Solving "simple" trigonometric equations: Practice Name KEY

Solve the following equations for x over the interval $[0, 2\pi)$.

1. $2\cos x + 4 = 5$

$2\cos x = 1$

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

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

2. $2\sin x - 1 = 0$

$2\sin x = 1$

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

$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$

3. $\tan^2 x - 3 = 0$

$\tan^2 x = 3$

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

$\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}}$

4. $5\cos x - \sqrt{3} = 3\cos x$

$2\cos x = \sqrt{3}$

$\cos x = \frac{\sqrt{3}}{2}$

$\boxed{x = \frac{\pi}{6}, \frac{11\pi}{6}}$

5. $4\csc^2 x - 2 = 0$

$4\csc^2 x = 2$

$\csc^2 x = \frac{2}{4} = \frac{1}{2}$

$\csc x = \pm\frac{1}{\sqrt{2}}$

$\sin x = \pm\sqrt{2}$

$\boxed{\text{NO SOLUTIONS}}$

6. $4\sin^2 x - 2 = 0$

$4\sin^2 x = 2$

$\sin^2 x = \frac{2}{4} = \frac{1}{2}$

$\sin x = \pm\frac{1}{\sqrt{2}} = \pm\frac{\sqrt{2}}{2}$

$\boxed{x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}}$

Solve the following equations for all angle values of x.

7. $3\tan x - 3 = 0$

$3\tan x = 3$

$\tan x = 1$

or... $x = \frac{\pi}{4} + n\pi$

$\boxed{x = \left.\frac{\pi}{4}, \frac{5\pi}{4}\right\} + 2n\pi}$

8. $\sec\left(\frac{3x}{2}\right) + 2 = 0$

$\sec\left(\frac{3x}{2}\right) = -2$

$\cos\left(\frac{3x}{2}\right) = -\frac{1}{2}$

$\frac{2}{3}\left(\frac{3x}{2}\right) = \left(\frac{2\pi}{3}\right)\frac{2}{3} \Rightarrow x = \frac{4\pi}{9}$

$\frac{2}{3}\left(\frac{3x}{2}\right) = \left(\frac{4\pi}{3}\right)\frac{2}{3}$

$x = \frac{8\pi}{9}$

$\boxed{x = \left.\frac{4\pi}{9}, \frac{8\pi}{9}\right\} + 2n\pi}$

9. $\sin^2 x - 4\sin x - 5 = 0$

$(\sin x + 1)(\sin x - 5) = 0$

$\sin x + 1 = 0$

$\sin x = -1$

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

$\sin x - 5 = 0$

$\sin x = 5$

NO SOLUTION

10. $5\cos 2x + 1 = 3\cos 2x$

$2\cos 2x + 1 = 0$

$2\cos 2x = -1$

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

$\frac{1}{2}2x = \left(\frac{2\pi}{3}\right)\frac{1}{2}$ $\frac{1}{2}2x = \left(\frac{4\pi}{3}\right)\frac{1}{2}$

$\boxed{\underbrace{x = \frac{\pi}{3}, \quad x = \frac{2\pi}{3}}_{+2n\pi}}$

11. $16\cos^2 x - 8 = 0$

$16\cos^2 x = 8$

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

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

$\boxed{x = \underbrace{\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}}_{+2n\pi}}$

12. $2\cos^2 x - 3\cos x + 1 = 0$

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

$2\cos x - 1 = 0$

$2\cos x = 1$

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

$\cos x - 1 = 0$

$\cos x = 1$

$x = 0 + 2n\pi$

$\boxed{x = \left.\frac{\pi}{3}, \frac{5\pi}{3}\right\} + 2n\pi}$