

7c5, 3.82 תיכונ

$$9 \log_{\sin 2x} (4 \cos^2 x) + 8 \log_{2 \cos x} \sin x = 16$$

$$9 \log_{2 \sin x \cos x} (2 \cos x)^2 + 8 \log_{2 \cos x} \sin x = 16$$

$$9 \cdot \frac{\log_{2 \cos x} (2 \cos x)^2}{\log_{2 \cos x} 2 \sin x \cos x} + 8 \log_{2 \cos x} \sin x = 16$$

$$9 \cdot \frac{2}{\log_{2 \cos x} \sin x + \log_{2 \cos x} \cos x} + 8 \log_{2 \cos x} \sin x = 16$$

$$\frac{18}{\log_{2 \cos x} \sin x + 1} + 8 \log_{2 \cos x} \sin x = 16$$

: נניח $\log_{2 \cos x} \sin x = t$ נניח

$$\frac{18}{t+1} + 8t = 16$$

$$18 + 8t^2 + 8t = 16t + 16$$

$$8t^2 - 8t + 2 = 0$$

$$t = \frac{1}{2}$$

$$\log_{2 \cos x} \sin x = \frac{1}{2}$$

$$\sqrt{2 \cos x} = \sin x \quad (1)$$

$$2 \cos x = \sin^2 x$$

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

$$\cos^2 x + 2 \cos x - 1 = 0$$

$$\cos x = \frac{-2 \pm \sqrt{4+4}}{2} = -1 \pm \sqrt{2}$$

$\cos x = -1 + \sqrt{2}$ כיון $\cos x \in [-1, 1]$: זהו הפתרון

$$x = \arccos(-1 + \sqrt{2}) : \text{פיתרון}$$

תנאי הפתרון

$$\sin x > 0$$

$$1 \neq \cos x > 0$$

$$\cos^2 x > 0$$

$$1 \neq \sin 2x > 0$$

תנאי הפתרון: $0 < x < \frac{\pi}{2}$

$$0 < x < \frac{\pi}{2}$$