Equations and Multiple-Angle Identities

Date_____ Period____

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

1) $-\sin 2\theta = \sqrt{2}\sin \theta - 2\sin 2\theta$

2) $-2\cos \theta = \sin 2\theta - \cos \theta$

3) $0 = \cos 2\theta + 3\sin \theta + 4\sin^2 \theta$

4) $\cos \theta + \cos 2\theta = 0$

5) $\cos \frac{\theta}{2} = \cos \theta + 1$

6) $\cos \theta = 2 + 3\sin \frac{\theta}{2}$

7) $3 + 2\cos \theta = 4\cos \frac{\theta}{2}$

8) $\sqrt{3}\sin \frac{\theta}{2} + \cos \theta = 1$

Find all solutions to each equation in degrees.

9) $\sin 4x + \sin 6x = 0$

10) $0 = \cos 2x + \cos 6x$

11) $0 = \cos 8x + \cos 6x$

12) $\cos x + \cos 7x = 0$

13) $\sin 8x + \sin 2x = \cos 3x$

14) $\sin 3x + \sin 2x + \sin 4x = 0$

15) $\sin 2x = -\cos 3x + \sin 4x$

16) $0 = \sin x + \sin 3x + \sin 5x$

Critical thinking question:

17) Write an equation involving $\cos x$ and $\sin \frac{x}{2}$ that has no solution.

Equations and Multiple-Angle Identities

Date_____ Period____

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

1) $-\sin 2\theta = \sqrt{2}\sin\theta - 2\sin 2\theta$

$\left\{0, \frac{\pi}{4}, \pi, \frac{7\pi}{4}\right\}$

2) $-2\cos\theta = \sin 2\theta - \cos\theta$

$\left\{\frac{\pi}{2}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}\right\}$

3) $0 = \cos 2\theta + 3\sin\theta + 4\sin^2\theta$

$\left\{\frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}\right\}$

4) $\cos\theta + \cos 2\theta = 0$

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

5) $\cos\frac{\theta}{2} = \cos\theta + 1$

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

6) $\cos\theta = 2 + 3\sin\frac{\theta}{2}$

No solution.

7) $3 + 2\cos\theta = 4\cos\frac{\theta}{2}$

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

8) $\sqrt{3}\sin\frac{\theta}{2} + \cos\theta = 1$

$\left\{0, \frac{2\pi}{3}, \frac{4\pi}{3}\right\}$

Find all solutions to each equation in degrees.

9) $\sin 4x + \sin 6x = 0$

$\{36n,\ 90 + 180n\}$

10) $0 = \cos 2x + \cos 6x$

$\left\{\frac{45}{2} + 45n,\ 45 + 90n\right\}$

11) $0 = \cos 8x + \cos 6x$

$\left\{\frac{90}{7} + \frac{180n}{7}\right\}$

12) $\cos x + \cos 7x = 0$

$\left\{\frac{45}{2} + 45n,\ 30 + 60n\right\}$

13) $\sin 8x + \sin 2x = \cos 3x$

$\{30 + 60n,\ 6 + 72n,\ 30 + 72n\}$

14) $\sin 3x + \sin 2x + \sin 4x = 0$

$\{60n\}$

15) $\sin 2x = -\cos 3x + \sin 4x$

$\{30 + 60n\}$

16) $0 = \sin x + \sin 3x + \sin 5x$

$\{60n\}$

Critical thinking question:

17) Write an equation involving $\cos x$ and $\sin \frac{x}{2}$ that has no solution.

Many. Ex: $\cos x + \sin \frac{x}{2} = 100$