Author: <u>Blinzy Fernandes</u>

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 *<u>which exercise</u> and <u>which question</u>* in the email.

Thank you for using BF Maths for your maths revision!

Problem Solving : Set A : Chap 5

Bronze :

a) $CAB = \frac{\pi}{3}$

b) area $= \frac{1}{2} ab \sin C \Rightarrow \frac{1}{2}(6)(6)\sin\frac{\pi}{3}$

$\Rightarrow 9\sqrt{3}$

c) area of sector $= \frac{1}{2} r^2 \theta$

$= \frac{1}{2}(6)^2\left(\frac{\pi}{3}\right)$

$= 6\pi \text{ cm}^2$

d) area of shaded area =

$= 2 \times (\text{area of sector} - \text{area of } \Delta ABC)$

$= 2(6\pi - 9\sqrt{3})$

$= 12\pi - 18\sqrt{3} \text{ cm}^2$

Silver :

a) $BO^2 = 8^2 - 4^2$

$BO = \sqrt{8^2 - 4^2}$

$BO = 4\sqrt{3}$

So $BD = 8\sqrt{3}$

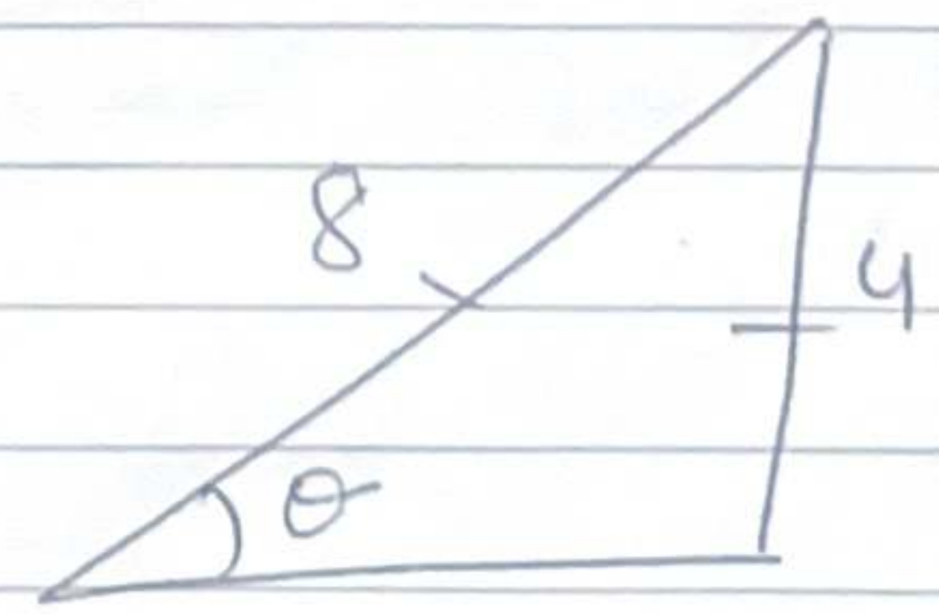
So area $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 8 \times 8\sqrt{3}$

$= 32\sqrt{3} \text{ cm}^2$

b) $\cos^{-1}\left(\frac{4}{8}\right) = \frac{\pi}{3} \times 2$

$= \frac{2\pi}{3}$



Cont.

Problem Solving : Set A : Chap 5

Silver 6: Cont:

b) $\text{area} = \frac{1}{2} r^2 \theta$

$$= \frac{1}{2}(8)^2\left(\frac{2\pi}{3}\right)$$

$$= \frac{64\pi}{3} \text{ cm}^2$$

c) $2D = 4 \times 4\sqrt{3} \Rightarrow 16\sqrt{3} \text{ cm}^2$

$$2S = \frac{\frac{64\pi}{3} - 32\sqrt{3}}{2} = \frac{32\pi}{3} - 16\sqrt{3}$$

$$\text{Shaded area} = \frac{64\pi}{3} - 16\sqrt{3}$$

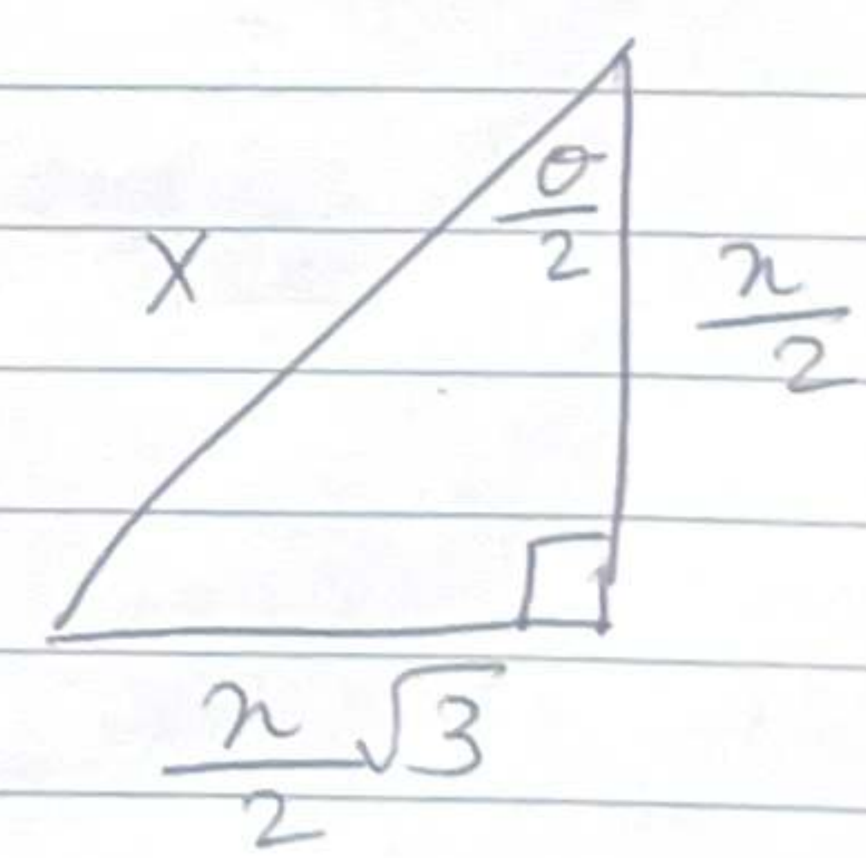
$$= \frac{1}{3}\left(64\pi - 48\sqrt{3}\right) \text{ cm}^2$$

Gold

a) Divide the shape into two isosceles triangles (BAD and BCD) and 4 arcs.

$$\angle OAB = \frac{\theta}{2}$$

$$\sin\frac{\theta}{2} = \frac{\frac{x\sqrt{3}}{2}}{x} = \frac{\sqrt{3}}{2}$$



$$\cos\frac{\theta}{2} = \frac{\frac{x}{2}}{x} = \frac{1}{2}$$

Then, $\sin 2\theta = 2\sin\theta\cos\theta$

$$= 2 \times \frac{1}{2}\sqrt{3} \times \frac{1}{2} \Rightarrow \frac{1}{2}\sqrt{3}$$

Problem Solving: Set A : Chap 5

Gold a: Cont:

a] area of $\Delta BAD = \frac{1}{2} \cdot AB \cdot AD \cdot \sin\theta$

$$= \frac{1}{2} \cdot x \cdot x \cdot \sin\theta$$

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

$$= \frac{1}{2} x^2 \cdot \frac{1}{2}\sqrt{3} \Longrightarrow \frac{1}{4} x^2 \sqrt{3}$$

Area of 2 arcs is equal to the area of segments of circle with angle θ and $r = x$, subtracted by the area of rhombus.

Area of Segment $= \frac{\theta}{2\cancel{\pi}} \cdot \cancel{\pi} r^2$

$$= \frac{\theta}{2} \cdot x^2$$

Area of rhombus $= 2 \cdot A_{\Delta BAD}$

$$= \frac{1}{2} x^2 \sqrt{3}$$

Then, area of two areas $= \frac{\theta}{2} x^2 - \frac{1}{2} x^2 \sqrt{3}$

$\therefore$ total area of the shape is:

$$= A_{rhombus} + 2A_{two\ arcs}$$

$$= \frac{1}{2} x^2 \sqrt{3} + 2\left[\frac{\theta}{2} x^2 - \frac{1}{2} x^2 \sqrt{3}\right]$$

$$= \frac{1}{2} x^2 \sqrt{3} + \theta x^2 - x^2\sqrt{3}$$

Problem Solving: Set A: Chap5

Gold Cont:

$$= \theta x^2 - \frac{1}{2}x^2\sqrt{3}$$

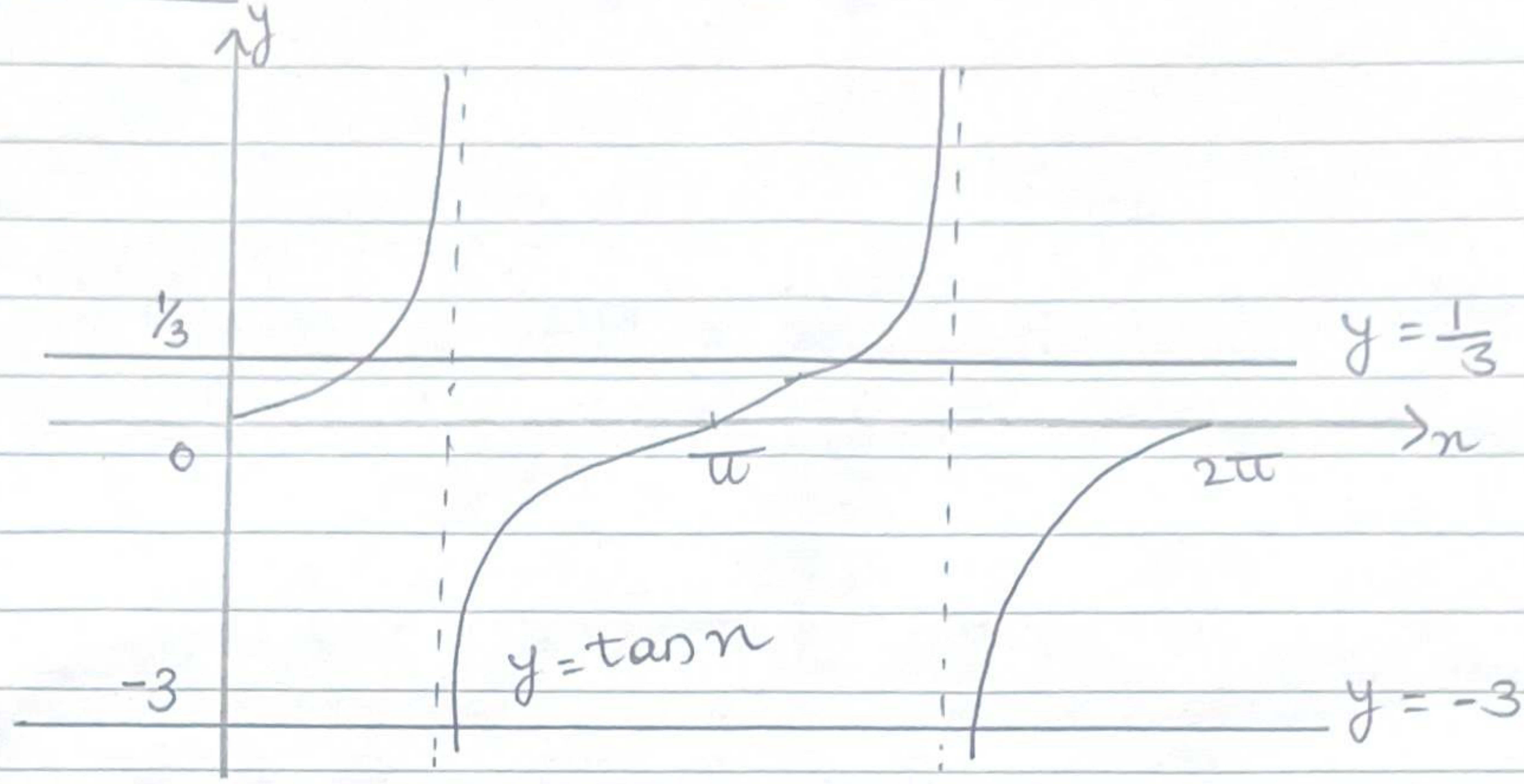
$$= \left[\theta - \frac{\sqrt{3}}{2}\right]x^2$$

So $a = 3$, $b = 2$

Problem Solving : Set B : Chapter 5

Bronze :

a]



b]

$3\tan^2 x + 8\tan x - 3 = 0$

$3\tan^2 x + 9\tan x - \tan x - 3 = 0$

$3\tan x(\tan x + 3) - 1(\tan x + 3) = 0$

$(3\tan x - 1)(\tan x + 3) = 0$

Hence, proved.

c]

$\tan x = \frac{1}{3}$ or $\tan x = -3$

$0 \leq x \leq 2\pi$

$x = 18.43, 198.43, 108.43, 71.57$

$x = 0.322, 1.25, 1.89, 5.03$

Silver :

a]

$3\cos^2 x = 5(1 - \sin x)$

$3(1 - \sin^2 x) = 5 - 5\sin x$

$3 - 3\sin^2 x = 5 - 5\sin x$

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

Hence, proved.

Problem Solving : Set B : Chapter 5

Cont. Silver

b] $(3\sin x - 2)(\sin x - 1) = 0$

$\sin x = \frac{2}{3}$ or $\sin x = 1$

$-\pi \le x \le \pi$

$x = 41.8, 138.2, 90, -90$ $\quad -180 \le x \le 180$

$x = -\frac{\pi}{2}, \frac{\pi}{2}, 0.730, 2.41$

Gold

$\cos x = 3\tan x$

$\cos x = 3\frac{\sin x}{\cos x}$

$\cos^2 x = 3\sin x$

$(1 - \sin^2 x) = 3\sin x$

$\sin^2 x + 3\sin x - 1 = 0$

$\sin x = 0.302$ $\quad \sin x = -3.302$

$x = 17.62^\circ, 197.62^\circ, 377.62^\circ$

$x = 0.308, 3.45, 6.59, 9.7$