Math Class 11 Chapter 10 Formulae

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AL-HUDA SCIENCE ACADEMY

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Must Share to Others to Whom You Care

Contents

THE SUM AND DIFFERENCE IDENTITIES

$Sin\ (\alpha \pm \beta) = Sin\alpha\ Cos\beta \pm Cos\alpha\ Sin\beta$

$Cos\ (\alpha \pm \beta) = Cos\alpha\ Cos\beta \mp Sin\alpha\ Sin\beta$

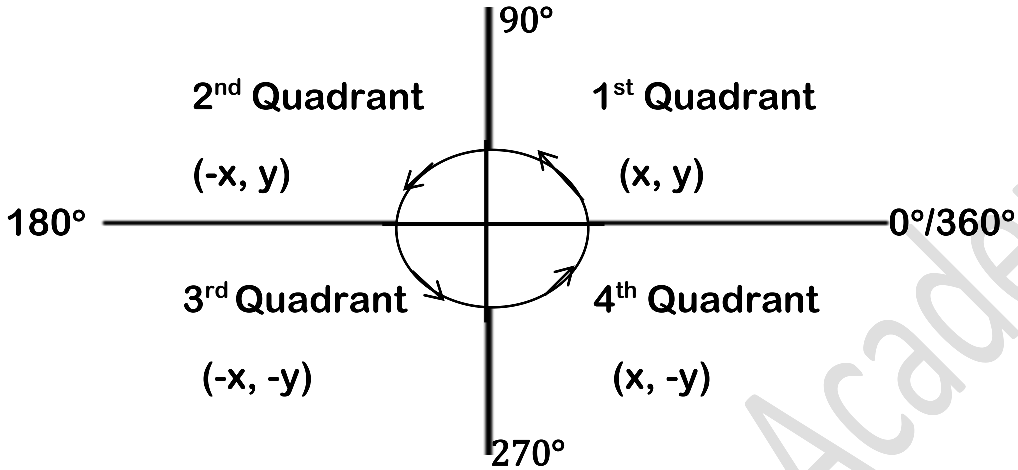
$Tan\ (\alpha \pm \beta) = \frac{Tan\propto \pm Tan\beta}{1 \mp Tan\propto Tan\beta}$

$Cot\ (\alpha \pm \beta) = \frac{Cot\propto Cot\beta \mp 1}{Cot\beta \pm Cot\propto}$

VALUES OF TRIG: RATIOS AT MOST COMMON ANGLES

Sin 0° or π = 0	Cos 0° or π = 1	Tan 0° or π = 0
Sin 90° or $\frac{\pi}{2} = 1$	Cos 90° or $\frac{\pi}{2} = 0$	Tan 90°or $\frac{\pi}{2} = \infty$
Sin 180 ° or π = 0	Cos 180 ° or π= -1	Tan 180 ° or π = 0
Sin 270° or $\frac{3\pi}{2}$ = -1	Cos 270° or $\frac{3\pi}{2} = 0$	Tan 270°or $\frac{3\pi}{2} = \infty$
Sin 360° or 2π = 0	Cos 360° or 2π =1	Tan 360° or 2π= 0

SIGNS OF TRIG: RATIOS IN DIFFERENT QUADRANTS



Signs of trigonometric ratios in different quadrants can be found using

$\frac{y}{x} = Tan\ \theta$

$x = Cos\ \theta$

$y = Sin\ \theta$

*<u>N.B:</u> **Sin** 15° can be written as **Sin** (45°- 30°) or (60°-45°) in order to find its value easily, and similarly **Cos, Tan, Cot** can also be written in these forms for any angles and can be easily calculated with the help of sum and difference identities.*

RELATION BETWEEN TRIGNOMETRIC RATIOS OF THE COMPLEMENTARY ANGLE

1. $Sin\ (90° - \theta) = Cos\ \theta$
2. $Tan\ (90° - \theta) = Cot\ \theta$
3. $Sec\ (90° - \theta) = Cosec\ \theta$
4. $Cos\ (90° - \theta) = Sin\ \theta$
5. $Cot\ (90° - \theta) = Tan\ \theta$
6. $Cosec\ (90° - \theta) = Sec\ \theta$

IDENTITIES FOR DOUBLED ANGLE

1. $\boldsymbol{Sin\ 2\theta = 2\ Sin\theta Cos\theta}$

$\Rrightarrow \frac{2Tan\theta}{1+Tan^2\theta}$

2. $\boldsymbol{Cos\ 2\theta = Cos^2\theta - Sin^2\theta}$

$\Rrightarrow 1- 2Sin^2\theta$

$\Rrightarrow 2Cos^2\theta - 1$

$\Rrightarrow \frac{1-Tan^2\theta}{1+Tan^2\theta}$

3. $\boldsymbol{Tan\ 2\theta = \frac{2Tan\theta}{1-Tan^2\theta}}$

IDENTITIES FOR HALVED ANGLES

1. $\boldsymbol{Sin\ \frac{\theta}{2} = \pm\sqrt{\frac{1-Cos\theta}{2}}}$

$\Rrightarrow Sin^2\frac{\theta}{2} = \frac{1-Cos\theta}{2}$

$\Rrightarrow 2Sin^2\frac{\theta}{2} = 1- \text{Cos}\ \theta$

2. $\boldsymbol{Cos\ \frac{\theta}{2} = \pm\sqrt{\frac{1+Cos\theta}{2}}}$

$\Rrightarrow Cos^2\frac{\theta}{2} = \frac{1+Cos\theta}{2}$

$\Rrightarrow 2Cos^2\frac{\theta}{2} = 1+\text{Cos}\ \theta$

3. $\boldsymbol{Tan\ \frac{\theta}{2} = \sqrt{\frac{1-Cos\theta}{1+Cos\theta}}}$

$\Rrightarrow \frac{Sin\ \theta}{1+Cos\theta}\ or\ \frac{1-Cos\theta}{Sin\theta}$

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SUM AND PRODUCT IDENTITIES

FOR PRODUCT INTO SUM

1. $Sin\alpha \, Cos\beta = \frac{1}{2}[Sin\,(\alpha+\beta) + Sin\,(\alpha-\beta)]$
2. $Cos\alpha \, Sin\beta = \frac{1}{2}[Sin\,(\alpha+\beta) - Sin\,(\alpha-\beta)]$
3. $Sin\alpha \, Sin\beta = -\frac{1}{2}[Cos\,(\alpha+\beta) - Cos\,(\alpha-\beta)]$
4. $Cos\alpha \, Cos\beta = \frac{1}{2}[Cos\,(\alpha+\beta) + Cos\,(\alpha-\beta)]$

FOR SUM INTO PRODUCT

1. $Sin\alpha + Sin\beta = 2\,Sin\frac{\alpha+\beta}{2}\,Cos\frac{\alpha-\beta}{2}$

2. $Sin\,\alpha - Sin\beta = 2\,Cos\frac{\alpha+\beta}{2}\,Sin\,\frac{\alpha-\beta}{2}$

3. $Cos\,\alpha + Cos\,\beta = 2\,Cos\,\frac{\alpha+\beta}{2}\,Cos\,\frac{\alpha-\beta}{2}$

4. $Cos\,\alpha - Cos\,\beta = -2\,Sin\frac{\alpha+\beta}{2}\,Sin\frac{\alpha-\beta}{2}$