College Algebra

Name _____

Unit 6 Test Review

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

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

$\sqrt{3}\csc x \tan\theta = 2\tan\theta$

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

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

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

$\theta = 0°, 180°$ $\qquad$ $\sin x = \frac{\sqrt{3}}{2}$

$3x = 0°, 180°, 360°, 540°, 720°, 900°$ $\div 3$ $\qquad$ $x = 60°, 120°$

Solutions: $x = 0°, 60°, 120°, 180°, 240°, 300°$

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

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

cross multiply

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

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

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

$\sin x = 0$ $\qquad$ $\cos x = 1/2$

$x = 0°, 180°$ $\qquad$ $x = 60°, 300°$

Solutions: $x = 0°, 60°, 180°, 300°$

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

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

-6, -3, 2, -1

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

$\sin x = -2/3$ $\qquad$ $\sin x = 1$

RA: 41.81° $\qquad$ $x = 90°$

$x = 221.81°, 318.19°$

Solutions: $x = 90°, 221.81°, 318.19°$

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

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

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

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

$(2\sec x - 1)(\sec x - 1) = 0$ $\quad$ 2, -1, -2, -3

$\sec x = 1/2$ $\qquad$ $\sec x = 1$

$\cos x = 2$ $\qquad$ $\cos x = 1$

Solutions: $x = 0°$

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

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

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

$4\cos^2\theta = 3$

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

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

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

$\frac{2}{2}\cdot\frac{x}{2} = \pi/6,\ 5\pi/6,\ 7\pi/6,\ 11\pi/6\ \}\cdot 2$

$x = \pi/3,\ 5\pi/3,\ \cancel{7\pi/3},\ \cancel{11\pi/3}$

Solutions: $\boxed{x = \pi/3,\ 5\pi/3}$

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

$7\sec\theta = 14\tan\theta$

$\cancel{\frac{7}{\cos\theta} = \frac{14\sin\theta}{\cos\theta}}$

cross multiply

$7\cos\theta = 14\sin\theta\cos\theta$

$7\cos\theta - 14\sin\theta\cos\theta = 0$

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

$\cos\theta = 0$ | $\sin\theta = 1/2$

$\theta = \pi/2,\ 3\pi/2$ | $\theta = \pi/6,\ 5\pi/6$

$2x = \pi/2,\ 3\pi/2,\ 5\pi/2,\ 7\pi/2$ | $2x = \pi/6,\ 5\pi/6,\ \frac{13\pi}{6},\ \frac{17\pi}{6}$

$x = \pi/4,\ 3\pi/4,\ 5\pi/4,\ 7\pi/4$ | $x = \frac{\pi}{12},\ \frac{5\pi}{12},\ \frac{13\pi}{12},\ \frac{17\pi}{12}$

Solutions: $\boxed{x = \frac{\pi}{4},\ \frac{3\pi}{4},\ \frac{5\pi}{4},\ \frac{7\pi}{4},\ \frac{\pi}{12},\ \frac{5\pi}{12},\ \frac{13\pi}{12},\ \frac{17\pi}{12}}$

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

$\sin x = 3/2$ | $\sin x = 2/3$

DNE | RA: .73

$x = .73,\ 2.41$

Solutions: $\boxed{x = .73,\ 2.41}$

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

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

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

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

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

$\cos x = 0$ | $\cos x = -1/2$

$x = \pi/2,\ 3\pi/2$ | $x = 2\pi/3,\ 5\pi/3$

Solutions: $\boxed{x = \pi/2,\ 3\pi/2,\ 2\pi/3,\ 5\pi/3}$

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

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

$2\cos\theta+\sqrt{3}=0$

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

$\theta=150°, 210°$

$2\cdot\frac{x}{2}=150°, 210° \}\cdot 2$

$x=300°, \cancel{420°}$

Solutions: $\boxed{x=300°}$

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

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

$\csc x=0$

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

undefined

DNE

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

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

$x=240°, 300°$

Solutions: $\boxed{x=240°, 300°}$

11) $6\sin^2 2x+5\sin 2x+1=0$

$6\sin^2\theta+5\sin\theta+1=0$

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

$\sin\theta=-1/3$

RA: $19.47°$

$\theta=199.47°, 340.53°$

$\frac{2x}{2}=199.47°, 340.53°$

$559.47°, 700.53°\}\div 2$

$\sin\theta=-1/2$

$\theta=210°, 330°$

$2x=210°, 330°\}\div 2$

$=570°, 690°$

$x=99.74°, 170.27°, 279.74°, 350.27°, 105°, 165°, 285°, 345°$

Solutions:

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

$-3=-\sin x$

$3=\sin x$

DNE

Solutions: $\boxed{\text{DNE}}$

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

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

$\sqrt{3}\csc\theta - 2 = 0$

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

$\sin\theta = \sqrt{3}/2$

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

$3x = \pi/3,\ 2\pi/3,\ 7\pi/3,\ 8\pi/3,\ 13\pi/3,\ 14\pi/3 \quad \cdot\frac{1}{3}$

Solutions: $x = \frac{\pi}{9},\ \frac{2\pi}{9},\ \frac{7\pi}{9},\ \frac{8\pi}{9},\ \frac{13\pi}{9},\ \frac{14\pi}{9}$

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

-6, 6, -1, 5

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

$\sin x = 1/2,\ -3$ DNE

$x = \pi/6,\ 5\pi/6$

Solutions: $x = \pi/6,\ 5\pi/6$

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

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

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

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

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

-2, 2, -1, 1

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

$\cos x = 1/2 \qquad \cos x = -1$

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

Solutions: $x = \pi/3,\ 5\pi/3,\ \pi$

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

$\cot x \cos^2\theta = \cot x$

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

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

$\cot x = 0 \quad \frac{x}{y}$

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

$\cos^2\theta = 1$

$\cos\theta = \pm 1$

$\theta = 0,\ \pi$

$2x = 0,\ \pi,\ 2\pi,\ 3\pi$

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

Solutions: $x = 0,\ \pi/2,\ \pi,\ 3\pi/2.$