

# W/S # 1 Simplifying Identities

$$\textcircled{1} \quad \csc(-x) \sin x = -\csc x \sin x = \frac{-1}{\sin x} \cdot \sin x = \boxed{-1}$$

even-odd identity      reciprocal id.

$$\textcircled{2} \quad \cot x \sin x = \frac{\cos x}{\sin x} \cdot \sin x = \cos x$$

quotient id.

$$\textcircled{3} \quad 1 + \tan^2(-x) = 1 + (-\tan x)^2 = 1 + \tan^2 x = \boxed{\sec^2 x}$$

even-odd id      pythagorean id

$$\textcircled{4} \quad \frac{\sin(-x)}{\cos(-x)} = \frac{-\sin x}{\cos x} = \boxed{-\tan x}$$

even-odd id      quotient id

$$\textcircled{5} \quad \frac{\tan x}{\sec x} = \frac{\sin x}{\cos x} \cdot \frac{1}{\frac{1}{\cos x}} = \frac{\sin x \cos x}{\cos x} = \boxed{\sin x}$$

quotient id

$$\textcircled{6} \quad \sec x \cdot \frac{\sin x}{\tan x} = \frac{1}{\cos x} \cdot \frac{\sin x}{\frac{\sin x}{\cos x}} = \frac{1}{\cos x} \cdot \frac{\sin x \cos x}{\sin x} = \boxed{1}$$

reciprocal id      quotient id

$$\textcircled{7} \quad \frac{\sin^2 x + \cos^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} = \boxed{\sec^2 x}$$

pyth. id.      recip. id

$$\textcircled{8} \quad \frac{1 + \cot^2 x}{\cot^2 x} = \frac{\csc^2 x}{\cot^2 x} = \frac{\frac{1}{\sin^2 x}}{\frac{\cos^2 x}{\sin^2 x}} = \frac{1}{\sin^2 x} \cdot \frac{\sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} = \boxed{\sec^2 x}$$

pyth. id.      quot. id.      recip. id.

$$\textcircled{9} \quad \sec^2 \theta (1 - \sin^2 \theta) = \frac{1}{\cos^2 \theta} (\cos^2 \theta) = \boxed{1}$$

recip. id.      pyth. id.

$$\textcircled{10} \quad \tan^2 \theta - \sec^2 \theta = \tan^2 \theta - (1 + \tan^2 \theta) = \tan^2 \theta - 1 - \tan^2 \theta = \boxed{-1}$$

pyth. id.      distribute

$$\textcircled{11} \quad \sec x \sin\left(\frac{\pi}{2} - x\right) = \frac{1}{\cos x} \cdot \cos x = \boxed{1}$$

recip. id.      periodic id.

$$\textcircled{12} \frac{\sin^2\theta + \tan^2\theta + \cos^2\theta}{\sec\theta} = \frac{\tan^2\theta + 1}{\sec\theta} = \frac{\sec^2\theta}{\sec\theta} = \boxed{\sec\theta}$$

pyth. id.      pyth. id.

$$\textcircled{13} \sin(-x) \csc(-x) = -\sin x \cdot -\csc x = \sin x \cdot \frac{1}{\sin x} = \boxed{1}$$

even-odd id.      recip. id.

$$\textcircled{14} \cot(-x) \tan(-x) = -\cot x \cdot -\tan x = \frac{1}{\tan x} \cdot \tan x = \boxed{1}$$

even-odd id.      recip. id.

$$\textcircled{15} \frac{\tan x \csc x}{\csc^2 x} = \frac{\tan x}{\csc x} = \frac{\frac{\sin x}{\cos x}}{\frac{1}{\sin x}} = \frac{\sin^2 x}{\cos x}$$

$$\textcircled{16} \frac{\sec^2\theta - \tan^2\theta}{\cos^2\theta + \sin^2\theta} = \frac{1}{1} = \boxed{1}$$

pyth. id.      recip. id.

$$\textcircled{17} (\sec^2 x + \csc^2 x) + (\tan^2 x + \cot^2 x) = \sec^2 x + \csc^2 x + \tan^2 x + \cot^2 x = 1 + 1 = \boxed{2}$$

pyth. id.

$$\textcircled{18} \frac{\sin(\frac{\pi}{2} - x)}{\cos(\frac{\pi}{2} - x)} = \frac{\cos x}{\sin x} = \boxed{\cot x}$$

periodic id.      quot. id.

$$\textcircled{19} \frac{\cos^2[\frac{\pi}{2} - x]}{\cos x} = \frac{\sin^2 x}{\cos x} = \frac{\sin x \cdot \sin x}{\cos x} = \boxed{\tan x \sin x}$$

periodic id.      quot. id.

$$\textcircled{20} \sin(\frac{\pi}{2} - x) \csc x = \cos x \cdot \frac{1}{\sin x} = \frac{\cos x}{\sin x} = \boxed{\cot x}$$

periodic id.      recip. id.      quot. id.

$$\textcircled{21} \cot(\frac{\pi}{2} - x) \cos x = \frac{\cos(\frac{\pi}{2} - x)}{\sin(\frac{\pi}{2} - x)} \cdot \cos x = \frac{\sin x}{\cos x} \cdot \cos x = \boxed{\sin x}$$

quot. id.      periodic id.

$$\textcircled{22} \csc^2(\frac{\pi}{2} - x) - 1 = \frac{1}{\sin^2(\frac{\pi}{2} - x)} - 1 = \frac{1}{\cos^2 x} - 1 = \sec^2 x - 1 = \boxed{\tan^2 x}$$

recip. id.      periodic id.      pyth. id.