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कक्षा - 10

गणित

अध्याय - 8

त्रिकोणमिति का परिचय

भाग - 10

केशव शर्मा

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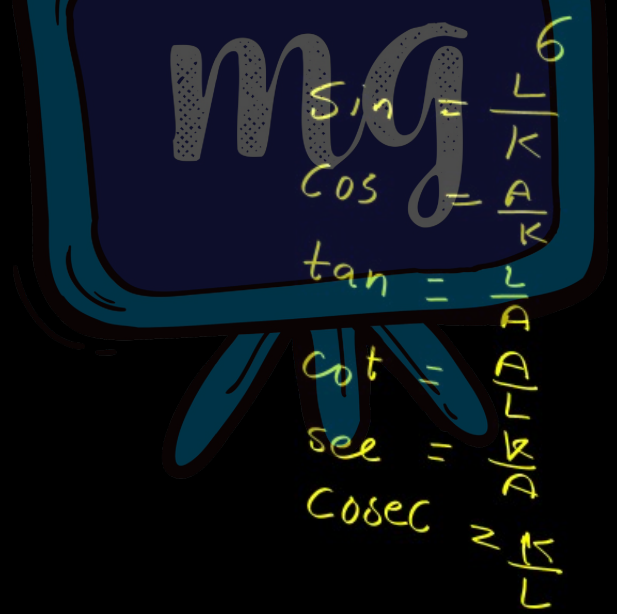
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1. त्रिकोणमिति अनुपात पर आधारित
2. विशिष्ट कोणों पर आधारित
3. त्रिकोणमिति सर्वसमिका पर आधारित

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1. त्रिकोणमिति अनुपात पर आधारित



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

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Q.1 यदि $\sin A = \frac{3}{5}$ हो, तब $\tan A + \cos A$ का मान ज्ञात कीजिए।

(2022)

$25 - 9 = A^2$

$16 = A^2$

$\sqrt{16} = A$

$4 = A$

$\sin A = \frac{3}{5} = \frac{L}{K}$

$L = 3,\ K = 5,\ A = ?$

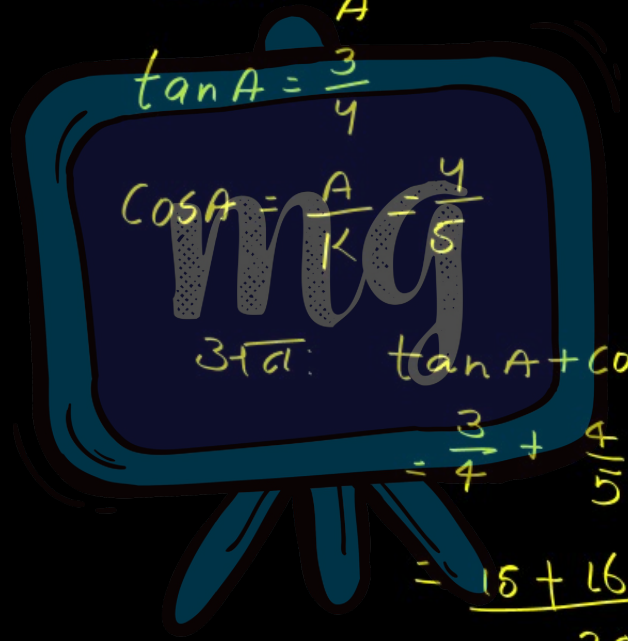
$K^2 = A^2 + L^2$

$(5)^2 = A^2 + (3)^2$

$25 = A^2 + 9$

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Aim - 100

$\tan A = \frac{L}{A}$

$\tan A = \frac{3}{4}$

$\cos A = \frac{A}{K} = \frac{4}{5}$

Find: $\tan A + \cos A$

$= \frac{3}{4} + \frac{4}{5}$

$= \frac{15 + 16}{20} = \frac{31}{20}$

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2. विशिष्ट कोणों पर आधारित

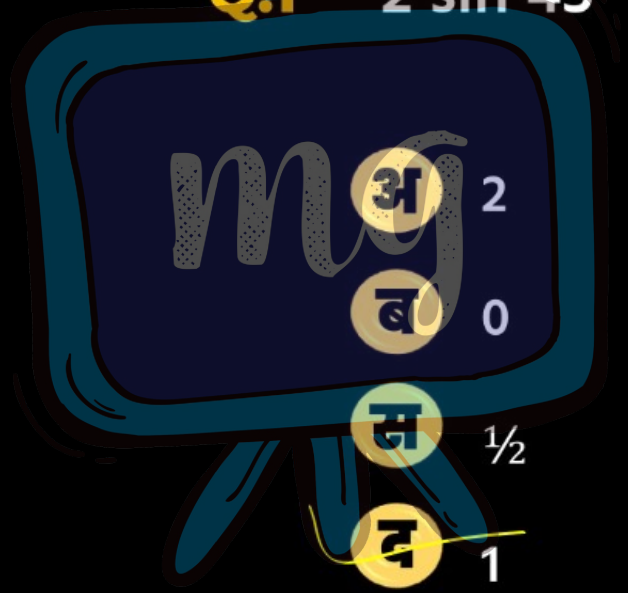
0° 30° 45° 60° 90°

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Q.1 2 sin 45° cos 45° का मान है :

(2024)



$2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}$

$\frac{1}{2} \times \frac{1}{2} = 1$

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Q.2 $\dfrac{2\tan 30°}{1-\tan^2 30°}$ का मान है :

(2022, 23)

अ $\dfrac{1}{\sqrt{3}}$

ब 1

स 0

द $\sqrt{3}$

mg

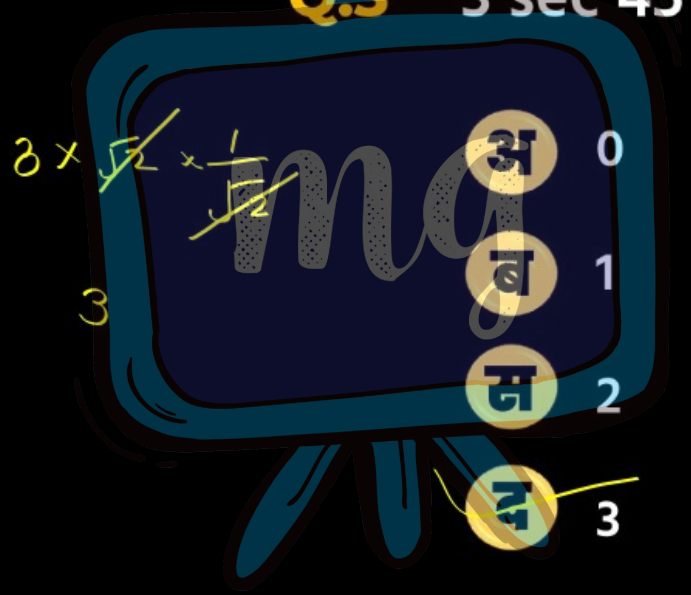
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$\sec\theta = \frac{1}{\cos\theta}$

Q.3 3 sec 45° cos 45° का मान होगा

(2023)



अ 0

ब 1

स 2

द 3

$3 \times \frac{1}{\cos 45^\circ} \times \cos 45^\circ$

$= 3$

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Q.4 $\cos^2 60° - \sin^2 60°$ का मान .....

है।

$\cos 60 = \frac{1}{2}$

$\sin 60 = \frac{\sqrt{3}}{2}$

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

$= \frac{1}{4} - \frac{3}{4}$

(2024)

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Q.5 $\cos^2 45°$ का मान ..... है। $\frac{1}{2}$

(2023)



$(\cos 45°)^2$

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

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Q.6 यदि tan A = 1 हो, तो 2 sin A cos A का मान ज्ञात कीजिए । **(2024)**

$2 \times \frac{1}{2} = 1$

$\tan A = 1$

$\tan A = \tan 45^\circ \quad \{\tan 45^\circ = 1\}$

$A = 45^\circ$

$2 \sin A \cos A$

A का मान रखने पर

$2 \times \sin 45^\circ \times \cos 45^\circ$

$2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}$

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Q.7 $2\tan^2 45° + \cos^2 30° - \sin^2 60°$ का मान ज्ञात कीजिए।

(2022)

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

$\tan 45° = 1$, $\cos 30° = \frac{\sqrt{3}}{2}$

$\sin 60° = \frac{\sqrt{3}}{2}$

$2\tan^2 45° + \cos^2 30° - \sin^2 60°$

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

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Q.8 $\sqrt{1-\cos^2\theta}$ का मान $\theta = 60°$ पर ज्ञात कीजिए।

(2023)

$\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2}$

$\sqrt{1-\cos^2 60}$

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

$\sqrt{\frac{1}{1}-\frac{1}{4}} = \sqrt{\frac{4-1}{4}}$

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M-II

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

$\sqrt{\sin^2\theta}$

$= \sin\theta$

$\theta = 60°$ रखने पर

$= \sin 60° = \frac{\sqrt{3}}{2}$

$\left\{ \begin{array}{l} \sin^2\theta + \cos^2\theta = 1 \\ \sin^2\theta = 1 - \cos^2\theta \end{array} \right\}$

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3. त्रिकोणमिति सर्वसमिका पर आधारित

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

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

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

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

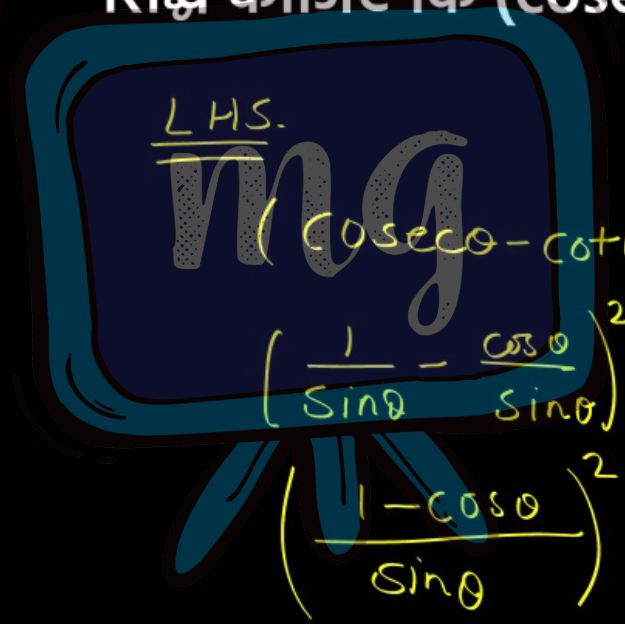
$$\sec^2\theta - \tan^2\theta = 1$$

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Q.1 सिद्ध कीजिए कि $(\text{cosec}\,\theta - \cot\theta)^2 = \dfrac{1-\cos\theta}{1+\cos\theta}$

(2024)



$\left\{\text{cosec}\theta = \dfrac{1}{\sin\theta}, \quad \cot\theta = \dfrac{\cos\theta}{\sin\theta}\right\}$

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

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

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

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

H.P.

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

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Q.2 सिद्ध कीजिए कि

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

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

(cosec A – sin A) (sec A – cos A) (tan A + cot A) = 1.

(2024)

LHS.

$$(\operatorname{cosec}A-\sin A)(\sec A-\cos A)(\tan A+\cot A)$$

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

$$\left(\frac{1-\sin^2A}{\sin A}\right)\left(\frac{1-\cos^2A}{\cos A}\right)\left(\frac{\sin^2A+\cos^2A}{\sin A\times\cos A}\right)$$

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

$$=1$$

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Q.3 सिद्ध कीजिए कि :

$$\sqrt{\frac{1-\cos A}{1+\cos A}} = \text{cosec } A - \cot A$$

(2023)

LHS.

$$\sqrt{\frac{1-\cos A}{1+\cos A}}$$

परिमेयकरण करने पर

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

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

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

$$\sqrt{\left(\frac{1-\cos A}{\sin A}\right)^2}$$

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

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

$$= \text{cosec } A - \cot A$$ (HW)