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ई-पाठशाला कार्यक्रम

CLASS 10th MATHS

त्रिकोणमिति का परिचय

INTRODUCTION TO TRIGONOMETRY



RAPID REVISION

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

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

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

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



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

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

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

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

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

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

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

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

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

Q.10 सही विकल्प चुनिए और अपने विकल्प की पुष्टि कीजिए :

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

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

$9 \times 1 = 9$

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

(अ) 1

(ब) 9

(स) 8

(द) 10

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Sin / cos

छोटे भाई

tan / cot / sec / cosec

बड़े भाई



(ii) (sec A+ tan A) (1 – sin A) बराबर है :

(अ) sec A (ब) sin A

(स) cosec A (द) cos A

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

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

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

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

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

$= \frac{\cos^2 A}{\cos A} = \cos A$

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

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

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

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

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

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

(अ) $\sec^2 A$

(ब) -1

(स) $\cot^2 A$

(द) $\tan^2 A$

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Q.11 निम्नलिखित सर्वसमिकाएँ सिद्ध कीजिए, जहाँ वे कोण, जिनके लिए व्यंजक परिभाषित है, न्यून कोण है :

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

LHS

RHS

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

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

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

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

Eq! LHS

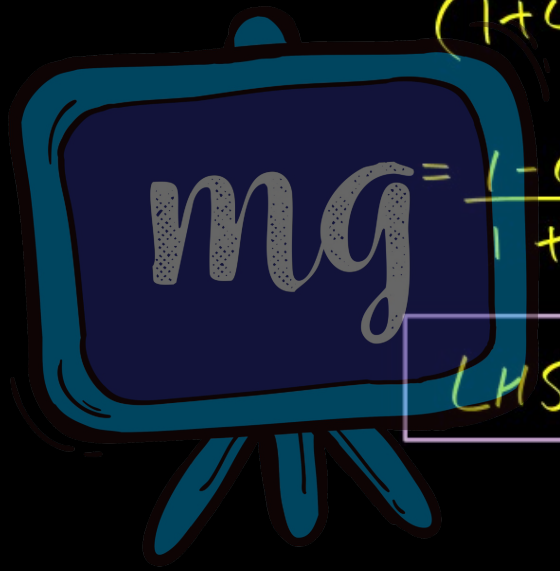
$$(\operatorname{cosec}\theta - \cot\theta)^2$$

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

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



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

$$LHS = RHS$$

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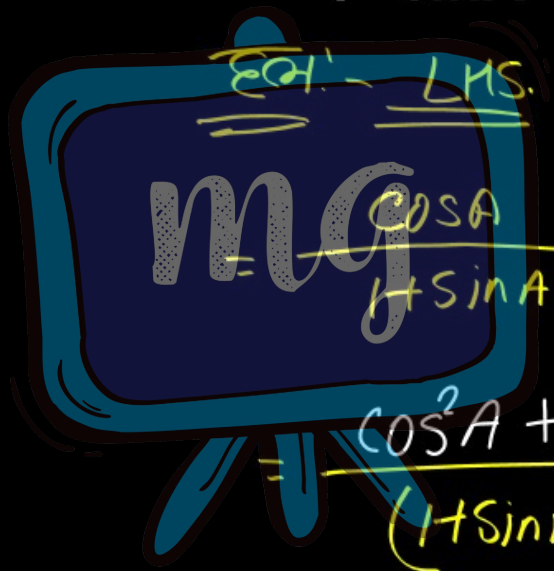
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$$\sin^2\theta + \cos^2\theta = 1$$

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



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



Eqn. – LHS.

$$=\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}$$

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

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

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

$$= \frac{2}{\cos A} = 2\sec A$$

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

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

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

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

Eq! – LHS

$\frac{1+\sec A}{\sec A}$

$= \frac{1+\frac{1}{\cos A}}{\frac{1}{\cos A}} = \frac{\frac{\cos A+1}{\cos A}}{\frac{1}{\cos A}}$

$= \frac{(1+\cos A)}{\cos A} \times \cos A$

$= 1+\cos A$

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$1^2 - \cos^2 A$

I

II

$a^2 - b^2$

$(a+b)(a+b)$

$(1+\cos A)(1-\cos A)$

$\sin^2 A$

RHS

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

$= \dfrac{1-\cos^2 A}{1-\cos A}$

$= \dfrac{(1+\cos A)\cancel{(1-\cos A)}}{\cancel{1-\cos A}}$

$= 1+\cos A$

RHS = LHS

$\{ \sin^2 A + \cos^2 A = 1$

$\sin^2 A = 1 - \cos^2 A \}$

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

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

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

(iv) $\sqrt{\dfrac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

Eqⁿ. – LHS

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

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

$$= \sqrt{\frac{1+\sin A}{1-\sin A} \times \frac{1+\sin A}{1+\sin A}}$$

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

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$$= \frac{1+\sin A}{\cos A}$$



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

$$= \tan\theta\left(\frac{1-2+2\cos^2\theta}{2\cos^2\theta-1}\right)$$

$$= \tan\theta\left(\frac{2\cos^2\theta-1}{2\cos^2\theta-1}\right)$$

$$= \tan\theta = RHS$$

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

हल :- LHS

$$= \frac{\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta}$$

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

$\sin^2\theta +$

H.W.

Q. $\frac{\cos\theta - 2\cos^3\theta}{2\sin^3\theta - \cos\theta} = ?$

Q. $2\sin^2 60^\circ + 3\cos^2 60^\circ - \frac{3\tan 45^\circ}{2} = ?$

Q. यदि $\sec\theta = 2$ है तो $\sin^3\theta + \cos\theta$ का मान ज्ञात करो।

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

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



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

