# TRIGO IDENTITIES

## BASIC IDENTITIES :

- $\sin^2 x + \cos^2 x = 1$
- $\tan^2 x + 1 = \sec^2 x$
- $\cot^2 x + 1 = \operatorname{cosec}^2 x$

## ADDITION FORMULAE :

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

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

## DOUBLE ANGLE FORMULAE :

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

## HALF-ANGLE FORMULAE :

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

## R-FORMULAE :

- let $A\sin x \pm B\cos x = R\sin(x \pm \alpha)$,
- let $A\cos x \pm B\sin x = R\cos(x \mp \alpha)$,

where $R > 0$, $\alpha$ is acute / $0 < \alpha < 90°$ :

$R = \sqrt{a^2 + b^2}$, $\tan\alpha = \frac{b}{a}$