

a)

The x-component of a vector  $\vec{A}$  is along x-axis and is represented as  $A_x$  and its y-component of the vector along y-axis is  $A_y$ . In vector notation it can be expressed as,

$$\vec{A} = A_x \hat{x} + A_y \hat{y}$$

Here,  $\hat{x}$  and  $\hat{y}$  are the unit vectors.

Magnitude of the vector is calculated using the following formula:

$$|\vec{A}| = \sqrt{A_x^2 + A_y^2}$$

If the components of the vector are doubled, then the new vector is represented by,

$$\vec{A}' = (2A_x) \hat{x} + (2A_y) \hat{y} \text{ Then the magnitude of new vector is,}$$

$$\begin{aligned} |\vec{A}'| &= \sqrt{(2A_x)^2 + (2A_y)^2} \\ &= 2\sqrt{A_x^2 + A_y^2} \\ &= 2|\vec{A}| \end{aligned}$$

Therefore, the magnitude of the vector changes by a factor of 2.

# Mastering Physics Solutions Chapter 3

**Don Kulasiri, Rahul Kosarwal**



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Ajawad I Haija is a professor of physics at Indiana University of Pennsylvania M Z Numan is professor and chair of the department of physics at Indiana University of Pennsylvania W Larry Freeman is Emeritus Professor of Physics at Indiana University of Pennsylvania

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