Trigonometric Identities
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Quotient Identities

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

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$\sin \theta \cos ec\, \theta = 1$$

$$\cos \theta \, sec\, \theta = 1$$

$$\tan \theta \, cot\, \theta = 1$$

Pythagorean Identities

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

$$\cos ec^2 \theta = 1 + cot^2 \theta$$

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

Trig Values Table

	0	30^0	45^0	60^0	90^0	180^0	270^0
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	0	-1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	N.D.	0	N.D.

Sum/Difference Formulas

$$\sin\,(A+B) = \sin A \cos B + \cos A \sin B$$

$$\cos\,(A+B) = \cos A \cos B - \sin A \sin B$$

$$\tan\,(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\sin\,(A-B) = \sin A \cos B - \cos A \sin B$$

$$\cos\,(A-B) = \cos A \cos B + \sin A \sin B$$

$$\tan\,(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

Double Angle Identities

2θ

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

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

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

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

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

$$\cos^2 \theta = \frac{1 + \cos 2\theta}{2}$$

$$\sin^2 \theta = \frac{1 - \cos 2\theta}{2}$$

$$\tan^2 \theta = \frac{1 - \cos 2\theta}{1 + \cos 2\theta}$$

3θ

$$\sin 3\theta = 3\sin \theta - 4\sin^3 \theta$$

$$\cos 3\theta = 4\cos^3 \theta - 3\cos \theta$$

$$\tan 3\theta = \frac{3\tan \theta - \tan^3 \theta}{1 - 3\tan^2 \theta}$$

Sum to Product of Two Angles

$$\sin C + \sin D = 2\sin\left(\frac{C + D}{2}\right)\cos\left(\frac{C - D}{2}\right)$$

$$\sin C - \sin D = 2\cos\left(\frac{C + D}{2}\right)\sin\left(\frac{C - D}{2}\right)$$

$$\cos C + \cos D = 2\cos\left(\frac{C + D}{2}\right)\cos\left(\frac{C - D}{2}\right)$$

$$\cos C - \cos D = -2\sin\left(\frac{C + D}{2}\right)\sin\left(\frac{C - D}{2}\right)$$

Product to Sum of Two Angles

$$2 \sin A \cos B = \sin(A + B) + \sin(A - B)$$

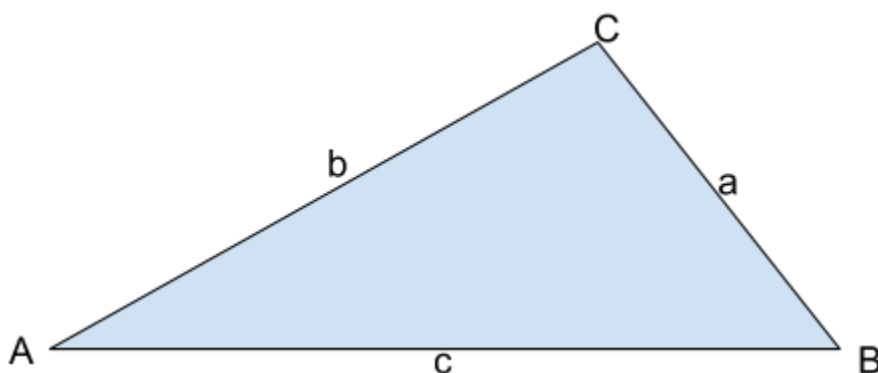$$2 \cos A \sin B = \sin(A + B) - \sin(A - B)$$

$$2 \cos A \cos B = \cos(A + B) + \cos(A - B)$$

$$2 \sin A \sin B = \cos(A - B) - \cos(A + B)$$

$$t = \frac{\tan \theta}{2}$$

$$\sin \theta = \frac{2t}{1 + t^2}$$

$$\cos \theta = \frac{1 - t^2}{1 + t^2}$$

Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Area of Triangle

$$\Delta = \frac{1}{2} bc \sin A$$