

# Simplifying Trig Identities

①  $\sec \theta \cos \theta$

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

$$\boxed{1}$$

②  $\frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta}$  Pythag. ID

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

$$\boxed{\sec^2 \theta}$$

③  $\cot \theta \sin \theta$

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

$$\boxed{\cos \theta}$$

④  $\frac{\sec^2 \theta - 1}{\sec^2 \theta}$  ← Pythag. ID

$$\frac{\tan^2 \theta}{\sec^2 \theta}$$

$$\tan^2 \theta \cdot \frac{1}{\sec^2 \theta}$$

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

$$\boxed{\sin^2 \theta}$$

⑤  $\frac{\csc \theta - \sin \theta}{\csc \theta}$

$$1 - \sin \theta \cdot \frac{1}{\csc \theta}$$

$$1 - \sin \theta \cdot \sin \theta$$

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

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

⑥  $\cos \theta + \tan \theta \sin \theta$

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

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

\*get a common denominator\*

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

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

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

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

⑦  $\cos \theta \sec \theta - \frac{\cos \theta}{\sec \theta}$

$$\cos \theta \cdot \frac{1}{\cos \theta} - \cos \theta \cdot \frac{1}{\sec \theta}$$

$$1 - \cos \theta \cdot \cos \theta$$

$$1 - \cos^2 \theta$$

$$\boxed{\sin^2 \theta}$$

⑧  $\cos^2 \theta (\sec^2 \theta - 1)$

$$\cos^2 \theta (\tan^2 \theta)$$

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

$$\boxed{\sin^2 \theta}$$

⑨  $\tan^2 \theta - \tan^2 \theta \sin^2 \theta$

\*factor out a GCF\*

$$\tan^2 \theta (1 - \sin^2 \theta)$$

$$\tan^2 \theta \cdot \cos^2 \theta$$

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

$$\boxed{\sin^2 \theta}$$

⑩  $\frac{\csc \theta}{\sec \theta}$

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

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

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

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

$$\boxed{\cot \theta}$$

$$(11) \frac{\tan^2 \theta}{\sec^2 \theta}$$

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

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

$$\boxed{\sin^2 \theta}$$

$$(14) \cos \theta (1 + \tan^2 \theta)$$
$$\cos \theta (\sec^2 \theta)$$

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

$$\frac{\cos \theta}{\cos^2 \theta}$$

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

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

$$(17) \sin \theta \tan \theta \cot \theta \csc \theta$$

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

$$\boxed{1}$$

$$(12) \frac{1}{\tan^2 \theta + 1}$$

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

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

$$(15) \frac{\sin^2 \theta}{1 - \cos \theta}$$

$$1 - \cos \theta$$

$$\frac{1 - \cos^2 \theta}{1 - \cos \theta}$$

factor!

$$\frac{(1 - \cos \theta)(1 + \cos \theta)}{1 - \cos \theta}$$

$$\boxed{1 + \cos \theta}$$

$$(13) (\sec \theta + 1)(\sec \theta - 1)$$

\*FOIL\*

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

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

$$\boxed{\tan^2 \theta}$$

$$(16) \frac{\sec^2 \theta + \cot^2 \theta - \tan^2 \theta}{1}$$

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$$1 + \cot^2 \theta$$

$$\boxed{\csc^2 \theta}$$

$$(18) \frac{\sec^2 \theta}{\sec^2 \theta - 1}$$

$$\frac{\sec^2 \theta}{\tan^2 \theta}$$

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

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

$$\frac{1}{\sin^2 \theta}$$

$$\boxed{\csc^2 \theta}$$

$$\tan \theta \cot \theta - \cos^2 \theta$$

$$\frac{\cancel{\sin \theta}}{\cancel{\cos \theta}} \cdot \frac{\cancel{\cos \theta}}{\cancel{\sin \theta}} - \cos^2 \theta$$

$$1 - \cos^2 \theta$$

$$\sin^2 \theta$$

$$(20) \sec \theta - \sin \theta \tan \theta$$

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

$$\frac{1}{\cos \theta} - \frac{\sin^2 \theta}{\cos \theta}$$

$$\frac{1 - \sin^2 \theta}{\cos \theta}$$

$$\frac{\cos^2 \theta}{\cos \theta}$$

$$\cos \theta$$