

# STRAIGHT LINES

## 1 11<sup>th</sup> Maths - Chapter 10

This is Problem 11 from Exercise-10.3

1. Prove that the line through the point  $(x_1, y_1)$  and parallel to the line  $Ax + By + C = 0$  is  $A(x - x_1) + B(y - y_1) = 0$ .

**Solution:** Given

$$\text{Let } \mathbf{P} = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix} \quad (1)$$

$$Ax + By + C = 0 \quad (2)$$

The line equation is

$$\mathbf{n}^\top \mathbf{x} = c \quad (3)$$

from (2)

$$\mathbf{n} = \begin{pmatrix} A \\ B \end{pmatrix} \quad (4)$$

The line passing through the  $\mathbf{P}$  is parallel to line  $Ax + By + C = 0$ .

The line equation for line passing through  $\mathbf{P}$  is

$$\mathbf{n}^\top \mathbf{m} = 0 \quad (5)$$

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{P}) = 0 \quad (6)$$

$$(A \ B) \left( \begin{pmatrix} x \\ y \end{pmatrix} - \begin{pmatrix} x_1 \\ y_1 \end{pmatrix} \right) = 0 \quad (7)$$

$$(A \ B) \begin{pmatrix} x - x_1 \\ y - y_1 \end{pmatrix} = 0 \quad (8)$$

$$A(x - x_1) + B(y - y_1) = 0 \quad (9)$$

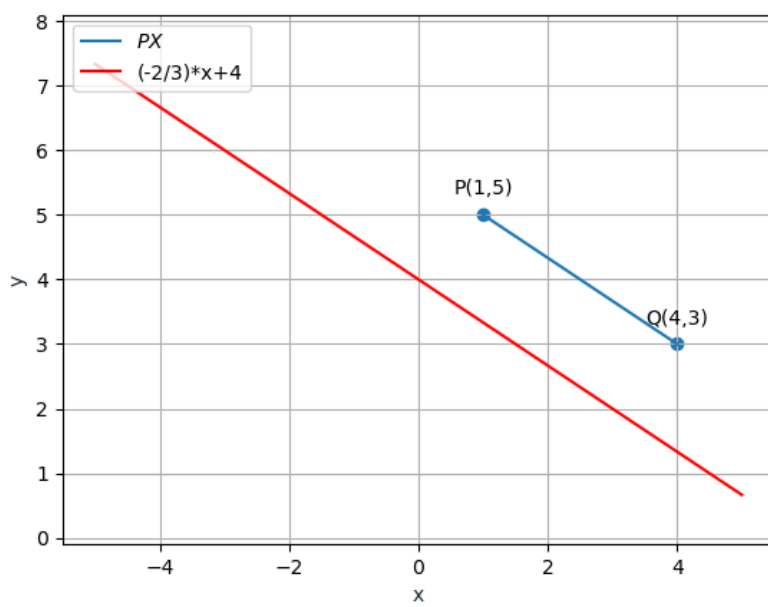


Figure 1