

### Answer on Question#51985 - Physics - Other

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  $\vec{b}$ .

Solution:

The dot product is given by

$$\vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}| \cos \varphi$$

Therefore

$$\cos \varphi = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| \cdot |\vec{b}|} = \frac{a_x b_x + a_y b_y}{\sqrt{a_x^2 + a_y^2} \sqrt{b_x^2 + b_y^2}} = \frac{3.2 \cdot 0.5 + 1.6 \cdot 4.5}{\sqrt{3.2^2 + 1.6^2} \sqrt{0.5^2 + 4.5^2}} = \frac{8.8}{\sqrt{262.4}}$$

The angle between  $\vec{a}$  and  $\vec{b}$  is given by

$$\varphi = \arccos \frac{8.8}{\sqrt{262.4}} = 57.1^\circ$$

Answer:  $57.1^\circ$ .