

Identities Quiz Review

Date _____ Period _____

Find the exact value of each.

1) $\sin 165$

2) $\cos 195$

3) $\tan 165$

Simplify.

4) $\sin -5u \cos 5u - \cos -5u \sin 5u$

5) $\sin 5\theta \cos 3\theta + \cos 5\theta \sin 3\theta$

6)
$$\frac{\tan 4x - \tan -4x}{1 + \tan 4x \tan -4x}$$

Verify each identity.

7)
$$\frac{\cot x}{1 + \tan^2 x} = \frac{\cos^2 x}{\tan x}$$

8)
$$\frac{\cot^2 x + 1}{\cot^2 x} = \frac{\sec x}{\cos x}$$

$$9) \frac{\csc^2 x - 1}{\sec x} = \cot x \csc x \cos^2 x$$

$$10) \frac{\sec x}{\cot x + \tan x} = \sin x$$

$$11) \cos(90 - \theta) = \sin \theta$$

$$12) \tan(\theta - 180) = \tan \theta$$

$$13) \frac{1}{2 \tan^2 x \cos^2 x} = \frac{1}{1 - \cos 2x}$$

$$14) \frac{\sin 2x}{\cos x} = \frac{2}{\csc x}$$

$$15) \frac{\tan^2 x}{1 - \tan^2 x} = \frac{\sin^2 x}{\cos 2x}$$

$$16) \frac{\csc^2 x \sec^2 x}{2} = \frac{1}{\sin^2 x (1 + \cos 2x)}$$

Answers to Identities Quiz Review

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

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

3) $\sqrt{3} - 2$

4) $\sin -10u$

5) $\sin 8\theta$

6) $\tan 8x$

7) $\frac{\cot x}{1 + \tan^2 x}$

Use $\tan^2 x + 1 = \sec^2 x$

$\frac{\cot x}{\sec^2 x}$

Use $\cot x = \frac{1}{\tan x}$

$\frac{1}{\tan x \sec^2 x}$

Use $\sec x = \frac{1}{\cos x}$

$\frac{\cos^2 x}{\tan x}$

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9) $\frac{\csc^2 x - 1}{\sec x}$

Use $\cot^2 x + 1 = \csc^2 x$

8) $\frac{\cot^2 x + 1}{\cot^2 x}$

Use $\cot^2 x + 1 = \csc^2 x$

$\frac{\csc^2 x}{\cot^2 x}$

Decompose into sine and cosine

$\frac{\cot^2 x}{\sec x}$

Use $\sec x = \frac{1}{\cos x}$

$\frac{\left(\frac{1}{\sin x}\right)^2}{\left(\frac{\cos x}{\sin x}\right)^2}$

Simplify

$\cos x \cot^2 x$

Use $\cot x = \frac{\cos x}{\sin x}$

$\frac{\cot x \cos^2 x}{\sin x}$

Use $\csc x = \frac{1}{\sin x}$

$\frac{1}{\cos^2 x}$

Use $\sec x = \frac{1}{\cos x}$

$\cot x \csc x \cos^2 x$

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$\frac{\sec x}{\cos x}$

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10) $\frac{\sec x}{\cot x + \tan x}$

Decompose into sine and cosine

11) $\begin{aligned} \cos(90 - \theta) &= \cos 90 \cos \theta + \sin 90 \sin \theta \\ &= 0 \cos \theta + \sin \theta \\ &= \sin \theta \end{aligned}$

$\frac{\frac{1}{\cos x}}{\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}}$

Simplify

$\frac{\sin x}{\cos^2 x + \sin^2 x}$

Use $\sin^2 x + \cos^2 x = 1$

$\sin x$

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$$\begin{aligned}
 12) \quad & \tan(\theta - 180) \\
 &= \frac{\tan \theta - \tan 180}{1 + \tan \theta \tan 180} \\
 &= \frac{\tan \theta - 0}{1 + \tan \theta \cdot 0} \\
 &= \tan \theta
 \end{aligned}$$

$$13) \quad \frac{1}{2 \tan^2 x \cos^2 x} \quad \text{Decompose into sine and cosine}$$

$$\frac{1}{2 \cdot \left(\frac{\sin x}{\cos x}\right)^2 \cdot \cos^2 x} \quad \text{Simplify}$$

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

$$\frac{1}{1 - \cos 2x} \quad \blacksquare$$

$$14) \quad \frac{\sin 2x}{\cos x} \quad \text{Use } \sin 2x = 2 \sin x \cos x$$

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

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

$$\frac{2}{\csc x} \quad \blacksquare$$

$$16) \quad \frac{\csc^2 x \sec^2 x}{2} \quad \text{Decompose into sine and cosine}$$

$$\frac{\left(\frac{1}{\sin x}\right)^2 \cdot \left(\frac{1}{\cos x}\right)^2}{2} \quad \text{Simplify}$$

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

$$\frac{1}{\sin^2 x (1 + \cos 2x)} \quad \blacksquare$$

$$15) \quad \frac{\tan^2 x}{1 - \tan^2 x} \quad \text{Decompose into sine and cosine}$$

$$\frac{\left(\frac{\sin x}{\cos x}\right)^2}{1 - \left(\frac{\sin x}{\cos x}\right)^2} \quad \text{Simplify}$$

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

$$\frac{\sin^2 x}{\cos 2x} \quad \blacksquare$$