Nishant Jindal

Q $\sqrt{\sec^2\theta + \csc^2\theta} = \tan\theta + \cot\theta$

$\sqrt{1+\tan^2\theta + 1 + \cot^2\theta}$

$\sqrt{\tan^2\theta + \cot^2\theta + 2\cdot\tan\theta\cdot\cot\theta}$

$\sqrt{(\tan\theta + \cot\theta)^2}$

$= \tan\theta + \cot\theta = RHS$

Q $(\csc\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = 1$

$\left(\frac{1}{s} - s\right)\left(\frac{1}{c} - c\right)\left(\frac{s}{c} + \frac{c}{s}\right)$

$\frac{1-s^2}{s} \times \frac{1-c^2}{c} \times \frac{s^2+c^2}{s\cdot c}$

$\cancel{\frac{c^2}{s} \times \frac{s^2}{c}} \times \frac{1}{\cancel{s c}} = 1 \; RHS$

Nishant Jindal

Q $\tan\theta + \sec\theta = \frac{3}{2}$ then $\sin\theta = ?$

$$\sec\theta + \tan\theta = \frac{3}{2}$$
$$\sec\theta - \tan\theta = \frac{2}{3}$$

$$2\sec\theta = \frac{3}{2} + \frac{2}{3} = \frac{9+4}{6}$$

$$\sec\theta = \frac{13}{12} \Rightarrow \cos\theta = \frac{12}{13}$$

$$\sin\theta = \sqrt{1 - \cos^2\theta}$$
$$= \sqrt{1 - \frac{144}{169}} = \sqrt{\frac{25}{169}}$$
$$= \frac{5}{13}$$

Q If $2\sin\theta = 2 - \cos\theta$ then $\sin\theta = ?$

$$\cos\theta = 2 - 2\sin\theta$$

$$\cos^2\theta = 4 + 4\sin^2\theta - 8\sin\theta$$

$$1 - \sin^2\theta = 4 + 4\sin^2\theta - 8\sin\theta$$

$$5\sin^2\theta - 8\sin\theta + 3 = 0$$

$$5\sin^2\theta - 5\sin\theta - 3\sin\theta + 3 = 0$$

$$5\sin\theta(\sin\theta - 1) - 3(\sin\theta - 1) = 0$$

$$(\sin\theta - 1)(5\sin\theta - 3) = 0$$

$$\sin\theta = 1, \frac{3}{5}$$

$\boxed{\sin\theta \text{ की Q Eqn बनाओ \& solve}}$

Nishant Jindal

Q5 $3\sec^4\theta + 8 = 10\sec^2\theta$ then $\tan\theta = ?$

$\boxed{\sec^2\theta = T}$

$3T^2 + 8 = 10T$

$3T^2 - 10T + 8 = 0$

$3T^2 - 6T - 4T + 8 = 0$

$3T(T-2) - 4(T-2) = 0$

$T = \frac{4}{3}, \; 2$

$\sec^2\theta = \frac{4}{3}$

$1 + \tan^2\theta = \frac{4}{3} \Rightarrow \tan^2\theta = \frac{1}{3}$

$\tan\theta = \frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}$

$\sec^2\theta = 2$

$1 + \tan^2\theta = 2$

$\boxed{\tan^2\theta = 1} \Rightarrow \tan\theta = 1, -1$

Q6

$$\frac{\sin x + \cos x}{\cos^3 x} = \tan^3 x + \tan^2 x + \tan x + 1$$

$$LHS \Rightarrow \frac{\sin x + \cos x}{\cos^3 x}$$

$$\Rightarrow \frac{1}{\cos^2 x} \times \left(\frac{\sin x + \cos x}{\cos x}\right)$$

$$\Rightarrow \sec^2 x \times (\tan x + 1)$$

$$(1 + \tan^2 x)(\tan x + 1)$$

$$\tan^3 x + \tan^2 x + \tan x + 1 = RHS$$

Nishant Jindal

Fundamentals of Mathematics

Q. $\sin\theta + \sin^2\theta + \sin^3\theta = 1$

then $\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta = ?$

Hint

$\sin\theta + \sin^3\theta = 1 - \sin^2\theta$

$\sin\theta + \sin^3\theta = \cos^2\theta$

$\sin\theta(1+\sin^2\theta) = \cos^2\theta$

Sqr

$\sin^2\theta(1+\sin^2\theta)^2 = \cos^4\theta$

$(1-\cos^2\theta)(1+1-\cos^2\theta)^2 = \cos^4\theta$

$(1-\cos^2\theta)(2-\cos^2\theta)^2 = \cos^4\theta$

$(1-\cos^2\theta)(4+\cos^4\theta-4\cos^2\theta) = \cos^4\theta$

$4+\cancel{\cos^4\theta}-4\cos^2\theta-4\cos^2\theta-\cos^6\theta+4\cos^4\theta-\cancel{\cos^4\theta}$

$4\cos^4\theta-\cos^6\theta-8\cos^2\theta = -4$

$\cos^6\theta+8\cos^2\theta-4\cos^4\theta = 4$

Nishant Jindal

Q If $\frac{\sin^4 x}{2}+\frac{\cos^4 x}{3}=\frac{1}{5}$ then.

A) $\frac{\sin^8 x}{8}+\frac{\cos^8 x}{27}=\frac{1}{125}$ ✓

B) $\tan^2 x=\frac{1}{3}$ ✗

C) $\tan^2 x=\frac{2}{3}$ ✓

D) $\frac{\sin^8 x}{8}+\frac{\cos^8 x}{27}=\frac{2}{125}$ ✗

$$\frac{\sin^4 x}{2}+\frac{(1-\sin^2 x)^2}{3}=\frac{1}{5}$$

$$\frac{\sin^4 x}{2}+\frac{\sin^4 x-2\sin^2 x+1}{3}=\frac{1}{5}$$

$$3\sin^4 x+2\sin^4 x-4\sin^2 x+2=\frac{6}{5}$$

$$5\sin^4 x-4\sin^2 x+2=\frac{6}{5}$$

$$25\sin^4 x-20\sin^2 x+4=0$$

$$(5\sin^2 x-2)^2=0$$

$$5\sin^2 x-2=0$$

$$\sin^2 x=\frac{2}{5}\Rightarrow \cos^2 x=1-\sin^2 x=1-\frac{2}{5}=\frac{3}{5}$$

$$\tan^2 x=\frac{\sin^2 x}{\cos^2 x}=\frac{\frac{2}{\cancel{5}}}{\frac{3}{\cancel{5}}}=\frac{2}{3}$$

A) $$\frac{\sin^8 x}{8}+\frac{\cos^8 x}{27}=\frac{\left(\frac{2}{5}\right)^4}{8}+\frac{\left(\frac{3}{5}\right)^4}{27}$$

$$\frac{\cancel{16}\,2}{625\times\cancel{8}}+\frac{\cancel{81}\,3}{625\times\cancel{27}}=\frac{\cancel{5}}{\cancel{625}}=\frac{1}{125}$$

Nishant Jindal

Q $81^{\sin^2\theta} + 81^{\cos^2\theta} = 30$

find $\theta = ?$

$81^{\sin^2\theta} + 81^{1-\sin^2\theta} = 30$

$81^{\sin^2\theta} + \frac{81}{81^{\sin^2\theta}} = 30$

$t + \frac{81}{t} = 30$

$t^2 - 30t + 81 = 0$

$t^2 - 27t - 3t + 81 = 0$

$t(t-27) - 3(t-27) = 0$

$t = 3, 27$

$81^{\sin^2\theta} = 3$ & $81^{\sin^2\theta} = \underline{27}$

3 में बदलो

$3^{4\sin^2\theta} = 3^1$

$4\sin^2\theta = 1$

$\sin^2\theta = \frac{1}{4}$

$\sin\theta = \frac{1}{2}, -\frac{1}{2}$

$\theta = 30^\circ, -30^\circ$

$\frac{\pi}{6}, -\frac{\pi}{6}$

$3^{4\sin^2\theta} = 3^3$

$4\sin^2\theta = 3$

$\sin^2\theta = \frac{3}{4}$

$\sin\theta = \frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}$

$\theta = 60^\circ, -60^\circ$

$\theta = \frac{\pi}{3}, -\frac{\pi}{3}$

Nishant Jindal

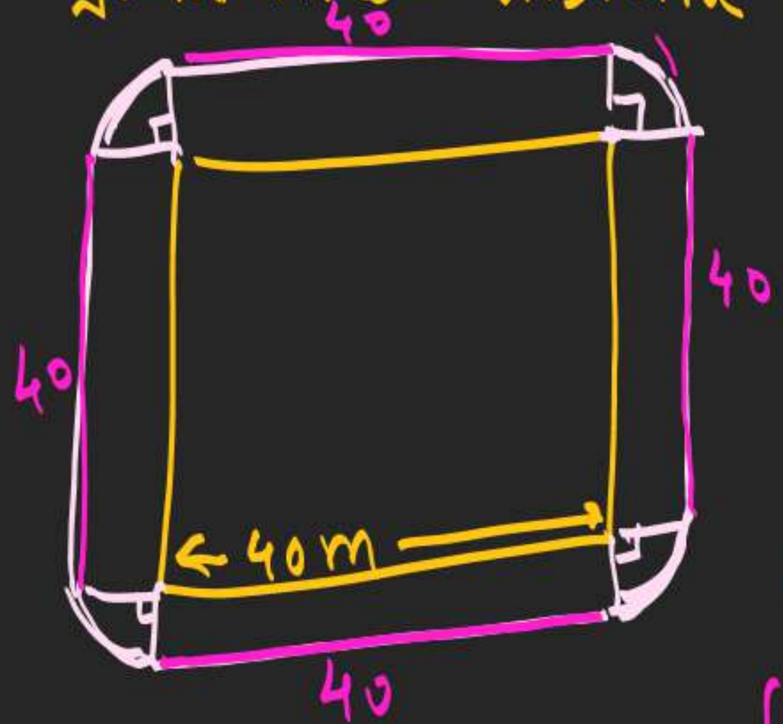
Q Let $f_k(\theta) = \sin^k\theta + \cos^k\theta$

then find value of $\frac{1}{6} f_6(\theta) - \frac{1}{4} f_4(\theta)$

Q $\tan\theta + \sin\theta = m$, $\tan\theta - \sin\theta = n$

then P.T. $m^2 - n^2 = 4\sqrt{mn}$

Q A Garden is in Shape of a sqr. of Side length 40m. Now if a man runs around the garden in such a way that his distance from Side of sqr is 1 meter. How much distance will he travel after 1 Round



$\rightarrow 2\pi \times 1$

dist $= 2\pi$

$40 + 40 + 40 + 40 + 2\pi$

$160 + 2\pi$

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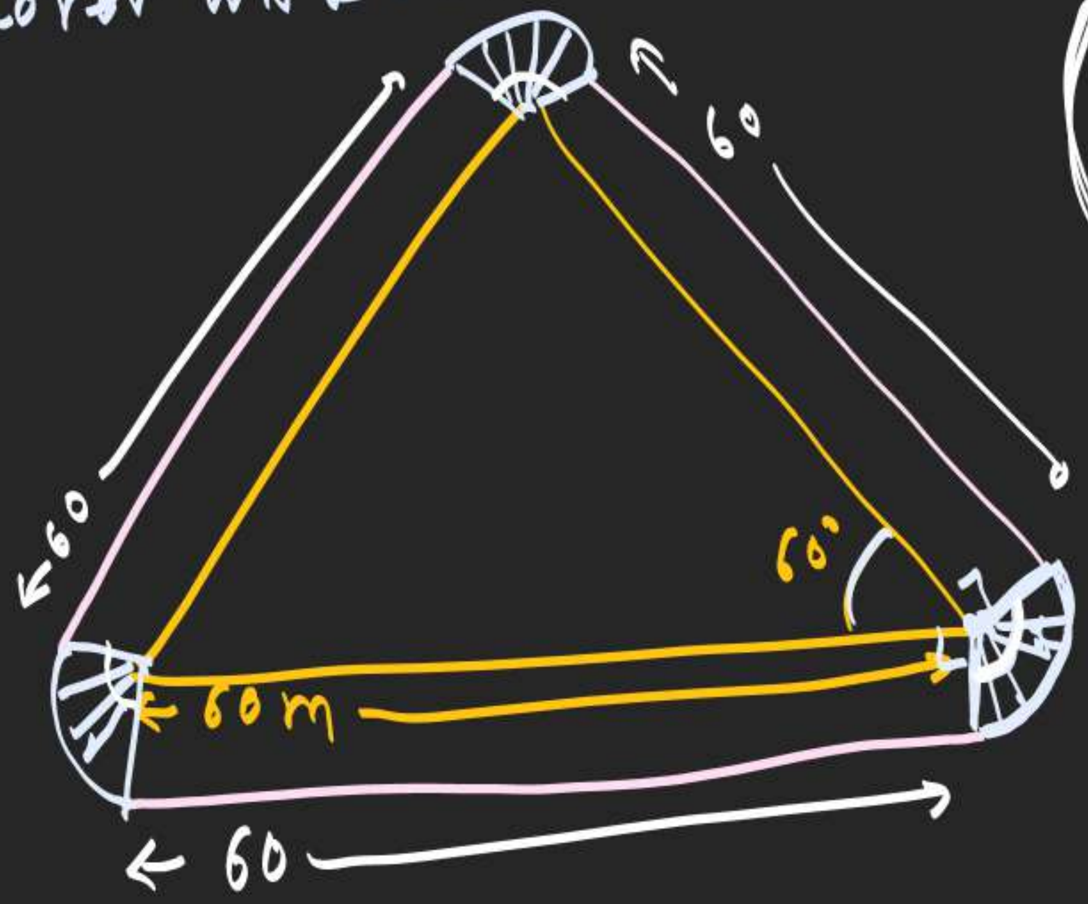
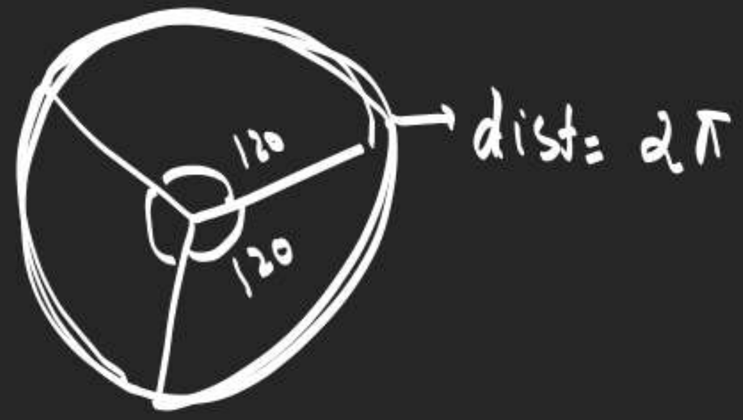
Q An eq^l $\triangle$ of sides 60 m is in the shape of garden. Now if a man runs in such a way that his distance from the side of $\triangle$ is always 1 M. How much distance he will cover in 1 round

Total $\doteq 180 + 2\pi$





$x + \underline{90 + 90} + 60° = 360$

$x = 120°$

Nishant Jindal

Q If $\theta \in \left(0, \frac{\pi}{4}\right)$ then.

$t_1 = (\tan\theta)^{\tan\theta}$

$t_2 = (\tan\theta)^{\cot\theta}$

$t_3 = (\cot\theta)^{\tan\theta}$

$t_4 = (\cot\theta)^{\cot\theta}$

$t_1 > t_2 > t_3 > t_4$

$\boxed{t_4 > t_3 > t_2 > t_1}$

$t_3 > t_1 > t_2 > t_4$

$t_2 > t_3 > t_1 > t_4$

$\theta = (0, 45^\circ)$

$\theta = 30^\circ$ Assume

$t_1 = (\tan 30^\circ)^{\tan 30^\circ} = \left(\frac{1}{\sqrt{3}}\right)^{\frac{1}{\sqrt{3}}}$

$t_2 = (\tan 30^\circ)^{\cot 30} = \left(\frac{1}{\sqrt{3}}\right)^{\sqrt{3}} = \left(\frac{1}{1.7}\right)^{1.7} = (1 \text{ से छोटा})^{1.7} =$ Aurchhotu

$t_3 = (\cot 30^\circ)^{\tan 30^\circ} = (\sqrt{3})^{1/\sqrt{3}}$

$t_4 = (\cot 30^\circ)^{\cot 30^\circ} = (\sqrt{3})^{\sqrt{3}} =$ Sabse Bda

Nishant Jindal

Conversion from Radian to degree

$\frac{5\pi}{12} \rightarrow \frac{5\cancel{\pi}}{\cancel{12}} \times \frac{\overset{15^\circ}{\cancel{180^\circ}}}{\cancel{\pi}} = 75^\circ$

$\frac{\pi}{10} \rightarrow \frac{\cancel{\pi}}{\cancel{10}} \times \frac{\overset{18^\circ}{\cancel{180^\circ}}}{\cancel{\pi}} = 18^\circ$

$\frac{2\pi}{3} \rightarrow \frac{2\cancel{\pi}}{\cancel{3}} \times \frac{\overset{60^\circ}{\cancel{180^\circ}}}{\cancel{\pi}} = 120^\circ$

$\frac{4\pi}{5} \rightarrow \frac{4\cancel{\pi}}{\cancel{5}} \times \frac{\overset{36^\circ}{\cancel{180^\circ}}}{\cancel{\pi}} = 144^\circ$

$\frac{\pi}{5} \rightarrow \frac{\cancel{\pi}}{5} \times \frac{180^\circ}{\cancel{\pi}} = 36^\circ$

Quadrant system

Change line

2nd: Sin, Cosec +	1st: All +ve
3rd: Tan, Cot +	4th: Cos, Sec +

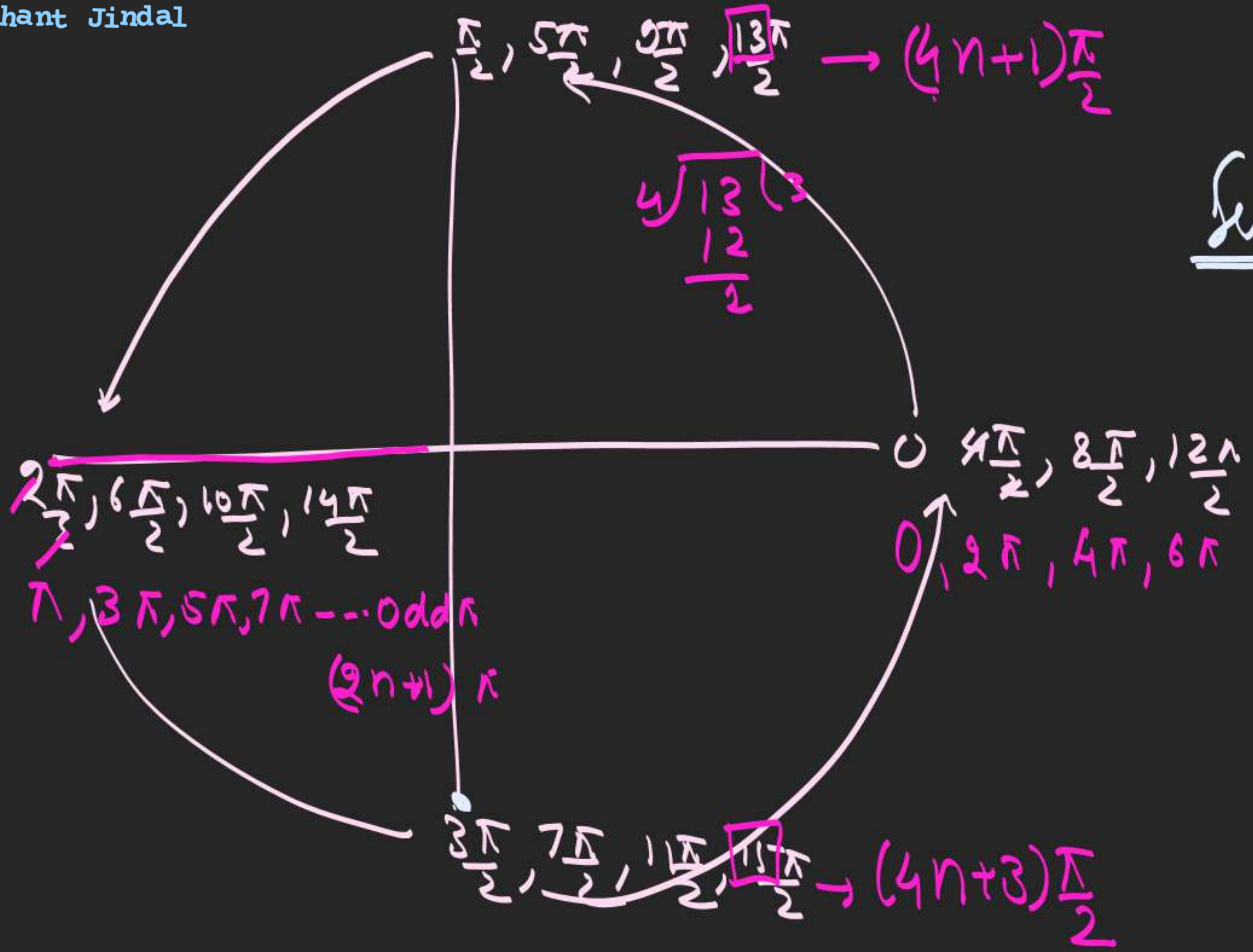
No change line

0

All silver Tea Cup

Change

$\boxed{\begin{array}{l} \text{Sin} \rightleftharpoons \text{Cos} \\ \text{Tan} \rightleftharpoons \text{Cot} \\ \text{Sec} \rightleftharpoons \text{Cosec} \end{array}}$



4)31(7
28
3

$$\underline{\sec}\left(\frac{31\pi}{2}-\theta\right) = -\mathrm{cosec}\,\theta$$

$$\mathrm{cosec}\left(\frac{17\pi}{2}+\theta\right)$$

$$\sin(82\pi-\theta)$$

$$\cos(8\pi+\theta)$$

$$\tan\left(\frac{7\pi}{2}-\theta\right)$$

$$\cot\left(\frac{3\pi}{2}+\theta\right)$$