

Solving Equations WS

1) $\tan \theta + \sqrt{3} = 0$

$$\tan \theta = -\sqrt{3}$$

$$\theta = 120^\circ, 300^\circ$$

2) $2 \cos \theta + \sqrt{3} = 0$

$$2 \cos \theta = -\sqrt{3}$$

$$\cos \theta = \frac{-\sqrt{3}}{2}$$

$$\theta = 150^\circ, 210^\circ$$

3) $2 \sin(\theta + 47^\circ) = 1$

$$\sin(\theta + 47^\circ) = \frac{1}{2}$$

$$\sin^{-1}\left(\frac{1}{2}\right) = \theta + 47^\circ$$

$$30^\circ, 150^\circ = \theta + 47^\circ$$



$$30 = \theta + 47$$

$$-17^\circ = \theta$$

$$343^\circ = \theta$$

$$150 = \theta + 47$$

$$103^\circ = \theta$$

$$\theta = 103^\circ, 343^\circ$$

4) $\sec(\theta + 81^\circ) = 2$

$$\cos(\theta + 81^\circ) = \frac{1}{2}$$

$$\cos^{-1}\left(\frac{1}{2}\right) = \theta + 81^\circ$$

$$60^\circ, 300^\circ = \theta + 81^\circ$$



$$60 = \theta + 81$$

$$-21 = \theta$$

$$339^\circ = \theta$$

$$300 = \theta + 81$$

$$219 = \theta$$

$$\theta = 219^\circ, 339^\circ$$

5) $4 \cos^2 \theta = 1$

$$\cos^2 \theta = \frac{1}{4}$$

$$\cos \theta = \pm \frac{1}{2}$$

$$\theta = 60^\circ, 120^\circ, -60^\circ, -120^\circ$$

6) $4 \sin^2 \theta = 3$

$$\sin^2 \theta = \frac{3}{4}$$

$$\sin \theta = \pm \frac{\sqrt{3}}{2}$$

$$\theta = 60^\circ, 120^\circ, -60^\circ, -120^\circ$$

7) $2 \sin \theta \cos \theta = \sqrt{2} \cos \theta$

$$2 \sin \theta \cos \theta - \sqrt{2} \cos \theta = 0$$

$$\cos \theta (2 \sin \theta - \sqrt{2}) = 0$$

$$\cos \theta = 0$$

$$2 \sin \theta - \sqrt{2} = 0$$

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

$$\theta = 90^\circ + 180n \quad \theta = 45^\circ + 360n$$

$$\theta = 135^\circ + 360n$$

8) $\tan \theta \sec \theta = \tan \theta$

$$\tan \theta \sec \theta - \tan \theta = 0$$

$$\tan \theta (\sec \theta - 1) = 0$$

$$\tan \theta = 0$$

$$\sec \theta - 1 = 0$$

$$\theta = 180n$$

$$\sec \theta = 1$$

$$\cos \theta = 1$$

$$\theta = 180n$$

$$9) \tan x - \sqrt{3} = 2 \tan x$$

$$-\sqrt{3} = \tan x$$

$$\boxed{\frac{2\pi}{3} + \pi n = x}$$

$$10) \cos x + 2 = 3 \cos x$$

$$2 = 2 \cos x$$

$$1 = \cos x$$

$$0^\circ = x$$

$$\boxed{0 + 2\pi n = x}$$

$$11) 2 \sin^2 \theta + \sin \theta = 0$$

$$\sin \theta (2 \sin \theta + 1) = 0$$

$$\sin \theta = 0 \quad 2 \sin \theta + 1 = 0$$

$$\theta = 0, 180$$

$$2 \sin \theta = -1$$

$$\sin \theta = -\frac{1}{2}$$

$$\theta = -30^\circ, -150^\circ$$

$$\boxed{\theta = -30, -150, 0, \pm 180^\circ}$$

$$12) \tan^2 \theta + \tan \theta = 0$$

$$\tan \theta (\tan \theta + 1) = 0$$

$$\tan \theta = 0 \quad \tan \theta = -1$$

$$\theta = 0$$

$$\theta = -45^\circ$$

$$\boxed{\theta = 0^\circ, -45^\circ}$$

$$13) 2 \cos^2 x - 5 \cos x + 2 = 0$$

$$(2 \cos x - 1)(\cos x - 2) = 0$$

$$2 \cos x - 1 = 0$$

$$\cos x = \frac{1}{2}$$

$$\boxed{x = \frac{\pi}{3}, \frac{5\pi}{3}}$$

$$\cos x - 2 = 0$$

$$\cos x = 2$$

$$\uparrow$$

No Sol.

$$14) 2 \sec^2 x - 3 \sec x - 2 = 0$$

$$(2 \sec x + 1)(\sec x - 2) = 0$$

$$2 \sec x + 1 = 0$$

$$2 \sec x = -1$$

$$\sec x = -\frac{1}{2}$$

$$\cos x = -2$$

$$\uparrow$$

No Sol.

$$\sec x - 2 = 0$$

$$\sec x = 2$$

$$\cos x = \frac{1}{2}$$

$$\boxed{x = \frac{\pi}{3}, \frac{5\pi}{3}}$$

$$15) \sin^2 \theta + 5 \sin \theta + 6 = 0$$

$$(\sin \theta + 3)(\sin \theta + 2) = 0$$

$$\sin \theta = -3 \quad \sin \theta = -2$$

$$\boxed{\text{No Solution!}}$$