

Fundamental Trigonometry Laws and Identities

<p>6 Trig Functions - sohcahtoa</p> $\sin x = \frac{\text{opp}}{\text{adj}} \quad \csc x = \frac{\text{hyp}}{\text{opp}}$ $\cos x = \frac{\text{adj}}{\text{hyp}} \quad \sec x = \frac{\text{hyp}}{\text{adj}}$ $\tan x = \frac{\text{opp}}{\text{adj}} \quad \cot x = \frac{\text{adj}}{\text{opp}}$	<p>Reciprocal Functions</p> $\sin x = \frac{1}{\csc x} \quad \csc x = \frac{1}{\sin x}$ $\cos x = \frac{1}{\sec x} \quad \sec x = \frac{1}{\cos x}$ $\tan x = \frac{1}{\cot x} \quad \cot x = \frac{1}{\tan x}$	<p>Tangent Identities</p> $\tan x = \frac{\sin x}{\cos x}$ $\cot x = \frac{\cos x}{\sin x}$
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<p>Even/Odd Identities</p> $\sin(-x) = -\sin x$ $\csc(-x) = -\csc x$ $\tan(-x) = -\tan x$ $\cot(-x) = -\cot x$ $\cos(-x) = \cos x$ $\sec(-x) = \sec x$	<p>Double Angle Identities</p> $\sin(2x) = 2\sin x \cos x$ $\cos(2x) = \cos^2 x - \sin^2 x$ $\cos(2x) = 2\cos^2 x - 1$ $\cos(2x) = 1 - 2\sin^2 x$ $\tan(2x) = \frac{2\tan x}{1-\tan^2 x}$	<p>Sum and Difference Identities</p> $\sin(x + y) = \sin x \cos y + \cos x \sin y$ $\sin(x - y) = \sin x \cos y - \cos x \sin y$ $\cos(x + y) = \cos x \cos y - \sin x \sin y$ $\cos(x - y) = \cos x \cos y + \sin x \sin y$ $\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$ $\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$
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<p>Half Angle Identities</p> $\sin\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 - \cos x}{2}}$ $\cos\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 + \cos x}{2}}$ $\tan\left(\frac{x}{2}\right) = \frac{\sin x}{1 + \cos x} = \frac{1 - \cos x}{\sin x}$	<p>Cofunction Identities</p> $\sin\left(\frac{\pi}{2} - x\right) = \cos x \quad \csc\left(\frac{\pi}{2} - x\right) = \sec x$ $\cos\left(\frac{\pi}{2} - x\right) = \sin x \quad \sec\left(\frac{\pi}{2} - x\right) = \csc x$ $\tan\left(\frac{\pi}{2} - x\right) = \cot x \quad \cot\left(\frac{\pi}{2} - x\right) = \tan x$	<p>Power Reducing formulas</p> $\sin^2 x = \frac{1 - \cos(2x)}{2}$ $\cos^2 x = \frac{1 + \cos(2x)}{2}$ $\tan^2 x = \frac{1 - \cos(2x)}{1 + \cos(2x)}$
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<p>Pythagorean Identities</p> $\sin^2 x + \cos^2 x = 1$ $\tan^2 x + 1 = \sec^2 x$ $\cot^2 x + 1 = \csc^2 x$	<p>Law of Sines</p> $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$	<p>Law of Cosines</p> $a^2 = b^2 + c^2 - 2bc \cos A$ $b^2 = a^2 + c^2 - 2ac \cos B$ $c^2 = a^2 + b^2 - 2ab \cos C$
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<p>Product to Sum Identities</p> $\sin x \cos y = \frac{1}{2} [\sin(x + y) + \sin(x - y)]$ $\cos x \sin y = \frac{1}{2} [\sin(x + y) - \sin(x - y)]$ $\cos x \cos y = \frac{1}{2} [\cos(x + y) + \cos(x - y)]$ $\sin x \sin y = \frac{1}{2} [\cos(x - y) - \cos(x + y)]$	<p>Sum to Product Identities</p> $\sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$ $\sin x - \sin y = 2\cos\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$ $\cos x + \cos y = 2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$ $\cos x - \cos y = -2\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$
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