

Simplifying Trigonometric Identities

1) $1 - \sec^2 \theta$

$$= -\tan^2 \theta$$

Identity!

2) $\frac{\sec \theta}{\tan \theta} = \frac{\frac{1}{\cos \theta}}{\frac{\sin \theta}{\cos \theta}} = \frac{1}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta}$

$$= \frac{1}{\sin \theta} = \boxed{\csc \theta}$$

3) $\csc \theta \tan \theta$

$$\frac{1}{\sin \theta} \cdot \frac{\sin \theta}{\cos \theta} = \frac{1}{\cos \theta}$$

$$= \boxed{\sec \theta}$$

4) $\sec \theta \cos^2 \theta$

$$\frac{1}{\cos \theta} \cdot \frac{\cos^2 \theta}{1} = \boxed{\cos \theta}$$

5) $\csc^2 \theta - \cot^2 \theta$

$$= \boxed{1}$$

Identity!

6) $1 - \sin^2 \theta$

$$= \boxed{\cos^2 \theta}$$

Identity!

7) $\tan \theta \cot \theta$

Definition
of reciprocals!

$$= \boxed{1}$$

8) $\cos \theta \cot \theta + \sin \theta$

$$\cos \theta \cdot \frac{\cos \theta}{\sin \theta} + \sin \theta$$

$$\frac{\cos^2 \theta}{\sin \theta} + \frac{\sin \theta}{1} \cdot \frac{\sin \theta}{\sin \theta}$$

$$\frac{\cos^2 \theta + \sin^2 \theta}{\sin \theta} = \frac{1}{\sin \theta} = \boxed{\csc \theta}$$

9) $\cos \theta \tan \theta$

$$\frac{\cos \theta \cdot \sin \theta}{\cos \theta}$$

$$= \sin \theta$$

10) $\frac{\sin \theta \cot \theta}{\cos \theta}$

$$\frac{\sin \theta \cdot \frac{\cos \theta}{\sin \theta}}{\cos \theta} = \frac{\cos \theta}{\cos \theta} = 1$$

11) $\sec \theta \tan \theta \csc \theta$

$$\frac{1}{\cos \theta} \cdot \frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\sin \theta}$$

$$= \frac{1}{\cos^2 \theta} = \sec^2 \theta$$

12) $\sec \theta \cot \theta$

$$\frac{1}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta} = \frac{1}{\sin \theta} = \csc \theta$$

13) $\frac{\sin \theta}{\csc \theta} + \frac{\cos \theta}{\sec \theta}$

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

$$\sin \theta \cdot \sin \theta + \cos \theta \cdot \cos \theta = \sin^2 \theta + \cos^2 \theta = 1$$

14) $\frac{\tan \theta \csc \theta}{\sec \theta}$

$$\frac{\frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\sin \theta}}{\frac{1}{\cos \theta}} = \frac{\frac{1}{\cos \theta}}{\frac{1}{\cos \theta}} = 1$$

15) $\cot^2 \theta - \csc^2 \theta$

$$= -1$$

Identity!

16) $\frac{\cot \theta}{\csc \theta}$

$$\frac{\frac{\cos \theta}{\sin \theta}}{\frac{1}{\sin \theta}} = \frac{\cos \theta}{\sin \theta} \cdot \frac{\sin \theta}{1} = \cos \theta$$