**Answer on Question #47625-Physics-Other**

Given that $\vec{A} + \overrightarrow{B} + \vec{C} = 0$. Out of three vectors, two are equal in magnitude and the magnitude of the third vector is $\sqrt{2}$ times that of either vector having equal magnitudes. Then the angle between the vectors is

(1) 30, 60, 90 (2) 45, 45, 90 (3) 45, 60, 90 (4) 90, 135, 135

**Solution**

If $|\vec{A}| = |\vec{B}| = x$, then $|\vec{C}| = \sqrt{2}x$. Now $\vec{A} + \overrightarrow{B} = -\vec{C}$ or

$$(\vec{A} + \overrightarrow{B})(\vec{A} + \overrightarrow{B}) = (-\vec{C})(-\vec{C})$$

or

$$x^2 + x^2 + 2x^2 \cos\theta_1 = 2x^2$$

or

$$\cos\theta_1 = 0 \rightarrow \theta_1 = 90.$$

Now, $\vec{A} + \overrightarrow{C} = -\vec{B}$ or

$$(\vec{A} + \overrightarrow{C})(\vec{A} + \overrightarrow{C}) = (-\vec{B})(-\vec{B})$$

or

$$x^2 + 2x^2 + 2\sqrt{2}x^2 \cos\theta_2 = x^2$$

or

$$\cos\theta_2 = -\frac{2x^2}{2\sqrt{2}x^2} = -\frac{1}{\sqrt{2}} \rightarrow \cos(180 - \theta_2) = \frac{1}{\sqrt{2}} \rightarrow 180 - \theta_2 = 45 \rightarrow \theta_2 = 135.$$

Again, $\vec{B} + \overrightarrow{C} = -\vec{A}$ or

$$(\vec{B} + \overrightarrow{C})(\vec{B} + \overrightarrow{C}) = (-\vec{A})(-\vec{A})$$

or

$$x^2 + 2x^2 + 2\sqrt{2}x^2 \cos\theta_3 = x^2$$

or

$$\cos\theta_3 = -\frac{2x^2}{2\sqrt{2}x^2} = -\frac{1}{\sqrt{2}} \rightarrow \cos(180 - \theta_3) = \frac{1}{\sqrt{2}} \rightarrow 180 - \theta_3 = 45 \rightarrow \theta_3 = 135.$$

**Answer: (4) 90, 135, 135.**