

Trig Equations

Solve the equation in the indicated domain (θ is degrees, x is radians)

1. $\tan \theta + \sqrt{3} = 0$ $\theta = [0, 360)$
2. $2 \cos \theta + \sqrt{3} = 0$ $\theta = [0, 360)$
3. $2 \sin(\theta + 47) = 1$ $\theta = [0, 360)$
4. $\sec(\theta + 81) = 2$ $\theta = [0, 360)$
5. $4 \cos^2 \theta = 1$ $\theta = [-180, 180]$
6. $4 \sin^2 \theta = 3$ $\theta = [-180, 180]$
7. $2 \sin \theta \cos \theta = \sqrt{2} \cos \theta$ $\theta = (-\infty, \infty)$
8. $\tan \theta \sec \theta = \tan \theta$ $\theta = (-\infty, \infty)$
9. $\tan x - \sqrt{3} = 2 \tan x$ $x = (-\infty, \infty)$
10. $\cos x + 2 = 3 \cos x$ $x = (-\infty, \infty)$
11. $2 \sin^2 \theta + \sin \theta = 0$ $\theta = [-180, 180]$
12. $\tan^2 \theta + \tan \theta = 0$ $\theta = [-90, 90]$
13. $2 \cos^2 x - 5 \cos x + 2 = 0$ $x = [0, 2\pi)$
14. $2 \sec^2 x - 3 \sec x - 2 = 0$ $x = [0, 2\pi)$
15. $\sin^2 \theta + 5 \sin \theta + 6 = 0$ $\theta = [0, 360)$
16. $4 \csc^2 \theta + 4 \csc \theta + 1 = 0$ $\theta = [0, 360)$
17. $\tan^2 x - \sec x - 1 = 0$ $x = [-\pi, \pi)$
18. $3 - 3 \sin x - 2 \cos^2 x = 0$ $x = [-\pi, \pi)$
19. $4 \sin x \cos x = \sqrt{3}$ $x = [0, 2\pi)$
20. $\sin x = \sin 2x$ $x = [0, 2\pi)$
21. $\frac{\sin(90 - \theta)}{\sin \theta} = -\sqrt{3}$ $\theta = (-270, 270)$
22. $\sin 2\theta \cos 64 + \cos 2\theta \sin 64 = \frac{\sqrt{3}}{2}$ $\theta = [0, 360)$
23. $\cos 3\theta \cos 12 - \sin 3\theta \sin 12 = \frac{1}{2}$ $\theta = [-120, 120)$
24. $\frac{\tan 10\theta + \tan 50}{1 - \tan 10\theta \tan 50} = \frac{\sqrt{3}}{3}$ $\theta = [0, 90)$
25. $\cos x \cos \frac{\pi}{5} - \sin x \sin \frac{\pi}{5} = \frac{\sqrt{3}}{2}$ $x = [0, 2\pi)$
26. $\sin \theta \cos 35 + \cos \theta \sin 35 = \frac{1}{2}$ $\theta = [0, 360)$
27. $\sin 2\theta \cos \theta - \cos 2\theta \sin \theta = \frac{\sqrt{2}}{2}$ $\theta = [0, 360)$
28. $\cos 2x \cos x + \sin 2x \sin x = -1$ $x = [0, 2\pi)$
29. $\frac{\tan 2x - \tan x}{1 + \tan 2x \tan x} = \sqrt{3}$ $x = [0, 2\pi)$
30. $\frac{\tan \theta + \tan 27}{1 - \tan \theta \tan 27} = 1$ $\theta = [0, 360)$
31. $4 \sin x \cos x = -\sqrt{2}$ $x = [0, 2\pi)$
32. $\cos^2 \theta - \sin^2 \theta = -1$ $\theta = [0, 360)$
33. $1 - 2 \sin^2 \theta = \frac{1}{2}$ $\theta = [0, 360)$
34. $\frac{2 \tan x}{1 - \tan^2 x} = \sqrt{3}$ $x = [0, 2\pi)$

Answers:

1. 120, 300
2. 150, 210
3. 103, 343
4. 219, 339
5. -60, 60, -120, 120
6. -60, 60, -120, 120
7. $-90 + 360n$, $90 + 360n$, $45 + 360n$, $135 + 360n$
8. $0 + 180n$
9. $\frac{2\pi}{3} + \pi n$
10. $0 + 2\pi n$
11. 0, -30, -150
12. 0, -45
13. $\frac{\pi}{3}$, $\frac{5\pi}{3}$
14. $\frac{\pi}{3}$, $\frac{5\pi}{3}$
15. No solution
16. No solution
17. $-\frac{\pi}{3}$, $\frac{\pi}{3}$, $-\pi$
18. $\frac{\pi}{6}$, $\frac{5\pi}{6}$, $\frac{\pi}{2}$
19. $\frac{\pi}{6}$, $\frac{7\pi}{6}$, $\frac{\pi}{3}$, $\frac{4\pi}{3}$
20. 0 , π , $\frac{\pi}{3}$, $\frac{5\pi}{3}$
21. 150, -30, -210
22. 178, 358, 28, 208
23. 16, -104, -24, 96
24. 16, 34, 52, 70, 88
25. $\frac{49\pi}{30}$, $\frac{59\pi}{30}$
26. 115, 355
27. 45, 135
28. π
29. $\frac{\pi}{3}$, $\frac{4\pi}{3}$
30. 18, 198
31. $\frac{5\pi}{8}$, $\frac{7\pi}{8}$, $\frac{13\pi}{8}$, $\frac{15\pi}{8}$
32. 90, 270
33. 30, 150, 210, 330
34. $\frac{3\pi}{8}$, $\frac{7\pi}{8}$, $\frac{11\pi}{8}$, $\frac{15\pi}{8}$