

PRACTICE Test 4 Trigonometric Identities**Simplify.**

1) $\cos \theta \cos 3\theta + \sin \theta \sin 3\theta$

2) $\cos 6u \cos 3u + \sin 6u \sin 3u$

3) $\sin -v \cos 2v + \cos -v \sin 2v$

4) $\cos -6x \cos 6x + \sin -6x \sin 6x$

Verify each identity.

$$5) \tan\left(\frac{3\pi}{4} + \theta\right) = \frac{-1 + \tan \theta}{1 + \tan \theta}$$

$$6) \tan(\theta + \pi) = \tan \theta$$

$$7) \frac{1 - 2\sin^2 x}{\sec^2 x} = \cos^2 x \cos 2x$$

$$8) \frac{\tan x}{2\sin^2 x} = \frac{1}{\sin 2x}$$

PRACTICE Test 4 Trigonometric Identities**Simplify.**

1) $\cos \theta \cos 3\theta + \sin \theta \sin 3\theta$

$\cos -2\theta$

2) $\cos 6u \cos 3u + \sin 6u \sin 3u$

$\cos 3u$

3) $\sin -v \cos 2v + \cos -v \sin 2v$

$\sin v$

4) $\cos -6x \cos 6x + \sin -6x \sin 6x$

$\cos -12x$

Verify each identity.

$$5) \tan\left(\frac{3\pi}{4} + \theta\right) = \frac{-1 + \tan \theta}{1 + \tan \theta}$$

$$\begin{aligned} & \tan\left(\frac{3\pi}{4} + \theta\right) \\ &= \frac{\tan \frac{3\pi}{4} + \tan \theta}{1 - \tan \frac{3\pi}{4} \tan \theta} \\ &= \frac{-1 + \tan \theta}{1 - (-1) \tan \theta} \\ &= \frac{-1 + \tan \theta}{1 + \tan \theta} \end{aligned}$$

$$6) \tan(\theta + \pi) = \tan \theta$$

$$\begin{aligned} & \tan(\theta + \pi) \\ &= \frac{\tan \theta + \tan \pi}{1 - \tan \theta \tan \pi} \\ &= \frac{\tan \theta + 0}{1 - \tan \theta \cdot 0} \\ &= \tan \theta \end{aligned}$$

$$7) \frac{1 - 2\sin^2 x}{\sec^2 x} = \cos^2 x \cos 2x$$

$$\frac{1 - 2\sin^2 x}{\sec^2 x} \quad \text{Use } \cos 2x = 1 - 2\sin^2 x$$

$$\frac{\cos 2x}{\sec^2 x} \quad \text{Use } \sec x = \frac{1}{\cos x}$$

$$\cos^2 x \cos 2x \quad \blacksquare$$

$$8) \frac{\tan x}{2\sin^2 x} = \frac{1}{\sin 2x}$$

$$\frac{\tan x}{2\sin^2 x} \quad \text{Use } \tan x = \frac{\sin x}{\cos x}$$

$$\frac{\sin x}{2\sin^2 x \cos x} \quad \text{Cancel common factors}$$

$$\frac{1}{2\cos x \sin x} \quad \text{Use } \sin 2x = 2\sin x \cos x$$

$$\frac{1}{\sin 2x} \quad \blacksquare$$