1.8.9

AI25BTECH11033 - SPOORTHI

Question:
The distance of the point $\mathbf{P}(-6, 8)$ from the origin is
  solution:
  Let the point be represented as a column matrix or (vector).

$$\mathbf{P} = \begin{pmatrix} -6 \\ 8 \end{pmatrix} \text{ and } \mathbf{O} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{1}$$

Consider

$$\mathbf{P} - \mathbf{O} = \begin{pmatrix} -6 \\ 8 \end{pmatrix} \tag{2}$$

Transpose the vector

$$(\mathbf{P} - \mathbf{O})^T = \begin{pmatrix} -6 & 8 \end{pmatrix} \tag{3}$$

multiply the transpose with the original vector.

$$(\mathbf{P} - \mathbf{O})^T(\mathbf{P} - \mathbf{O}) = (-6)^2 + 8^2 \tag{4}$$
$$= 36 + 64 \tag{5}$$
$$= 100 \tag{6}$$

$$d = \|\mathbf{P} - \mathbf{O}\| = \sqrt{100} = 10 \tag{7}$$

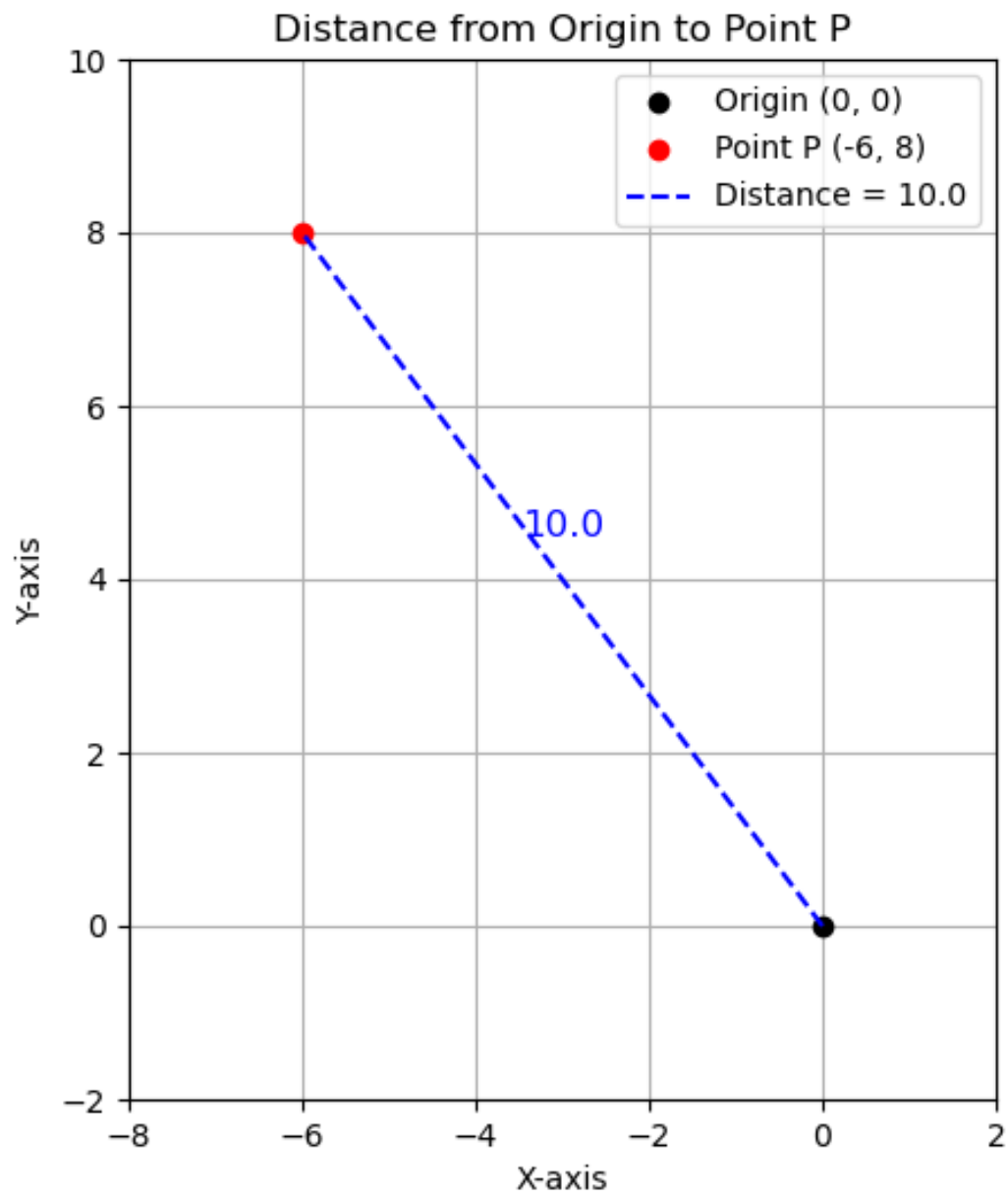The distance of the point $\mathbf{P}\left(-6, 8\right)$ from the origin is 10 units

Fig. 1