Trig Cheat Sheet

Sum and Difference Formulas

$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \sin\beta\cos\alpha$

$\cos(\gamma \pm \delta) = \cos\gamma\cos\delta \mp \sin\gamma\sin\delta$

$\tan(\epsilon \pm \zeta) = \frac{\tan\epsilon \pm \tan\zeta}{1 \mp \tan\epsilon\tan\zeta}$

Double-Angle Formulas

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

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

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

Power-Reducing Formulas

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

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

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

Half-Angle Formulas

$\sin(\nu/2) = \pm\sqrt{\frac{1 - \cos\nu}{2}}$

$\cos(\xi/2) = \pm\sqrt{\frac{1 + \cos\xi}{2}}$

$\tan(\rho/2) = \frac{1 - \cos\rho}{\sin\rho} = \frac{\sin\rho}{1 + \cos\rho}$

Product-to-Sum Formulas

$\sin\sigma\sin\tau = \frac{1}{2}\left[\cos(\sigma - \tau) - \cos(\sigma + \tau)\right]$

$\cos\upsilon\cos\phi = \frac{1}{2}\left[\cos(\upsilon - \phi) + \cos(\upsilon + \phi)\right]$

$\sin\chi\cos\psi = \frac{1}{2}\left[\sin(\chi + \psi) + \sin(\chi - \psi)\right]$

Sum-to-Product Formulas

$\sin\omega + \sin\alpha = 2\sin\left(\frac{\omega + \alpha}{2}\right)\cos\left(\frac{\omega - \alpha}{2}\right)$

$\sin\omega - \sin\alpha = 2\cos\left(\frac{\omega + \alpha}{2}\right)\sin\left(\frac{\omega - \alpha}{2}\right)$

$\cos\omega + \cos\alpha = 2\cos\left(\frac{\omega + \alpha}{2}\right)\cos\left(\frac{\omega - \alpha}{2}\right)$

$\cos\omega - \cos\alpha = -2\sin\left(\frac{\omega + \alpha}{2}\right)\sin\left(\frac{\omega - \alpha}{2}\right)$

Law of Sines

$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$

Law of Cosines

$c^2 = a^2 + b^2 - 2ab\cos\gamma$

$b^2 = a^2 + c^2 - 2ac\cos\beta$

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

Area of a Triangle

From Law of Sines

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

Heron's Formula

$A = \sqrt{s(s - a)(s - b)(s - c)}$

$s = \frac{a + b + c}{2}$