

**Answer on Question #83569 – Math – Trigonometry**

**Question**

What is the value of  $\sin \theta$  if  $\cos(-\theta) = -\frac{\sqrt{3}}{4}$ ,  $\sin \theta < 0$ ?

$$-\frac{\sqrt{13}}{16}$$

$$\frac{\sqrt{13}}{16}$$

$$-\frac{\sqrt{13}}{4}$$

$$\frac{\sqrt{13}}{4}$$

**Solution**

If  $\cos(-\theta) = \cos \theta$  then  $\cos \theta = -\frac{\sqrt{3}}{4}$ .

Using the basic trigonometric identity  $\sin^2 \theta + \cos^2 \theta = 1$ ;

$$\sin^2 \theta = 1 - \cos^2 \theta;$$

$$\sin \theta = \pm \sqrt{1 - \cos^2 \theta}.$$

If  $\sin \theta < 0$  then

$$\sin \theta = -\sqrt{1 - \cos^2 \theta};$$

$$\sin \theta = -\sqrt{1 - \left(-\frac{\sqrt{3}}{4}\right)^2};$$

$$\sin \theta = -\sqrt{1 - \frac{3}{16}};$$

$$\sin \theta = -\sqrt{\frac{16}{16} - \frac{3}{16}};$$

$$\sin \theta = -\sqrt{\frac{16-3}{16}};$$

$$\sin \theta = -\sqrt{\frac{13}{16}};$$

$$\sin \theta = -\frac{\sqrt{13}}{\sqrt{16}};$$

$$\sin \theta = -\frac{\sqrt{13}}{4};$$

**Answer:**  $\sin \theta = -\frac{\sqrt{13}}{4}.$