

MATH 122: TRIG EQUATIONS

Solve for x , y , t , or θ

1. $\tan x + 1 = 0$

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

3. $\sqrt{3} \sin x - 2 = 0$

4. $\cot(x + 1) - \sqrt{3} = 0$

5. $4 \sin^2 t - 1 = 0$

6. $2 \tan x - 2 \cot x + 3 = 0$

7. $2 \cos^2 \theta - 1 = 0$

8. $\sin^2 y + 2 \sin y = 0$

9. $\sqrt{3} \cos x + \sin x = 0$

10. $2 \sin^2 x + \sin x - 1 = 0$

11. $3 \tan^2 x - 1 = 0$

12. $\sin^2 y = \sqrt{3} \sin y \cos y$

Equations involving multiple angles. Find all solutions in $[0, 2\pi)$ or $[0, 360^\circ)$

13. $\sin 2\theta + 2 \sin \theta = 0$

14. $\cos 2\theta + \cos \theta + 1 = 0$

15. $4 \sin x \cos x = \sqrt{3}$

16. $\cos 2x = \cos x$

17. $\sqrt{2} \cos 2x = -1$

18. $2\sqrt{3} \sin 2x + 3 = 0$

19. $\sin^{-1} \left(-\frac{5}{13} \right) + \cos^{-1} \left(\frac{4}{5} \right) = \sin^{-1} t$

ANSWERS: In the following, k is an integer.

1. $\frac{3\pi}{4} + k\pi$; $135^\circ + 180^\circ k$ or $-\frac{\pi}{4} + k\pi$; $-45^\circ + 180^\circ k$
2. $\frac{\pi}{6} + 2k\pi$ and $\frac{5\pi}{6} + 2k\pi$
or $30^\circ + 360^\circ k$ and $150^\circ + 360^\circ k$
3. No Solution
4. $\left(\frac{\pi}{6} - 1\right) + k\pi$
5. $\frac{\pi}{6} + \pi k$ and $\frac{5\pi}{6} + \pi k$
6. $0.46 + k\pi$ and $-1.11 + k\pi$
or $26.6^\circ + 180^\circ k$ and $-63.4^\circ + 180^\circ k$
7. $\frac{\pi}{4} + \frac{k\pi}{2}$ or $45^\circ + 90^\circ k$
8. $k\pi$ or $180^\circ k$
9. $\frac{2\pi}{3} + k\pi$ or $120^\circ + 180^\circ k$
10. $\pi/6 + 2k\pi$, $5\pi/6 + 2k\pi$, and $3\pi/2 + 2k\pi$
or $30^\circ + 360^\circ k$, $150^\circ + 360^\circ k$ and $270^\circ + 360^\circ k$
11. $\frac{\pi}{6} + \pi k$ and $\frac{5\pi}{6} + \pi k$
or $30^\circ + 180^\circ k$ and $150^\circ + 180^\circ k$
12. $k\pi$ and $\frac{\pi}{3} + k\pi$
or $180^\circ k$ and $60^\circ + 180^\circ k$
13. 0 , π or 0° , 180°
14. $\frac{\pi}{2}$, $\frac{2\pi}{3}$, $\frac{3\pi}{2}$ and $\frac{4\pi}{3}$
or 90° , 120° , 240° and 270°
15. $\frac{\pi}{6}$, $\frac{\pi}{3}$, $\frac{7\pi}{6}$, $\frac{4\pi}{3}$
or 30° , 60° , 210° , 240°
16. 0 , $\frac{2\pi}{3}$, $\frac{4\pi}{3}$
or 0° , 120° , 240°
17. $\frac{3\pi}{8}$, $\frac{5\pi}{8}$, $\frac{11\pi}{8}$, $\frac{13\pi}{8}$
or 67.5° , 112.5° , 247.5° , 292.5°
18. $\frac{2\pi}{3}$, $\frac{5\pi}{6}$, $\frac{5\pi}{3}$, $\frac{11\pi}{6}$
or 120° , 150° , 300° , 330°
19. $\frac{-5}{13} \cdot \frac{4}{5} + \frac{12}{13} \cdot \frac{3}{5} = \frac{16}{65}$