

CHAPTER-7
COORDINATE GEOMETRY

Excercise 7.1.

Q8.Find the Value of y for which the distance between the points P(2,-3) and Q(10,y) is 10 units:

1. $(2, -3), (10, y)$

Solution:

1. The coordinates are given as

$$\mathbf{P} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}, \mathbf{Q} = \begin{pmatrix} 10 \\ y \end{pmatrix}, \quad (1)$$

$$\mathbf{P} - \mathbf{Q} = \begin{pmatrix} 2 \\ -3 \end{pmatrix} - \begin{pmatrix} 10 \\ y \end{pmatrix} = \begin{pmatrix} -8 \\ -3 - y \end{pmatrix} \quad (2)$$

(3)

$$(\mathbf{P} - \mathbf{Q})^\top (\mathbf{P} - \mathbf{Q}) = \begin{pmatrix} -8 & -3 - y \end{pmatrix} \begin{pmatrix} -8 \\ -3 - y \end{pmatrix} = y^2 + 6y + 9 + 64 \quad (4)$$

$$d = \|\mathbf{P} - \mathbf{Q}\| = \sqrt{(\mathbf{P} - \mathbf{Q})^\top (\mathbf{P} - \mathbf{Q})} \quad (5)$$

Given, d=10 units, therefore;

$$10 = \sqrt{y^2 + 6y + 9 + 64} \quad (6)$$

Removing root on Right Hand Side(RHS)

Squaring on Both Sides

$$100 = y^2 + 6y + 73 \quad (7)$$

$$y^2 + 6y + 73 - 100 = 0 \quad (8)$$

$$y^2 + 6y - 27 = 0 \quad (9)$$

$$(y - 3)(y + 9) = 0 \quad (10)$$

Hence, the values of y for given point $P(2,-3)$ and $Q(10,y)$ is " $y = 3$ or $y = -9$ ".

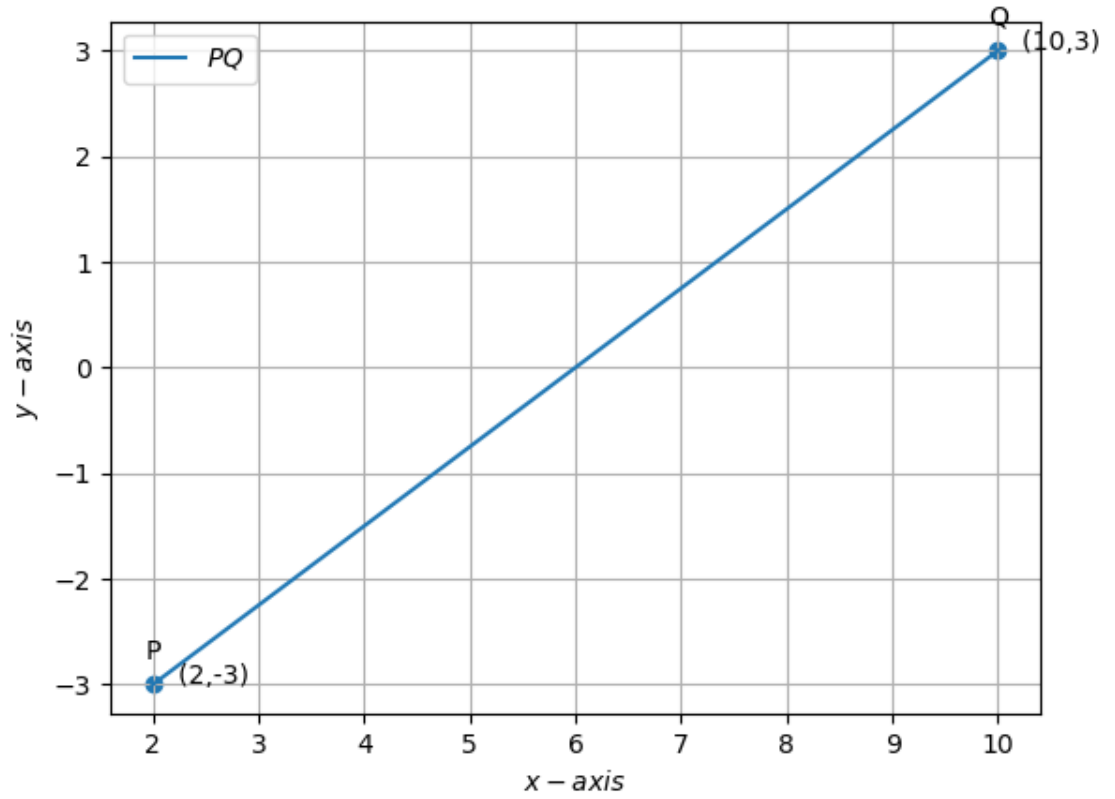


Figure 1: Graph for the line