

CHAPTER 7 - COORDINATE GEOMETRY

Exercise 7.1

Q4. Check whether (5,-2), (6,4) and (7,-2) are the vertices of an isosceles triangle:

Solution:

1. In an Isosceles triangle, If any 2 of the 3 sides of triangle are equal then it satisfies the condition. Let us assume the given three points be,

$$\mathbf{A}, \mathbf{B}, \mathbf{C} \quad (1)$$

Now, the direction vectors of AB, BC and CA are:

$$\mathbf{A} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 7 \\ -2 \end{pmatrix} \quad (2)$$

Now, making the given points into matrix and solving them to get the rank of matrix. Assuming P is the matrix.

$$\mathbf{P} = \begin{pmatrix} 5 & 6 & 7 \\ -2 & 4 & -2 \end{pmatrix} \xrightarrow{R_2 = \frac{R_2}{2}} \begin{pmatrix} 5 & 6 & 7 \\ -1 & 2 & -1 \end{pmatrix} \xrightarrow{R_1 = \frac{R_1}{5}} \begin{pmatrix} 1 & \frac{6}{5} & \frac{7}{5} \\ -1 & 2 & -1 \end{pmatrix} \quad (3)$$

$$\xrightarrow{R_2 = R_2 + R_1} \begin{pmatrix} 1 & \frac{6}{5} & \frac{7}{5} \\ 0 & \frac{16}{5} & \frac{8}{5} \end{pmatrix} \xrightarrow{R_2 = \frac{R_2}{16/5}} \begin{pmatrix} 1 & \frac{6}{5} & \frac{7}{5} \\ 0 & 1 & \frac{1}{8} \end{pmatrix} \quad (4)$$

Since we have two linearly independent rows hence Rank of Matrix, Rank(P) = 2. Therefore, as the rank is 2, it is proved that the given points are Isosceles Triangle.

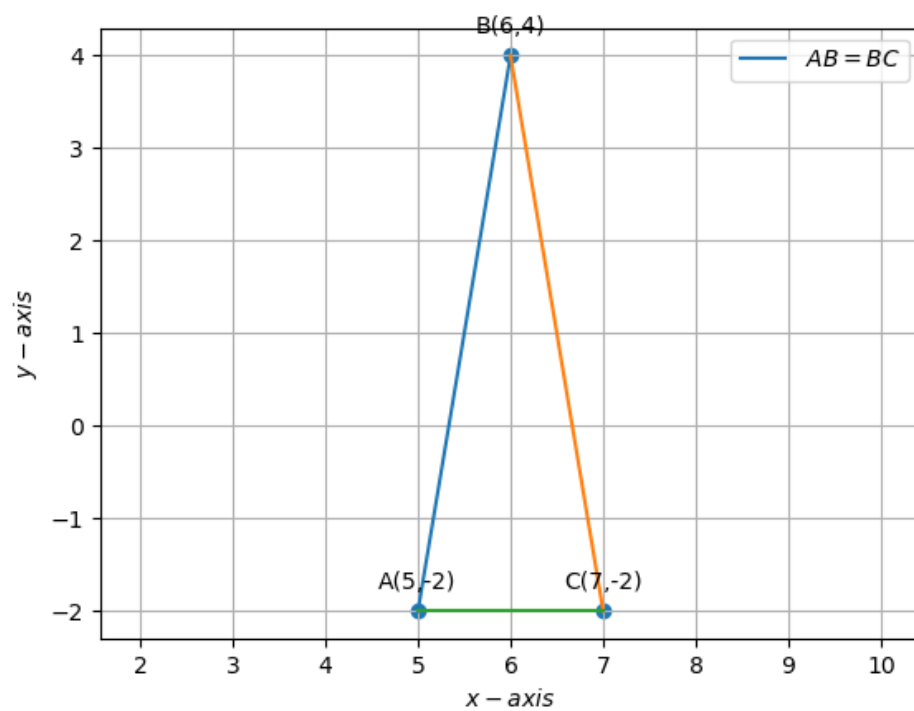


Figure 1: Isoscles Triangle with the given coordinates