Fundamental Identities	***Triple Angle Identities***
i $\sin^2\theta + \cos^2\theta = 1$	$\sin 3\theta = 3\sin\theta - 4\sin^3\theta$
ii $1 + \tan^2\theta = \sec^2\theta$	$\cos 3\theta = 4\cos^3\theta - 3\cos\theta$
iii $1 + \cot^2\theta = \operatorname{cosec}^2\theta$	$\tan 3\theta = \dfrac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta}$

$$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$
$$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$
$$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$
$$\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$
$$\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$
$$\tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

Sum or Difference into Product

$$\sin P + \sin Q = 2\sin\frac{P+Q}{2}\cos\frac{P-Q}{2}$$
$$\sin P - \sin Q = 2\cos\frac{P+Q}{2}\sin\frac{P-Q}{2}$$
$$\operatorname{Cos} P + \operatorname{Cos} Q = 2\cos\frac{P+Q}{2}\cos\frac{P-Q}{2}$$
$$\operatorname{Cos} P - \operatorname{Cos} Q = -2\sin\frac{P+Q}{2}\sin\frac{P-Q}{2}$$

Product into Sum or Difference

$$2\sin\alpha\cos\beta = \sin(\alpha+\beta) + \sin(\alpha-\beta)$$
$$2\cos\alpha\sin\beta = \sin(\alpha+\beta) - \sin(\alpha-\beta)$$
$$2\cos\alpha\cos\beta = \cos(\alpha+\beta) + \cos(\alpha-\beta)$$
$$-2\sin\alpha\sin\beta = \cos(\alpha+\beta) - \cos(\alpha-\beta)$$

Double Angle Identities

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

Half Angle Identities

$$1 + \operatorname{Cos}\theta = 2\cos^2\frac{\theta}{2}$$
$$1 - \operatorname{Cos}\theta = 2\sin^2\frac{\theta}{2}$$
$$\tan\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$$

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