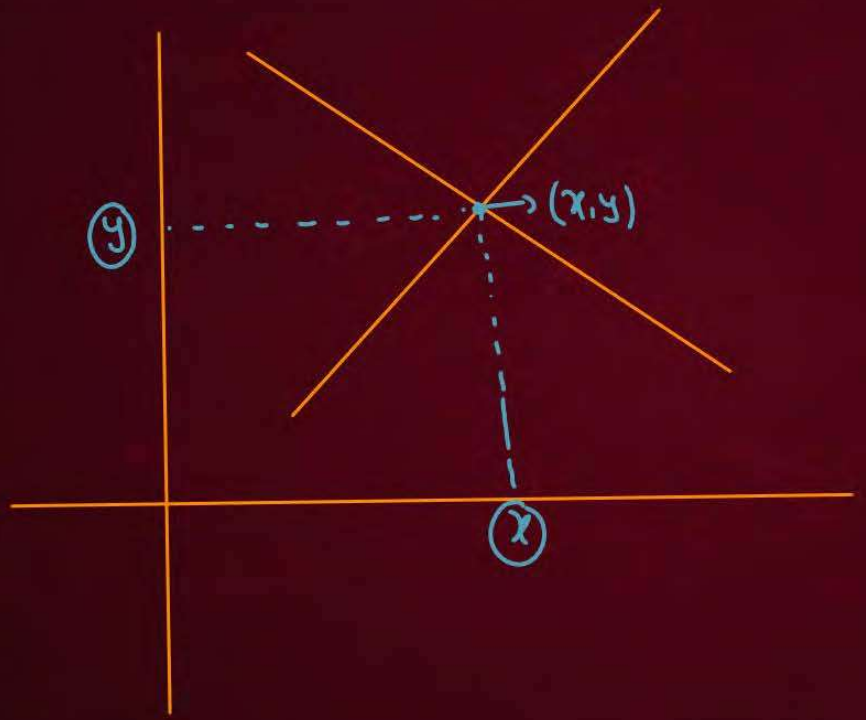
Dependent ×

Coincident line

Infinite solution

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Graphical method of solution of a pair of linear equations



QUESTION

Check graphically whether the pair of equations $x + 3y = 6$, $2x - 3y = 12$ is consistent, if so, solve then graphically.

$\frac{a_1}{a_2} = \frac{1}{2}$

$\frac{b_1}{b_2} = \frac{3}{-3} = -1$

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Consistent

① $x + 3y = 6$

$x = 6 - 3y$

x	6	3
y	0	1

at $y = 0$

$x = 6 - 3(0)$

$x = 6 - 0 = 6$

$y = 1$

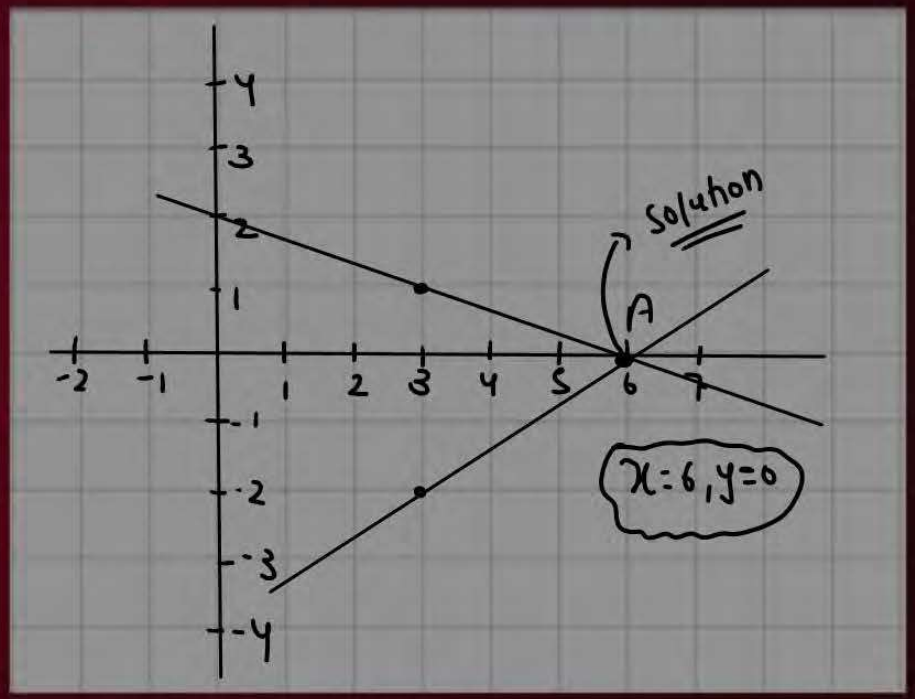
$x = 6 - 3(1) = 3$

② $2x - 3y = 12$

$2x = 12 + 3y$

$x = \frac{12 + 3y}{2}$

x	6	3
y	0	-2



QUESTION

Solve the following pair of linear equations by substitution method

$x + y = 5$ and $2x - 3y = 4$

$x + y = 5 - (i)$

from (i)

$x = 5 - y$

Substitute $x = 5 - y$ in eq (ii)

$2(5-y) - 3y = 4$

$10 - 2y - 3y = 4$

$10 - 5y = 4$

$-5y = 4 - 10$

$-5y = -6$

$y = \frac{-6}{-5}$

$y = \frac{6}{5}$

$x = 5 - y$

$x = \frac{5}{1} - \frac{6}{5}$

$x = \frac{25 - 6}{5}$

$x = \frac{19}{5}$

QUESTION

Solve the following pair of linear equations by elimination method

$3x + 4y = 10$ and $2x - 2y = 2$

$3x+4y=10$ - (i) $\times 2$

$2x-2y=2$ - (ii) $\times 3$

$6x+8y=20$

$6x-6y=6$

$+ \quad -$

$14y=14$

$y=\frac{14}{14}$

$y=1$

pulling $y=1$ in eq (i)

$3x+4(1)=10$

$3x=10-4$

$3x=6$

$x=\frac{6}{3}$

$x=2$

QUESTION

The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

Let two digit no be $xy \Rightarrow$ (18)

A.T.Q $(x+y) = 9 - (i)$

$9xy = 2yx$

$9(10x+y) = 2(10y+x)$

$90x + 9y = 20y + 2x$

$90x - 2x = 20y - 9y$

$88x = 11y$

$11y = 88x$

$y = \frac{88}{11}x$

$y = 8x \quad -(ii)$

$x + 8x = 9$

$9x = 9$

$x = \frac{9}{9} = 1$

$42 = 4 \times 10 + 2$

$21 = 2 \times 10 + 1$

$xy = x \times 10 + y = 10x + y$

$yx = 10y + x$

Putting $x = 1$ in eq (ii)

$y = 8(1)$

$y = 8$ ✓