

Activity 20

OBJECTIVE

To verify that the equation of a line passing through the point of intersection of two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is of the form $(a_1x + b_1y + c_1) + \lambda (a_2x + b_2y + c_2) = 0$.

MATERIAL REQUIRED

Cardboard, sketch pen, white paper, adhesive, pencil, ruler.

METHOD OF CONSTRUCTION

1. Take a cardboard of convenient size and paste a white paper on it.
2. Draw two perpendicular lines $X'OX$ and $Y'OY$ on the graph paper. Take same scale for marking points on x and y -axes.
3. Draw the graph of the given two intersecting lines and note down the point of intersection, say (h, k) (see Fig. 20.1)

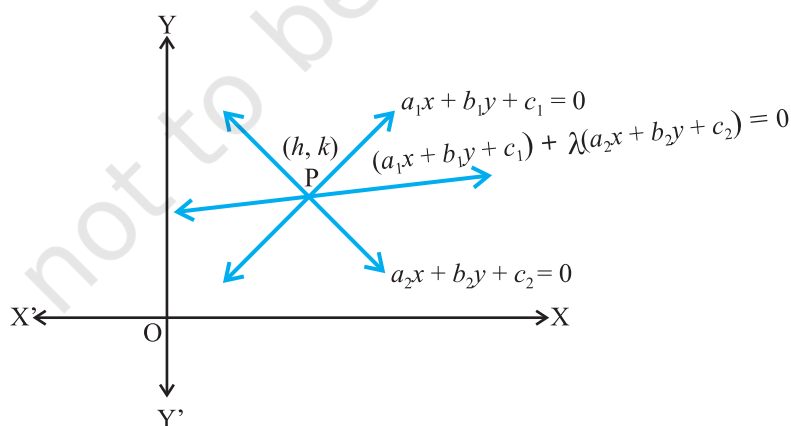


Fig. 20.1

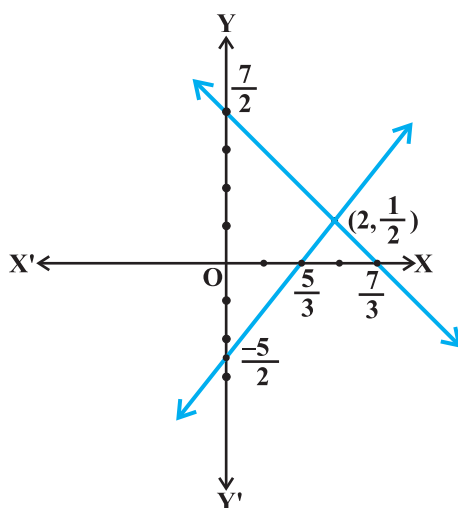


Fig. 20.2

DEMONSTRATION

1. Let the equations of the lines be $3x - 2y = 5$ and $3x + 2y = 7$.
2. The point of intersection of these lines is $\left(2, \frac{1}{2}\right)$ (See Fig. 20.2).
3. Equation of the line passing through the point of intersection $\left(2, \frac{1}{2}\right)$ of these lines is $(3x - 2y - 5) + \lambda(3x + 2y - 7) = 0$ (1)
4. Take $\lambda = 1, -1, 2, \frac{1}{2}$.
5. (i) For $\lambda = 1$, equation of line passing through the point of intersection is $(3x - 2y - 5) + 1(3x + 2y - 7)$, i.e., $6x - 12 = 0$, which is satisfied by the point of intersection $\left(2, \frac{1}{2}\right)$, i.e., $6(2) - 12 = 0$

(ii) For $\lambda = -1$, the equation of line passing through the point of intersection is

$(3x - 2y - 5) - 1(3x + 2y - 7) = 0$ is $-4y + 2 = 0$, which is also satisfied by the point of intersection $\left(2, \frac{1}{2}\right)$.

(iii) For $\lambda = 2$, the equation is $(3x - 2y - 5) + 2(3x + 2y - 7) = 0$, i.e., $9x + 2y - 19 = 0$, which is again satisfied by the point $\left(2, \frac{1}{2}\right)$.

OBSERVATION

1. For $\lambda = 3$, the equation of the line passing through intersection of the lines is _____ which is satisfied by the point $\left(2, \frac{1}{2}\right)$.
2. For $\lambda = 4$, the equation of the line passing through point of the intersection of the lines is _____ which is satisfied by the point of intersection _____ of the lines.
3. For $\lambda = 5$, the equation of the line passing through the intersection of the lines is _____ which is satisfied by the point of intersection _____ of the lines.

APPLICATION

The activity can be used in understanding the result relating to the equation of a line through the point of intersection of two given lines. It is also observed that infinitely many lines pass through a fixed point.