Right triangle definitions

$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \quad \cos\theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \quad \cot\theta = \frac{\text{adj}}{\text{opp}}$$

$$\sec\theta = \frac{\text{hyp}}{\text{adj}} \quad \csc\theta = \frac{\text{hyp}}{\text{opp}}$$

Circular definitions

$$\sin\theta = \frac{y}{r} \quad \cos\theta = \frac{x}{r}$$

$$\tan\theta = \frac{y}{x} \quad \cot\theta = \frac{x}{y}$$

$$\sec\theta = \frac{r}{x} \quad \csc\theta = \frac{r}{y}$$

Other identities

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

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

Reduction formulas

$$\sin(-x) = -\sin(x) \quad \cos(-x) = \cos(x)$$

$$\tan(-x) = -\tan(x) \quad \cot(-x) = -\cot(x)$$

$$\sec(-x) = \sec(x) \quad \csc(-x) = -\csc(x)$$

Sum and difference formulas

$$\cos(u \pm v) = \cos u \cdot \cos v \mp \sin u \cdot \sin v$$

$$\sin(u \pm v) = \sin u \cdot \cos v \pm \cos u \sin v$$

$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \cdot \tan v}$$

Pythagorean identities

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

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

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

Double angle formulas

$$\sin(2u) = 2\sin u \cos u$$

$$\cos(2u) = \cos^2 u - \sin^2 u$$
$$\cos(2u) = 2\cos^2 u - 1$$
$$\cos(2u) = 1 - 2\sin^2 u$$

$$\tan(2u) = \frac{2\tan u}{1 - \tan^2 u}$$

Power reducing formulas

$$\sin^2 u = \frac{1 - \cos(2u)}{2}$$

$$\cos^2 u = \frac{1 + \cos(2u)}{2}$$

$$\tan^2 u = \frac{1 - \cos(2u)}{1 + \cos(2u)}$$

Cofunction identities

$$\sin\left(\frac{\pi}{2} - x\right) = \cos x \quad \cos\left(\frac{\pi}{2} - x\right) = \sin x$$

$$\tan\left(\frac{\pi}{2} - x\right) = \cot x \quad \cot\left(\frac{\pi}{2} - x\right) = \tan x$$

$$\sec\left(\frac{\pi}{2} - x\right) = \csc x \quad \csc\left(\frac{\pi}{2} - x\right) = \sec x$$

Product to sum formulas

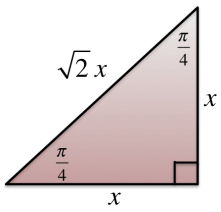
$$\sin u \sin v = \frac{\cos(u - v) - \cos(u + v)}{2}$$

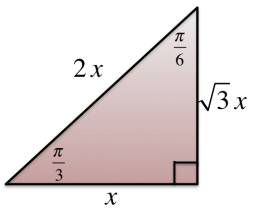
$$\cos u \cos v = \frac{\cos(u - v) + \cos(u + v)}{2}$$

$$\sin u \cos v = \frac{\sin(u + v) + \sin(u - v)}{2}$$

$$\cos u \sin v = \frac{\sin(u + v) - \sin(u - v)}{2}$$

Special triangles





$$\sin 0 = 0 \quad \cos 0 = 1 \qquad \sin\frac{\pi}{2} = 1 \quad \cos\frac{\pi}{2} = 0$$

Derivatives rules

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

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

$$\frac{d}{dx}\tan x = \sec^2 x \qquad \frac{d}{dx}\cot x = -\csc^2 x$$

$$\frac{d}{dx}\arctan x = \frac{1}{x^2 + 1} \qquad \frac{d}{dx}\operatorname{arccot} x = -\frac{1}{x^2 + 1}$$

$$\frac{d}{dx}\sec x = \sec x \tan x \qquad \frac{d}{dx}\csc x = -\csc x \cot x$$

$$\frac{d}{dx}\operatorname{arcsec} x = \frac{1}{x\sqrt{x^2 - 1}} \qquad \frac{d}{dx}\operatorname{arccsc} x = -\frac{1}{x\sqrt{x^2 - 1}}$$