Trigonometry Formulas For Class 12

Formula > Trigonometry Formulas For Class 12

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Introduction

Trigonometry Formulas For Class 12 provided at Vedantu are sets of different formulas involving trigonometric identities, used to solve maths problems based on the sides and angles of a right-angled triangle. These Trigonometry Formulas For Class 12include trigonometric functions like sine, cosine, tangent, cosecant, secant, cotangent for given angles. These Trigonometry Formulas are very useful for students from class 12 which cover Pythagorean identities, product identities, cofunction identities (shifting angles), sum & difference identities, double angle identities, half-angle identities, etc. in detail to score good marks in Maths Class 12 board exam.

What is Trigonometry?

Trigonometry is the study of the relationships dealing with angles, heights and lengths of triangles and also the relationships between the different circle parts and other geometric figures. In trigonometry class 12, we study trigonometry which finds its application in the field of astronomy, engineering, architectural design, and physics. Trigonometry Formulas for class 12 contains all the essential trigonometric identities which can fetch some direct questions in competitive exams based on formulae.

Trigonometric identities given in the 12th trigonometry formula are very useful and help to solve the problems better. There are huge numbers of fields in which these trigonometry identities and trigonometric equations are used.

The Difference Between Trigonometric Identities And Trigonometric Ratios:

- **Trigonometric Identities:** Equalities in trigonometry functions are known as trigonometric identities.
- **Trigonometric Ratio:** The relationship of the angle measurement and the right-angle triangle side length known for its trigonometric ratio.

All Trigonometry Formulas For Class 12

Double Angle Formulas:

1. $sin2\theta = 2sin\theta cos\theta$

2. $cos2\theta = Cos^2\theta - Sin^2\theta = 2Cos^2\theta - 1 = 1 - 2Sin^2\theta$

3. $tan2\theta = \frac{2tan\theta}{1 - tan^2\theta}$

Triple Angle Formula:

1. $sin3\theta = 3Sin\theta - 4Sin^3\theta$

2. $cos\theta = 4Cos^3\theta – 3Cos\theta$

3. $tan3\theta = \frac{3tan\theta - tan^3\theta}{1 - 3tan^2\theta}$

4. $cot3\theta = \frac{cot^3\theta - 3cot\theta}{3cot^2\theta - 1}$

Converting Products Into Sums And Difference:

1. $sinAsinB = \frac{1}{2}[cos(A - B) - cos(A + B)]$

2. $cosAcosB = \frac{1}{2}[cos(A - B) + cos(A + B)]$

3. $sinAcosB = \frac{1}{2}[sin(A + B) + sin(A - B)]$

4. $cosAsinB = \frac{1}{2}[cos(A + B) + sin(A - B)]$

Half Angle Identities:

1. $Sin(\frac{x}{2}) = \pm\sqrt{(\frac{1 - cos(x)}{2})}$

2. $Cos(\frac{x}{2}) = \pm\sqrt{(\frac{1 + cos(x)}{2})}$

3. $Tan(\frac{x}{2}) = \pm\sqrt{\frac{1 - cos(x)}{1 + cos(x)}} = \frac{1 - cos(x)}{sin(x)} = \frac{sin(x)}{1 + cos(x)}$

On squaring the above identities we can re-state the above equations as following-

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

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

3. $Tan^2(x) = \frac{1 - cos(2x)}{1 + cos(2x)}$

Complex Relations:

1. $Sin\theta = \frac{e^{i\theta} - e^{-i\theta}}{2i}$
2. $Cos\theta = \frac{e^{i\theta} + e^{-i\theta}}{2i}$
3. $Tan\theta = \frac{e^{i\theta} - e^{-i\theta}}{e^{i\theta} + e^{-i\theta}}$
4. $Cosec\theta = \frac{2i}{e^{i\theta} - e^{-i\theta}}$
5. $Cosec\theta = \frac{2i}{e^{i\theta} + e^{-i\theta}}$
6. $Cot\theta = \frac{e^{i\theta} + e^{-i\theta}}{e^{i\theta} - e^{-i\theta}}$

Inverse Trigonometric Functions:

Definition:

1. $\theta = Sin^{-1}(x)$ is equivalent to $x = Sin\theta$
2. $\theta = Cos^{-1}(x)$ is equivalent to $x = Cos\theta$
3. $\theta = Tan^{-1}(x)$ is equivalent to $x = Tan\theta$

Inverse Properties:

These properties hold for x in the domain and θ in the range

1. $sin(sin^{-1}(x)) = x$
2. $cos(cos^{-1}(x)) = x$
3. $tan(tan^{-1}(x)) = x$
4. $sin^{-1}(sin(\theta)) = \theta$
5. $cos^{-1}(cos(\theta)) = \theta$
6. $tan^{-1}(tan(\theta)) = \theta$

Other Notations

1. $sin^{-1}(x) = arcsin(x)$

2. $cos^{-1}(x) = arccos(x)$

3. $tan^{-1}(x) = arctan(x)$

Domain and Range:

Function	Domain	Range
$\theta = \sin^{-1}(x)$	$-1 \le x \le 1$	$-\pi/2 \le \theta \le \pi/2$
$\theta = \cos^{-1}(x)$	$-1 \le x \le 1$	$0 \le \theta \le \pi$
$\theta = \tan^{-1}(x)$	$-\infty \le x \le \infty$	$-\pi/2 < \theta < \pi/2$

Inverse Trigonometric Functions:

Name	Usual Notation	Definition	Domain of x for real number	Range of usual principal values (Radians)	Range of principal values (Degrees)
arcsine	y=arcsin(x)	x=sin(y)	$-1 \le x \le 1$	$-\pi/2 \le y \le \pi/2$	$-90^o \le y \le 90^o$
arccosine	y=arcos(x)	x=cos(y)	$-1 \le x \le 1$	$0 \le y \le \pi$	$0^o \le y \le 180^o$
arctangent	y=arctan(x)	x=tan(y)	All real numbers	$-\pi/2 \le y \le \pi/2$	$-90^o \le y \le 90^o$
arccotangent	y=arccot(x)	x=cot(y)	All real numbers	$0 \le y \le \pi$	$0^o \le y \le 180^o$
arcsecant	y=arcsec(x)	x=sec(y)	$x \le -1$ or $1 \le x$	$0 \le y < \pi/2$ or $\pi/2 < y \le \pi$	$0 \le y < 90^o$ or $90^o < y \le 180^o$
arccosecant	y=arccosec(x)	x=cosec(x)	$x \le -1$ or $1 \le x$	$-\pi/2 \le y < 0$ or $0 < y \le \pi/2$	$-90^o \le y < 0$ or $0 < y \le 90^o$

Solved Examples:

Question 1. Find the principal values of $Sin^{-1}(\frac{1}{\sqrt{2}})$

Solution

Let $Sin^{-1}(\frac{1}{\sqrt{2}})$ = α;

then sin α = sin α = $Sin^{-1}(\frac{1}{\sqrt{2}})$ = sin 45 degree

α = 45 degree or π/4, which is the required principal value.

Question 2. Show that $Tan^{-1}\frac{1}{2} + Tan^{-1}\frac{1}{3} = \frac{\pi}{4}$

Solution

L.H.S. = $Tan^{-1}\frac{1}{2} + Tan^{-1}\frac{1}{3}$

= $tan^{-1}\left(\frac{\frac{1}{2}+\frac{1}{3}}{1-\left(\frac{1}{2}\times\frac{1}{3}\right)}\right) = tan^{-1}\left(\frac{\frac{5}{6}}{\frac{5}{6}}\right)$

= $tan^{-1}(1) = \frac{\pi}{4}$

Fun Facts

- The word "Trigonometry" is taken from the word "Triangle Measure".
- Trigonometry is used by engineers to figure out the angles of the sound waves and how to design rooms.
- Trigonometry is connected with music and architecture.

Conclusion

These are Trigonometry Formulas For Class 12 introduced in the Inverse trigonometric functions chapter of Class 12. Students can solve the problems based on these properties taking reference from this article. To get formulas for classes 10 and 11, students can visit Vedantu's official website.