



Elimination Method

Sol.
$$(1x)(1y) = 7$$
 (i)

Adding (i) and (ii)

$$x - y = 7$$

$$x + y = 11$$

$$2x = 18$$

$$x = 9$$

Substituti We have to substitute x = 9

How to eliminate?

subtracting

Either by adding or

Either equation (i) or As Sign. equation (ii)

> Whichever variable coefficient is same

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

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

Substituting x = 2 in (i)

Soln. Elimination method

7

x =

$$(3)$$
 + (4) = 10 ... (i)

$$(2) - (2) = 2 \dots (ii)$$

$$3(2) + 4y = 10$$

$$4v = 10 -$$

have to

OfY

m nave to

Multiplying (ii) by 2, we get

$$4x - 4y = 4 \dots (ii)$$

 $3x = 10 \dots (i)$

(i)

First in equation as e

We have to substitute x = 2

Here coefficent of y is same

Which variable can be

To remove y, we need to add

As Signs are different

Either equation (i),(ii) or equation (iii)

Q. Solve the following pair of linear equations by the elimination method

(and the substitution method)

(i)
$$x + y - 5 = 0$$
 and $2x - 3y - 4 = 0$

Soln. Elimination method

$$(2x + 3y = 5 ... (i)$$

 $(2x - 3y = 4)$

Multiplying eqⁿ (i) by 2, we get

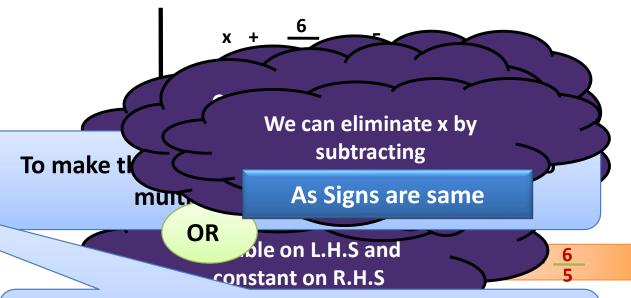
$$(+2x) + 2y = 10$$
 (iii)
+2x - 3y = 4 ... (ii)

Subtracting eqⁿ (ii) from eqⁿ (iii)

$$2y + 2y = 10$$
 ... (iii)
 $-3y = 4$... (ii)

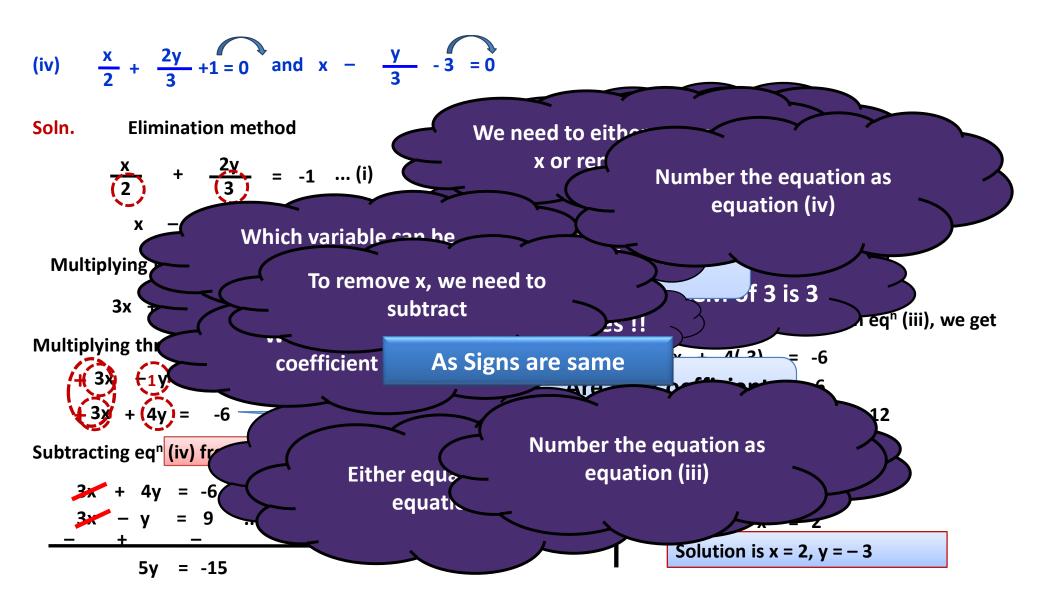
$$y = \frac{6}{5}$$

Substituting $y = \frac{6}{5}$ in (i)



To make the coefficient of y same we will have to multiplying equation (i) by 3

throughout by 5



Q.] Solve the following pair of linear equations by the elimination method

$$3x - 5y - 4 = 0$$
 and $9x = 2y + 7$

Elimination method Soln.

$$(3) - (5) = 4 \qquad \cdots (i)$$

Multiplying (i) by 3, we get

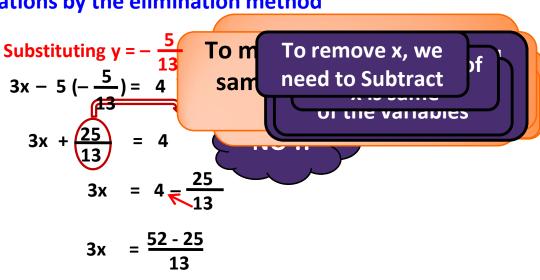
$$9x - 15y = 12$$
 ... (iii)
 $9x - 2y = 7$... (i)

Subtracting (i) from (iii)

$$- \frac{9x}{-} - \frac{15y}{-} = \frac{12}{-}$$

$$- \frac{2y}{-} = \frac{7}{-}$$

$$- \frac{13y}{-} = \frac{5}{13}$$



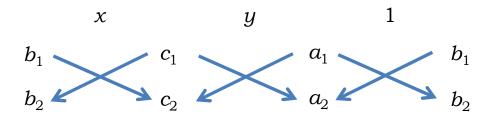
$$x = \frac{27}{39}$$

Solution is
$$x = \frac{9}{13}$$
, $y = -\frac{5}{13}$

Cross Multiplication Method

$$a_1x + b_1y + c_1 = 0$$

 $a_2x + b_2y + c_2 = 0$



$$\frac{x}{b_1c_2 - b_2c_1} = \frac{y}{c_1a_2 - c_2a_1} = \frac{1}{a_1b_2 - a_2b_1}$$

Q. Solve the following pair of linear equations by the substitution method and cross multiplication.

(i)
$$8x + 5y = 9$$

 $3x + 2y = 4$

(ii) By Cross Multiplication Method

Soln.
$$8x + 5y - 9 = 0$$
 ... (i) ... (ii) ... (ii)

Comparing equation (i) with $a_1x + b_1y + c_1 = 0$ and equation (ii) with $a_2x + b_2y + c_2 = 0$

By Cross Multiplication Method

Solution is x = -2, y = 5

We get
$$a_1 = 8$$

 $a_2 = 3$

$$b_1 = 5$$

$$c_1 = -9$$

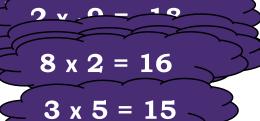
$$b_2 = 2$$

$$c_2 = -4$$

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

$$\frac{x}{-20 - (-18)} = \frac{y}{-27 - (-32)}$$

$$\therefore \frac{x}{-2} = \frac{y}{5} = \frac{1}{1}$$



Q. Which of the following pairs of linear equations has unique solution, no solution, or infinitely many solutions. In case there is a unique solution, find it by using cross multiplication method: 2x + y = 5, 3x + 2y = 8

Sol:
$$2x + y - 5 = 0$$
 ... (i)

Comparing equation (i) with $a_1x + b_1y + c_1 = 0$
and equation (ii) with $a_2x + b_2y + c_2 = 0$

We get $a_1 = 2$ $b_1 = 1$ $c_1 = -5$
 $a_2 = 3$... (iii)

$$\frac{b_1}{b_2} = \frac{1}{2}$$
 ... (iv)
$$\frac{c_1}{c_2} = \frac{-5}{-8} = \frac{5}{8}$$
 ... (v)

From (iii), (iv) and (v)
$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

... The given pair of linear equations has a unique solution.

$$\frac{x}{b_1c_2} - b_2c_1 = \frac{y}{c_1a_2} - c_2a_1 = \frac{1}{a_1b_2} - a_2b_1$$

$$\frac{x}{-8 - (-10)} = \frac{y}{-15 - (-16)} = \frac{1}{4 - 3}$$

$$\frac{x}{-8 - (-10)} = \frac{1}{1}$$

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$
Equations has unique solution (Consistent)
$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$
Equations has no solution (Inconsistent)
$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$
Equations has infinite solutions (Consistent)

Q. Which of the following pairs of linear equations has unique solution, no solution, or infinitely many solutions. In case there is a unique solution, find it by using cross

multiplication method:

$$3x - 5y = 20$$
; $6x - 10y = 40$

Sol:

$$\frac{3x - 5y - 20 = 0}{6x - 10y - 40 = 0}$$

Comparing equation (i) with
$$a_1x + b_1y + c_1 = 0$$

and equation (ii) with $a_2x + b_2y + c_2 = 0$

We get
$$a_1 = 3$$
 $b_1 = -5$ $c_1 = -20$ $a_2 = 6$ $b_2 = -10$ $c_2 = -40$

$$b_1 = -5$$

$$c_1 = -20$$

$$a_2 = 6$$

$$b_2 = -10$$

$$c_2 = -40$$

$$\frac{a_1}{a_2} = \frac{3}{6} = \frac{1}{2}$$
 ... (iii)

$$\frac{b_1}{b_2} = \frac{-5}{-10} = \frac{1}{2}$$
 ... (iv)

$$\frac{c_1}{c_2} = \frac{-20}{-40} = \frac{1}{2}$$
 ... (v)

From (iii), (iv) and (v)

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

.. The two lines are coincident, so they have infinitely many solutions.

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$
 Equations has unique solution (Consistent)

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$
 Equations has no solution (Inconsistent)

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$
 Equations has infinite solutions (Consistent)

Thank You