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ARJUN BATCH

कक्षा-10 गणित

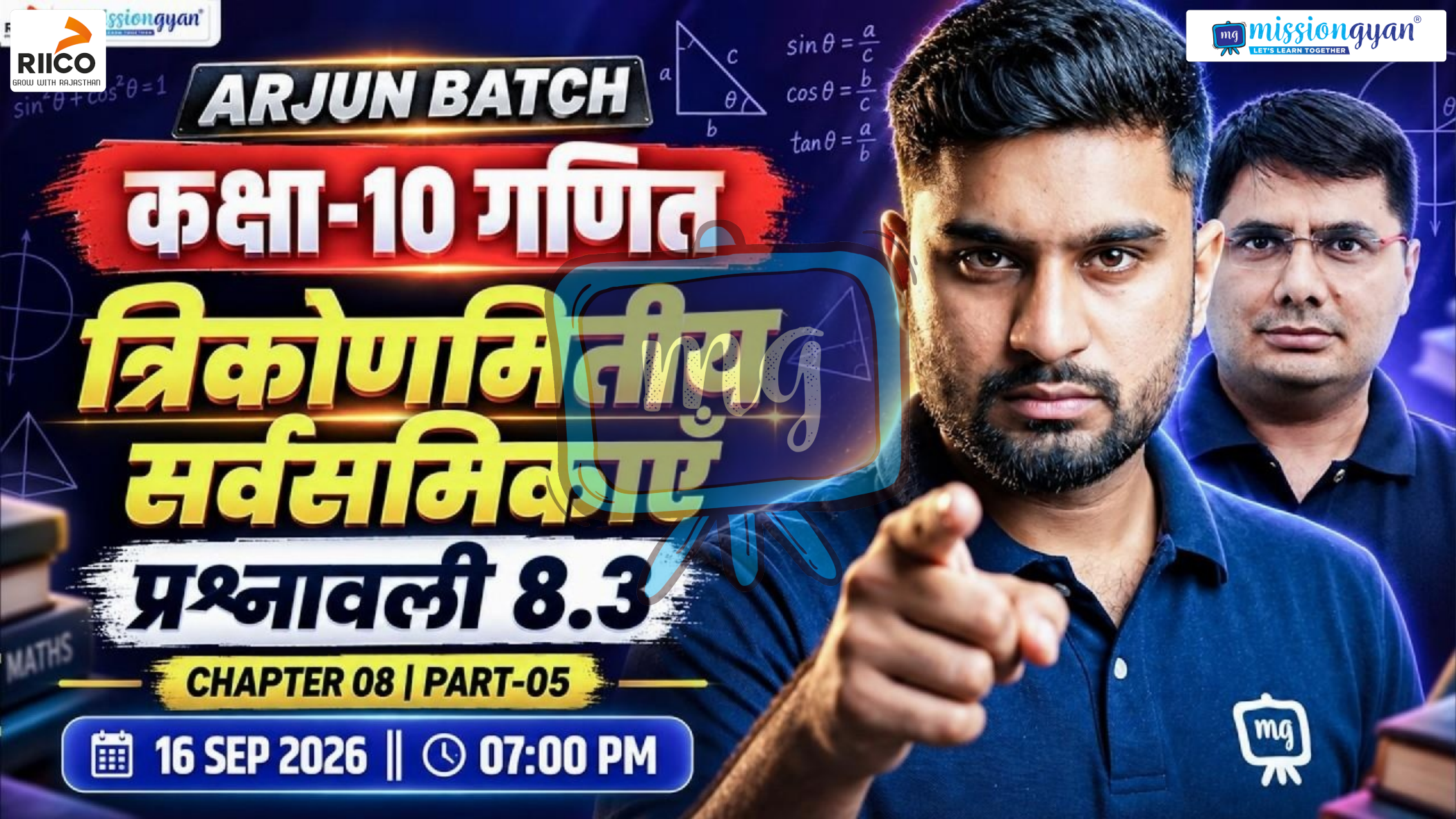
त्रिकोणमिति

सर्वसमिकाएँ

प्रश्नावली 8.3

CHAPTER 08 | PART-05

16 SEP 2026 || 07:00 PM



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आज क्या पढेंगे ?

1 प्रश्नावली 8.3

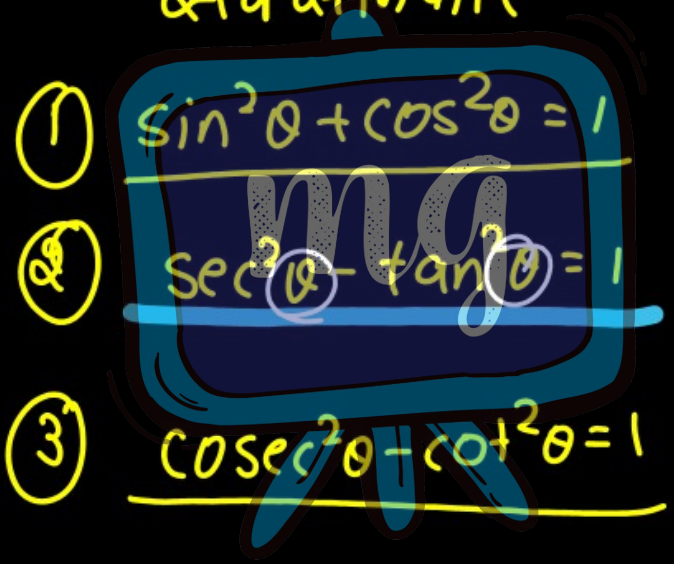


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Aim-100

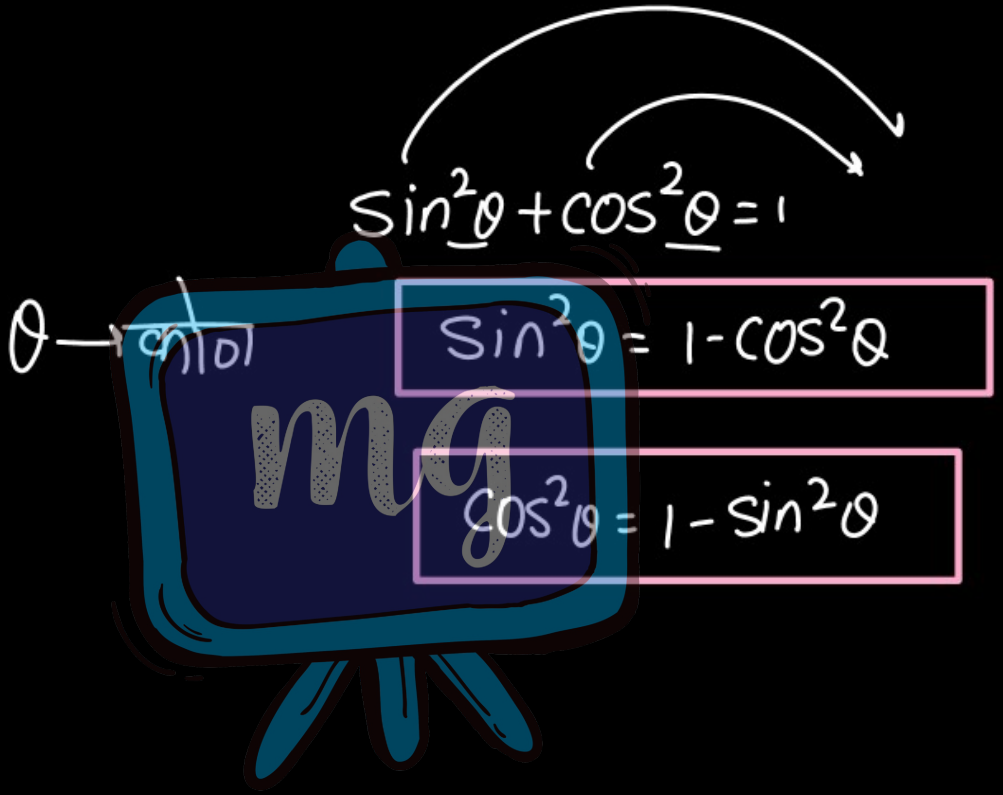
सर्वसमिकाएँ



1. $\sin^2\theta + \cos^2\theta = 1$
2. $\sec^2\theta - \tan^2\theta = 1$
3. $\operatorname{cosec}^2\theta - \cot^2\theta = 1$

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Q. $2(\sin^2 70^\circ + \cos^2 70^\circ) - (\operatorname{cosec}^2 80^\circ - \cot^2 80^\circ)$

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

$2(1) - (1)$

$2 - 1 = 1$

$(a+b)\ (a-b) = a^2-b^2$

$\theta.\ \dfrac{(1+\cos\theta)(1-\cos\theta)}{(1+\sin\theta)(1-\sin\theta)} = ?$

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

$= \dfrac{\sin^2\theta}{\cos^2\theta} = \left(\dfrac{\sin\theta}{\cos\theta}\right)^2 = \tan^2\theta$

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$\sec^2\theta - \tan^2\theta = 1$

$\sec^2\theta = 1 + \tan^2\theta$

$\sec^2\theta - 1 = \tan^2\theta$

$a^2 - b^2 = (a+b)(a-b)$

$\sec\theta \quad \tan\theta$

$\sec^2\theta - \tan^2\theta = 1$

$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

$$\sec\theta - \tan\theta = \frac{1}{\sec\theta + \tan\theta}$$

$$\sec\theta + \tan\theta = \frac{1}{\sec\theta - \tan\theta}$$

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Q. यदि $\sec\theta+\tan\theta=p$ है तो $\sec\theta$ का मान ज्ञात करो?

हल:- $\sec\theta+\tan\theta=p$ —(i)

$\therefore \sec\theta-\tan\theta=\frac{1}{\sec\theta+\tan\theta}$

$\sec\theta-\tan\theta=\frac{1}{p}$ —(ii)

अब (i) व (ii) को जोड़ने पर,

$\sec\theta+\tan\theta=p$

$\sec\theta-\tan\theta=\frac{1}{p}$

$2\sec\theta=p+\frac{1}{p}$

$\sec\theta=\frac{1}{2}\left(p+\frac{1}{p}\right)$

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

$\sec^2\theta - \tan^2\theta = 1$

$\operatorname{cosec}^2\theta - \cot^2\theta = 1$

$\operatorname{cosec}\theta = \frac{1}{\sin\theta}$ $\quad \sin\theta = \frac{1}{\operatorname{cosec}\theta}$

$\sec\theta = \frac{1}{\cos\theta}$ $\quad \cos\theta = \frac{1}{\sec\theta}$

$\cot\theta = \frac{1}{\tan\theta}$ $\quad \tan\theta = \frac{1}{\cot\theta}$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

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

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Q $2\sin\theta\cosec\theta + 3\tan\theta \times \cot\theta - 5\cos\theta \times \sec\theta = ?$

($\cosec\theta = \frac{1}{\sin\theta}$, $\cot\theta = \frac{1}{\tan\theta}$)

Sol. $= 2\sin\theta \times \frac{1}{\sin\theta} + 3 \times \tan\theta \times \frac{1}{\tan\theta} - 5\cos\theta \times \frac{1}{\cos\theta}$

$= 2 + 3 - 5$

$= 5 - 5 = 0$

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Q. $(\sin A+\operatorname{cosec} A)^2+(\cos A+\sec A)^2$

$= 7+\tan^2+\cot^2 A$

हल :- LHS.

$(a+b)^2=a^2+b^2+2ab$

$(\sin A+\operatorname{cosec} A)^2+(\cos A+\sec A)^2$

$=\sin^2 A+\operatorname{cosec}^2 A+2\times \sin A\times \operatorname{cosec} A$

$+\cos^2 A+\sec^2 A+2\times\cos A\times\sec A$

$=(\sin^2 A+\cos^2 A)+\operatorname{cosec}^2 A+2\times \sin A\times\frac{1}{\sin A}$

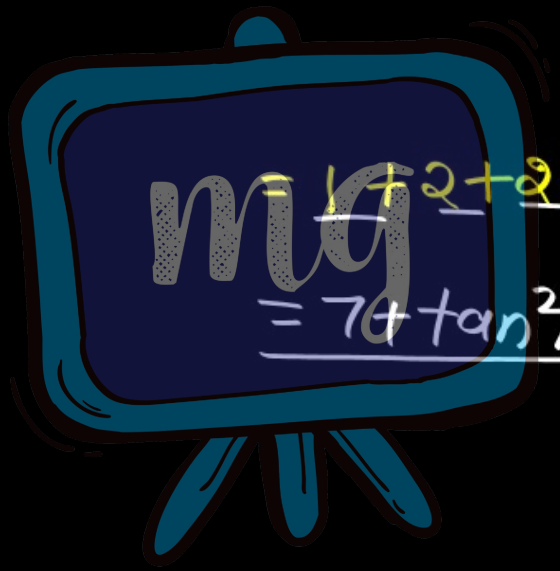
$+\sec^2 A+2\times\cos A\times\frac{1}{\cos A}$

$\operatorname{cosec}^2\theta-\cot^2\theta=1$

$\operatorname{cosec}^2\theta=1+\cot^2\theta$

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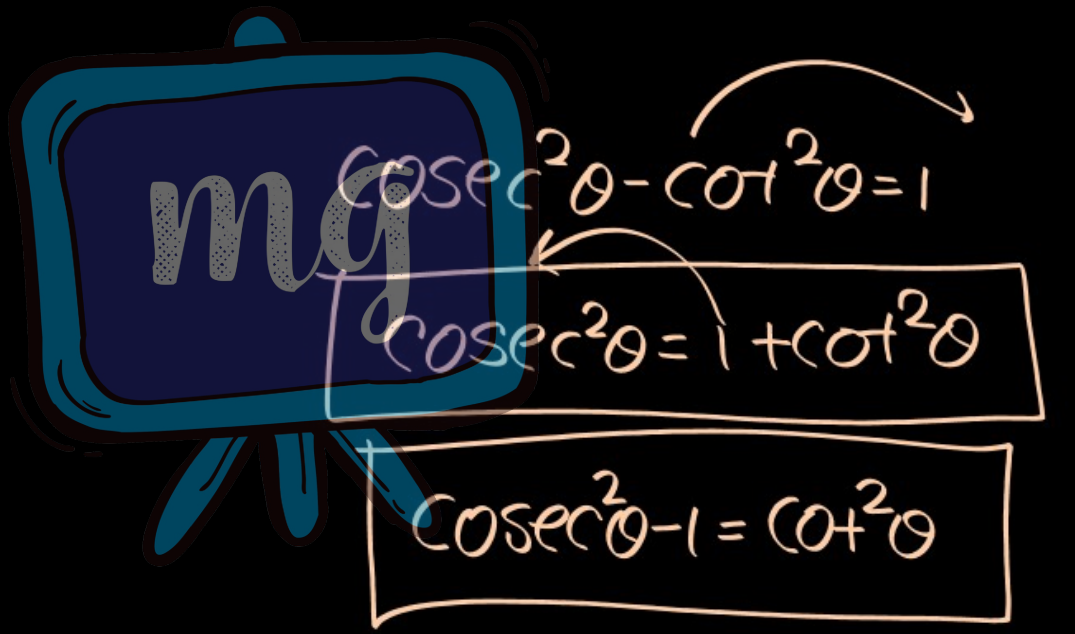


$$= 1 + 2 + 2 + 1 + \cot^2 A + 1 + \tan^2 A$$

$$= 7 + \tan^2 A + \cot^2 A$$

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प्रश्नावली 8.3

Q.1 त्रिकोणमितीय अनुपातों sin A, sec A और tan A को cot A के पदों में व्यक्त कीजिए।

हल :-

$\tan A = \frac{1}{\cot A}$

$\sec^2 A = 1 + \tan^2 A$

$\sec^2 A = 1 + \left(\frac{1}{\cot A}\right)^2$

$\sec^2 A = 1 + \frac{1}{\cot^2 A}$

$\sec^2 A = \frac{\cot^2 A + 1}{\cot^2 A}$

$\sec A = \sqrt{\frac{1 + \cot^2 A}{\cot^2 A}}$

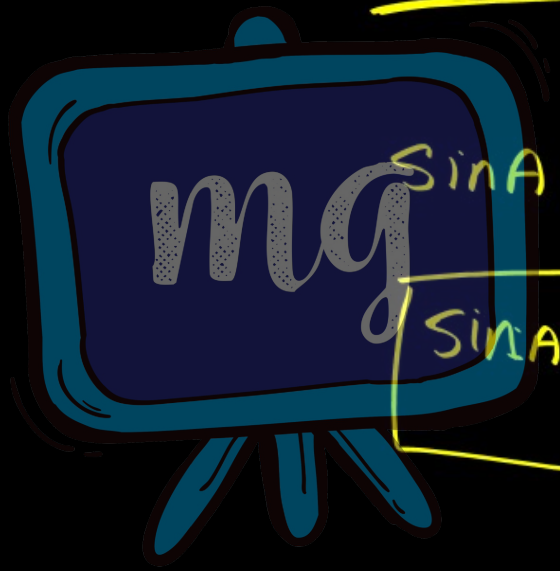
$\sec A = \frac{\sqrt{1 + \cot^2 A}}{\cot A}$

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$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

$$\operatorname{cosec} A = \sqrt{1 + \cot^2 A}$$



$$\sin A = \frac{1}{\operatorname{cosec} A}$$

$$\sin A = \frac{1}{\sqrt{1 + \cot^2 A}}$$

प्रश्नावली 8.3

Q.2 $\angle A$ के अन्य सभी त्रिकोणमितीय अनुपातों को sec A के पदों में लिखिए।

प्रश्नावली 8.3

$9\sec^2 A - 9\tan^2 A$

$9(\sec^2 A - \tan^2 A)$

$9 \times 1 = 9$

Q.3 सही विकल्प चुनिए और अपने विकल्प की पुष्टि कीजिए :

(i) $9\sec^2 A - 9\tan^2 A$ बराबर है :

(अ) 1 (ब) 9

(स) 8 (द) 10

प्रश्नावली 8.3

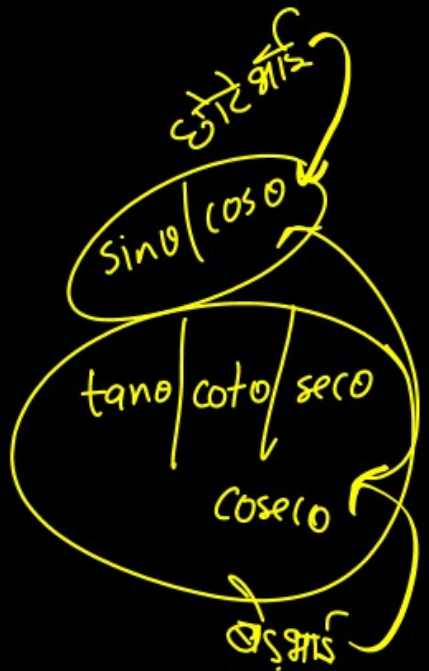
(ii) $(1 + \tan\theta + \sec 0)(1 + \cot\theta - \text{cosec}\,\theta)$ बराबर है :

(अ) 1 ~~(ब) 2~~

(स) -1 (द) 0

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$$(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta)$$

$$= \left(1+\frac{\sin\theta}{\cos\theta}+\frac{1}{\cos\theta}\right)\left(1+\frac{\cos\theta}{\sin\theta}-\frac{1}{\sin\theta}\right)$$

$$= \frac{(\cos\theta+\sin\theta+1)}{\cos\theta}\cdot\frac{(\sin\theta+\cos\theta-1)}{\sin\theta}$$

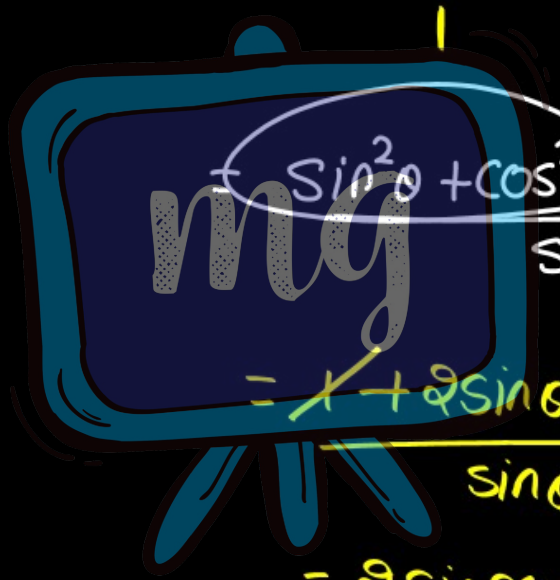
$$(a+b)(a-b) = a^2-b^2$$

$$= \frac{(\sin\theta+\cos\theta+1)(\sin\theta+\cos\theta-1)}{\sin\theta\cos\theta}$$

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

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

$$= \frac{1 + 2\sin\theta\cos\theta - 1}{\sin\theta\cos\theta}$$

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

प्रश्नावली 8.3

(iii) (sec A+ tan A) (1 – sin A)

$(\sec A+\tan A)(1-\sin A)$

$\left(\frac{1}{\cos A}+\frac{\sin A}{\cos A}\right)(1-\sin A)$

$(a+b)(a-b)=a^2-b^2$

$\left(\frac{1+\sin A}{\cos A}\right)(1-\sin A)$

$=\frac{1^2-(\sin^2 A)}{\cos A}=\frac{1-\sin^2 A}{\cos A}$

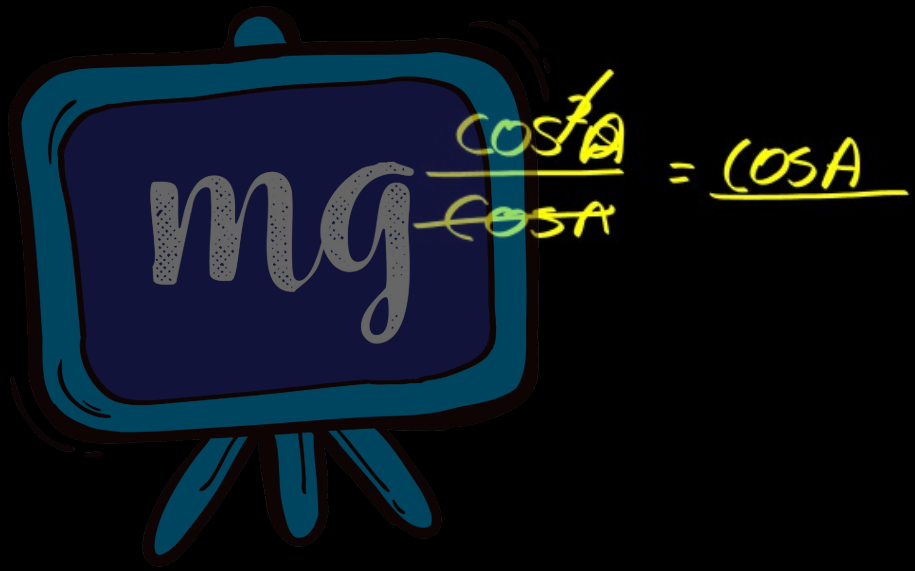
बराबर है :

(अ) sec A (ब) sin A

(स) cosec A (द) cos A

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प्रश्नावली 8.3

(iv) $\frac{1+\tan^2 A}{1+\cot^2 A}$ बराबर है :

(अ) $\sec^2 A$ (ब) -1

(स) $\cot^2 A$ ~~(द)~~ $\tan^2 A$

$= \frac{1+\tan^2 A}{1+\left(\frac{1}{\tan A}\right)^2}$

$= \frac{1+\tan^2 A}{1+\frac{1}{\tan^2 A}}$

$= \frac{1+\tan^2 A}{\frac{\tan^2 A+1}{\tan^2 A}}$

$= \tan^2 A$

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M-II

$1+\tan^2 A = \sec^2 A$

$1+\cot^2 A = \operatorname{cosec}^2 A$



$= \dfrac{\sec^2 A}{\operatorname{cosec}^2 A}$

$= \dfrac{\frac{1}{\cos^2 A}}{\frac{1}{\sin^2 A}} = \dfrac{\sin^2 A}{\cos^2 A} = \tan^2 A$

प्रश्नावली 8.3

Q.4 निम्नलिखित सर्वसमिकाएँ सिद्ध कीजिए, जहाँ वे कोण, जिनके लिए व्यंजक परिभाषित है, न्यून कोण है :

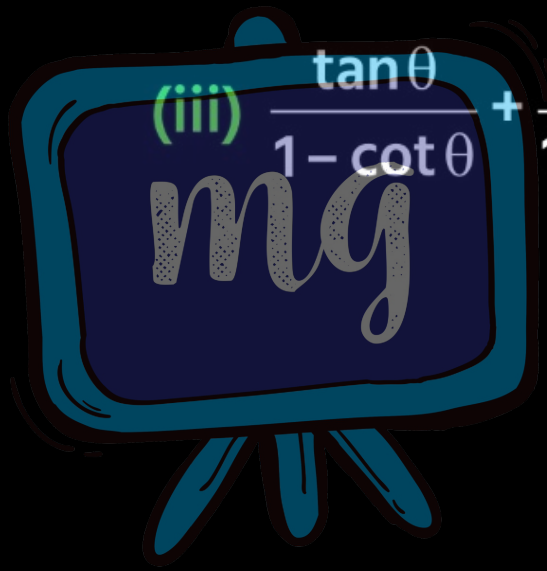
(i) $(\text{cosec}\,\theta - \cot\theta)^2 = \dfrac{1-\cos\theta}{1+\cos\theta}$

प्रश्नावली 8.3

(ii) $\frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A} = 2\sec A$



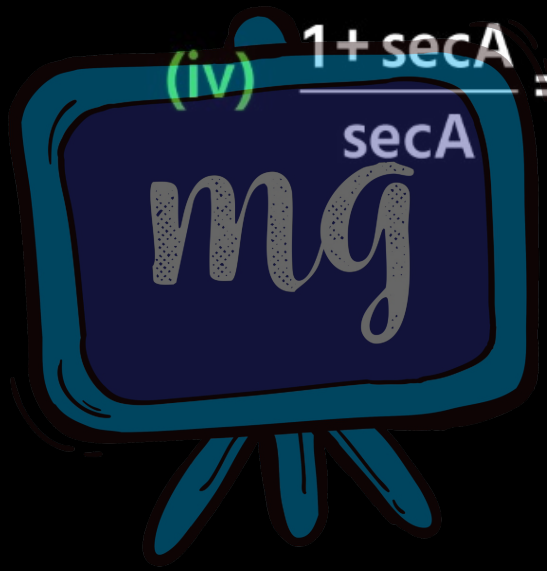
प्रश्नावली 8.3



(iii) $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\,\mathrm{cosec}\,\theta$

प्रश्नावली 8.3

(iv) $\frac{1+\sec A}{\sec A} = \frac{\sin^2 A}{1-\cos A}$



प्रश्नावली 8.3

(v) $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} A + \cot A$

प्रश्नावली 8.3

(vi) $\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

प्रश्नावली 8.3

(vii) $\dfrac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$

प्रश्नावली 8.3

(viii) $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2$

$= 7 + \tan^2 A + \cot^2 A$

प्रश्नावली 8.3

(ix) $(\text{cosec}A - \sin A)(\sec A - \cos A) = \dfrac{1}{\tan A + \cot A}$

प्रश्नावली 8.3

(x) $\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$


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