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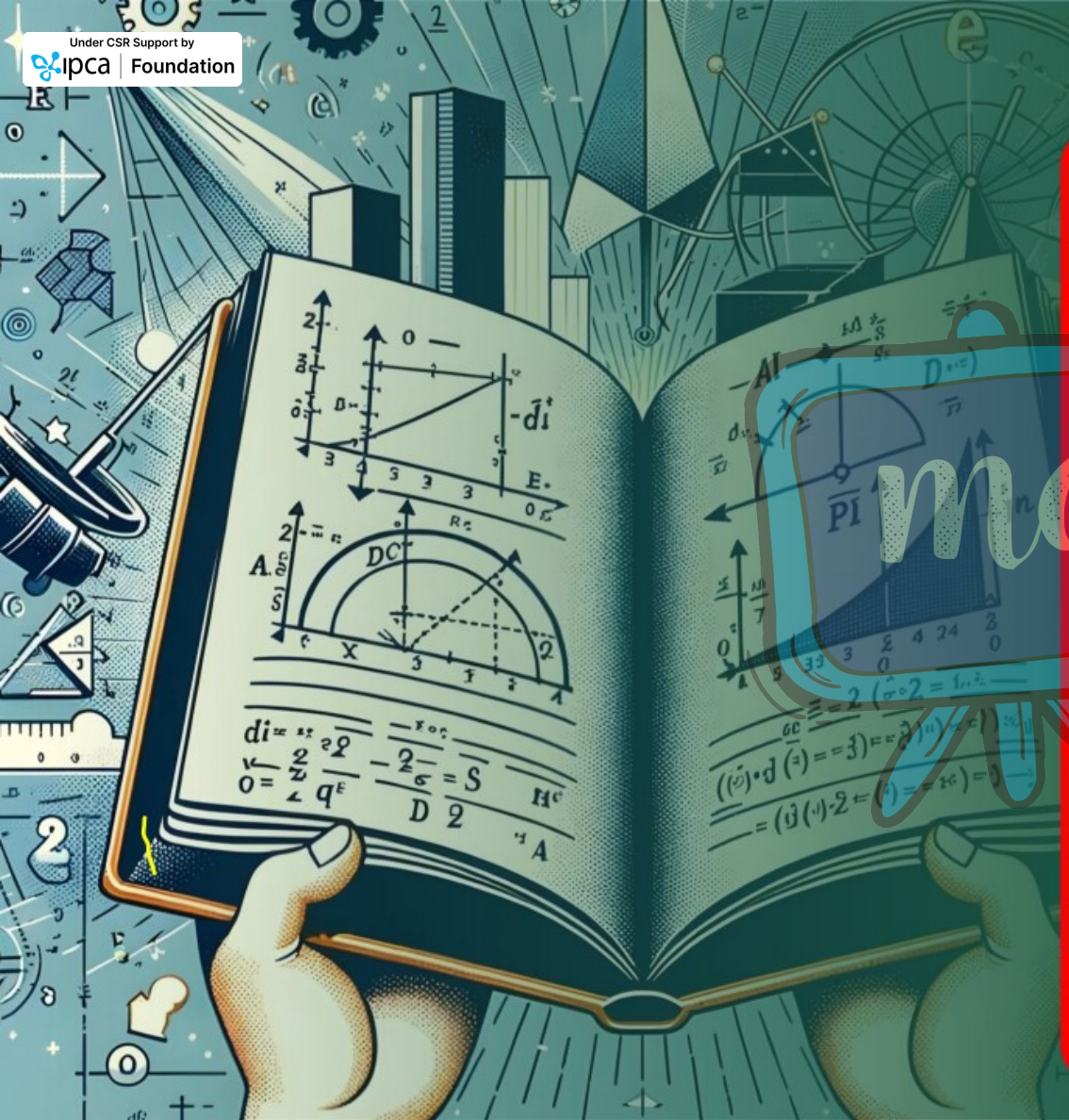
missiongyan



CLASS – 10

MATHEMATICS

CH – 8 : Introduction to Trigonometry

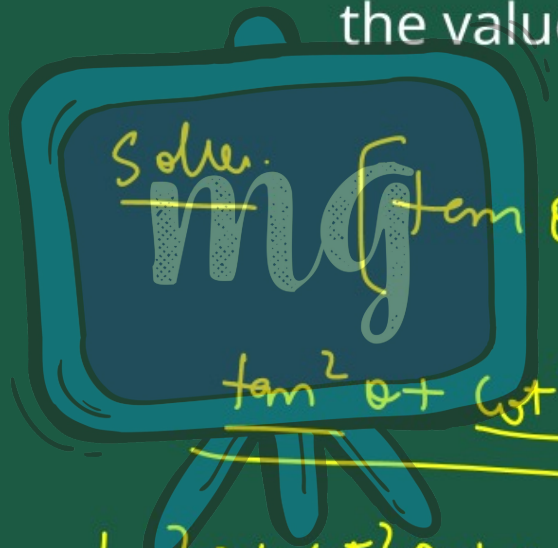
CBSE Board

Previous Year Questions – 2

Shubham Tiwari

1. If $\tan\theta + \cot\theta = \frac{4\sqrt{3}}{3}$, then find the value of $\tan^2\theta + \cot^2\theta$.

(CBSE 2021)



Solve.

$$(\tan\theta + \cot\theta)^2 = \left(\frac{4\sqrt{3}}{3}\right)^2$$

$$\tan^2\theta + \cot^2\theta + 2\tan\theta \cdot \cot\theta = \frac{16 \times 3}{9_3} = 16/3$$

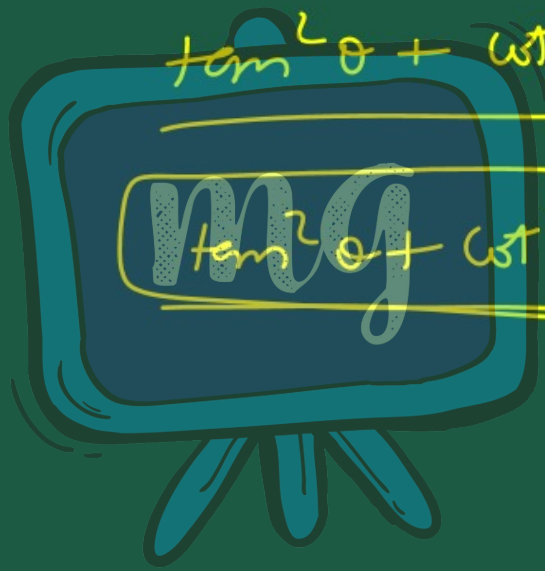
$$\tan^2\theta + \cot^2\theta + 2 = \frac{16}{3}$$

$$\tan^2\theta + \cot^2\theta = 16/3 - 2$$

$$\tan^2\theta + \cot^2\theta = \frac{16}{3} - 2$$

$$\tan^2\theta + \cot^2\theta = \frac{16 - 6}{3}$$

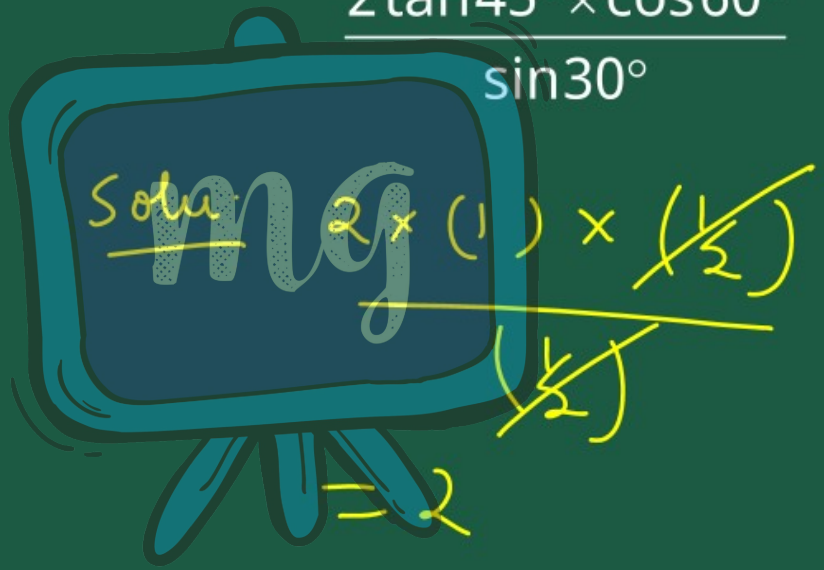
$$\tan^2\theta + \cot^2\theta = \frac{10}{3}$$



2. Evaluate :

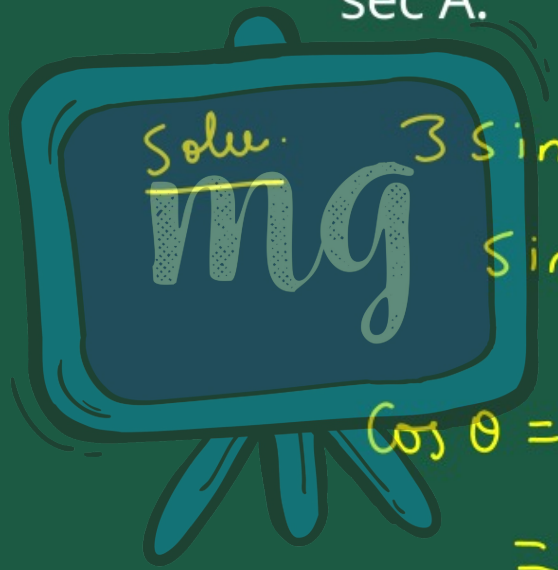
$$\frac{2\tan 45^\circ \times \cos 60^\circ}{\sin 30^\circ}$$

(CBSE 2020)



3. If 3 sin A = 1, then find the value of sec A.

(CBSE 2021)



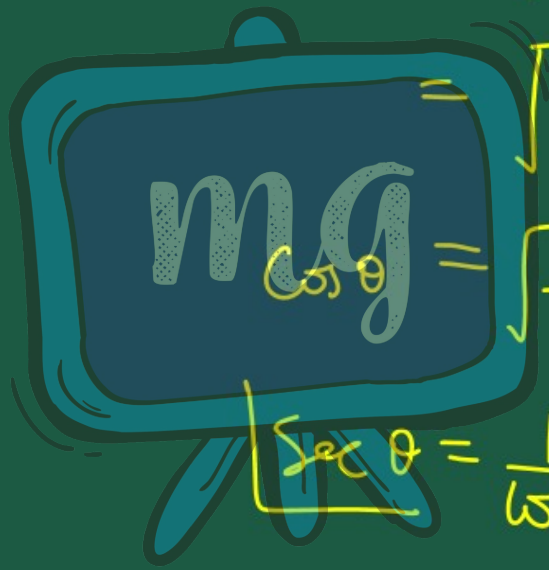
Solu. $3 \sin A = 1$

$\sin A = \frac{1}{3}$

$\cos \theta = \sqrt{1 - \sin^2 \theta}$

$= \sqrt{1 - \left(\frac{1}{3}\right)^2}$

$= \sqrt{1 - \frac{1}{9}}$



$$\cos\theta = \sqrt{1 - \frac{1}{9}}$$

$$= \sqrt{\frac{9-1}{9}}$$

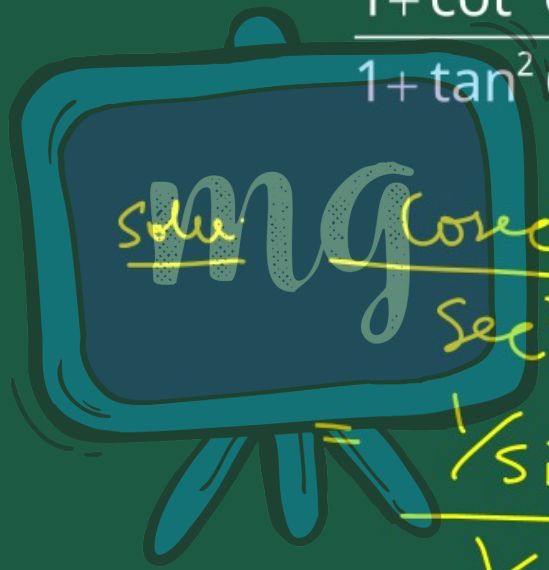
$$\cos\theta = \sqrt{\frac{8}{9}} = \frac{2\sqrt{2}}{3}$$

$$\sec\theta = \frac{1}{\cos\theta} = \frac{3}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{4}$$

4. Show that :

$$\frac{1+\cot^2\theta}{1+\tan^2\theta} = \cot^2\theta$$

(CBSE 2021)



Solve

$$\frac{\operatorname{cosec}^2\theta}{\sec^2\theta}$$

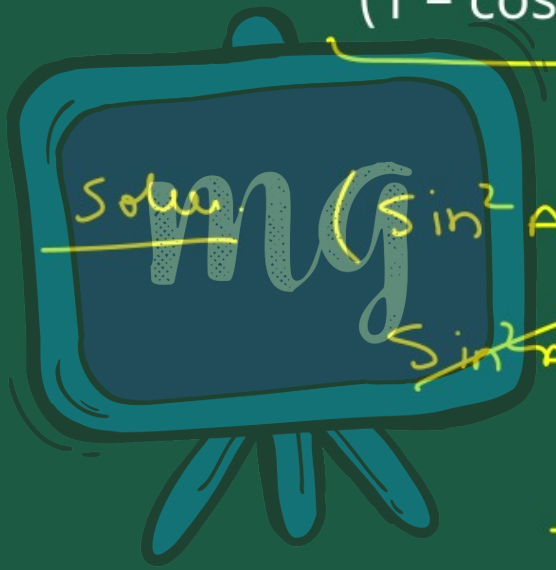
$$= \frac{1/\sin^2\theta}{1/\cos^2\theta} = \frac{1}{\sin^2\theta} \times \frac{\cos^2\theta}{1}$$

$$= \frac{\cos^2\theta}{\sin^2\theta} = \cot^2\theta$$

5. Simplest form of

$(1 - \cos^2 A)(1 + \cot^2 A)$ is :

(CBSE 2020)

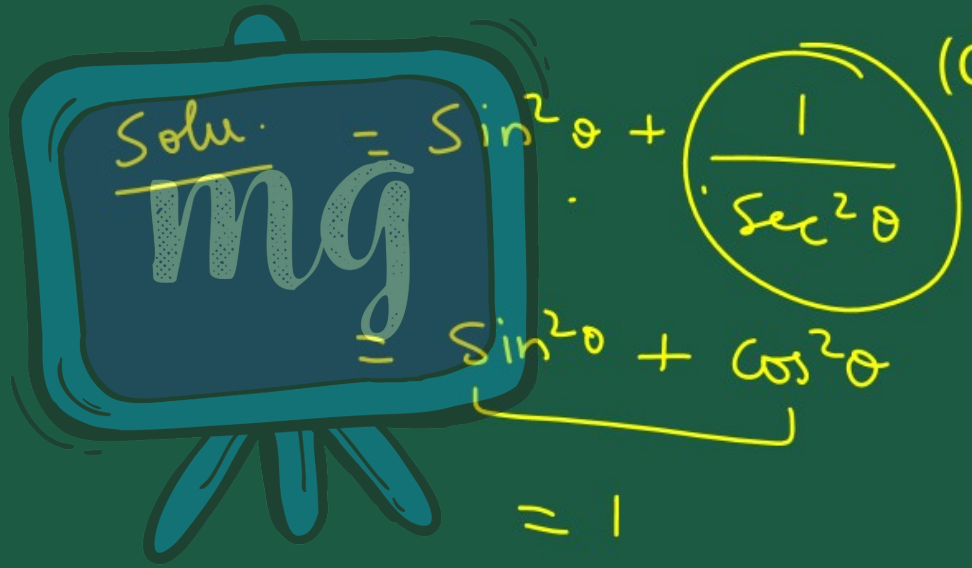


Solu. $(\sin^2 A)\ \text{cosec}^2 A$

$\sin^2 A \times \frac{1}{\sin^2 A}$

$= 1$

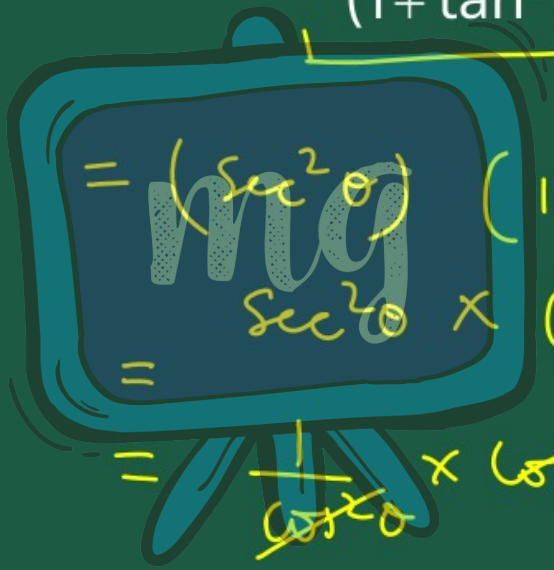
6. The value of $\left(\sin^2\theta + \frac{1}{1+\tan^2\theta}\right)$ (CBSE 2020)



7. The value of

$$(1+\tan^2\theta)(1-\sin\theta)(1+\sin\theta)$$

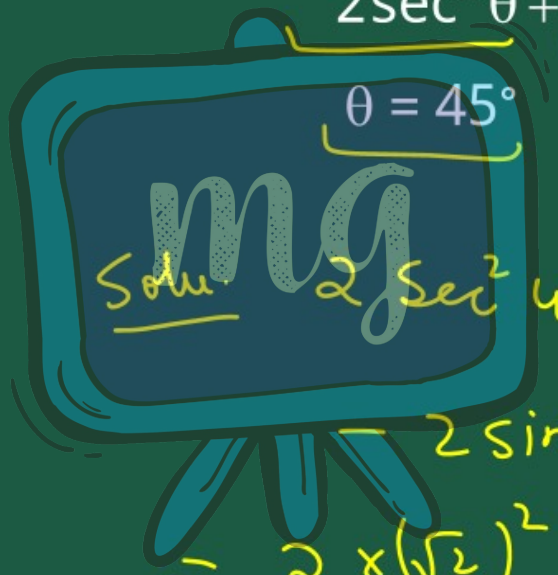
(CBSE 2020)



8. Evaluate :

$2\sec^2\theta + 3\operatorname{cosec}^2\theta - 2\sin\theta\cos\theta$ if $\theta = 45°$

(CBSE 2023)



Solu. $2\sec^2 45° + 3\operatorname{cosec}^2 45° - 2\sin 45° \times \cos 45°$

$= 2 \times (\sqrt{2})^2 + 3(\sqrt{2})^2 - 2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}$

$= 4 + 6 - 1$

$= 9$

9. If $\sin\theta - \cos\theta = 0$, then find the value of $\sin^4\theta + \cos^4\theta$.

(CBSE 2023)

Solu.

$\sin\theta - \cos\theta = 0$

$\sin\theta = \cos\theta$

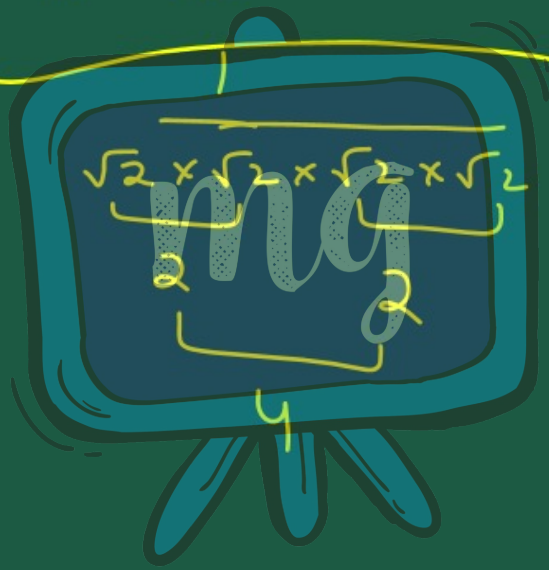
$\Rightarrow \theta = 45$

$\sin^4\theta + \cos^4\theta$

$\sin^4(45) + \cos^4(45)$

$\left(\frac{1}{\sqrt{2}}\right)^4 + \left(\frac{1}{\sqrt{2}}\right)^4$

$= \left(\frac{1}{\sqrt{2}}\right)^4 + \left(\frac{1}{\sqrt{2}}\right)^4$



$\frac{1}{4} + \frac{1}{4}$

$= \frac{2}{4}$

$= \frac{1}{2}$

10. Evaluate :

$$\frac{5}{\cot^2 30^\circ} + \frac{1}{\sin^2 30^\circ} - \cot^2 45^\circ + 2\sin^2 90^\circ$$

(CBSE 2023)

Solu.

$$\frac{5}{\cot^2 30} + \frac{1}{\sin^2 30} - \cot^2 45 + 2\sin^2 90$$

$$\Rightarrow \frac{5}{(\sqrt{3})^2} + \frac{1}{(1/2)^2} - \left(\frac{1}{\sqrt{2}}\right)^2 + 2\,(1)^2$$

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

$$\frac{5}{3} + 6 - \frac{1}{2}$$

$$= \frac{5}{3} - \frac{1}{2} + 6$$

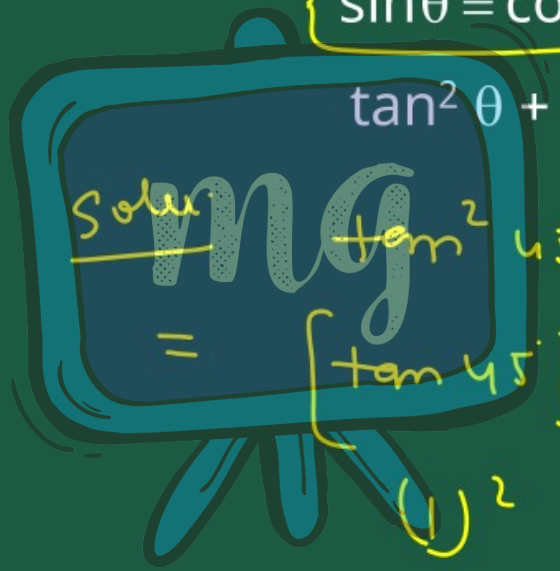
$$= \frac{10 - 3}{6} + 6$$

$$= \frac{7}{6} + 6$$

$$= \frac{36 + 7}{6} = \frac{43}{6}$$

11. If θ is an acute angle and $\sin\theta = \cos\theta$ find the value of $\tan^2\theta + \cot^2\theta - 2$.

(CBSE 2023)



Solution

$= \tan^2 45^\circ + \cot^2 45^\circ - 2$

$= [\tan 45^\circ]^2 + (\cot 45)^2 - 2$

$(1)^2 + (1)^2 - 2$

$1 + 1 - 2$

$2 - 2 = 0$

12. If $\sin\theta + \cos\theta = \sqrt{3}$, then find the value of $\sin\theta.\cos\theta$.

(CBSE 2023)

$\sin\theta + \cos\theta = \sqrt{3}$

by Squaring both side

$(\sin\theta + \cos\theta)^2 = (\sqrt{3})^2$

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

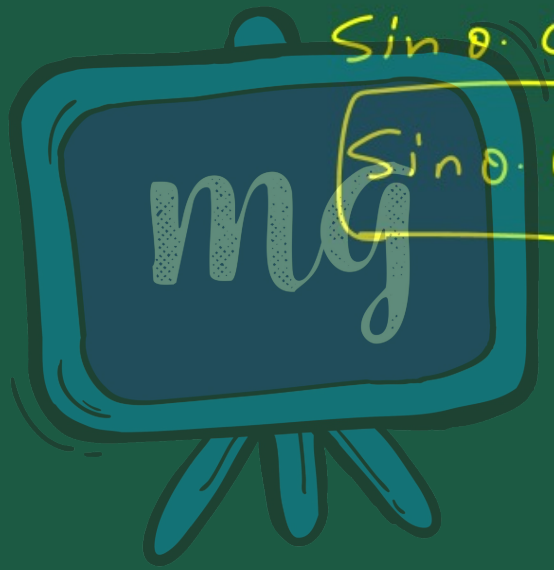
$1 + 2\sin\theta\cos\theta = 3$

$2\sin\theta \cdot \cos\theta = 3 - 1$

$$2 \sin\theta \cdot \cos\theta = 2$$

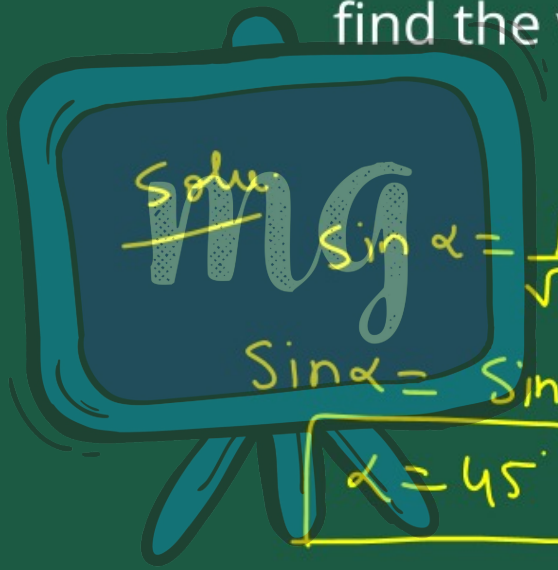
$$\sin\theta \cdot \cos\theta = 2/2$$

$$\sin\theta \cdot \cos\theta = 1$$



13. If $\sin\alpha = \frac{1}{\sqrt{2}}$ and $\cos\beta = \frac{\sqrt{3}}{2}$, then find the value of $\operatorname{cosec}\alpha + \operatorname{cosec}\beta$.

(CBSE 2023)



Solu.

$\sin\alpha = \frac{1}{\sqrt{2}}$

$\sin\alpha = \sin 45^\circ$

$\alpha = 45^\circ$

$\cos\beta = \frac{\sqrt{3}}{2}$

$\cos\beta = \cos 30^\circ$

$\beta = 30^\circ$

$$= \operatorname{cosec}\alpha + \operatorname{cosec}\beta$$

$$= \operatorname{cosec} 45^\circ + \operatorname{cosec} 30^\circ$$

$$= \sqrt{2} + 2$$

$$= \sqrt{2}(\sqrt{2}+1)$$