13-1B Trigonometric Identities

Using trig. identities to simplify an expression:

- Look for a direct relationship between trigonometric functions and relationships between inverse trigonometric functions.

- Simplify by replacing trigonometric functions with identities.

- Expressions will usually simplify to a numeric value OR a single trigonometric function.

Simplify.

1. $\sin\theta(\csc\theta - \sin\theta)$

$\theta = 45°$

$\left(\frac{\sqrt{2}}{2}\right)^2 = \frac{2}{4} = \frac{1}{2}$

$\sin 45° = \frac{\sqrt{2}}{2}$

$\cos 45° = \frac{\sqrt{2}}{2}$

$\tan 45° = 1$

$\csc 45° = \sqrt{2}$

$\sec 45° = \sqrt{2}$

$\cot 45° = 1$

$\sin\theta \cdot \csc\theta - \sin^2\theta$

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

$1 - \sin^2\theta$

$\cos^2\theta$

$\sin 45(\csc 45 - \sin 45)$

$\frac{\sqrt{2}}{2}\left(\frac{\sqrt{2}}{1} - \frac{\sqrt{2}}{2}\right)$

$\frac{2}{2} - \frac{2}{4}$

$1 - \frac{1}{2}$

$\frac{1}{2}$

2. $\csc\theta\cos\theta\tan\theta$

$\theta = 30°$

$\left(\frac{1}{\sin\theta}\right)\left(\frac{\cos\theta}{1}\right)\left(\frac{\sin\theta}{\cos\theta}\right)$

$(\csc 30)(\cos 30)(\tan 30)$

$\frac{2}{1}\left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{3}\right) = \frac{3}{3} = 1$

1

3. $\csc\theta\tan\theta$

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

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

$\sec\theta$

$(\tan\theta)^2 = \left(\frac{\sin\theta}{\cos\theta}\right)^2$

$\tan^2\theta = \frac{\sin^2\theta}{\cos^2\theta}$

$(\csc\theta)^2 = \left(\frac{1}{\sin\theta}\right)^2$

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

4. $\dfrac{\csc^2\theta - \cot^2\theta}{1-\cos^2\theta}$

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

$\csc^2\theta$

$\frac{1}{5} + \frac{3}{5}$

$1+3$

5

$\frac{4}{5}$

$\dfrac{\csc^2\theta}{1-\cos^2\theta} - \dfrac{\cot^2\theta}{1-\cos^2\theta}$

$\dfrac{\csc^2\theta}{\sin^2\theta} - \dfrac{\cot^2\theta}{\sin^2\theta}$

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

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

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

$\dfrac{1}{\sin^4\theta} - \dfrac{\cos^2\theta}{\sin^4\theta}$

$\dfrac{1-\cos^2\theta}{\sin^4\theta}$

$\dfrac{\sin^2\theta}{\sin^4\theta} = \dfrac{1}{\sin^2\theta}$

$\csc^2\theta$

13-1B Worksheet