

Trig Identities p. 51

insert identity graphic organizer

Reciprocal Identities

$$\sin x = \frac{1}{\csc x} \quad \cos x = \frac{1}{\sec x} \quad \tan x = \frac{1}{\cot x}$$

$$\csc x = \frac{1}{\sin x} \quad \sec x = \frac{1}{\cos x} \quad \cot x = \frac{1}{\tan x}$$

Quotient Identities

$$\tan x = \frac{\sin x}{\cos x} \quad \cot x = \frac{\cos x}{\sin x}$$

Pythagorean Identities

$$\sin^2 x + \cos^2 x = 1 \quad 1 + \tan^2 x = \sec^2 x$$

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

★ Pythagorean id. can be rearranged:

ex: $\sin^2 x + \cos^2 x = 1$
 or $\sin^2 x = 1 - \cos^2 x$
 or $\cos^2 x = 1 - \sin^2 x$

Sum & Difference Identities

Double Angle Identities

Half Angle Identities

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Using Basic Trig Identities to Find Trig Values p.52

*Do NOT use right triangles to solve in this unit!

1. If $\sec \theta = 3$, find $\tan \theta$. ★ look for an identity that has $\sec + \tan$

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

$$1 + \tan^2 x = (3)^2$$

$$1 + \tan^2 x = 9$$

$$\tan^2 x = 8$$

$$\tan x = \pm 2\sqrt{2}$$

2. If $\cot \theta = 1/5$, find $\sin \theta$. ★ sometimes you need to use more than 1 identity to get to your ans

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

$$1 + (1/5)^2 = \csc^2 x$$

$$1 + \frac{1}{25} = \csc^2 x$$

$$\pm \sqrt{\frac{26}{25}} = \csc x$$

$$\pm \frac{\sqrt{26}}{5} = \csc x$$

② $\sin x = \frac{1}{\csc x}$ (flips it)

$$\sin x = \pm \frac{5\sqrt{26}}{26}$$

3. If $\csc \theta = 2$, find $\cos \theta$.

① $\sin x = \frac{1}{\csc x}$

$$\sin x = \frac{1}{2}$$

② $\sin^2 x + \cos^2 x = 1$

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

$$\frac{1}{4} + \cos^2 x = 1$$

$$\sqrt{\cos^2 x} = \sqrt{1 - \frac{1}{4}} = \frac{\sqrt{3}}{2}$$

$$\cos x = \pm \frac{\sqrt{3}}{2}$$

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Simplify Using Trig Identities p. 53

Hints: Rewrite in terms of sin or cos
Use pythagorean identities if you have a trig² added or subtracted with 1 or another trig²

Simplify

- cscx sinx use reciprocal id. for csc

$$\frac{1}{\sin x} \cdot \frac{\sin x}{1} = 1$$
- tanx cosx use quotient id. for tan

$$\frac{\sin x \cdot \cos x}{\cos x \cdot 1} = \frac{\sin x \cos x}{\cos x} = \sin x$$
- (1-sin²x) secx rearrange sin²x + cos²x = 1
-sin²x -sin²x

$$\frac{\cos^2 x \cdot \sec x}{1} = \frac{\cos^2 x}{\cos x} = \cos x \quad \text{cos}^2 x = 1 - \sin^2 x$$
- tanx cscx * can't cancel terms
(1+tan²x) ← pyth. id.

$$\frac{\frac{\sin x}{\cos x} \cdot \frac{1}{\sin x}}{\sec^2 x} = \frac{\frac{\sin x}{\cos x \sin x}}{\sec^2 x} = \frac{1}{\cos x \sec^2 x}$$

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

or

$$\frac{1}{\cos x} \div \frac{\sec^2 x}{1} = \frac{1}{\cos x} \cdot \frac{1}{\sec^2 x}$$

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

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17. $\frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta}$ ← Wrong!

$$\frac{(\sin^2 \theta + \cos^2 \theta)}{\cos^2 \theta} = \frac{1}{\cos^2 \theta} = \sec^2 \theta$$

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