CISCE VIRTUAL LEARNING SERIES

LESSON: MATHEMATICS

TRIGONOMETRIC IDENTITIES (SESSION 1)

October 14th, 2020

Response to Questions posed by students during the live Lesson:

S.No.	Questions	Answers
1.	Can we prove the standard identity $sec^2\theta - tan^2\theta = 1$ by using $sin^2\theta + cos^2\theta = 1$?	YES LHS= $sec^2\theta - tan^2\theta$ = $\frac{1}{cos^2\theta} - \frac{sin^2\theta}{cos^2\theta}$ = $\frac{1-sin^2\theta}{cos^2\theta}$ = $\frac{cos^2\theta}{cos^2\theta}$ = 1
2.	$Prove\ that: sin^4\theta + cos^4\theta = 1 - 2sin^2\theta cos^2\theta$ Can we solve the sum by starting directly from a standard identity instead of starting from LHS or RHS?	Yes $We\ know\ sin^2\theta + cos^2\theta = 1$ Squaring both sides $(sin^2\theta + cos^2\theta)^2 = (1)^2$ $\Rightarrow sin^4\theta + 2\ sin^2\theta.cos^2\theta + cos^4\theta = 1$ $\Rightarrow sin^4\theta + cos^4\theta = 1 - 2\ sin^2\theta.cos^2\theta$
3.	Given to prove $cos^2\theta\ (1 + tan^2\theta) = 1$ If we prove it by taking any standard angle will that be correct?	No. It will be a verification only, not proof. $LHS = cos^2\theta\ (1 + tan^2\theta)$ = $cos^2\theta\ (sec^2\theta)$ = $cos^2\theta \frac{1}{cos^2\theta}$ = 1 RHS

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4.	How do we prove $(1 - tanA)^2 + (1 + tanA)^2 = 2sec^2A$?	LHS = $(1 - tanA)^2 + (1 + tanA)^2$ = $(1 - 2tanA + tan^2A) + (1 + 2tanA + tan^2A)$ = $1 - 2tanA + tan^2A + 1 + 2tanA + tan^2A$ = 2 + $2tan^2A$ = 2(1 + tan^2A) = $2sec^2A$ = RHS.
5.	How do we prove $tan^2x\,(1 + cot^2x) = \frac{1}{1-sin^2x}$?	LHS = $tan^2x(1 + cot^2x)$ = $tan^2x + tan^2xcot^2x$ = $tan^2x + tan^2x\frac{1}{tan^2x}$ = $tan^2x + 1$ = sec^2x = $\frac{1}{cos^2x}$ = $\frac{1}{1-sin^2x}$ $= RHS$
6.	Are we allowed to prove all identities by using a right angled triangle and applying Pythagoras Theorem?	It is not advisable to do so, except for standard identities.
7.	Do we get sums to prove the standard identities?	Yes, you may be asked.
8.	Is it necessary to prove from LHS to RHS or the reverse may also be done?	You may work out from any side. More detail will be given in the second session.
9.	Find the minimum value of 5cosA + 12sinA + 12.	These sums are not a part of the scope of your syllabus. You will learn to solve these sums in higher classes.

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10.	In a problem of trigonometric identity can the value of angle θ be greater than $90°$?	As per your syllabus the angle, say θ, to be considered is such that, $0° \leq \theta \leq 90°$. But the trigonometric identities are true, irrespective of the value of the angle if the functions involved are defined.