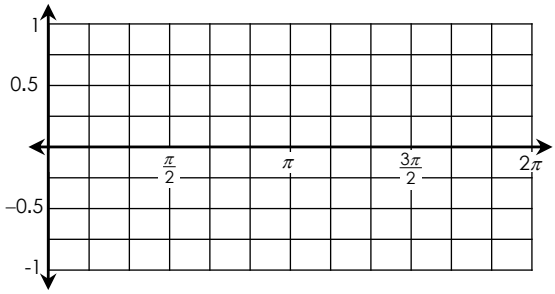
Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples	
SOLVING *Trigonometric* **EQUATIONS**	**Graph the function $f(x) = \sin x$ below.** 	Give the solutions to the equation $\sin x = ½$ on the interval $[0, 2\pi]$: Give the solutions to the equation $\sin x = ½$ on the interval $(-\infty, \infty)$:
	• A **trigonometric equation** can have one solution, no solution, or several solutions depending on the defined interval. • To solve a trigonometric equation, isolate the **trigonometric function(s).**	
Solve by **ISOLATING THE EXPRESSION**	**Directions:** Solve for all values of x on the given interval.	
	1. $5\cos x + \sqrt{2} = 3\cos x$; $(-\infty, \infty)$	**2.** $3\tan\theta + 2\sqrt{3} = 8\sqrt{3} - 3\tan\theta$; $(-\infty, \infty)$
	3. $\frac{\csc\alpha - 6}{4} = -1$; $(-\infty, \infty)$	**4.** $7\sec y = \sec y - 4\sqrt{3}$; $(-\infty, \infty)$
	5. $3\tan A = \tan A - 2$; $[0, 2\pi]$	**6.** $4 \cdot \sin^2 u + 8 = 11$; $\left[\pi, \frac{3\pi}{2}\right]$

Solve Using

FACTORING

7. $4\cos^2 x - 1 = 0;\ [0,\ 2\pi]$

8. $\cot x = \cot x \sin^2 x;\ [\pi,\ 2\pi]$

9. $3\tan^2 u - \sqrt{3}\tan u = 0;\ \left[\pi,\ \frac{3\pi}{2}\right]$

10. $\sin x \cdot \sec x + 2\sqrt{2}\sin x = \sqrt{2}\sin x;\ [0,\ \pi]$

11. $\csc^2\theta + 5 = 7 - \csc\theta;\ \left[\frac{3\pi}{2},\ 2\pi\right]$

12. $2\sin^2\alpha + 3\sin\alpha - 2 = 0;\ [0,\ 2\pi]$

13. $\sec^4 x - 4\sec^2 x + 3 = \sec^2 x - 1;\ [\pi, 2\pi]$

14. $\tan^3 y + \tan^2 y - 3\tan y - 3 = 0;\ [0,\ \pi]$

Solve Using

BASIC IDENTITIES

15. $\cos x - 1 = \sin^2 x$; $(-\infty, \infty)$

16. $\cot^2\theta - 3\csc\theta + 3 = 0$; $[0, 2\pi]$

17. $3\tan\alpha - 2\sqrt{3}\sin\alpha = 0$; $[\pi, 2\pi]$

18. $\sec x - \tan x = 1$; $[0, 2\pi]$

Solve Using

SUM & DIFFERENCE IDENTITIES

19. $\sin\left(\frac{\pi}{6} - \beta\right) - \cos\left(\frac{\pi}{3} - \beta\right) = \frac{\sqrt{6}}{2}$; $[0, 2\pi]$

20. $\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \frac{\sqrt{2}}{2}$; $[0, 2\pi]$

Solve Using **DOUBLE-ANGLE IDENTITIES**	**21.** $\sin 2u + 4\cos u = 3\cos u$; $[0, 2\pi]$	**22.** $\cot 2\theta \cdot 2\tan\theta + 2 = 0$; $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$
Solve Using **HALF-ANGLE IDENTITIES**	**23.** $\cos x + 2 = \sin\frac{x}{2}$; $[0, 2\pi]$	**24.** $\frac{1}{2} \cdot \tan\frac{A}{2} - \cos^2\frac{A}{2} \cdot \csc A = 1$; $[\pi, 2\pi]$
Solve Using **PRODUCT-SUM IDENTITIES**	**25.** $\sin\theta - \sin 3\theta = 0$; $[0, \pi]$	**26.** $\cos 2y + \cos 4y = \cos y$; $[\pi, 2\pi]$

Name: _____ **Unit 6:** Trigonometric Identities & Equations

Date: _____ **Per:** _____ **Homework 8:** Trigonometric Equations (Day 1)

**** This is a 2-page document! ****

Directions: Solve for all values of x on the given intervals. Write all answers in radians.

1. $9 \cdot \csc x = 6\sqrt{3}$; $(-\infty, \infty)$

2. $2\sin\theta + \frac{\sqrt{3}}{4} = \frac{3}{2}\sin\theta$; $(-\infty, \infty)$

3. $1 + \cos\alpha = \frac{3 + 4\cos\alpha}{2}$; $(-\infty, \infty)$

4. $3 - 3\cot y = -6\cot y$; $(-\infty, \infty)$

5. $5\tan^2 A - 7 = 8$; $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

6. $\frac{\sec\beta + 10}{4} = 3$; $[\pi, 2\pi]$

7. $\sqrt{3}\csc\theta + \csc\theta\cot\theta = 0$; $\left[\frac{\pi}{2}, \pi\right]$

8. $\tan x \cdot \cos^2 x - \tan x = 0$; $[0, \pi]$

9. $-1 = -4\sec y - \sec^2 y - 5;\ \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

10. $3 - 2\cot^2 A = -\cot^2 A;\ [0, \pi]$

11. $-3\cos^2 \beta = \sqrt{3}\cos\beta - \cos^2 \beta;\ [0, 2\pi]$

12. $9\csc^2 \theta + 7 = 19;\ \left[\frac{\pi}{2}, 2\pi\right]$

13. $3\cos^2 y - 1 = \cos y + \cos^2 y;\ [\pi, 2\pi]$

14. $2\sin^2 A + 7\sin A + 3 = 0;\ \left[\pi, \frac{3\pi}{2}\right]$

15. $7\sec^2 x + 11\sec x - 1 = 1 + \sec^2 x;\ [\pi, 2\pi]$

16. $4\sin^4 \alpha - 7\sin^2 \alpha = -3;\ \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

Name: _____ **Unit 6:** Trigonometric Identities & Equations

Date: _____ **Per:** _____ **Homework 9:** Trigonometric Equations (Day 2)

**** This is a 2-page document! ****

Directions: Solve for all values of x on the given intervals. Write all answers in radians.

1. $4\cos x + \sin^2 x = 3\cos^2 x + 2;\ \ [0, 2\pi]$

2. $-2\tan\beta = \sec^2\beta;\ \ [0, \pi]$

3. $\cot y + 2 = 1 - \csc y;\ \ [0, 2\pi]$

4. $\sin x \cdot \tan x = -2 - \cot x \cdot \sin x;\ \ (-\infty, \infty)$

5. $\cos\left(\frac{\pi}{6} + \alpha\right) - \sin\left(\alpha + \frac{\pi}{3}\right) = -1;\ \ (-\infty, \infty)$

6. $\tan(x + \pi) - \cos\left(x + \frac{\pi}{2}\right) = 0;\ \ \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

7. $3\cos 2\theta - 2\cos^2\theta - 5 = 2\cos^2\theta - 7$; $[0, 2\pi]$

8. $2\sin 2x + 2\sin x = 1 + 2\cos x$; $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

9. $\tan\frac{y}{2} + 4\sin y = 5\sin y$; $[0, \pi]$

10. $\cos^2\alpha + 2\cos\alpha = \sin^2\frac{\alpha}{2} - 2$; $[\pi, 2\pi]$

11. $5\sin x - 3\sin 3x = 2\sin x$; $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

12. $\cos 5A + \cos 7A = 0$; $\left[0, \frac{\pi}{2}\right]$

Unit 6 Test Study Guide
(Trigonometric Identities & Equations)

Name: _____

Date: _____ **Per:** _____

Topic 1: Basic Trigonometric Identities (Quotient, Reciprocal, Pythagorean, Cofunction, and Even-Odd)

Directions: Use reciprocal or quotient identities to find each exact value.

1. Find $\cos x$ if $\cot x = -7$ and $\csc x = -5\sqrt{2}$.

2. Find $\tan\theta$ if $\sec\theta = -\frac{9}{5}$ and $\sin\theta = \frac{2\sqrt{14}}{9}$.

Directions: Use Pythagorean identities to find each exact value.

3. If $\csc\alpha = -\frac{5\sqrt{6}}{12}$ and $\cos\alpha > 0$, find $\cot\alpha$.

4. If $\tan A = 4$ and $\sec A < 0$, find $\sin A$.

Directions: Use the cofunctions and even-odd identities to find each value.

5. Find $\sec\left(y - \frac{\pi}{2}\right)$ if $\csc y$ = -1.08.

6. If $\tan\left(\frac{\pi}{2} - \beta\right) = 0.37$, find $\cot(-\beta)$.

Topic 2: Sum and Difference of Angles Identities

Directions: Find the exact value of each trigonometric expression.

7. cos 15°

8. $\sin\left(-\frac{23\pi}{12}\right)$

9. tan (-285°)

10. $\tan\frac{7\pi}{12}$

Topic 3: Double-Angle and Half-Angle Identities

Directions: Find the exact value of each trigonometric expression.

11. If $\cos\theta = \frac{1}{3}$ and $0 < \theta < \frac{\pi}{2}$, find $\tan 2\theta$.

12. If $\tan y = -\frac{6\sqrt{2}}{7}$ and $\frac{\pi}{2} < y < \pi$, find $\sin 2\theta$.

13. tan 67.5°

14. $\cos\frac{7\pi}{12}$

Topic 5: Simplifying Trigonometric Expressions

Directions: Simplify each trigonometric expression.

23. $\csc^2 A \cdot \cos^2 A - \csc^2 A$

24. $\dfrac{(\csc\theta - \cot\theta)(\csc\theta + \cot\theta)}{\sin\theta}$

25. $\dfrac{1+\cos 2x}{\sin 2x}$

26. $\dfrac{\cos(A+B)+\cos(A-B)}{\sin(A-B)-\sin(A+B)}$

Topic 6: Proving Trigonometric Identities

Directions: Prove each identity.

27. $\dfrac{\sin x}{1-\sec^2 x} = -\cot x \cdot \cos x$

28. $\dfrac{1}{\cot y + \tan y} = \sin y \cos y$

29. $\dfrac{\sin^2\alpha\left(\sin^2\alpha-\csc^2\alpha\right)}{\sin^2\alpha+1}=-\cos^2\alpha$	**30.** $\cot\theta+1=\dfrac{2}{1-\tan\theta}\cdot\cot 2\theta$
31. $\sec A\cdot\sin^2 A+\sec A=2\sec A-\cos A$	**32.** $-\cos 2x=2\sin x\left[\sin(\pi-x)-\dfrac{1}{2}\csc x\right]$

Topic 7: Solving Trigonometric Equations

Directions: Solve each equation for all solutions in the given interval. Write all answers in radians.	
33. $-8\cos\theta=4\sqrt{3};\ \ (-\infty,\infty)$	**34.** $\csc^2\beta=2\cot\beta;\ \ [\pi,\ 2\pi]$

35. $4\sin^2 A = -\cos 2A + 3\sin A;\ \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

36. $-2 + \sin^2 y = 3\cos y + \cos^2 y;\ [0, \pi]$

37. $1 + \cos\beta = \sqrt{3}\cos\frac{\beta}{2};\ [0, 2\pi]$

38. $\cos 3x + \cos 5x = 0;\ \left[\frac{\pi}{2}, \pi\right]$

39. $2\sin\left(x + \frac{5\pi}{6}\right) + 2\cos\left(x - \frac{\pi}{3}\right) = \sqrt{2};\ [\pi, 2\pi]$