3-3.2-7

EE24BTECH11066 - YERRA AKHILESH

Question:
Draw an isosceles triangle ABC in which $AB = AC = 6cm$ and $BC = 6cm$.
solution: Given, a=6cm, b=6cm and c=6cm.

Variable	Description
a	length of side-BC
b	length of side-CA
c	length of side-AB
A	co-ordinates of vertex-1
B	co-ordinates of vertex-2
C	co-ordinates of vertex-3

TABLE 0: Variables Used

Let us place B at origin and C along the x-axis i.e,

$$B = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{0.1}$$

$$C = \begin{pmatrix} 6 \\ 0 \end{pmatrix} \tag{0.2}$$

Let us use distances AB and CA to find co-ordinates of A,
By using c=6cm

$$(A - B) = \begin{pmatrix} x \\ y \end{pmatrix} \tag{0.3}$$

$$\|A - B\| = 6 \tag{0.4}$$

$$\sqrt{\begin{pmatrix} x & y \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}} = 6 \tag{0.5}$$

$$\sqrt{x^2 + y^2} = 6 \tag{0.6}$$

$$x^2 + y^2 = 36 \tag{0.7}$$

By using b=6cm

$$(A-C) = \begin{pmatrix} x-6 \\ y \end{pmatrix} \tag{0.8}$$

$$\|A-B\| = 6 \tag{0.9}$$

$$\sqrt{\begin{pmatrix} x-6 & y \end{pmatrix}\begin{pmatrix} x-6 \\ y \end{pmatrix}} = 6 \tag{0.10}$$

$$\sqrt{(x-6)^2+y^2} = 6 \tag{0.11}$$

$$(x-6)^2+y^2 = 36 \tag{0.12}$$

By solving both the equations we get, x=3 , y=5.196
Therefore,

$$A = \begin{pmatrix} 3 \\ 5.196 \end{pmatrix}, B = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, C = \begin{pmatrix} 6 \\ 0 \end{pmatrix}. \tag{0.13}$$

Fig. 0.1: Triangle ABC