What you'll Learn About

Solve each trigonometric equation for θ on the interval $[0,2\pi]$. Then give a formula for all possible angles that could be a solution of the equation.

A) $\sin\theta = \frac{\sqrt{2}}{2}$

$\theta = 45^\circ, 135^\circ$

$45^\circ \pm 360k$

$135^\circ \pm 360k$

$\theta = \frac{\pi}{4}, \frac{3\pi}{4}$

$\frac{\pi}{4} \pm 2\pi k$

$\frac{3\pi}{4} \pm 2\pi k$

B) $\cos\theta = \frac{-1}{2}$

$\theta = 120^\circ, 240^\circ$

$\frac{2\pi}{3}, \frac{4\pi}{3}$

$\theta = 120 \pm 360k$

$240 \pm 360k$

$\frac{2\pi}{3} \pm 2\pi k$

$\frac{4\pi}{3} \pm 2\pi k$

C) $\sin\theta = 1$

$\theta = 90^\circ, \frac{\pi}{2}$

$90^\circ \pm 360k$

$\frac{\pi}{2} \pm 2\pi k$

D) $\cos\theta = 0$

$\theta = 90^\circ, 270^\circ$

$\frac{\pi}{2} \quad \frac{3\pi}{2}$

$90^\circ \pm 360k$

$270^\circ \pm 360k$

$\frac{\pi}{2} \pm 2\pi k$

$\frac{3\pi}{2} \pm 2\pi k$

E) $\tan\theta = \sqrt{3}$

$60^\circ, 240^\circ$

$60 \pm 360k$

$240 \pm 360k$

$\frac{\pi}{3} \pm \pi k$

$\frac{\pi}{3} \quad \frac{4\pi}{3}$

6

F) $\tan\theta = -1$

$135^\circ, 315^\circ \quad \frac{3\pi}{4}, \frac{7\pi}{4}$

$135 \pm 360k$

$315 \pm 360k$

$135 \pm 180k$

$\frac{3\pi}{4} \pm 2\pi k$

$\frac{7\pi}{4} \pm 2\pi k$

$\frac{3\pi}{4} \pm \pi k$

$[0, 360)$

Solve each trigonometric equation for θ on the interval $[0, 2\pi]$.

A) $\cos 2\theta = \frac{1}{2}$

$\frac{2\theta}{2} = \frac{60^\circ}{2} \pm \frac{360k}{2}$

$\theta = 30 \pm 180k$

$30^\circ, 210^\circ$

$\frac{2\theta}{2} = \frac{300}{2} \pm \frac{360k}{2}$

$\theta = 150 \pm 180k$

$150^\circ, 330^\circ$

B) $\sin 3\theta = \frac{1}{2}$

$\frac{3\theta}{3} = \frac{30}{3} \pm \frac{360k}{3}$

$\theta = 10 \pm 120k$

$10, 130, 250,$

$\frac{3\theta}{3} = \frac{150}{3} \pm \frac{360k}{3}$

$\theta = 50 \pm 120k$

$50, 170, 290$

C) $\cos \frac{\theta}{3} = \frac{\sqrt{3}}{2}$

$3\left(\frac{\theta}{3}\right) = (30^\circ \pm 360k)3$

$\theta = 90 \pm 1080k$

$\boxed{90}$

$3\left(\frac{\theta}{3}\right) = (330 \pm 360k)3$

$\theta = 990 \pm 1080k$

D) $\tan\left(\frac{\theta}{2} + \frac{\pi}{3}\right) = 1$

$\tan\left(\frac{\theta}{2} + 60^\circ\right) = 1$

$\tan 45^\circ = 1$

$\frac{\theta}{2} + 60 = 45$

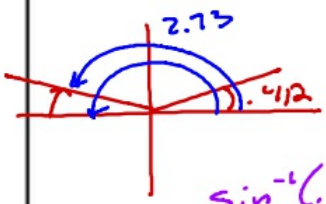
$\frac{\theta}{2} = -15^\circ$

$\theta = -30^\circ$

$\frac{\theta}{2} + 60 = 225$

$\frac{\theta}{2} = 165$

$\theta = 330^\circ$



E) $\sin\theta = .4$

$\sin^{-1}(.4) = \boxed{.412}$

$3.14 - .412$

$\boxed{2.73}$

$\sin^{-1}(.4)$

$\boxed{23.58^\circ}$

$180 - 23.58 = \boxed{156.42^\circ}$

F) $\cos\theta = -.2$

$\cos^{-1}(-.2) = 101.54^\circ$

258.46