

Activity

System of linear equations

Objective

To obtain the conditions for consistency of a system of linear equations in two variables by graphical method.

Pre-requisite knowledge

Plotting of points on a graph paper

Procedure

1. Take the first pair of linear equations in two variables of the form

$$a_1x + b_1y + c_1 = 0$$

$$a_2x + b_2y + c_2 = 0$$

e.g.

$$2x - 3y = 3$$

$$3x - 4y = 5$$

2. Obtain a table of ordered pairs (x, y) , which satisfy the given equation.

Find at least three such pairs for each equation.

e.g. For $2x - 3y = 3$

x	0	3	6
y	-1	1	3

For $3x - 4y = 5$

x	-1	-5	-7
y	-2	-5	4

3. Plot the graphs for the two equations on the graph paper as shown in Fig 1(a).

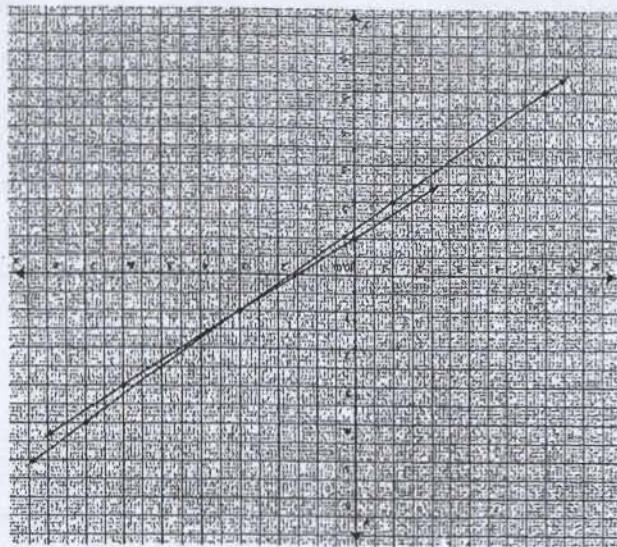


Fig 1(a)

Materials required
3 graph papers,
ruler,
pencil

1. The teacher will explain that when a system of linear equations has solution (whether unique or not), the system is said to be consistent; when the system of linear equations has no solution, it is said to be inconsistent.
2. The teacher may consider additional examples in which some of the co-efficients are zero.

Remarks

The student will learn that some pairs of linear equations in two variables have a unique solution (intersecting lines); some have infinitely many solutions (coincident lines) and some have no solution (parallel lines).

Learning outcomes

The student will observe that for intersecting lines $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, for parallel lines $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ and for coincident lines $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.

Observations

The student will observe that for intersecting lines $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, for parallel lines $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ and for coincident lines $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.

10. Obtain the condition for two lines to be intersecting, parallel or coincident from the

Type of lines	$\frac{a_1}{a_2}$	$\frac{b_1}{b_2}$	$\frac{c_1}{c_2}$
Intersecting			
Parallel			
Coincident			

9. Fill in the following observation table
8. Repeat the steps from 2 to 4.
e.g. $x - 2y = 5$, $2x - 4y = 10$
7. Take the third pair of linear equations in two variables.
e.g. $6x + 10y = 4$, $3x + 5y = -11$
6. Repeat the steps from 2 to 4.
5. Take the second pair of linear equations in two variables,
e.g. $6x + 10y = 4$, $3x + 5y = -11$
4. Observe if the lines are intersecting, parallel or coincident and note the following:
- $$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$