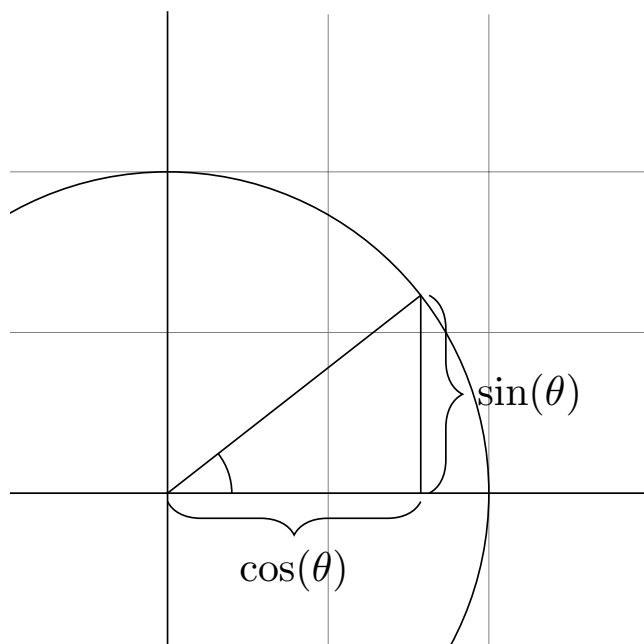


# Trigonometry

## Definitions



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

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

$$\operatorname{cosec} \theta \equiv \frac{1}{\sin \theta}$$

$$\cot \theta \equiv \frac{1}{\tan \theta} \equiv \frac{\cos \theta}{\sin \theta}$$

## Identities

$$\sin^2 \theta + \cos^2 \theta \equiv 1$$

$$1 + \tan^2 \theta \equiv \sec^2 \theta$$

$$1 + \cot^2 \theta \equiv \operatorname{cosec}^2 \theta$$

$$\sin(\alpha + \beta) \equiv \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) \equiv \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) \equiv \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) \equiv \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\tan(\alpha + \beta) \equiv \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$$

$$\tan(\alpha - \beta) \equiv \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$$

$$\sin 2\theta \equiv 2 \sin \theta \cos \theta$$

$$\cos 2\theta \equiv \cos^2 \theta - \sin^2 \theta$$

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

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

$$\tan 2\theta \equiv \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

## Calculus

$$\frac{d}{dx} \sin x = \cos x$$

$$\int \sin x \, dx = -\cos x + C$$

$$\frac{d}{dx} \cos x = -\sin x$$

$$\int \cos x \, dx = \sin x + C$$

$$\frac{d}{dx} \tan x = \sec^2 x$$

$$\int \tan x \, dx = \ln |\sec x| + C$$

$$\frac{d}{dx} \sec x = \sec x \tan x$$

$$\int \sec x \, dx = \ln |\tan x + \sec x| + C$$

$$\frac{d}{dx} \operatorname{cosec} x = -\operatorname{cosec} x \cot x$$

$$\int \operatorname{cosec} x \, dx = -\ln |\cot x + \operatorname{cosec} x| + C$$

$$\frac{d}{dx} \cot x = -\operatorname{cosec}^2 x$$

$$\int \cot x \, dx = \ln |\sin x| + C$$

$$\frac{d}{dx} \arcsin x = \frac{1}{\sqrt{1-x^2}}$$

$$\int \arcsin x \, dx = x \arcsin x + \sqrt{1-x^2} + C$$

$$\frac{d}{dx} \arccos x = -\frac{1}{\sqrt{1-x^2}}$$

$$\int \arccos x \, dx = x \arccos x - \sqrt{1-x^2} + C$$

$$\frac{d}{dx} \arctan x = \frac{1}{x^2+1}$$

$$\int \arctan x \, dx = x \arctan x - \frac{\ln(x^2+1)}{2} + C$$

## Graphs

