

# 1-1.6-15

EE24BTECH11048-NITHIN.K

## Question:

Find the value of m if the points (5, 1), (-2, -3) and (8, 2m) are collinear.

## Solution:

Variable	Description	Formula
$A$	A Point to be plotted	$A = \begin{pmatrix} 5 & 1 \end{pmatrix}$
$B$	A Point to be plotted	$B = \begin{pmatrix} -2 & -3 \end{pmatrix}$
$C$	A Point to be found and plotted	$C = \begin{pmatrix} 8 & 2m \end{pmatrix}$
$M$	It is a matrix comprising of vectors $B - A$ and $C - A$	$M = \begin{pmatrix} B - A & C - A \end{pmatrix}$

TABLE 0

A, B, C are collinear if  $\text{rank}(M) = 1$

**Note:** rank of matrix M = rank of matrix  $M^T$

$$M^T = \begin{pmatrix} -7 & -4 \\ 3 & 2m - 1 \end{pmatrix} \xrightarrow{R_2 = 3R_1 + 7R_2} \begin{pmatrix} -7 & -4 \\ 0 & -19 + 14m \end{pmatrix} \quad (0.1)$$

$$\text{for the rank to be 1,} \quad (0.2)$$

$$-19 + 14m = 0 \quad (0.3)$$

$$m = 19/14 \quad (0.4)$$

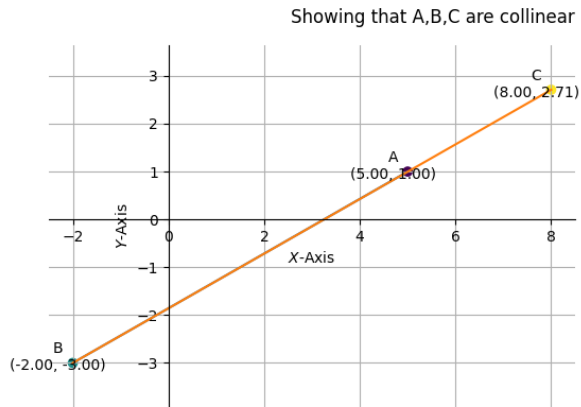


Fig. 0.1