

11.10.4.21

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CLASS 11, CHAPTER 10, EXERCISE 3.10

Q. 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 .

Solution: The slope of line through given points,
Let

$$\mathbf{A} = \begin{pmatrix} h \\ 3 \end{pmatrix} \quad (1)$$

$$\mathbf{B} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} \quad (2)$$

is given by

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 4 - h \\ 1 - 3 \end{pmatrix} = \begin{pmatrix} 4 - h \\ -2 \end{pmatrix} \quad (3)$$

For the given line,

$$(7 \quad -9)\mathbf{x} = 19 \quad (4)$$

$$\mathbf{n} = \begin{pmatrix} 7 \\ -9 \end{pmatrix} \quad (5)$$

$$\Rightarrow \mathbf{m} = \begin{pmatrix} 9 \\ 7 \end{pmatrix} \quad (6)$$

As given this two lines intersect at right angle, we have

$$\mathbf{m}^\top (\mathbf{B} - \mathbf{A}) = 0 \quad (7)$$

$$\Rightarrow (9 \quad 7) \begin{pmatrix} 4 - h \\ -2 \end{pmatrix} = 0 \quad (8)$$

$$\Rightarrow h = \frac{22}{9} \quad (9)$$

Fig. 1: Given lines and equidistant line