Definitions and Formulae:

➢ The algebraic sum of two or more angles is called a compound angle. i.e.,

$A+B, A-B, A+B+C, A+B-C,$ ...etc., are called compound angles.

➢ If A and B are any two angles then

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

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

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

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

➢ If $A, B, A+B, A-B$ are not odd multiples of $\pi/2$, then

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

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

➢ If $A, B, A+B$ and $A-B$ are not integral multiples of π, then

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

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

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

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

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

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

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

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

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

➢ i) $\sin\theta+\sin(120^\circ+\theta)-\sin(120^\circ-\theta)=0$

ii) $\sin\theta+\sin(240^\circ+\theta)-\sin(240^\circ-\theta)=0$

iii) $\cos\theta+\cos(120^\circ+\theta)+\cos(120^\circ-\theta)=0$

iv) $\cos\theta+\cos(240^\circ+\theta)+\cos(240^\circ-\theta)=0$

- If $A+B=45^\circ$ or 225° then

  i) $(1+\tan A)(1+\tan B)=2$

  ii) $(1-\cot A)(1-\cot B)=2$

  iii) $(1+\cot A)(1+\cot B)=2\cot A\cot B$

- If $A+B=135^\circ$ or 315° then

  i) $(1-\tan A)(1-\tan B)=2$

  ii) $(1+\cot A)(1+\cot B)=2$

  iii) $(1+\tan A)(1+\tan B)=2\tan A\tan B$

Some standard trigonometric values

i) $\sin 15^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}} = \cos 75^\circ$

ii) $\cos\ 15^\circ = \frac{\sqrt{3}+1}{2\sqrt{2}} = \sin\ 75^\circ$

iii) $\tan\ 15^\circ = 2-\sqrt{3} = \cot\ 75^\circ$

iv) $\cot\ 15^\circ = 2+\sqrt{3} = \tan\ 75^\circ$

v) $\sec 15^\circ = \sqrt{6}-\sqrt{2} = \operatorname{cosec} 75^\circ$

vi) $\operatorname{cosec} 15^\circ = \sqrt{6}+\sqrt{2} = \sec 75^\circ$

vii) $\tan 22\frac{1}{2}^0 = \sqrt{2}-1 = \cot 67\frac{1}{2}^0$

viii) $\cot 22\frac{1}{2}^0 = \sqrt{2}+1 = \tan 67\frac{1}{2}^0$