

**Notes/Guided Practice: 5.5 Multiple-Angle and Product-to-Sum Formulas****Double Angle Formulas**

**Example #1 Use the Sum & Difference Formulas to verify the Double Angle Formulas.**

a. Verify:  $\sin(2\theta) = 2\sin\theta\cos\theta$

b. Verify:  $\cos(2\theta) = \cos^2\theta - \sin^2\theta$

c. Verify:  $\tan(2\theta) = \frac{2\tan\theta}{1 - \tan^2\theta}$

**Example #2 Find the exact value of  $\frac{2\tan 15^\circ}{1 - \tan^2 15^\circ}$ .**



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**Example #6**    If  $\sin \theta = \frac{4}{5}$  and  $\theta$  lies in quadrant II, find the exact value of each  
of the following:  $\sin 2\theta$ ,  $\cos 2\theta$ ,  $\tan 2\theta$ .

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**Example #7**                  **Solve  $2\cos x + \sin 2x = 0$ .**

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## Power-Reducing/Half Angle Formulas

Example #8 Use the half-angle formulas to find the exact values of sine, cosine, and tangent of  $\frac{7\pi}{12}$ .

Example #9 Find  $\sin\left(\frac{u}{2}\right)$ ,  $\cos\left(\frac{u}{2}\right)$ , and  $\tan\left(\frac{u}{2}\right)$ , given that  $\csc u = -\frac{5}{3}$  and  $\pi < u < \frac{3\pi}{2}$

Example #10 Verify:  $\tan\frac{x}{2} = \csc x - \cot x$

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Example #11

Use the half-angle formulas to simplify the expression:

$$\sqrt{\frac{1 + \cos 4x}{2}}$$

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Example #12 Use the half-angle formulas to find the exact values of sine, cosine, and tangent of  $112.5^\circ$ .

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Example #13 Verify:  $\sin^2 \frac{x}{2} = \frac{\sec x - 1}{2\sec x}$

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