

Author: Blinzy Fernandes

This step-by-step solution guide has been created by **Blinzy Fernandes** for educational purposes. While we have made every effort to ensure the accuracy of the information presented, it is possible that there may be errors or omissions. We encourage users to critically evaluate and verify the content. BF Maths and the author cannot be held responsible for any errors or inaccuracies in this guide.

If you find any mistakes or have any suggestions for improvements, please contact us at bfmathshello@gmail.com. Your feedback is invaluable in helping us maintain the quality and accuracy of our resources. Please specify which exercise and which question in the email.

Thank you for using BF Maths for your maths revision!

Chap 6 Problem Solving : Set A

Bronze:

$$a) \frac{\cos n}{1 - \sin n} + \frac{1 - \sin n}{\cos n} = p$$

$$\frac{\cos^2 n + 1 - 2 \sin n + \sin^2 n}{1 - \sin n (\cos n)} = p$$

$$\frac{\cos^2 n + (1 - 2 \sin n + \sin^2 n)}{(1 - \sin n) (\cos n)} = p$$

Hence proved.

$$b) \text{ Using } \sin^2 n + \cos^2 n = 1$$

$$\frac{1 + 1 - 2 \sin n}{(1 - \sin n) (\cos n)} = p$$

$$\frac{2 - 2 \sin n}{(1 - \sin n) (\cos n)} = p$$

$$\frac{2 (1 - \sin n)}{(1 - \sin n) (\cos n)} = p$$

$$\frac{2}{\cos n} = p$$

$$2 \sec n = p$$

$$\sec n = \frac{p}{2} \quad \text{Hence, proved.}$$

Silver

$$a) \cot^2 n + \operatorname{cosec}^2 n = a$$

$$(\operatorname{cosec}^2 n - 1) + \operatorname{cosec}^2 n = a$$

$$2 \operatorname{cosec}^2 n - 1 = a$$

$$2 \operatorname{cosec}^2 n = a + 1$$

$$\operatorname{cosec}^2 n = \frac{a + 1}{2}$$

Hence, proved.

Chap 6 Problem Solving : Set A

Silver Cont:

$$b) \operatorname{cosec}^2 n = \frac{a+1}{2}$$

$$1 + \operatorname{cosec}^2 n = \frac{a+1}{a}$$

$$1 + \frac{1}{\tan^2 n} = \frac{a+1}{2}$$

$$\frac{1}{\tan^2 n} = \frac{a+1}{2} - 1$$

$$\frac{2}{\tan^2 n} = a+1-2$$

$$\frac{2}{\tan^2 n} = a-1$$

$$\frac{\tan^2 n}{2} = \frac{1}{a-1}$$

$$\tan^2 n = \frac{2}{a-1}$$

$$\sec^2 n - 1 = \frac{2}{a-1}$$

$$\sec^2 n = \frac{2}{a-1} + 1$$

$$\sec^2 n (a-1) = 2 + (a-1)$$

$$\sec^2 n = \frac{1+a}{a-1}$$

$$\sec^2 n = \frac{a+1}{a-1}$$

Hence, proved.

Chap 6 Problem Solving : Set A

Goal:

$$= \frac{1 - \tan^2 \pi}{1 + \tan^2 \pi} = z$$

$$= \frac{1 - \frac{\sin^2 \pi}{\cos^2 \pi}}{\sec^2 \pi} = z$$

$$= \frac{\frac{\cos^2 \pi - \sin^2 \pi}{\cos^2 \pi}}{\frac{1}{\cos^2 \pi}} = z$$

$$= 1 - \sin^2 \pi - \sin^2 \pi = z$$

$$= 1 - 2\sin^2 \pi = z$$

$$\neq -2\sin^2 \pi = z - 1$$

$$2\sin^2 \pi = -z + 1$$

$$\sin^2 \pi = \frac{1 - z}{2}$$

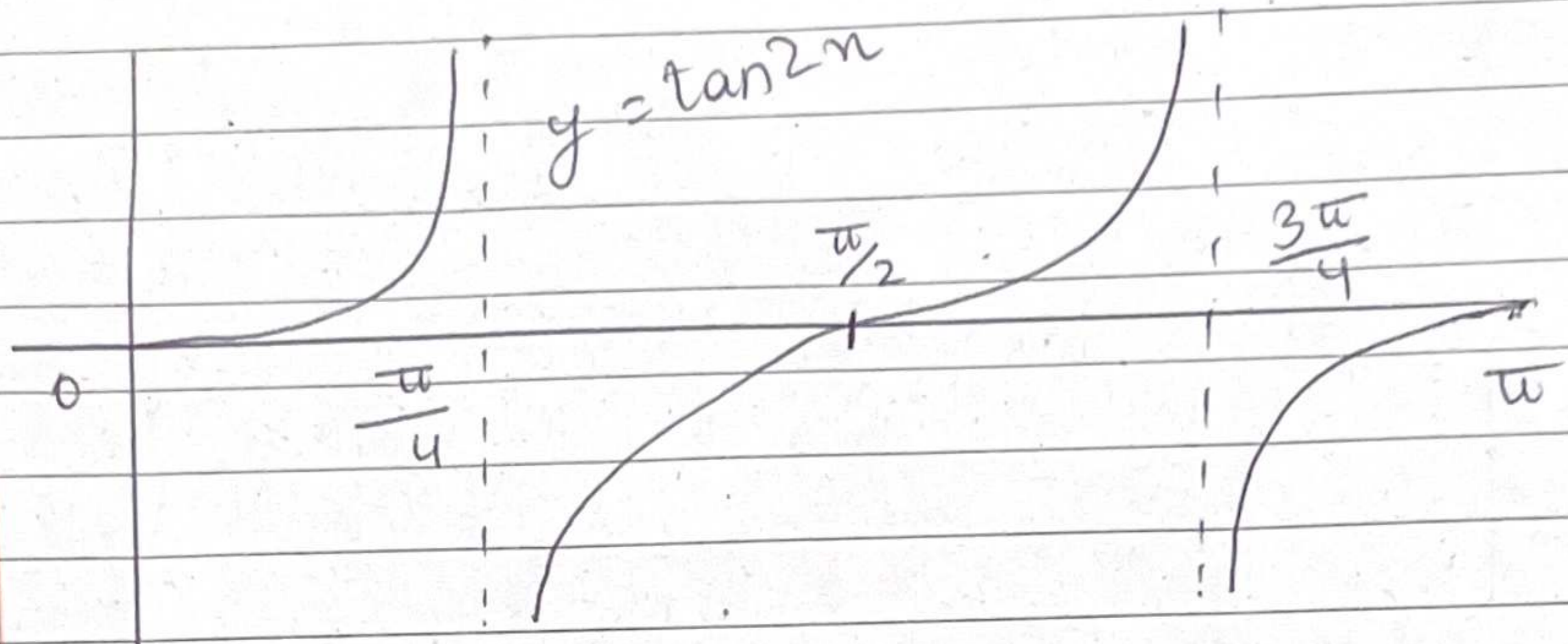
$$\cos^2 \pi = \frac{2}{1 - z}$$

Hence, proved.

Chapter 6 Problem Solving : Set B

Bronze

a) i)



ii) Period = $\frac{\pi}{2}$

b) i)

$$\cot^2 2x - 4 \cot 2x + 4 = 0$$

$$(\cot 2x - 2)^2 - 4 + 4 = 0$$

$$(\cot 2x - 2)^2 = 0$$

$$a = 2$$

Hence, proved.

ii)

$$\cot 2x = 2 \quad 0 \leq x \leq 2\pi$$

$$\tan 2x = \frac{1}{2}$$

$$\tan 2x = \frac{1}{2}$$

$$2x = 0.46, 3.61$$

$$x = 0.23, 1.80$$

Silver

a) i)

$$4 \cot^2 2x + 12 \operatorname{cosec} 2x + 9 = 0$$

$$4 (\operatorname{cosec}^2 2x - 1) + 12 \operatorname{cosec} 2x + 9 = 0$$

$$4 \operatorname{cosec}^2 2x + 12 \operatorname{cosec} 2x + 5 = 0$$

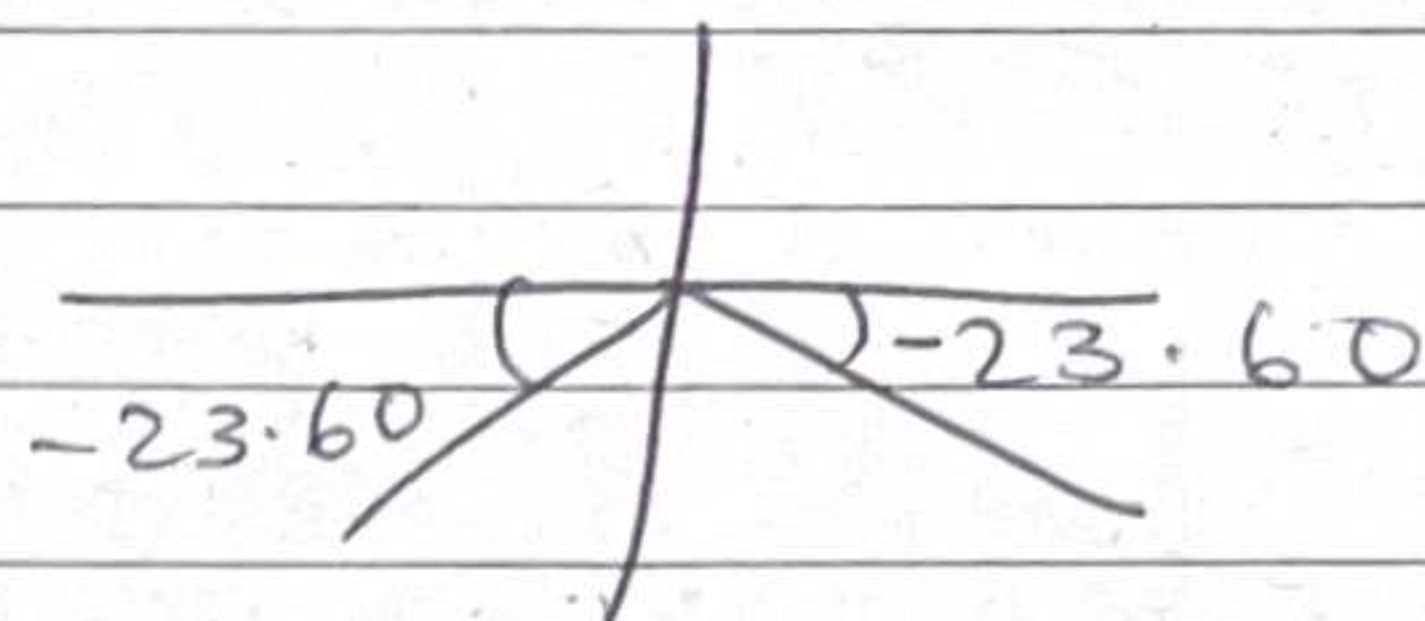
$$\operatorname{cosec} 2x = -\frac{1}{2}, \operatorname{cosec} 2x = -\frac{5}{2}$$

Chap 6 : Problem Solving : Set B

Silver cont:

a) $\sin 2n = -\frac{2}{5}$, $\sin 2n = -\frac{2}{5}$
Hence, proved.

b) $\sin 2n = -\frac{2}{5}$



$$2n = -23.60$$

$$2n = 336.4, 203.6, 696.4, 563.6$$

$$n = 101.8, 168.2, 281.8, 348.2$$

Gold

$$5 + 2 \cot^2 a = 7(1 + \operatorname{cosec} a), \quad a = 2n + \frac{\pi}{3}$$

$$5 + 2 \cot^2 a = 7 + 7 \operatorname{cosec} a$$

$$2 \cot^2 a - 7 \operatorname{cosec} a - 2 = 0$$

$$2 (\operatorname{cosec}^2 a - 1) - 7 \operatorname{cosec} a - 2 = 0$$

$$2 \operatorname{cosec}^2 a - 2 - 7 \operatorname{cosec} a - 2 = 0$$

$$2 \operatorname{cosec}^2 a - 7 \operatorname{cosec} a - 4 = 0$$

$$\operatorname{cosec} a = \frac{-1}{2} \quad \text{or} \quad \operatorname{cosec} a = 4$$

$$\sin a = -\frac{2}{2} \quad \text{or} \quad \sin a = \frac{1}{4}$$

Sub a-values in $\sin a$

$$\sin \left(2n + \frac{\pi}{3} \right) = -2 \quad 0 \leq n \leq 2\pi$$

$$\sin \left(2n + \frac{\pi}{3} \right) = \frac{1}{4} \quad \frac{\pi}{3} \leq n \leq \frac{13\pi}{3}$$

$$2n + \frac{\pi}{3} = 2.89, 9.17, 6.53, 12.83$$

$$n = 0.92, 4.06, 2.74, 5.89$$