

Solve each equation for $0 \leq x < 2\pi$.

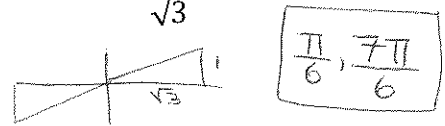
1. $\cos x = -\frac{1}{2}$



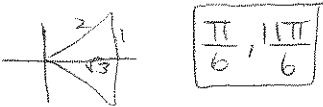
2. $\sin x = -1$



3. $\tan x = \frac{1}{\sqrt{3}}$



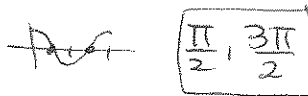
4. $\cos x = \frac{\sqrt{3}}{2}$



5. $1 + \cos x = 1 - \cos x$

$2 \cos x = 0$

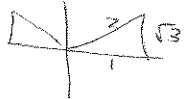
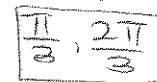
$\cos x = 0$



6. $\sin x = \sqrt{3} - \sin x$

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

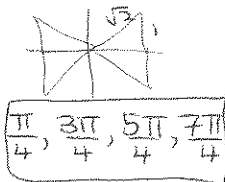
$\sin x = \frac{\sqrt{3}}{2}$



7. $2 \sin^2 x = 1$

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

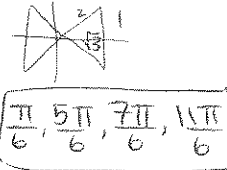
$\sin x = \pm \frac{1}{\sqrt{2}}$



8. $4 \cos^2 x = 3$

$\cos^2 x = \frac{3}{4}$

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



9. $4 \sin x = 3 \csc x$

$(4 \sin x = \frac{3}{\sin x}) \cdot \sin x$

$4 \sin^2 x = 3$

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

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

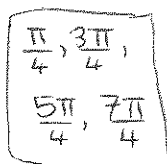


10. $\csc^2 x - 2 = 0$

$\csc^2 x = 2$

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

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

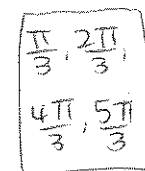


11. $3 \cot^2 x = 1$

$\cot^2 x = \frac{1}{3}$

$\cot x = \pm \frac{1}{\sqrt{3}}$

$\tan x = \pm \frac{\sqrt{3}}{1}$

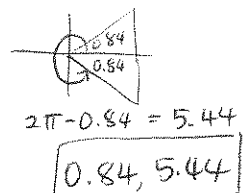


12. $3 \cos x = 2$

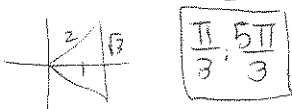
$\cos x = \frac{2}{3}$

$x = \cos^{-1} \frac{2}{3}$

$x = 0.84$



13.a) $\cos x = \frac{1}{2}$



13.b) $\cos 2x = \frac{1}{2}$

HC $\frac{1}{2}$

period = $\pi = \frac{6\pi}{6}$



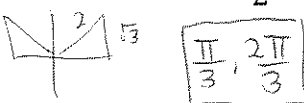
*13.a) 13.c) $\cos 3x = \frac{1}{2}$

HC $\frac{1}{2}$

period = $\frac{2\pi}{3} = \frac{6\pi}{9}$



14.a) $\sin x = \frac{\sqrt{3}}{2}$

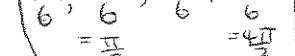


14.b) $\sin 2x = \frac{\sqrt{3}}{2}$

*14.a) $\times \frac{1}{2}$

HC $\frac{1}{2}$

period = $\pi = \frac{6\pi}{6}$

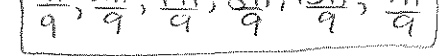


14.c) $\sin 3x = \frac{\sqrt{3}}{2}$

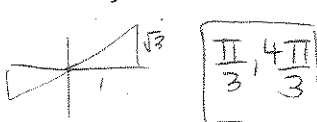
*14.a) $\times \frac{1}{3}$

HC $\frac{1}{2}$

period = $\frac{2\pi}{3} = \frac{6\pi}{9}$



15.a) $\tan x = \sqrt{3}$

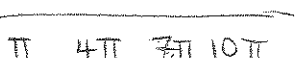


15.b) $\tan 2x = \sqrt{3}$

*15.a) $\times \frac{1}{2}$

HC $\frac{1}{2}$

period = $\pi = \frac{6\pi}{6}$

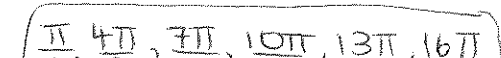


15.c) $\tan 3x = \sqrt{3}$

*15.a) $\times \frac{1}{3}$

HC $\frac{1}{2}$

period = $\frac{2\pi}{3} = \frac{6\pi}{9}$



$$HC \frac{1}{2}, \text{ period} = \pi = \frac{2\pi}{2}$$

$$16. 2\sin 2x = 1$$

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

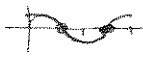
$$\frac{\pi}{6} \left(\frac{1}{2}\right), \frac{5\pi}{6} \left(\frac{1}{2}\right) \Rightarrow \frac{\pi}{12}, \frac{5\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}$$

$$19. \cos^2 x + 2\cos x = 0$$

$$\cos x (\cos x + 2) = 0$$

$$\cos x = 0$$

$$\cos x = -2$$



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

$$22. 6\sin^2 x + \sin x - 1 = 0$$

$$(3s - 1)(2s + 1) = 0$$

$$\sin x = \frac{1}{3}$$

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

$$x = \sin^{-1}\left(\frac{1}{3}\right) \approx 0.34$$

$$x = \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$25. 2\sin^2 x + \sin x - 1 = 0$$

$$(2s - 1)(s + 1) = 0$$

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

$$\sin x = -1$$

$$\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$$

$$28. \sin^2 x + 3\sin x + 2 = 0$$

$$(s + 2)(s + 1) = 0$$

$$\sin x = -2$$

$$\sin x = -1$$

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

$$HC \frac{1}{2}, \text{ period} = \pi = \frac{8\pi}{8}$$

$$17. \tan 2x = 1$$

$$\frac{\pi}{4} \left(\frac{1}{2}\right), \frac{5\pi}{4} \left(\frac{1}{2}\right) \Rightarrow \frac{\pi}{8}, \frac{5\pi}{8}, \frac{9\pi}{8}, \frac{13\pi}{8}$$

$$20. \sin^2 x + 5\sin x + 6 = 0$$

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

$$\sin x = -3$$

$$\sin x = -2$$

no solution!

$$23. \sin^2 x - \sin x = 0$$

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

$$\sin x = 0$$

$$\sin x = 1$$

$$0, \frac{\pi}{2}, \pi$$

$$26. \cos^2 x + 2\cos x + 1 = 0$$

$$(c + 1)(c + 1) = 0$$

$$\cos x = -1$$

$$\pi$$

$$29. 4\cos^2 x - 4\cos x + 1 = 0$$

$$(2c - 1)(2c - 1) = 0$$

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

$$\frac{\pi}{3}, \frac{5\pi}{3}$$

$$HC \frac{1}{4}, \text{ period} = \frac{\pi}{2} = \frac{6\pi}{12}$$

$$18. \tan 4x = -\sqrt{3}$$

$$\frac{2\pi}{3} \left(\frac{1}{4}\right), \frac{5\pi}{3} \left(\frac{1}{4}\right) \Rightarrow \frac{2\pi}{12}, \frac{5\pi}{12}, \frac{8\pi}{12}, \frac{11\pi}{12}, \frac{14\pi}{12}, \frac{17\pi}{12}, \frac{20\pi}{12}, \frac{23\pi}{12}$$

$$21. 2\cos^2 x - 7\cos x + 3 = 0$$

$$(2c - 1)(c - 3) = 0$$

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

$$\cos x = 3$$

$$\frac{\pi}{3}, \frac{5\pi}{3}$$

$$24. \cos^2 x + \cos x = 0$$

$$\cos x (\cos x + 1) = 0$$

$$\cos x = 0$$

$$\cos x = -1$$

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

$$27. 2\cos^2 x - 3\cos x + 1 = 0$$

$$(2c - 1)(c - 1) = 0$$

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

$$\cos x = 1$$

$$\frac{\pi}{3}, \frac{5\pi}{3}, 0$$

$$30. \tan^2 x - \tan x = 0$$

$$\tan x (\tan x - 1) = 0$$

$$\tan x = 0$$

$$\tan x = 1$$

$$0, \pi, \frac{\pi}{4}, \frac{5\pi}{4}$$

Answers:

$$1. \frac{2\pi}{3}, \frac{4\pi}{3}$$

$$4. \frac{\pi}{6}, \frac{11\pi}{6}$$

$$7. \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

$$10. \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

$$13.a) \frac{\pi}{3}, \frac{5\pi}{3}$$

$$14.a) \frac{\pi}{3}, \frac{2\pi}{3}$$

$$15.a) \frac{\pi}{3}, \frac{4\pi}{3}$$

$$16. \frac{\pi}{12}, \frac{5\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}$$

$$19. \frac{\pi}{2}, \frac{3\pi}{2}$$

$$22. \frac{7\pi}{6}, \frac{11\pi}{6}, 0.34, 2.80$$

$$25. \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$$

$$28. \frac{3\pi}{2}$$

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

$$5. \frac{\pi}{2}, \frac{3\pi}{2}$$

$$8. \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$11. \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

$$13.b) \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$14.b) \frac{\pi}{6}, \frac{\pi}{3}, \frac{7\pi}{6}, \frac{4\pi}{3}$$

$$15.b) \frac{\pi}{6}, \frac{2\pi}{3}, \frac{7\pi}{6}, \frac{5\pi}{3}$$

$$17. \frac{\pi}{8}, \frac{5\pi}{8}, \frac{9\pi}{8}, \frac{13\pi}{8}$$

20. No solution

$$23. 0, \frac{\pi}{2}, \pi$$

26. π

$$29. \frac{\pi}{3}, \frac{5\pi}{3}$$

$$3. \frac{\pi}{6}, \frac{7\pi}{6}$$

$$6. \frac{\pi}{3}, \frac{2\pi}{3}$$

$$9. \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

12. 0.84, 5.44

$$13.c) \frac{\pi}{9}, \frac{5\pi}{9}, \frac{7\pi}{9}, \frac{11\pi}{9}, \frac{13\pi}{9}, \frac{17\pi}{9}$$

$$14.c) \frac{\pi}{9}, \frac{2\pi}{9}, \frac{7\pi}{9}, \frac{8\pi}{9}, \frac{13\pi}{9}, \frac{14\pi}{9}$$

$$15.c) \frac{\pi}{9}, \frac{4\pi}{9}, \frac{7\pi}{9}, \frac{10\pi}{9}, \frac{13\pi}{9}, \frac{16\pi}{9}$$

$$18. \frac{\pi}{6}, \frac{5\pi}{12}, \frac{2\pi}{3}, \frac{11\pi}{12}, \frac{7\pi}{6}, \frac{17\pi}{12}, \frac{5\pi}{3}, \frac{23\pi}{12}$$

$$21. \frac{\pi}{3}, \frac{5\pi}{3}$$

$$24. \frac{\pi}{2}, \pi, \frac{3\pi}{2}$$

$$27. 0, \frac{\pi}{3}, \frac{5\pi}{3}$$

$$30. 0, \frac{\pi}{4}, \pi, \frac{5\pi}{4}$$