

Class:

Date:

Notes

Sum of Angles

$$\sin(A + B) = \sin A \cdot \cos B + \cos A \cdot \sin B$$

$$\cos(A + B) = \cos A \cdot \cos B - \sin A \cdot \sin B$$

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \cdot \tan B}$$

Difference of Angles

$$\sin(A - B) = \sin A \cdot \cos B - \cos A \cdot \sin B$$

$$\cos(A - B) = \cos A \cdot \cos B + \sin A \cdot \sin B$$

$$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \cdot \tan B}$$

Directions: Find the exact value of each expression. Use the sum and difference identities to break the value apart into the unit circle angles!

1. $\sin 165^\circ = \sin(45 + 120)$

$$\sin 45 \cos 120 + \cos 45 \sin 120$$

$$\left(\frac{\sqrt{2}}{2}\right)\left(-\frac{1}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$$

$$\frac{-\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$$

2. $\cos 75^\circ$

$$\cos(30 + 45)$$

$$\cos 30 \cos 45 - \sin 30 \sin 45$$

$$\left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$

$$\frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4}$$

3. $\sin\left(\frac{\pi}{12}\right)$

$$\sin\left(\frac{\pi}{3} - \frac{\pi}{4}\right)$$

$$\sin \frac{\pi}{3} \cos \frac{\pi}{4} - \cos \frac{\pi}{3} \sin \frac{\pi}{4}$$

$$\left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$

$$\frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4}$$

4. $\cos\left(\frac{\pi}{12}\right)$

$$\cos\left(\frac{\pi}{3} + \frac{\pi}{4}\right)$$

$$\cos \frac{\pi}{3} \cos \frac{\pi}{4} - \sin \frac{\pi}{3} \sin \frac{\pi}{4}$$

$$\left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$

$$\frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4}$$

5. $\sin(-330^\circ)$

$$\sin(30 - 360)$$

$$\sin 30 \cos 360 - \cos 30 \sin 360$$

$$\left(\frac{1}{2}\right)(1) - \left(\frac{\sqrt{3}}{2}\right)(0)$$

$$\frac{1}{2}$$

6. $\cos(-315^\circ)$

$$\cos(45 - 360)$$

$$\cos 45 \cos 360 + \sin 45 \sin 360$$

$$\left(\frac{\sqrt{2}}{2}\right)(1) + \left(\frac{\sqrt{2}}{2}\right)(0)$$

$$\frac{\sqrt{2}}{2}$$