Name: Key

Trig Equation Practice

Solve each equation on $0 \leq \theta \leq 2\pi$. Give exact answers in terms of π.

1.) $2\sin\theta + 3 = 2$

$2\sin\theta = -1$

$\sin\theta = -1/2$

$\theta = \sin^{-1}(-1/2)$

$\theta = 7\pi/6 \; ; \; \theta = 11\pi/6$

2.) $2\sin^2\theta - 1 = 0$

$\sin^2\theta = 1/2$

$\sin\theta = \pm\sqrt{2}/2$

$\theta = \pi/4 \; , \; 3\pi/4 \; , \; 5\pi/4 \; , \; 7\pi/4$

3.) $4\cos^2\theta - 3 = 0$

$\cos^2\theta = 3/4$

$\cos\theta = \pm\sqrt{3}/2$

$\theta = \pi/6 \; , \; 11\pi/6 \; , \; 5\pi/6 \; \; 7\pi/6$

4.) $\tan\theta + 1 = 0$

$\tan\theta = -1$

$\theta = 3\pi/4 \; , \; 7\pi/4$

5.) $\sqrt{3}\cot\theta + 1 = 0$

$\cot\theta = -1/\sqrt{3}$

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

$\theta = 2\pi/3 \; , \; 5\pi/3$

6.) $4\sec\theta + 6 = -2$

$\sec\theta = -2$

$\cos\theta = -1/2$

$\theta = 2\pi/3 \; , \; 4\pi/3$

7.) $2\cos^2\theta + \cos\theta = 0$

GCF $\cos\theta(2\cos\theta + 1) = 0$

$\cos\theta = 0$ { $2\cos\theta + 1 = 0$; $\cos\theta = -1/2$

$\theta = \pi/2 \; , \; 3\pi/2 \; , \; 2\pi/3 \; , \; 4\pi/3$

8.) $2\sin^2\theta - \sin\theta - 1 = 0$

* think $2x^2 - x - 1 = 0$

* factor $(2\sin\theta + 1)(\sin\theta - 1) = 0$

$2\sin\theta + 1 = 0$ { $\sin\theta = -1/2$; $\sin\theta - 1 = 0$ { $\sin\theta = 1$

$\theta = \pi/2 \; , \; 7\pi/6 \; , \; 11\pi/6$

9.) $(\tan\theta - 1)(\sec\theta - 1) = 0$ hint: set each factor = 0 and solve

$\tan\theta = 1$ $\cos\theta = 1$

$\theta = \pi/4 \; , \; 5\pi/4 \; , \; 0$

10.) $1 - \cos^2\theta = 1 + \cos\theta + \cos^2\theta$

set = 0

$0 = \cos\theta + 2\cos^2\theta$

GCF $0 = \cos\theta(1 + 2\cos\theta)$

$\cos\theta = 0$ { $1 + 2\cos\theta = 0$; $\cos\theta = -1/2$

$\theta = \pi/2, 3\pi/2, 2\pi/3, 4\pi/3$

11.) $1 - \sin^2\theta + \sin\theta = \sin^2\theta$

set = 0 $0 = 2\sin^2\theta - \sin\theta - 1$

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

$2\sin\theta + 1 = 0$ | $\sin\theta - 1 = 0$

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

$\theta = \pi/2, 7\pi/6, 11\pi/6$

12.) $1 - \cos^2\theta = 6(\cos\theta + 1)$

$0 = \cos^2\theta + 6\cos\theta + 5$

$0 = (\cos\theta + 5)(\cos\theta + 1)$

$\cos\theta + 5 = 0$ | $\cos\theta + 1 = 0$

$\cos\theta = -5$ | $\cos\theta = -1$

$\theta = \pi$

13.) $2(1 - \cos^2\theta) = 3(1 - \cos\theta)$

$0 = 2\cos^2\theta - 3\cos\theta + 1$

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

$\cos\theta - 1 = 0$ | $2\cos\theta - 1 = 0$

$\cos\theta = 1$ | $\cos\theta = 1/2$

$\theta = 0, \pi/3, 5\pi/3$

14.) $\sin\theta = \frac{1}{\sin\theta}$

$\sin^2\theta = 1$

$\sin\theta = \pm 1$

$\theta = \pi/2, 3\pi/2$

15.) $\sec^2\theta - 1 = \frac{3}{2}\sec\theta$

$2\sec^2\theta - 3\sec\theta - 2 = 0$

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

$\sec\theta = -1/2$ | $\sec\theta = 2$

$\cos\theta = -2$ | $\cos\theta = 1/2$

$\theta = \pi/3, 5\pi/3$

16.) $\cos^3\theta = \cos\theta$

$\cos^3\theta - \cos\theta = 0$

$\cos\theta(\cos^2\theta - 1) = 0$

$\cos\theta(\cos\theta + 1)(\cos\theta - 1) = 0$

$\cos\theta = 0$ $\cos\theta = -1$ $\cos\theta = 1$

$\theta = \pi/2, 3\pi/2, \pi, 0$

17.) $2\sin(2x) - \sqrt{3} = 0$

$\sin(2x) = \sqrt{3}/2$

$2x = \pi/3 + 2\pi k$ | $2x = 2\pi/3 + 2\pi k$

$x = \pi/6 + \pi k$ | $x = \pi/3 + \pi k$

$x = \pi/6, 7\pi/6, \pi/3, 4\pi/3$

18.) $2\cos(3x) + 1 = 0$

$\cos 3x = -1/2$

$3x = 2\pi/3 + 2\pi k$ | $3x = 4\pi/3 + 2\pi k$

$x = 2\pi/9 + 2/3\,\pi k$ | $x = 4\pi/9 + 2/3\,\pi k$

$x = 2\pi/9, 8\pi/9, 14\pi/9, 4\pi/9, 10\pi/9, 16\pi/9$

19.) $\sin(\frac{x}{3}) = \frac{1}{2}$

$\frac{x}{3} = \pi/6 + 2\pi k$ | $\frac{x}{3} = \frac{5\pi}{6} + 2\pi k$

$x = \pi/2 + 6\pi k$ | $x = \frac{5\pi}{2} + 6\pi k$ too big

$x = \pi/2$ $0 \le x < 2\pi$

20.) $1 = \sin(2x + \pi)$

$2x + \pi = \pi/2 + 2\pi k$

$2x = -\pi/2 + 2\pi k$

$x = -\pi/4 + \pi k$

$x = 3\pi/4, 7\pi/4$

21.) $\frac{-\sqrt{3}}{2} = \cos(2x)$

$2x = \frac{5\pi}{6} + 2\pi k$ | $2x = 7\pi/6 + 2\pi k$

$x = 5\pi/12 + \pi k$ | $x = 7\pi/12 + \pi k$

$x = \frac{5}{12}\pi, 17\pi/12$ | $x = 7\pi/12, 19\pi/12$