

Answer on Question #51857-Physics-Mechanics-Kinematics-Dynamics

Two vectors \vec{a} and \vec{b} have components, in arbitrary units, $a_x=3.2, a_y=1.6, b_x=0.5, b_y=4.5$. Find the angle between \vec{a} and \vec{b}

33o 28o 57o 62o

Solution

The scalar product of two vectors is

$$(\vec{a}, \vec{b}) = |\vec{a}| \cdot |\vec{b}| \cos \alpha = (a_x b_x + a_y b_y),$$

where α is the angle between \vec{a} and \vec{b} , $|\vec{a}|$ is the length of \vec{a} , $|\vec{b}|$ is the length of \vec{b} .

Thus,

$$\alpha = \cos^{-1} \left(\frac{a_x b_x + a_y b_y}{\sqrt{a_x^2 + a_y^2} \sqrt{b_x^2 + b_y^2}} \right) = \cos^{-1} \left(\frac{3.2 \cdot 0.5 + 1.6 \cdot 4.5}{\sqrt{3.2^2 + 1.6^2} \sqrt{0.5^2 + 4.5^2}} \right) = 57^\circ.$$

Answer: 57°.