Name: ______________________ **Precalculus Unit 10, Lesson 6**

Aim: Practice with Double Angle and Half Angle Identities

I. Do Now: READ THESE DIRECTIONS CAREFULLY FIRST!
Fill in the table of identities below. First, try to fill it in by memory. If you don't remember some of them, try to derive them using the identities that you do remember. (You should be able to derive all of the identities below from the sum and difference identities.) Then, check your notes to find out whether you were correct.

Sum and Difference Identities	*Double Angle Identities*	*Half Angle Identities*
$\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$	$\sin 2x =$	$\sin\left(\frac{1}{2}x\right) =$
$\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$	$\cos 2x =$	$\cos\left(\frac{1}{2}x\right) =$
$\tan(x \pm y) = \dfrac{\tan x \pm \tan y}{1 \mp \tan x \tan y}$	$\cos 2x =$	$\sin\left(\frac{1}{2}x\right) =$
	$\cos 2x =$	
	$\tan 2x =$	

II. Practice:

1. If $\cos\theta = \frac{1}{8}$ and θ terminates in Quadrant IV, find the exact value of $\sin 2\theta$.

2. Find the exact value of $\sin 15^\circ$ using a half-angle identity.

3. Find $\tan x$ if $\tan 2x = \frac{4}{3}$.

4. If $\sin A = \frac{\sqrt{8}}{3}$ and $\tan A < 0$, find the exact value of:
   (a) $\cos 2A$ (b) $\sin\frac{A}{2}$ (c) $\tan\frac{A}{2}$

5. Simplify using a double- or half-angle identity:
   (a) $-\sqrt{\frac{1+\cos 10x}{2}}$ (b) $\sqrt{\frac{1-\cos 6A}{2}}$
   (c) $2\cos^2(4x) - 1$ (d) $4\sin 3x \cos 3x$

6. Find the exact value of $\sin\frac{5\pi}{8}$.

7. If $\csc\theta = -5$ and $\pi < \theta < \frac{3\pi}{2}$, find the exact value of: (a) $\sec\frac{1}{2}\theta$ (b) $\cot 2\theta$

8. Prove the triple-angle identity for sine:
   $$\sin 3x = 3\sin x - 4\sin^3 x$$
   Hint: Express $\sin 3x$ as $\sin(2x + x)$ and use the angle sum identity for sine.

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- p. 451: 26, 39, 44, 48
- p. 455: 31
- p. 458: 2, 9