Matgeo-1.8.15

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Question

Find the value of a, if the distance between the points $A\begin{pmatrix}-3\\-14\end{pmatrix}$ and $B\begin{pmatrix}a\\-5\end{pmatrix}$ is 9 units.

Solution

$$\mathbf{A} = \begin{pmatrix} -3 \\ -14 \end{pmatrix}, \qquad \mathbf{B} = \begin{pmatrix} a \\ -5 \end{pmatrix} \tag{1}$$

$$\|\mathbf{A} - \mathbf{B}\| = 9 \tag{2}$$

$$\implies \left\| \begin{pmatrix} -3 \\ -14 \end{pmatrix} - \begin{pmatrix} a \\ -5 \end{pmatrix} \right\| = 9 \tag{3}$$

$$\implies \left\| \begin{pmatrix} -3-a \\ -9 \end{pmatrix} \right\| = 9 \tag{4}$$

$$\implies (-3-a)^2 + (-9)^2 = 9^2 \tag{5}$$

$$(a+3)^2 + 81 = 81 \tag{6}$$

$$(a+3)^2 = 0 \tag{7}$$

$$\therefore \ a = -3 \tag{8}$$

Graphical Representation

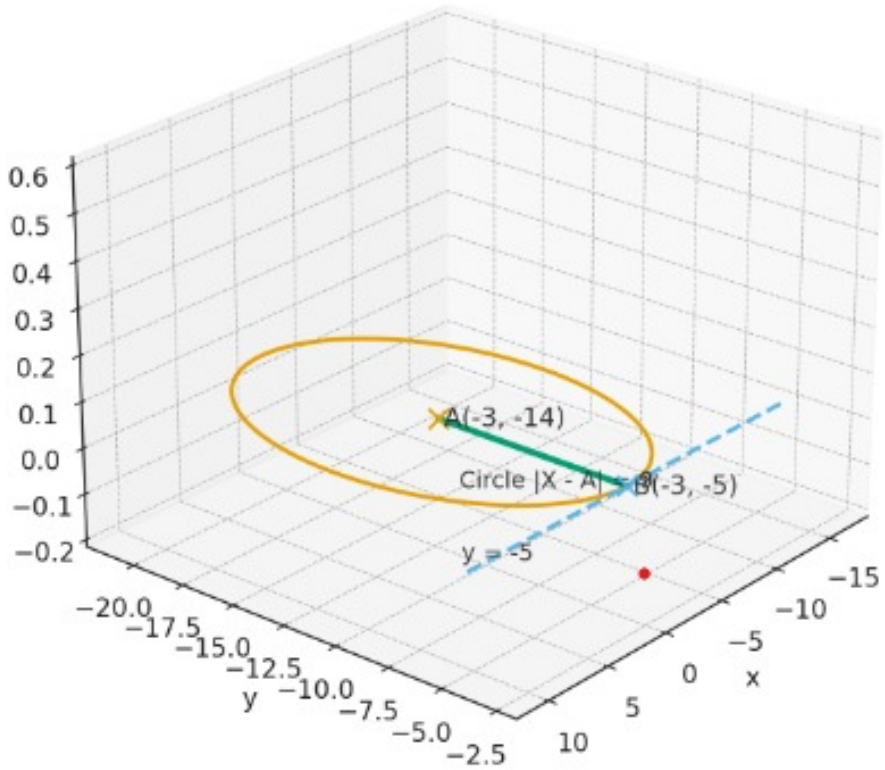

Figure: Circle centered at $A(-3, -14)$ with radius 9 intersecting the line $y = -5$ at $B(-3, -5)$.