# Trigonometry Proofs

- $\cos^2 A + \sin^2 A = 1$

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

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

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

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

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

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

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

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

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

- $\sin 2A = \dfrac{2\tan A}{1 + \tan^2 A}$

- $\cos 2A = \dfrac{1 - \tan^2 A}{1 + \tan^2 A}$

- $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

- $\cos^2 A = \dfrac{1}{2}(1 + \cos 2A)$

- $\sin^2 A = \dfrac{1}{2}(1 - \cos 2A)$

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

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

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

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

- $\cos A + \cos B = 2\cos\dfrac{A+B}{2}\cos\dfrac{A-B}{2}$

- $\cos A - \cos B = -2\sin\dfrac{A+B}{2}\sin\dfrac{A-B}{2}$

- $\sin A + \sin B = 2\sin\dfrac{A+B}{2}\cos\dfrac{A-B}{2}$

- $\sin A - \sin B = 2\cos\dfrac{A+B}{2}\sin\dfrac{A-B}{2}$

MULLINGAR MATHS GRINDS

To be learned for LCHL

It will be assumed that these formulae are established in the order listed here. In deriving any formula, use may be made of formulae that precede it.