LINE

1 11^{th} Maths - EXERCISE-10.3

1. The line through the points (h, 3) and (4, 1) intersects the line 7x- 9y-19= 0 at right angle. Find the value of h.

2 SOLUTION

Given points are

$$\mathbf{A} = \begin{pmatrix} h \\ 3 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} \tag{1}$$

$$\mathbf{P} = \mathbf{B} - \mathbf{A} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} - \begin{pmatrix} h \\ 3 \end{pmatrix} \tag{2}$$

$$\mathbf{P} = \begin{pmatrix} 4-h \\ -2 \end{pmatrix} \tag{3}$$

The directional vector is:

$$\mathbf{m} = \begin{pmatrix} 1 \\ \frac{9}{7} \end{pmatrix} \tag{4}$$

The normal vector is:

$$\mathbf{n} = \begin{pmatrix} \frac{9}{7} \\ 1 \end{pmatrix} \tag{5}$$

$$\mathbf{n}^\top = \begin{pmatrix} \frac{9}{7} & 1 \end{pmatrix} \tag{6}$$

The line equation is represented in the form of

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{P}) = 0 \tag{7}$$

$$\begin{pmatrix} \frac{9}{7} & 1 \end{pmatrix} \left(\mathbf{x} - \begin{pmatrix} 4-h \\ -2 \end{pmatrix} \right) = 0 \tag{8}$$

$$36 - 9h - 14 = 0 \tag{9}$$

$$36 - 14 = 9h \tag{10}$$

$$h = \frac{22}{9} \tag{11}$$

3 Figure

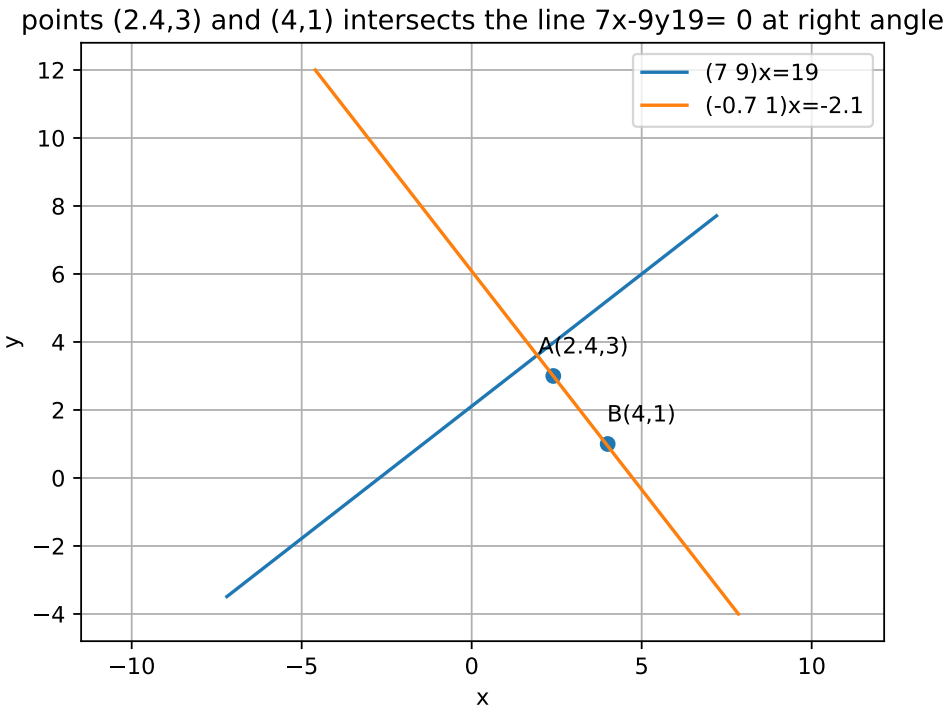

Figure 1: line