

# Trigonometric Identities

## Reciprocal Identities

$$\sin x = \frac{1}{\csc x} \quad \csc x = \frac{1}{\sin x}$$

$$\cos x = \frac{1}{\sec x} \quad \sec x = \frac{1}{\cos x}$$

$$\tan x = \frac{1}{\cot x} \quad \cot x = \frac{1}{\tan x}$$

## Quotient Identities

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

$$\tan x = \frac{\text{opp}}{\text{adj}} = \frac{\sin x}{\cos x}$$

$$\sin x = \frac{\text{opp}}{\text{hyp}} \quad \frac{\text{opp}}{\text{hyp}} \div \frac{\text{adj}}{\text{hyp}}$$

$$\cos x = \frac{\text{adj}}{\text{hyp}} \quad \frac{\text{opp}}{\cancel{\text{hyp}}} \times \frac{\cancel{\text{hyp}}}{\text{adj}} = \frac{\text{opp}}{\text{adj}}$$

$$1 \div \frac{\sin x}{\cos x} = 1 \cdot \frac{\cos x}{\sin x} =$$

$$a^2 + b^2 = c^2$$

$$(-2)^2 + b^2 = 3^2$$

$$4 + b^2 = 9$$

$$b^2 = 5$$

$$b = \pm\sqrt{5}$$

$$a \text{ adj} = -2 \quad c \text{ hyp} = 3$$

$$b \text{ opp} = -\sqrt{5}$$

$$\tan x > 0 \quad \rightarrow \quad \frac{\text{opp}}{\text{adj}} = \frac{-\sqrt{5}}{-2} = \frac{\sqrt{5}}{2}$$

$$\sec x = \frac{1}{\frac{2}{3}}$$

$$\cos x = \frac{-2}{3} \frac{\text{adj}}{\text{hyp}}$$

$$\cot x = \frac{\frac{2}{\sqrt{5}}}{\frac{2}{3}} = \frac{2\sqrt{5}}{5}$$

$$\sin x = \frac{1}{\frac{3}{\sqrt{5}}}$$

$$\csc x = \frac{3}{-\sqrt{5}} = \frac{-3\sqrt{5}}{5}$$

$$\csc x = 2$$

$$\tan x = \frac{\sqrt{3}}{3} \frac{\text{opp}}{\text{adj}}$$

$$\text{opp} = 1$$

$$\text{adj} = \sqrt{3}$$

$$\text{hyp} = 2$$

$$\text{opp} = \sqrt{3}$$

$$\text{adj} = 3$$

$$\text{hyp} = \sqrt{12}$$

$$\csc x = \frac{\sqrt{12}}{\sqrt{3}} = \sqrt{\frac{12}{3}} = \sqrt{4} = 2$$

$$\sin \frac{\text{opp}}{\text{hyp}}$$

$$\csc \frac{\text{hyp}}{\text{opp}}$$

$$\sin x = \frac{1}{2} \frac{\text{opp}}{\text{hyp}}$$

$$\cot x = \frac{3}{\sqrt{3}} = \sqrt{3}$$

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

$$\sec x = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

Hw pg 345

# 1, 5, 7, 11