

Unit 6 Test Review

Solve each equation over the interval $[0^\circ, 360^\circ)$. If necessary, round answers to the nearest hundredth of a degree.

1) $\sqrt{3} \csc x \tan 3x = 2 \tan 3x$

$\sqrt{3} \csc x \tan 3x - 2 \tan 3x = 0$

$\tan 3x (\sqrt{3} \csc x - 2) = 0$

$\tan 3x = 0$ $\csc x = \frac{2}{\sqrt{3}}$

$3x = 0$ $3x = 180$ $\sin x = \frac{\sqrt{3}}{2}$

$x = 0^\circ$ $x = 60^\circ$

$60^\circ, 120^\circ$

$3x = 360$ $3x = 540$

$x = 120^\circ$ $x = 180^\circ$

$3x = 720$ $3x = 900$

$x = 240^\circ$ $x = 300^\circ$

Solutions: _____

3) $3 \sin^2 x - \sin x = 2$

$\frac{-1 \pm \sqrt{1-4(-3)(2)}}{2(-3)}$

$3 \sin^2 x - \sin x - 2 = 0$

$3 \sin^2 x - 3 \sin x + 2 \sin x - 2 = 0$

$3 \sin x (\sin x - 1) - 2(\sin x - 1) = 0$

$(\sin x - 1)(3 \sin x + 2) = 0$

$\sin x = 1$

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

RA: 41.81°

90°

221.81°

318.19°

Solutions: _____

2) $4 \sin x = 2 \tan x$

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

$2 \sin x = 4 \sin x \cos x$

$0 = 4 \sin x \cos x - 2 \sin x$

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

$\sin x = 0$ $\cos x = \frac{1}{2}$

$0^\circ, 180^\circ$ $60^\circ, 300^\circ$

Solutions: _____

4) $2 \tan^2 x - 3 \sec x + 3 = 0$

$2(\sec^2 x - 1) - 3 \sec x + 3 = 0$

$2 \sec^2 x - 2 - 3 \sec x + 3 = 0$

$2 \sec^2 x - 3 \sec x + 1 = 0$

$\frac{-3 \pm \sqrt{9-8}}{4}$

$2 \sec^2 x - 2 \sec x - 1 \sec x + 1 = 0$

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

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

$\sec x = 1$

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

$\cos x = 1$

$\cos x = 2$

0°

\emptyset

Solutions: _____

Solve each equation over the interval $[0, 2\pi)$. If necessary, round answers to the nearest hundredth of a degree.

5) $4 \cos^2 \frac{x}{2} - 3 = 0$

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

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

$\frac{x}{2} = \frac{\pi}{6}$

$\frac{x}{2} = \frac{5\pi}{6}$

~~$\frac{x}{2} = \frac{7\pi}{6}$~~

$x = \frac{\pi}{3}$

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

~~$x = \frac{7\pi}{3}$~~

6) $7 \sec 2x = 14 \tan 2x$

$\frac{7}{\cos 2x} = \frac{14 \sin 2x}{\cos 2x}$

$14 \sin 2x \cos 2x = 7 \cos 2x$

$14 \sin 2x \cos 2x - 7 \cos 2x = 0$

$7 \cos 2x (2 \sin 2x - 1) = 0$

$\cos 2x = 0$ $\sin 2x = \frac{1}{2}$

$2x = \frac{\pi}{2}$

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

$2x = \frac{\pi}{6}$

$2x = \frac{5\pi}{6}$

$x = \frac{\pi}{4}$

$x = \frac{3\pi}{4}$

$x = \frac{\pi}{12}$

$x = \frac{5\pi}{12}$

$2x = \frac{5\pi}{2}$

$2x = \frac{7\pi}{2}$

$2x = \frac{13\pi}{6}$

$2x = \frac{17\pi}{6}$

$x = \frac{5\pi}{4}$

$x = \frac{7\pi}{4}$

$x = \frac{13\pi}{12}$

$x = \frac{17\pi}{12}$

Solutions: _____

Solutions: _____

7) $(2 \sin x - 3)(3 \sin x - 2) = 0$

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

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

CA: 0.73

Ø

0.73
 2.41

8) $\sin^2 x - \cos^2 x - \cos x - 1 = 0$

$1 - \cos^2 x - \cos^2 x - \cos x - 1 = 0$

$-2 \cos^2 x - \cos x = 0$

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

$\cos x = 0$

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

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

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

Solutions: _____

Solutions: _____

Solve each equation over the interval $[0^\circ, 360^\circ)$. If necessary, round answers to the nearest hundredth of a degree.

9) $2 \cos \frac{x}{2} + \sqrt{3} = 0$

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

$\frac{x}{2} = 150^\circ$

$\frac{x}{2} = 210^\circ$

$x = 300^\circ$

$x = 420^\circ$

10) $\sqrt{3} \csc^2 x + 2 \csc x = 0$

$\csc x (\sqrt{3} \csc x + 2) = 0$

$\csc x = 0$

$\sin x = \emptyset$

\emptyset

$\csc x = -\frac{2}{\sqrt{3}}$

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

$240^\circ, 300^\circ$

Solutions: _____

Solutions: _____

11) $6 \sin^2 x + 5 \sin x + 1 = 0$ $\frac{2}{5} \times \frac{4}{3}$

$6 \sin^2 x + 2 \sin x + 3 \sin x + 1$

$2 \sin x (3 \sin x + 1) + 1 (3 \sin x + 1)$

$(2 \sin x + 1)(3 \sin x + 1) = 0$

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

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

RA: 19.47°

$x = 30^\circ$
 $x = 150^\circ$

199.47°
 340.53°

12) $6 \sin x - 3 = 5 \sin x$

$-3 = -\sin x$

$3 = \sin x$

\emptyset

no solutions

Solutions: _____

Solutions: _____

Solve each equation over the interval $[0, 2\pi)$. If necessary, round answers to the nearest hundredth of a degree.

13) $\sqrt{3} \csc 3x - 2 = 0$

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

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

$3x = \frac{\pi}{3}$

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

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

$x = \frac{2\pi}{9}$

$3x = \frac{7\pi}{3}$

$3x = \frac{8\pi}{3}$

$x = \frac{7\pi}{9}$

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

$3x = \frac{13\pi}{3}$

$3x = \frac{14\pi}{3}$

$x = \frac{13\pi}{9}$

$x = \frac{14\pi}{9}$

14) $2 \sin^2 x + 5 \sin x - 3 = 0$

~~$\frac{-5 \pm \sqrt{25 - 4(2)(-3)}}{2(2)}$~~

$2 \sin^2 x + 4 \sin x - 1 \sin x - 3 = 0$

$2 \sin x (\sin x + 3) - 1 (\sin x + 3) = 0$

$(\sin x + 3)(2 \sin x - 1) = 0$

$\sin x = -3$ $\sin x = \frac{1}{2}$

\emptyset

$\left[\frac{\pi}{6}, \frac{5\pi}{6} \right]$

Solutions: _____

Solutions: _____

15) $2 \sin^2 x - \cos x = 1$

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

$2 - 2 \cos^2 x - \cos x = 1$

~~$\frac{-2 \pm \sqrt{4 - 4(2)(-1)}}{2(2)}$~~

$0 = 2 \cos^2 x + \cos x - 1$

$2 \cos^2 x + 2 \cos x - 1 \cos x - 1$

$2 \cos x (\cos x + 1) - 1 (\cos x + 1)$

$(\cos x + 1)(2 \cos x - 1)$

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

$\left[\pi, \frac{\pi}{3}, \frac{5\pi}{3} \right]$

Solutions: _____

16) $\cot x \cos^2 2x = \cot x$

$\cot x \cos^2 2x - \cot x = 0$

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

$\cot x = 0$ $\cos^2 2x = 1$

$\left[\frac{\pi}{2}, \frac{3\pi}{2} \right]$

$2x = 0$

$x = 0$

$2x = \pi$

$x = \frac{\pi}{2}$

$2x = 2\pi$

$x = \pi$

$2x = 3\pi$

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

~~$2x = 4\pi$~~

~~$x = 2\pi$~~

Solutions: _____