

# 1.5.16

EE25BTECH11028 - J.Navya sri

**Question:**

Find the coordinates of a point  $A$  where  $AB$  is the diameter of the circle with center is  $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$  and  $B$  is the point  $\begin{pmatrix} 2 \\ 6 \end{pmatrix}$ .

**Solution:**

Given data:

Point	Vector
B	$\begin{pmatrix} 2 \\ 6 \end{pmatrix}$
P	$\begin{pmatrix} 3 \\ -1 \end{pmatrix}$

**Theory :** Center of a circle is the mid-point of the diameter.

Let  $P$  be the center of the given circle , with  $AB$  as the diameter.

Let  $\mathbf{A}$  be the Vector to be found

Given :

$$B \equiv \begin{pmatrix} 2 \\ 6 \end{pmatrix}, \quad P \equiv \begin{pmatrix} 3 \\ -1 \end{pmatrix}$$

Center of a circle is the mid point of the diameter. For a circle with center  $\mathbf{P}$  and ends of diameters represented by vectors  $\mathbf{A}$  and  $\mathbf{B}$

$$\mathbf{P} = \frac{\mathbf{A} + \mathbf{B}}{2} \quad (0.1)$$

Rearranging , we get:

$$\mathbf{A} = 2\mathbf{P} - \mathbf{B} \quad (0.2)$$

Substituting the given vectors, we get:

$$\mathbf{A} = 2 \begin{pmatrix} 3 \\ -1 \end{pmatrix} - \begin{pmatrix} 2 \\ 6 \end{pmatrix} \quad (0.3)$$

$$\mathbf{A} = \begin{pmatrix} 6 \\ -2 \end{pmatrix} - \begin{pmatrix} 2 \\ 6 \end{pmatrix} \quad (0.4)$$

$$\therefore \mathbf{A} \equiv \begin{pmatrix} 4 \\ -8 \end{pmatrix}$$

Hence , Coordinates of  $\mathbf{A}$  are

$$\begin{pmatrix} 4 \\ -8 \end{pmatrix}$$

**Graph representation:**

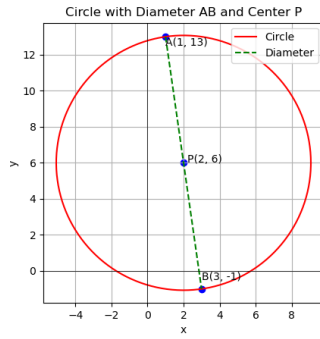


Fig. 0.1