GR10 ELIMINATION METHOD & Graph Method - 18.03.26

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The elimination method solves systems of linear equations by adding or subtracting equations to cancel out one variable, reducing it to a single-variable equation. By manipulating equations via multiplication, you make coefficients of one variable opposite, allowing for easy elimination and substitution to find the remaining values.

Elimination Method

Q. $x - y - 7 = 0$, $x + y - 11 = 0$

Sol. $x - y = 7$ ..... (i)

$x + y = 11$ ..... (ii)

Adding (i) and (ii)

$x - y = 7$

$x + y = 11$

$2x = 18$

$x = 9$

Substituting x = 9 in (ii)

$9 + y = 11$

$y = 11 - 9$

$y = 2$

x = 9 and y = 2 is the solution of the given simultaneous equations

Ex 3.3

Elimination method

(1) (i) $x + y = 5$ → ① × 3

$2x - 3y = 4$ → ② × 1

(Coeff of y equal)

$3x + 3y = 15$ → ③

$2x - 3y = 4$ → ④

Add eq 3 & 4

$5x = 19$

$x = \frac{19}{5}$ → sub in eq ①

$x + y = 5$

$\frac{19}{5} + y = 5$

$y = 5 - \frac{19}{5}$ (5 = 25/5)

$y = \frac{25 - 19}{5}$

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

Check

$x + y = 5$

$\frac{19}{5} + \frac{6}{5}$

$\frac{19 + 6}{5} = \frac{25}{5}$

$= 5$

LHS = RHS

(*) Substitution method :-

$x + y = 5$ → ①

$2x - 3y = 4$ → ②

$x + y = 5$

$x = 5 - y$ → ①

sub in eqn ②

③ $2x - 3y = 4$

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

$10 - 2y - 3y = 4$

$10 - 5y = 4$

$-5y = 4 - 10$

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

$y = \frac{6}{5}$ sub in eqn

④ $x + y = 5$

$x + \frac{6}{5} = 5$

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

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

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

Q. (ii) Solve the following pair of linear equations by the elimination method (and the substitution method)

(ii) $3x + 4y - 10 = 0$ and $2x - 2y - 2 = 0$

Elimination method

$3x + 4y = 10$ → ① × 2

$2x - 2y = 2$ → ② × 4

$6x + 8y = 20$

$3x + 4y = 10$

$3(2) + 4y = 10$

$4y = 10 - 6$

Check : $2x - 2y = 2$

$2(2) - 2(1) =$

$4 - 2 = 2$

$6x + 8y = 20$

$8x - 8y = 8$

$14x = 28$

$x = \frac{28}{14}$

$\boxed{x = 2}$ Sub in eq (1)

$4y = 10 - 6$

$4y = 4$

$y = \frac{4}{4} = 1$

$\boxed{y = 1}$

∴ The solution is $\boxed{x = 2, y = 1}$

Graphical Method

(iv) **x + 2y = 6; 2x + y = 6**

$x + 2y = 6 \rightarrow (1)$

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If $x = 0 \Rightarrow 0 + 2y = 6$

$2y = 6$

$y = \frac{6}{2} = 3$

If $x = 4$

$y = \frac{6-4}{2}$

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

$x + 2y = 6$

$2y = 6 - x$

$\boxed{y = \frac{6-x}{2}}$

x	0	4
$y = \frac{6-x}{2}$	3	1
x, y	(0, 3)	(4, 1)

$\Rightarrow$ eqn (1)

$2x + y = 6 \rightarrow (2)$

$\boxed{y = 6 - 2x}$

If $x = 0$

$y = 6 - 2(0)$

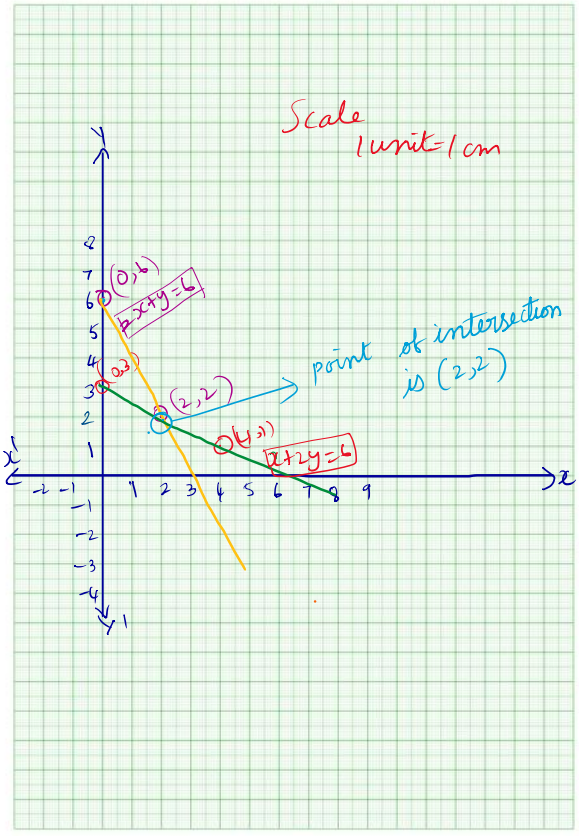
$y = 6$

If $x = 2$

$y = 6 - 2(2)$

$y = 6 - 4 = 2$

x	0	2
$y = 6 - 2x$	6	2
(x, y)	(0, 6)	(2, 2)



eqn ① intercept

$x, y = A(0,3)$ $B(4,1)$

eqn ② intercept

$(x, y) = (0,6)(2,4)$

∴ The point of intersection is $(2,2)$