

Solve:

$$\tan 2x = 8\cos^2 x - \cot x, \quad 0 \leq x \leq \frac{\pi}{2}$$

$$\frac{2\tan x}{1 - \tan^2 x} = 8\cos^2 x - \cot x$$

$$2\tan x = (8\cos^2 x - \cot x)(1 - \tan^2 x)$$

$$2\tan x = 8\cos^2 x - \cot x - 8\sin^2 x + \tan x$$

$$8\cos^2 x - 8\sin^2 x - \cot x - \tan x = 0$$

$$8\cos^2 x - 8\sin^2 x - \left(\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}\right) = 0$$

$$8\cos^2 x - 8\sin^2 x - \frac{\cos^2 x + \sin^2 x}{\sin x \cos x} = 0$$

$$8(\cos^2 x - \sin^2 x) - \frac{1}{\sin x \cos x} = 0$$

$$0 = 4(2\sin x \cos x)(\cos^2 x - \sin^2 x) - 1$$

$$0 = 4 \sin 2x \cos 2x - 1$$

$$4 \sin 2x \cos 2x = 1$$

$$1 = 2(2\sin 2x \cos 2x)$$

$$2 \sin 4x = 1, \quad \sin 4x = \frac{1}{2}, \quad 0 \leq 4x \leq 2\pi$$

S	A
T	C

$$4x \in QI \text{ or } 4x \in QII, \quad \text{RAA} = \sin^{-1}\left(\frac{1}{2}\right), \quad \begin{array}{c} 2 \\ 30^\circ \\ \sqrt{3} \end{array}$$

$$4x = \frac{\pi}{6}, \quad 4x = \frac{5\pi}{6}$$

$$x = \frac{\pi}{24} \text{ or } x = \frac{5\pi}{24}$$