

**Answer on Question #68614-Physics-Other**

Given  $|\vec{A}_1| = 2$ ,  $|\vec{A}_2| = 3$  and  $|\vec{A}_1 + \vec{A}_2| = 3$ . The magnitude of  $(\vec{A}_1 + 2\vec{A}_2) \cdot (3\vec{A}_1 - 4\vec{A}_2)$  is ?

**Solution**

$$|\vec{A}_1 + \vec{A}_2|^2 = |\vec{A}_1|^2 + |\vec{A}_2|^2 + 2|\vec{A}_1||\vec{A}_2| \cos \alpha$$

$$3^2 = 2^2 + 3^2 + 2(2)(3) \cos \alpha$$

$$\cos \alpha = -\frac{2^2}{2(2)(3)} = -\frac{1}{3}$$

$$\begin{aligned}(\vec{A}_1 + 2\vec{A}_2) \cdot (3\vec{A}_1 - 4\vec{A}_2) &= 3|\vec{A}_1|^2 - 4|\vec{A}_1||\vec{A}_2| \cos \alpha + 6|\vec{A}_1||\vec{A}_2| \cos \alpha - 8|\vec{A}_2|^2 \\ &= 3(2)^2 + 2(2)(3) \left(-\frac{1}{3}\right) - 8(3)^2 = -64.\end{aligned}$$

The magnitude of  $(\vec{A}_1 + 2\vec{A}_2) \cdot (3\vec{A}_1 - 4\vec{A}_2)$  is 64.

**Answer: 64.**