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कक्षा - 10

गणित

अध्याय - 8

त्रिकोणमिति का परिचय

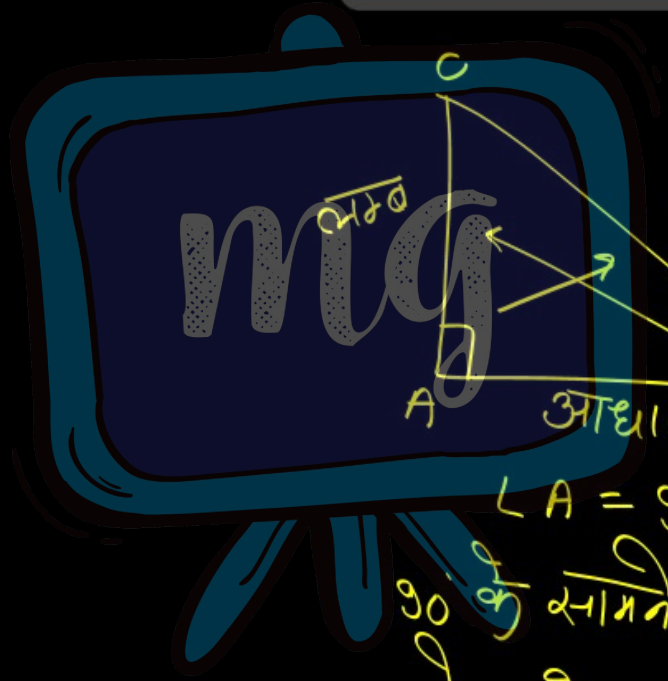
भाग - 1

केशव शर्मा

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$\angle A = 90^\circ$

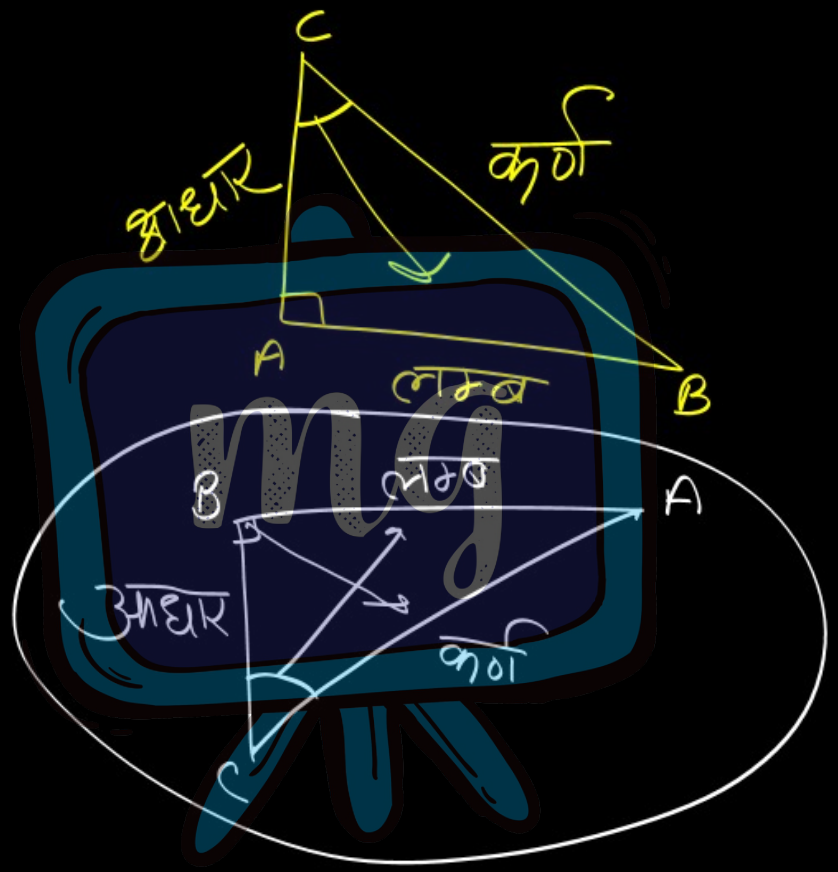
90° के सामने वाली भुजा कर्ण

कोण के _____ लम्ब

जो भुजा बच गयी → आधार

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* लम्ब, कोण पर निर्भर करता है।

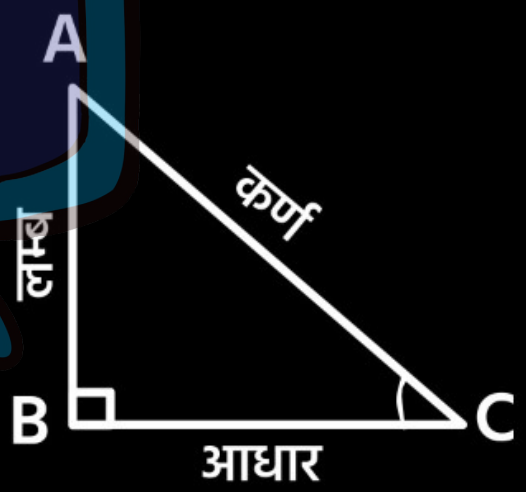


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समकोण त्रिभुज

- एक त्रिभुज **समकोण त्रिभुज** कहलाता है यदि इसमें एक कोण समकोण (90°) हो।



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पाइथागोरस प्रमेय

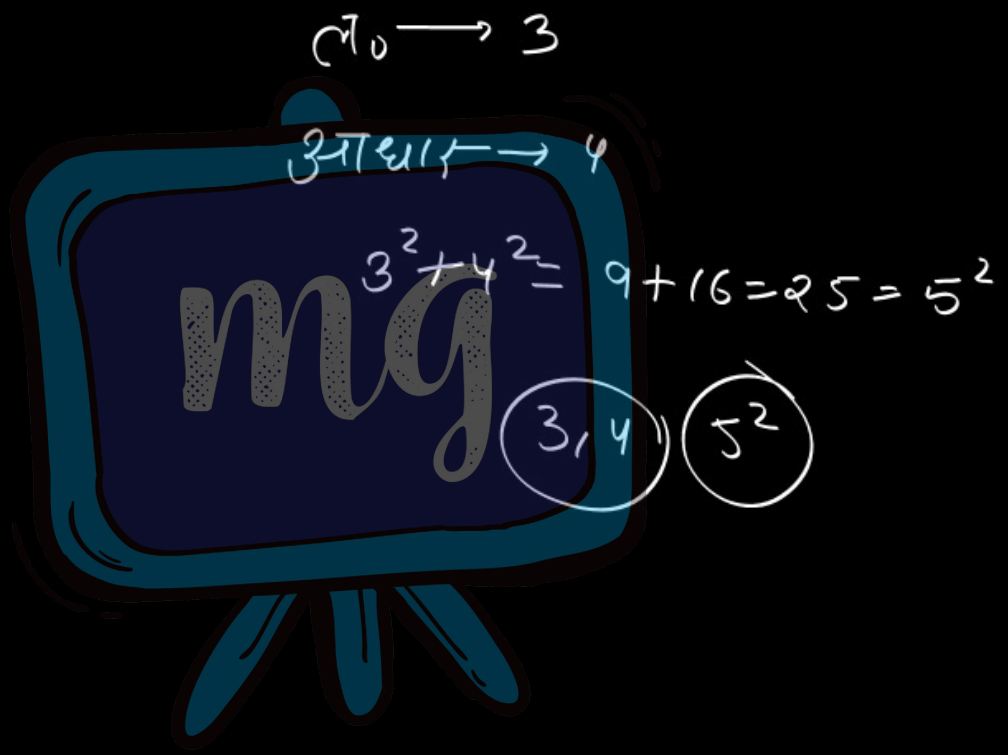
$$\text{कर्ण}^2 = (\text{लम्ब})^2 + (\text{आधार})^2$$

❖ समकोण त्रिभुज में,

1. समकोण के सम्मुख भुजा सबसे बड़ी भुजा होती है तथा इसे **कर्ण** कहते है।
2. समकोण त्रिभुज दोनों अन्य भुजाएँ क्रमशः **लम्ब तथा आधार** कहलाती है।

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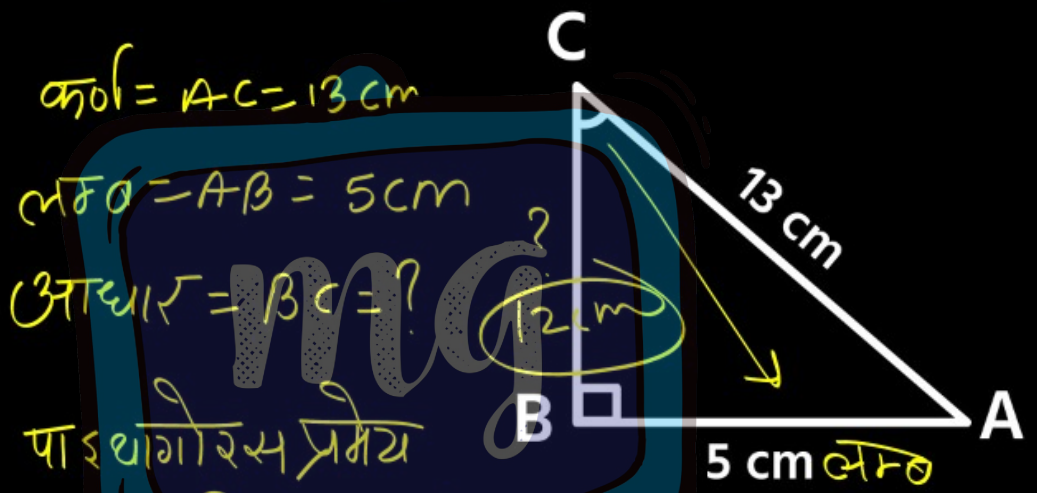
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उदाहरण –



कर्ण = AC = 13 cm

लम्ब = AB = 5 cm

आधार = BC = ?

पाइथागोरस प्रमेय

कर्ण^2 = लम्ब^2 + आधार^2

$(AC)^2 = (AB)^2 + (BC)^2$

$(13)^2 = (5)^2 + BC^2$

$169 = 25 + BC^2$

$169 - 25 = BC^2$

$144 = BC^2$

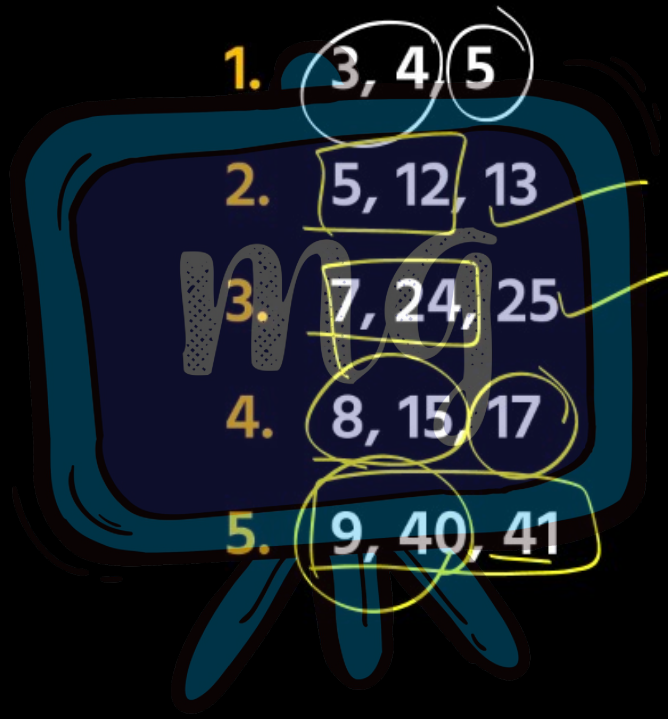
$\sqrt{144} = BC$

$12 = BC$

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पाइथागोरस त्रिक



$7^2 + 24^2$

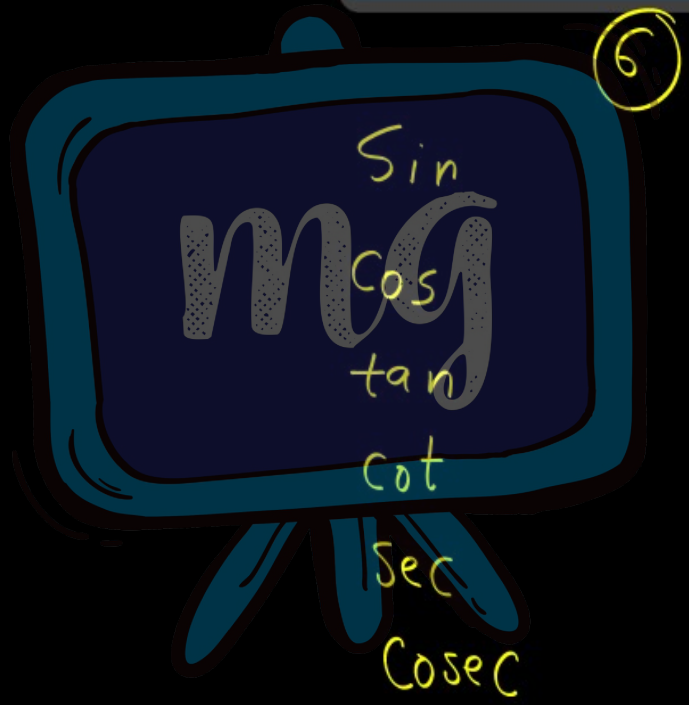
$49 + 576 = 625$

$= (25)^2$

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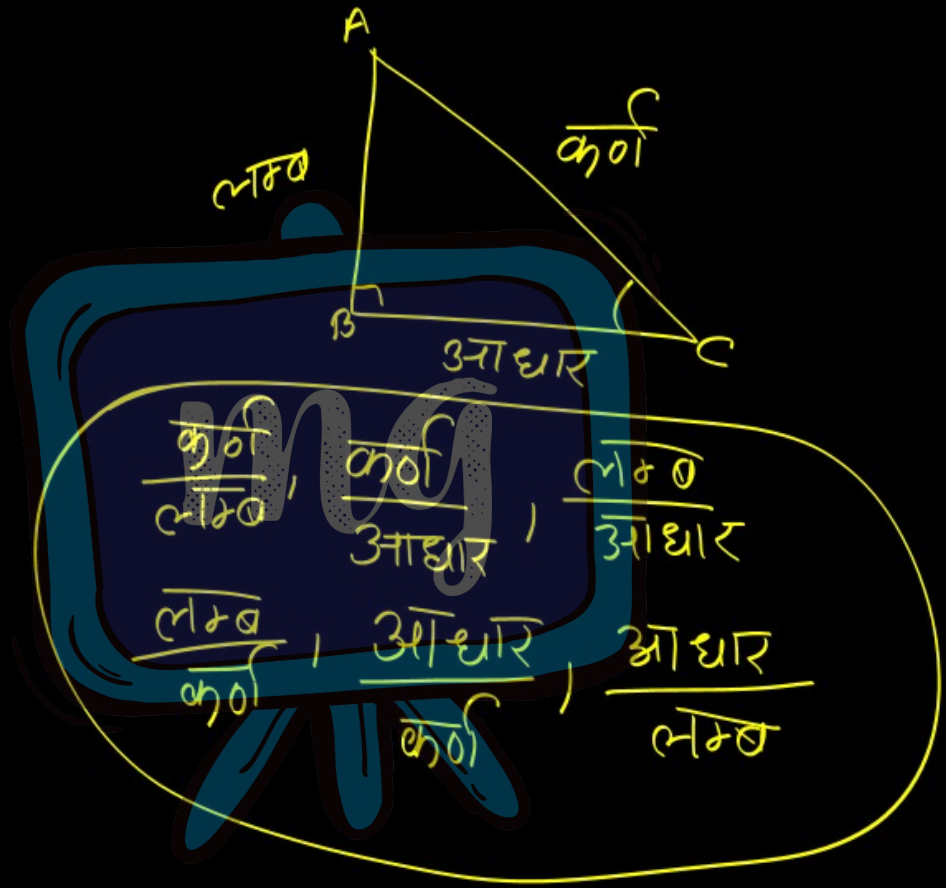
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त्रिकोणमितीय अनुपात



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$$\sin = \frac{\text{लम्ब}}{\text{कर्ण}}$$

$$\cos = \frac{\text{आधार}}{\text{कर्ण}}$$

$$\tan = \frac{\text{लम्ब}}{\text{आधार}}$$

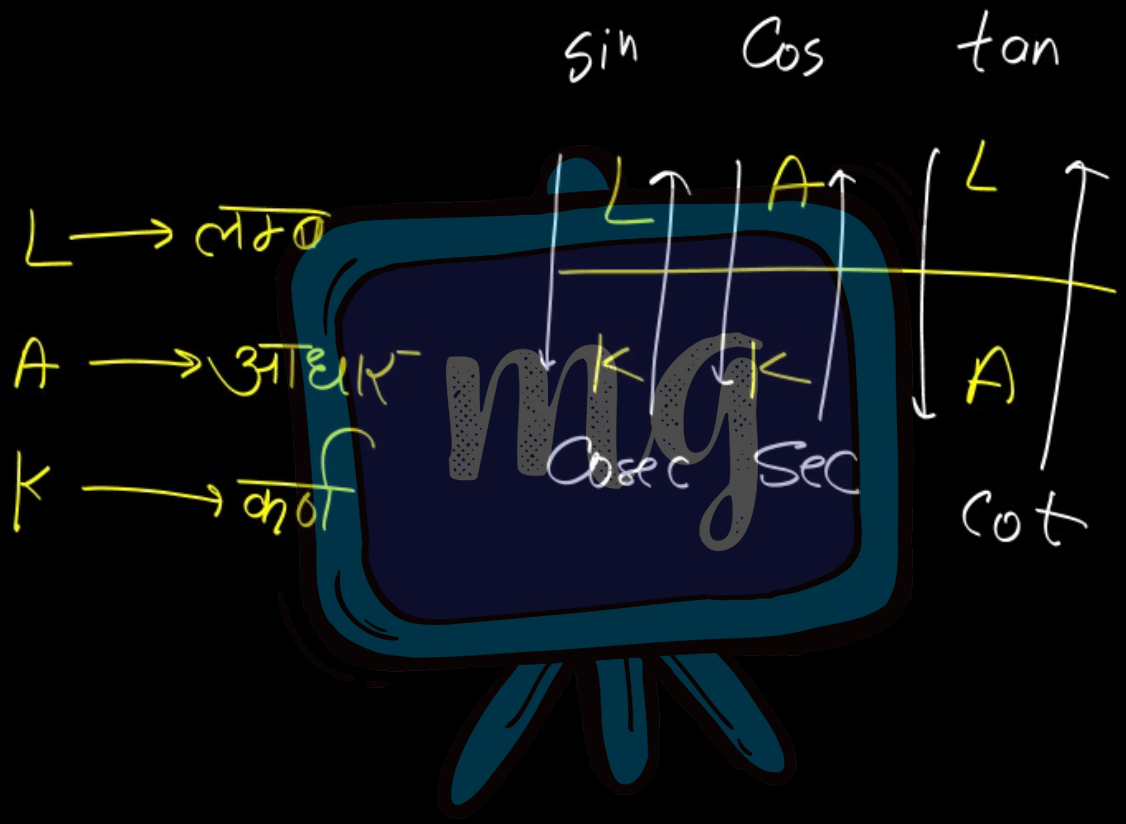
$$\text{cosec} = \frac{\text{कर्ण}}{\text{लम्ब}}$$

$$\sec = \frac{\text{कर्ण}}{\text{आधार}}$$

$$\cot = \frac{\text{आधार}}{\text{लम्ब}}$$

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त्रिकोणमितीय अनुपात निम्न 6 हैं –

1. $\text{sine}\theta/\sin\theta = \frac{\text{लम्ब}}{\text{कर्ण}}$

2. $\text{cosine}\theta/\cos\theta = \frac{\text{आधार}}{\text{कर्ण}}$

3. $\text{tangent}\theta/\tan\theta = \frac{\text{लम्ब}}{\text{आधार}}$

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4. Cotangentθ/cot θ = $\frac{\text{आधार}}{\text{लम्ब}}$

5. secantθ/secθ = $\frac{\text{कर्ण}}{\text{आधार}}$

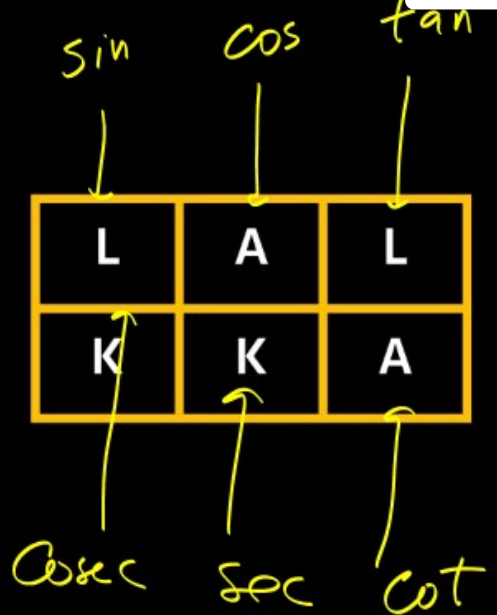
6. Cosecantθ/cosecθ = $\frac{\text{कर्ण}}{\text{लम्ब}}$

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Trick





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विभिन्न त्रिकोणमितीय अनुपातो में संबंध

$\sin\theta = \frac{\text{लम्ब}}{\text{कर्ण}}$

$\operatorname{cosec}\theta = \frac{\text{कर्ण}}{\text{लम्ब}}$

$\sin\theta = \frac{\frac{\text{लम्ब}}{\text{आधार}}}{\frac{\text{कर्ण}}{\text{आधार}}}$

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

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

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

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



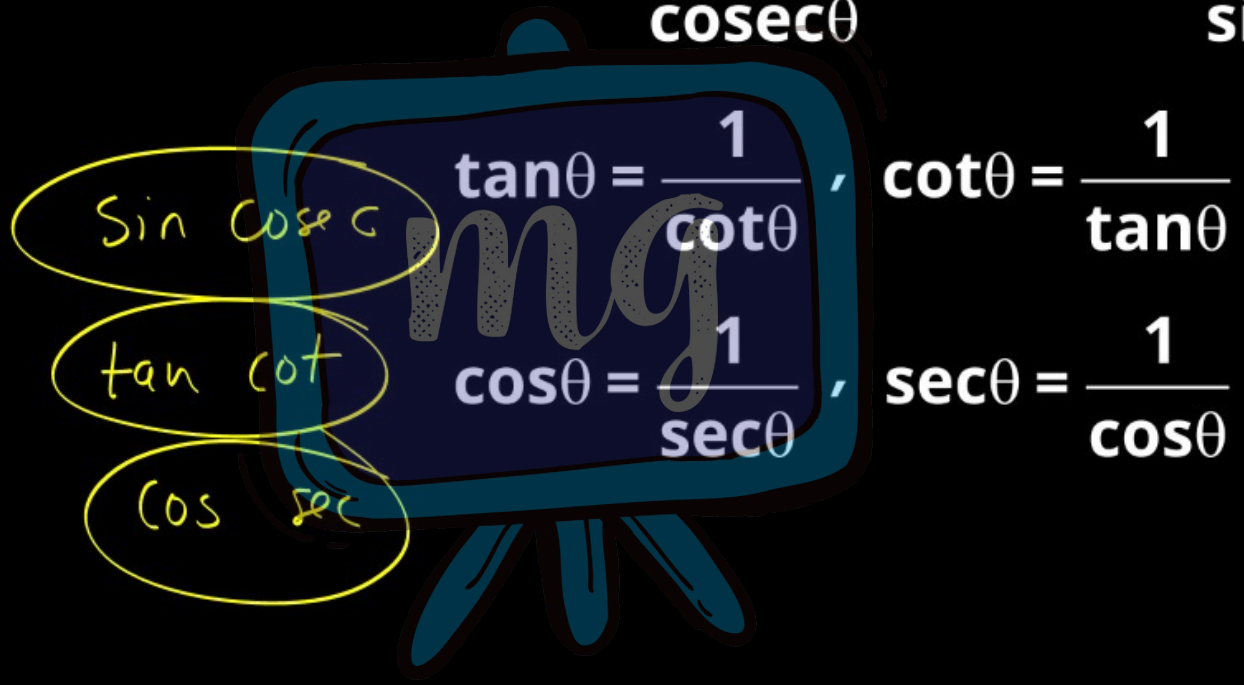
$$\tan\theta = \frac{1}{\cot\theta}$$

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

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

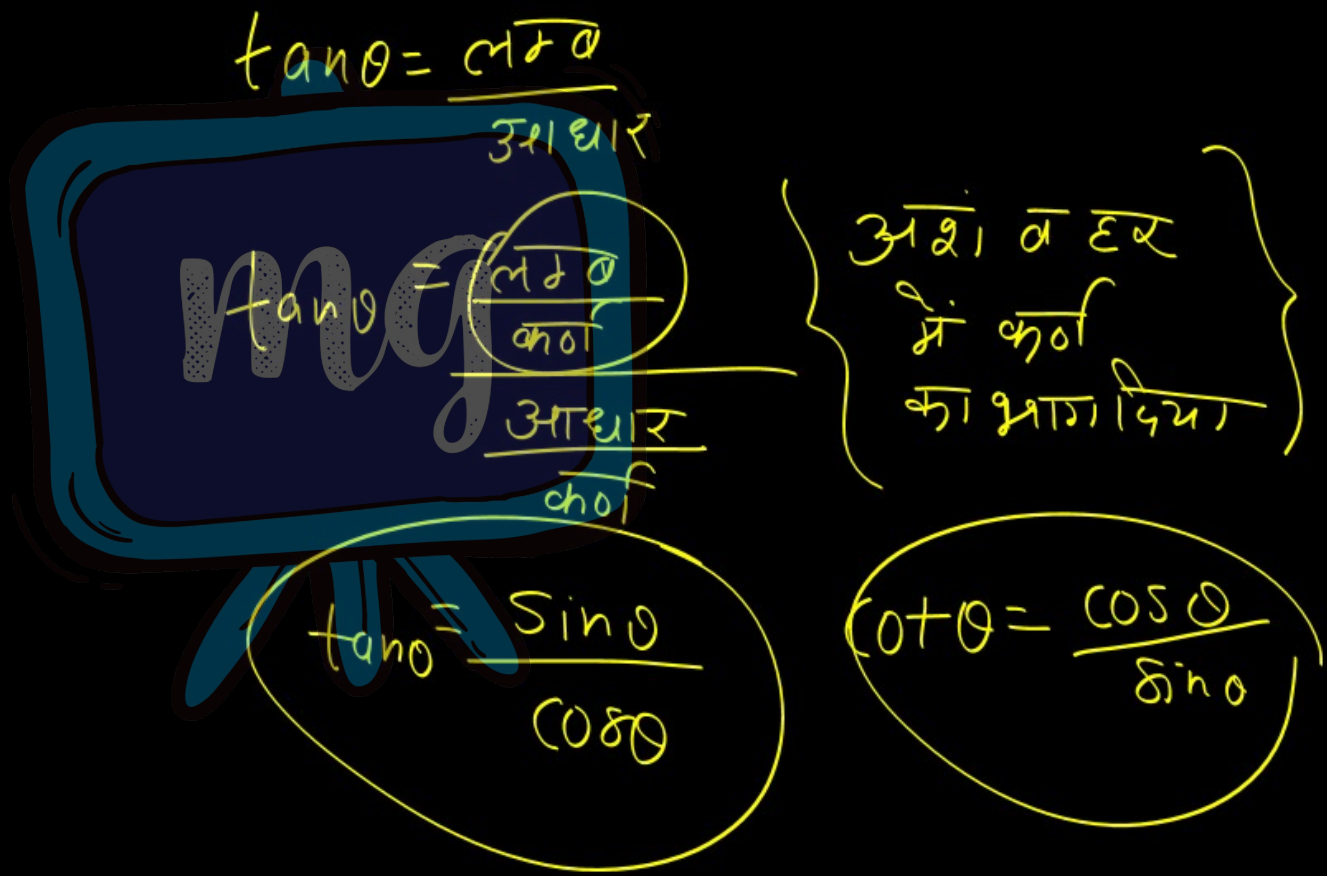


$$\tan\theta = \frac{1}{\cot\theta} \text{ , } \cot\theta = \frac{1}{\tan\theta}$$

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

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$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad , \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$



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उदाहरण 1.

यदि $\tan A = \frac{4}{3}$, तो कोण A के अन्य त्रिकोणमितीय अनुपात ज्ञात कीजिए।

$\tan A = \frac{4}{3} = \frac{\text{लम्ब}}{\text{आधार}}$

लम्ब $= 4k$, आधार $= 3k$, कर्ण $= ?$

पाइथागोरस प्रमेय

$\text{कर्ण}^2 = \text{लम्ब}^2 + \text{आधार}^2$

$= (4k)^2 + (3k)^2$

$= 16k^2 + 9k^2$

$\text{कर्ण}^2 = 25k^2$

$\text{कर्ण} = \sqrt{25k^2}$

$\text{कर्ण} = 5k$

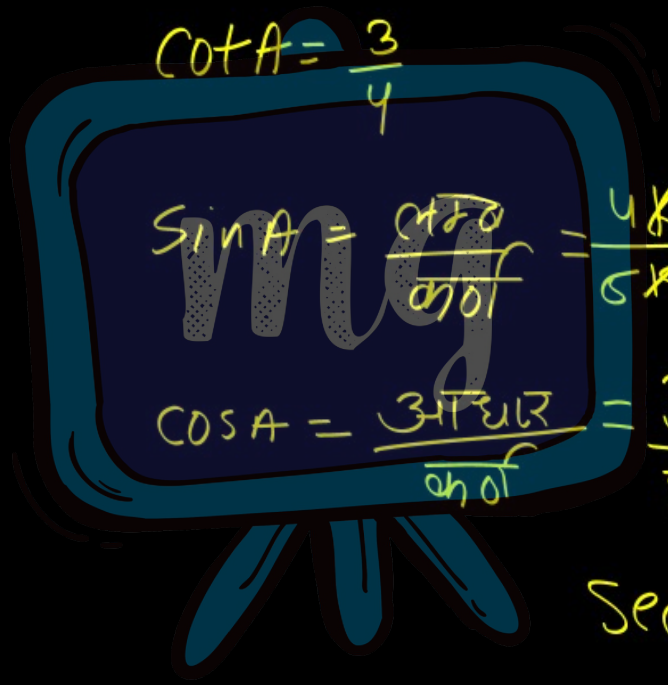
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CAL
1<1<A

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

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



$\sin A = \frac{\text{सामने}}{\text{कर्ण}} = \frac{4K}{5K} = \frac{4}{5}$ / $\text{Cosec}A = \frac{5}{4}$

$\cos A = \frac{\text{आधार}}{\text{कर्ण}} = \frac{3K}{5K} = \frac{3}{5}$

$\sec A = \frac{5}{3}$