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ARJUN BATCH

कक्षा-10 गणित

त्रिकोणमिति का परिचय

CHAPTER 08 | PART -1

10 SEP 2026 || 07:00 PM



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Ch-8
Aim-100

आज क्या पढेंगे ?

1 त्रिकोणमिति का परिचय

2 प्रश्नावली 8.1

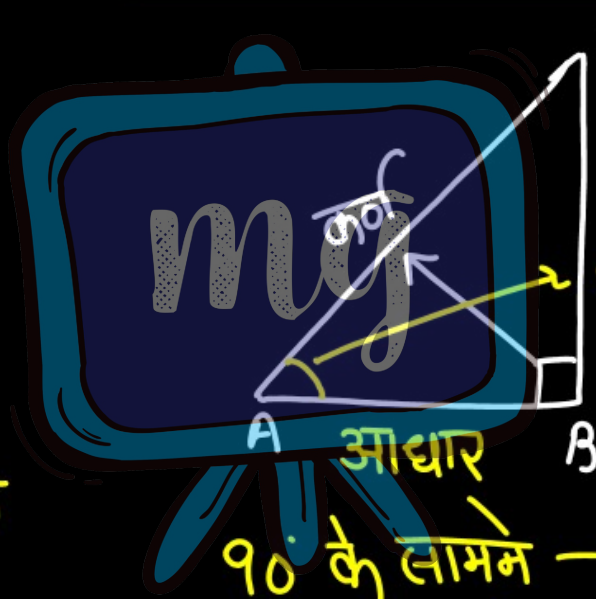


त्रिकोणमिति का परिचय

कर्ण

आधार

लम्ब



बची हुई भुजा

↓

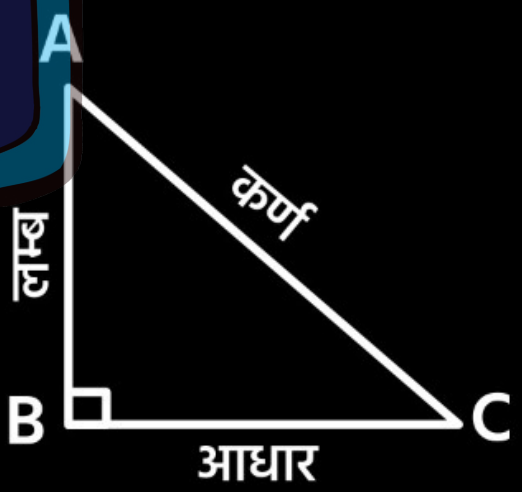
आधार

90° के सामने → कर्ण

कोण के सामने → लम्ब

समकोण त्रिभुज

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



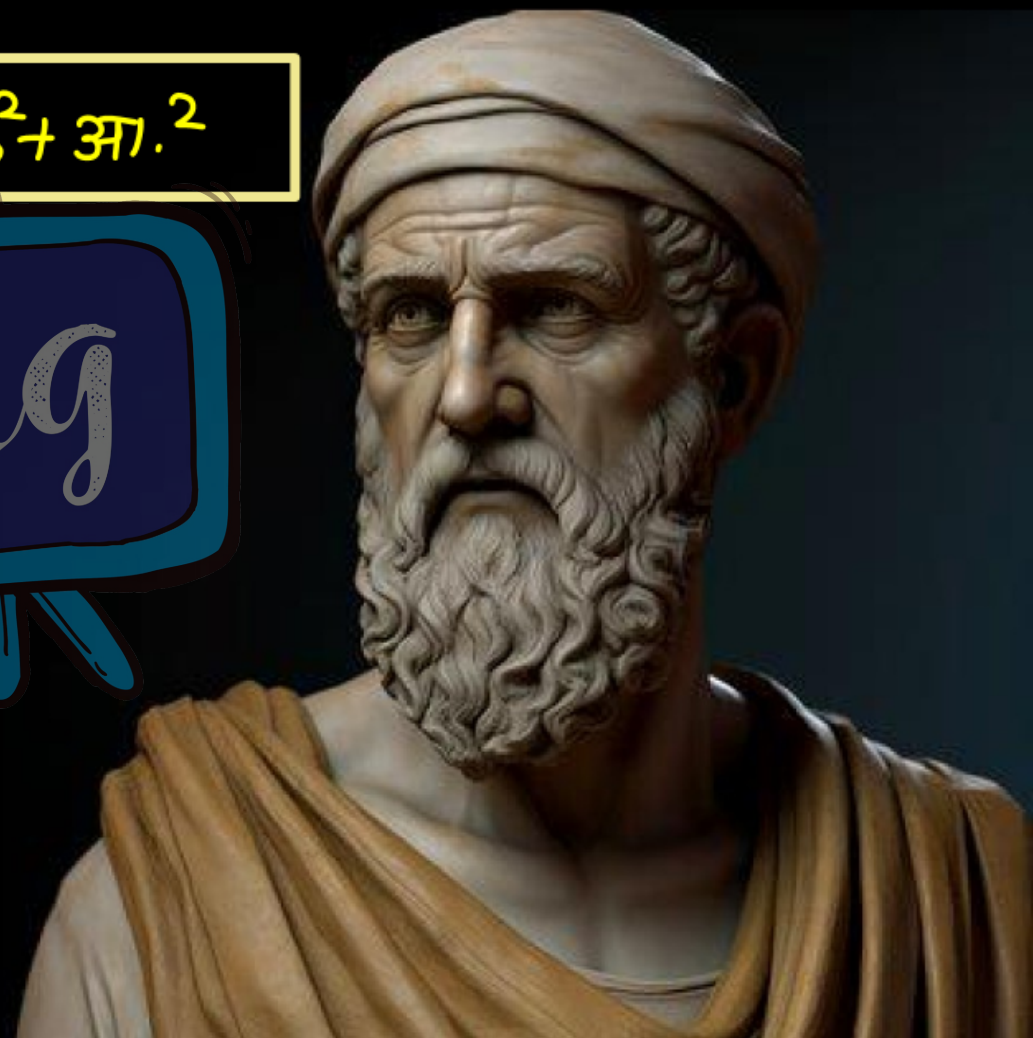
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पाइथागोरस प्रमेय

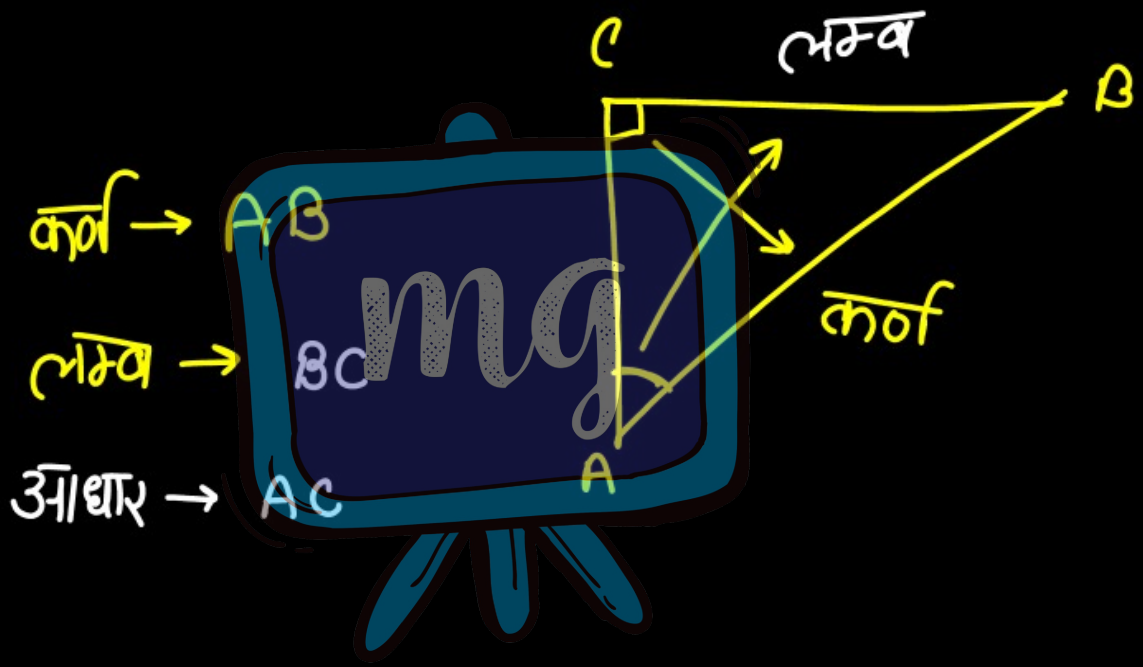
कर्ण^2 = लं०^2 + आ.^{2}





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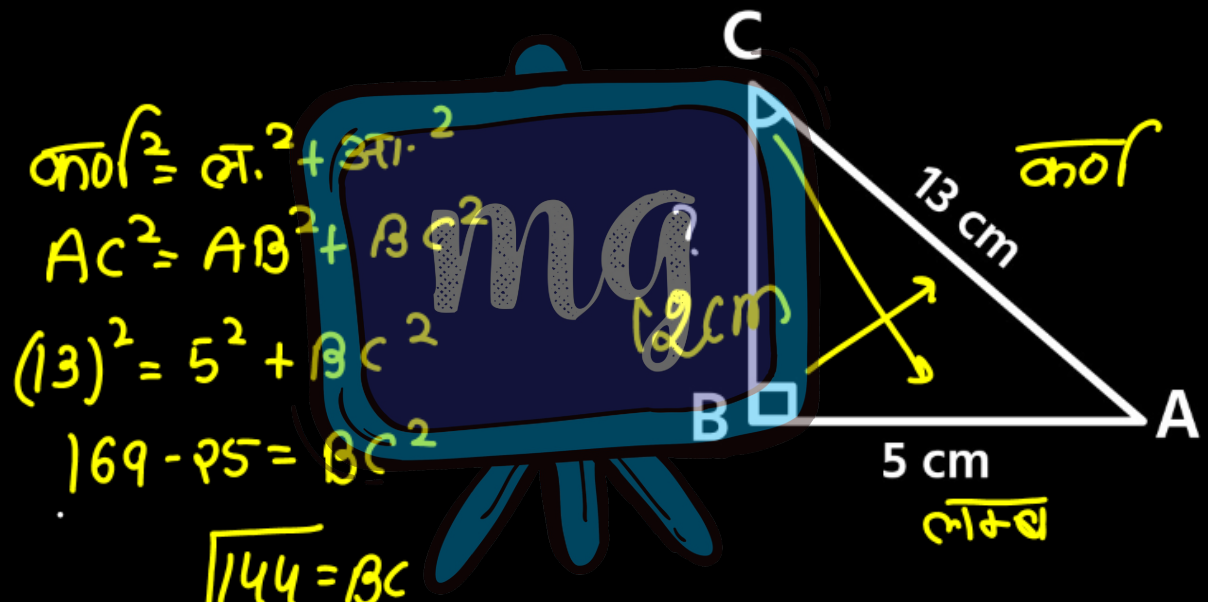
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उदाहरण –



कर्ण^2 = ल.^{2} + आ.^{2}

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

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

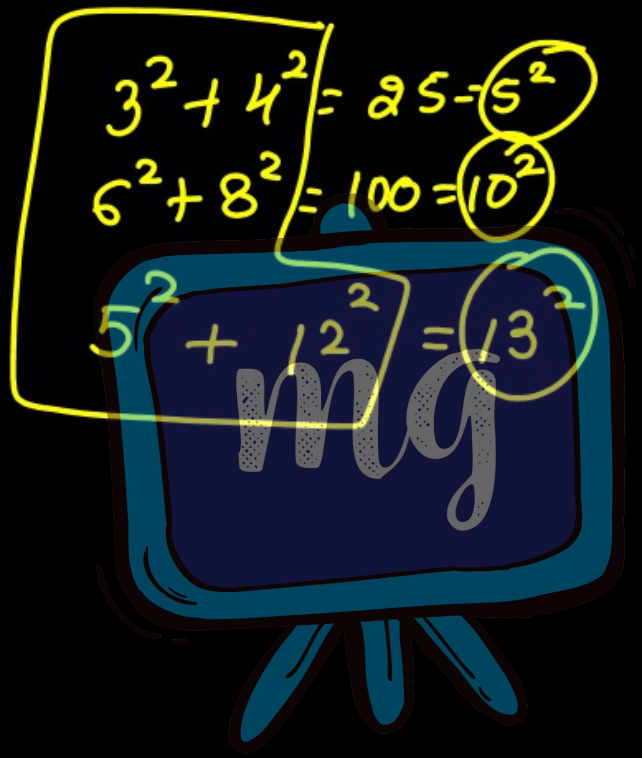
$169 - 25 = BC^2$

$\sqrt{144} = BC$

$12cm = BC$

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पाइथागोरस त्रिक

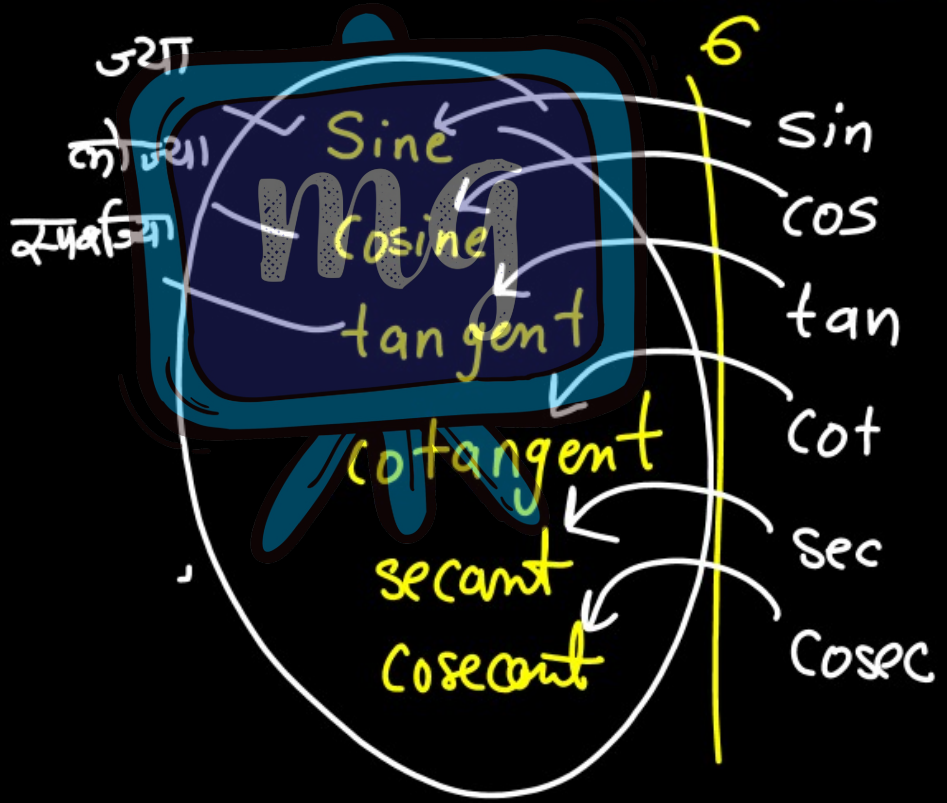
1. 3, 4, 5
2. 5, 12, 13
3. 7, 24, 25
4. 8, 15, 17
5. 9, 40, 41



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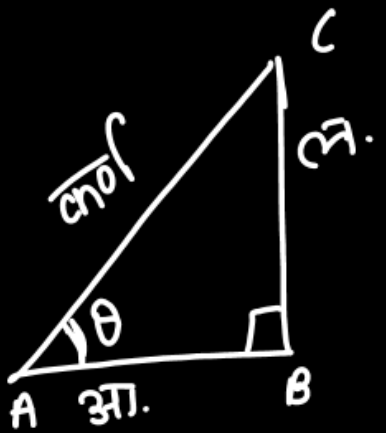
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त्रिकोणमितीय अनुपात



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$\sin\theta = \frac{\text{लं.}}{\text{कर्ण}}$ ✓

$\cos\theta = \frac{\text{आ.}}{\text{कर्ण}}$ ✓

$\tan\theta = \frac{\text{लं.}}{\text{आ.}}$ ✓

$\cot\theta = \frac{\text{आ.}}{\text{लं.}}$ ✓

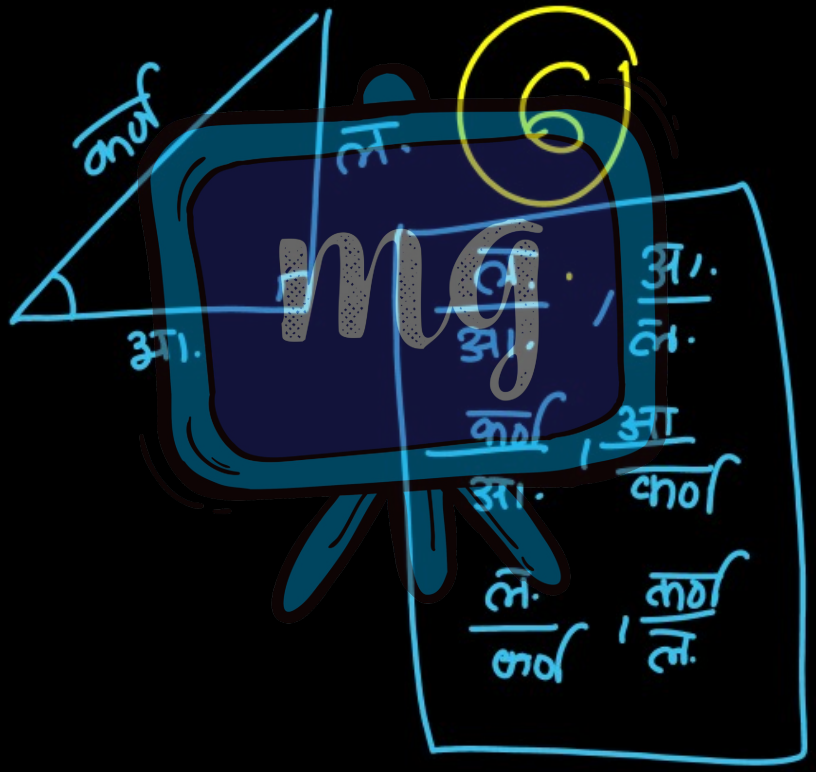
$\sec = \frac{\text{कर्ण}}{\text{आ.}}$ ✓

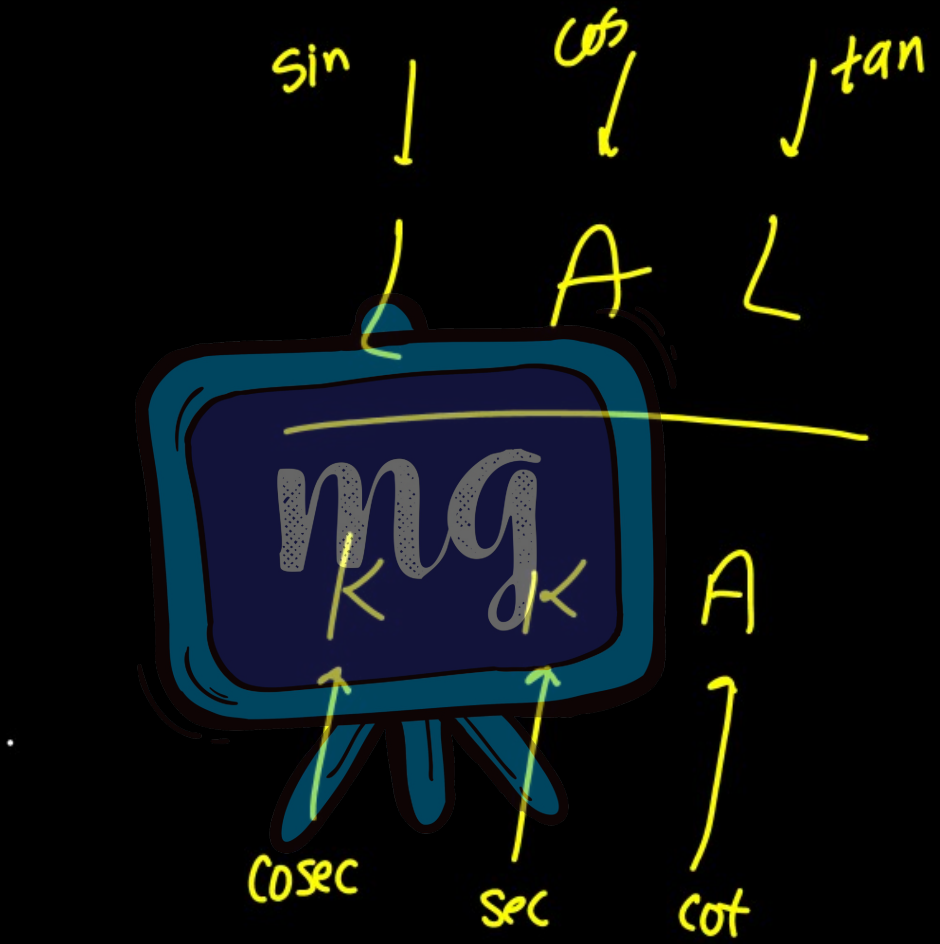
$\text{Cosec} = \frac{\text{कर्ण}}{\text{लं.}}$ ✓

$\left[\frac{LAL}{KKA}\right]$

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sin
cos
tan
A
L
mg
K
K
A
Cosec
Sec
cot

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$\frac{LAL}{KKA}$

$\sin\theta = \frac{L}{K} = \frac{AB}{AC}$

$\sin\theta = \frac{12}{13}$

$\cos\theta = \frac{A}{K} = \frac{BC}{AC}$

$\cos\theta = \frac{5}{13}$

$\tan\theta = \frac{L}{A} = \frac{AB}{BC}$

$\tan\theta = \frac{12}{5}$

$\text{cosec}\,\theta = \frac{K}{L} = \frac{AC}{AB}$

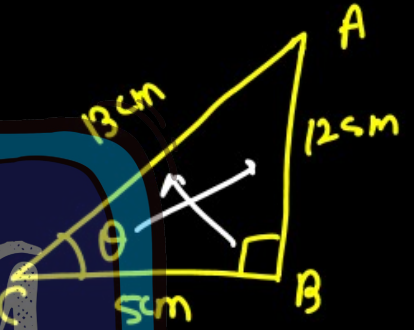
$\text{cosec}\,\theta = \frac{13}{12}$

$\sec\theta = \frac{K}{A} = \frac{AC}{BC}$

$\sec\theta = \frac{13}{5}$

$\cot\theta = \frac{A}{L} = \frac{BC}{AB}$

$\cot\theta = \frac{5}{12}$



कर्ण = AC = 13cm

लम्ब = AB = 12cm

आधार = BC = 5cm

$\sin\theta / \cos\theta / \tan\theta$

$\cot\theta / \sec\theta / \text{cosec}\,\theta$

विभिन्न त्रिकोणमितीय अनुपातो में संबंध

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

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

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

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

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

प्रश्नावली 8.1

2. आकृति में, $\tan P - \cot R$ का मान ज्ञात कीजिए।

$169 = 144 + QR^2$

$169 - 144 = QR^2$

$\sqrt{25} = QR$

$QR = 5cm$

$PR = 13cm$

$PQ = 12cm$

पाइथोगोरस प्रमेय से,

कर्ण^2 = लं.^{2} + आ.^{2} से.

$PR^2 = PQ^2 + QR^2$

$13^2 = 12^2 + QR^2$



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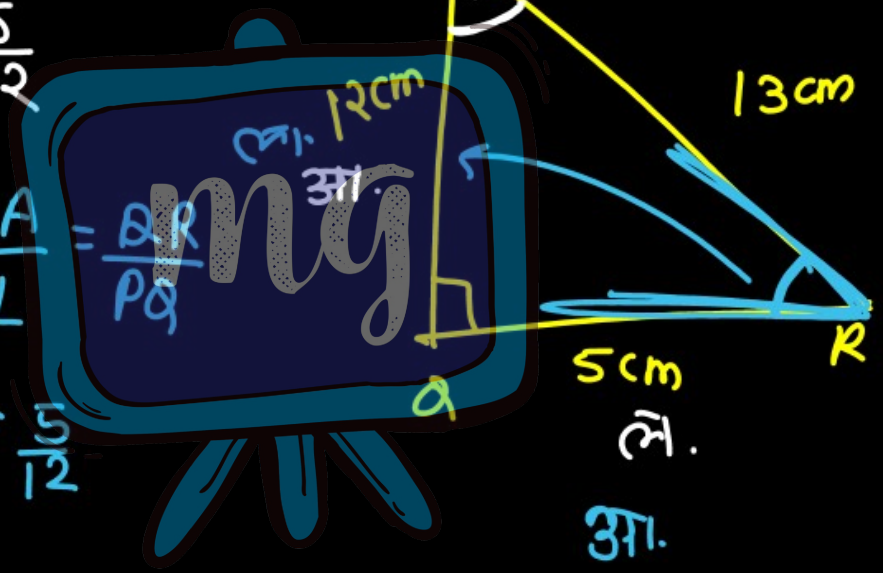
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$\tan P = \frac{L}{A} = \frac{QR}{PQ}$

$\tan P = \frac{5}{12}$

$\cot R = \frac{A}{L} = \frac{QR}{PQ}$

$\cot R = \frac{5}{12}$



कर्ण

ले. आ.

$\therefore \quad \tan P - \cot R = \frac{5}{12} - \frac{5}{12} = 0$

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CC

प्रश्नावली 8.1

3. यदि $\sin A = \frac{3}{4}$, तो cos A और tan A का मान परिकलित कीजिए।

हल :- $\sin A = \frac{3}{4} = \frac{\text{लं.}}{\text{कर्ण}}$

आ. = ?, लं. = 3k, कर्ण = 4k

$\text{कर्ण}^2 = \text{लं.}^2 + \text{आ.}^2$

$(4k)^2 = (3k)^2 + \text{आ.}^2$

$16k^2 = 9k^2 + \text{आ.}^2$

$16k^2 - 9k^2 = \text{आ.}^2$

$7k^2 = \text{आ.}^2$

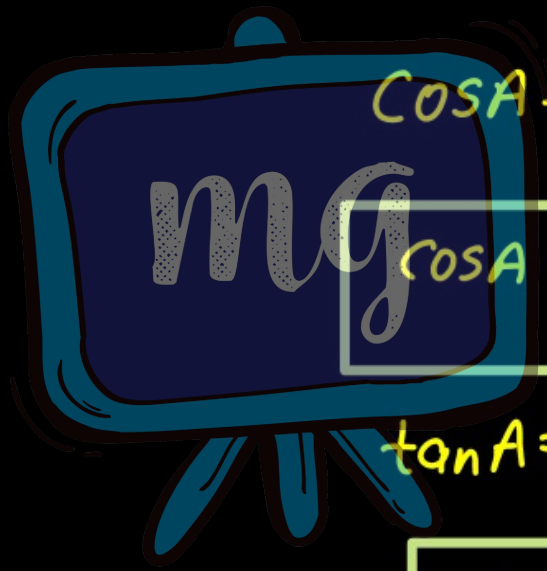
$\sqrt{7k^2} = \text{आ}$

$\sqrt{7}\,k = \text{आ}$

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$$\cos A = \frac{\text{आ.}}{\text{कर्ण}} = \frac{\sqrt{7}k}{4k}$$

$$\cos A = \frac{\sqrt{7}}{4}$$

$$\tan A = \frac{\text{ल.}}{\text{आ.}} = \frac{3k}{\sqrt{7}k}$$

$$\tan A = \frac{3}{\sqrt{7}}$$

प्रश्नावली 8.1

4. यदि 15 cot A = 8 हो तो sin A और sec A का मान ज्ञात कीजिए।

हल :- $15 \cot A = 8$

$\cot A = \frac{8}{15} = \frac{\text{आ.}}{\text{ल.}}$

आ. = 8k , ल. = 15k , कर्ण

कर्ण^2 = ल.^{2} + आ.^{2}

$= (15k)^2 + (8k)^2$

$= 225k^2 + 64k^2$

कर्ण $= \sqrt{289k^2}$

$= 17k$


mg

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LAL / KKA

Sin = सा. / कर्ण

Cosec = कर्ण / सा.

Cos = आ. / कर्ण

Sec = कर्ण / आ.

tan = सा. / आ.

Cot = आ. / सा.



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

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

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

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

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Sin/Cos/Tan/cot/Cosec

प्रश्नावली 8.1

LAL
KKR

5. यदि $\sec\theta = \frac{13}{12}$, हो तो अन्य सभी त्रिकोणमितीय अनुपात परिकलित कीजिए।

हल :- $\sec\theta = \frac{13}{12} = \frac{\text{कर्ण}}{\text{आ.}}$

कर्ण = 13k, आ. = 12k, ल.

कर्ण^2 = ल.^{2} + आ.^{2}

$(13k)^2 = \text{ल.}^2 + (12k)^2$

$169k^2 = \text{ल.}^2 + 144k^2$

$169k^2 - 144k^2 = \text{ल.}^2$

$\sqrt{25k^2} = \text{ल.}$

5k = ल.

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LAL / KKA

कर्ण = 13k, ला. = 5k, आ. = 12k

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

$\text{cosec}\theta = \frac{13}{5}$

$\sec\theta = \frac{13}{12}$

$\tan\theta = \frac{\text{ला.}}{\text{आ.}} = \frac{5k}{12k}$

$\cos\theta = \frac{1}{\sec\theta} = \frac{12}{13}$

$\tan\theta = \frac{5}{12}$

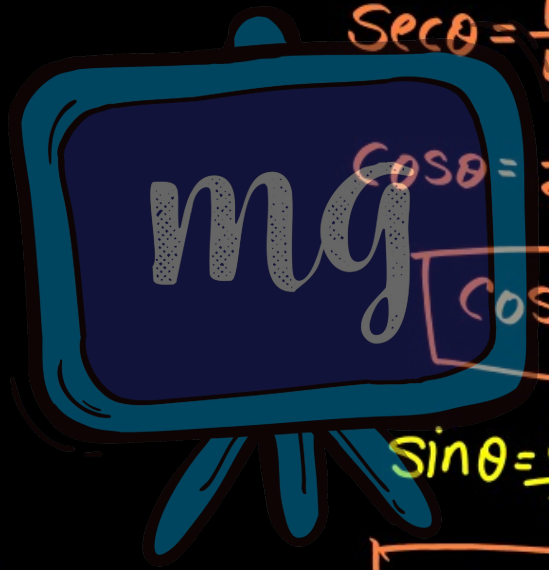
$\cos\theta = \frac{12}{13}$

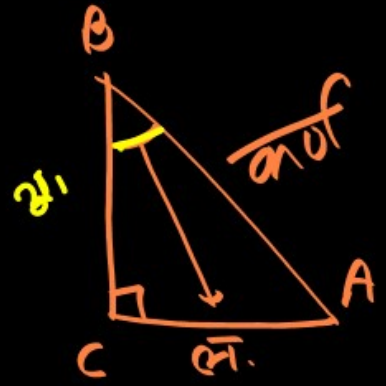
$\sin\theta = \frac{\text{ला.}}{\text{कर्ण}} = \frac{5k}{13k}$

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

$\sin\theta = \frac{5}{13}$

$\cot\theta = \frac{12}{5}$

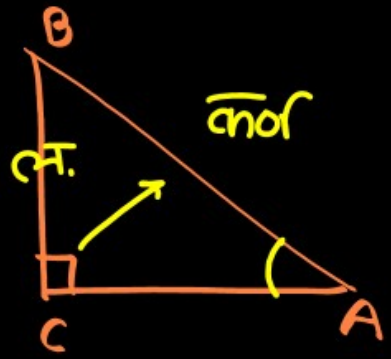




प्रश्नावली 8.1

6. यदि $\angle A$ और $\angle B$ न्यून कोण हो, जहाँ cos $A = \cos B$, तो दिखाइए कि $\angle A = \angle B$

हल :- $\cos A = \cos B$ — (1)



$\cos\theta = \frac{\text{आ.}}{\text{कर्ण}}$

$\cos B = \frac{BC}{AB}$

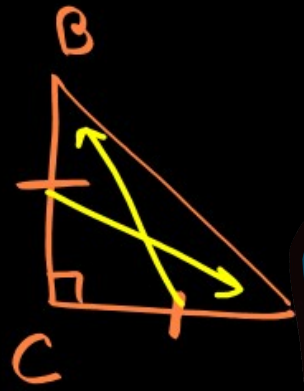
समी. (1) में मान रखने पर,

$\frac{AC}{AB} = \frac{BC}{AB}$

$\cos A = \frac{AC}{AB}$

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$AC = BC$

समद्विबाहु $\triangle$ में समान भुजाओं के
सम्मुख कोण समान होते है।

$\angle A = \angle B$

प्रश्नावली 8.1

7. यदि $\cot\theta = \frac{7}{8}$, तो

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

(ii) $\cot^2\theta$ का मान निकालिए?

हल :- (ii) $\cot\theta = \frac{7}{8}$

$\cot^2\theta = \left(\frac{7}{8}\right)^2 = \frac{49}{64}$

$\sin\theta = \frac{\text{लं.}}{\text{कर्ण}} = \frac{8k}{\sqrt{113}k}$

$\sin\theta = \frac{8}{\sqrt{113}}$

$\cos\theta = \frac{\text{आ.}}{\text{कर्ण}} = \frac{7k}{\sqrt{113}k}$

$\cos\theta = \frac{7}{\sqrt{113}}$

$\cot\theta = \frac{7}{8} = \frac{\text{आ}}{\text{लं}}$

आ = 7k, लं. = 8k, कर्ण =

कर्ण^2 = लं.^{2} + आ.^{2}

$= (8k)^2 + (7k)^2$

$= 64k^2 + 49k^2$

$= 113k^2$

कर्ण $= \sqrt{113k^2}$

$= \sqrt{113}\,k$

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

(i) $\dfrac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

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

$= 1 - \left(\dfrac{8}{\sqrt{113}}\right)^2$

$1 - \left(\dfrac{7}{\sqrt{113}}\right)^2$

$= \dfrac{1 - \frac{64}{113}}{1}$

$1 - \frac{49}{113}$

$= \dfrac{113 - 64}{113}$

$\dfrac{113 - 49}{113}$

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प्रश्नावली 8.1

8. यदि $3 \cot A = 4$, तो जाँच कीजिए कि

$$\frac{1 - \tan^2 A}{1 + \tan^2 A} = \cos^2 A - \sin^2 A$$ है या नहीं।

हल :-

$3 \cot A = 4$

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

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

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

$$= \frac{1 - \left(\frac{3}{4}\right)^2}{1 + \left(\frac{3}{4}\right)^2}$$

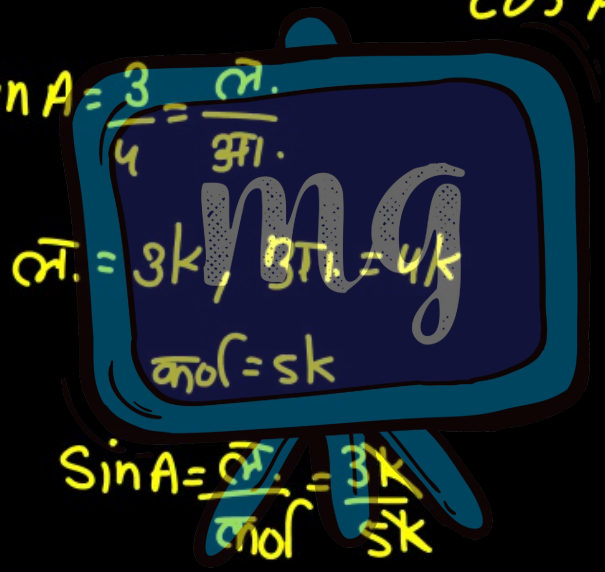
$$= \frac{1 - \frac{9}{16}}{1 + \frac{9}{16}} = \frac{\frac{16 - 9}{16}}{\frac{16 + 9}{16}} = \frac{7}{25}$$

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

$\tan A = \frac{3}{4} = \frac{\text{लं.}}{\text{आ.}}$



लं. = 3k, आ. = 4k

कर्ण = 5k

$\sin A = \frac{\text{लं.}}{\text{कर्ण}} = \frac{3k}{5k}$

$\cos A$

प्रश्नावली 8.1

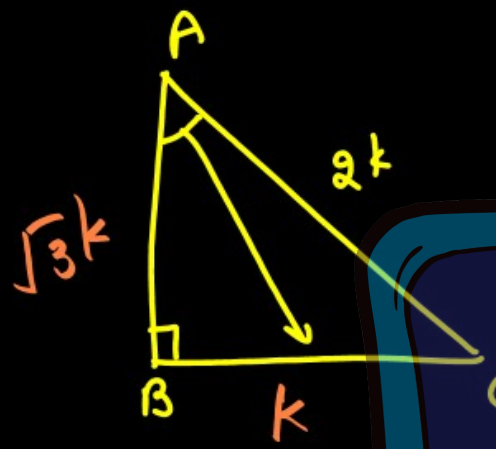
9. त्रिभुज ABC में, जिसका कोण B समकोण है, यदि $\tan A = \frac{1}{\sqrt{3}}$, तो निम्नलिखित के मान ज्ञात कीजिए :

(i) $\sin A \cos C + \cos A \sin C$

(ii) $\cos A \cos C - \sin A \sin C$

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$\tan A = \frac{1}{\sqrt{3}} = \frac{\text{लं.}}{\text{आ.}}$

कर्ण = 2, लं. = 1k, आ. = $\sqrt{3}k$

$\text{कर्ण}^2 = \text{लं.}^2 + \text{आ.}^2$

$= k^2 + (\sqrt{3}k)^2$

$= k^2 + 3k^2$

$\text{कर्ण}^2 = 4k^2$

$\text{कर्ण} = \sqrt{4k^2} = 2k$

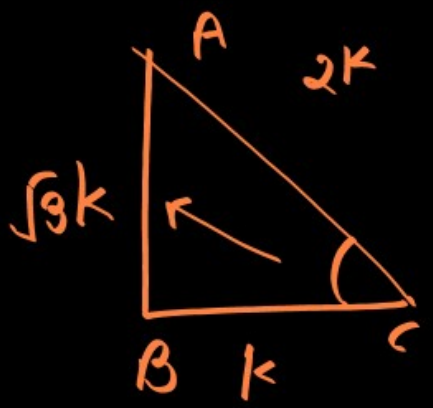
$\sin A = \frac{\text{लं.}}{\text{कर्ण}} = \frac{k}{2k}$

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

$\cos A = \frac{\text{आ.}}{\text{कर्ण}} = \frac{\sqrt{3}}{2}$

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$\sin C = \frac{\text{लम्ब}}{\text{कर्ण}} = \frac{\sqrt{3}k}{2k}$

$\sin C = \frac{\sqrt{3}}{2}$ | $\cos C = \frac{\text{आधार}}{\text{कर्ण}}$

$\cos C = \frac{k}{2k}$

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



(i) $\sin A \cos C + \cos A \sin C$

$\frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$

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

$= 1$

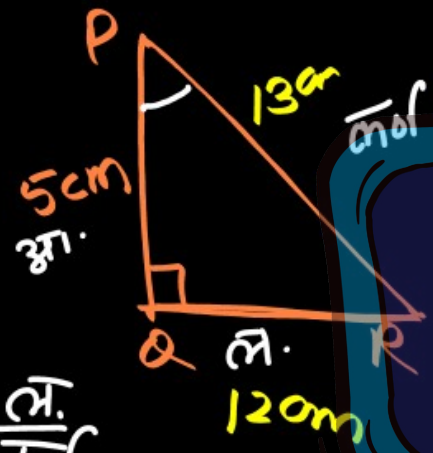
(ii) $\cos A \cos C - \sin A \sin C$

$\frac{\sqrt{3}}{2} \times \frac{1}{2} - \frac{1}{2} \times \frac{\sqrt{3}}{2}$

$\frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = 0$

H.W.

प्रश्नावली 8.1



10. Δ PQR में, जिसका कोण Q समकोण है, PR + QR = 25 cm और PQ = 5 cm है। sin P, cos P और tan P के मान ज्ञात कीजिए।

$PR + QR = 25cm$, $PQ = 5cm$

$PR = 25 - QR$

$\text{कर्ण}^2 = \text{ल.}^2 + \text{आ.}^2$

$PR^2 = QR^2 + PQ^2$

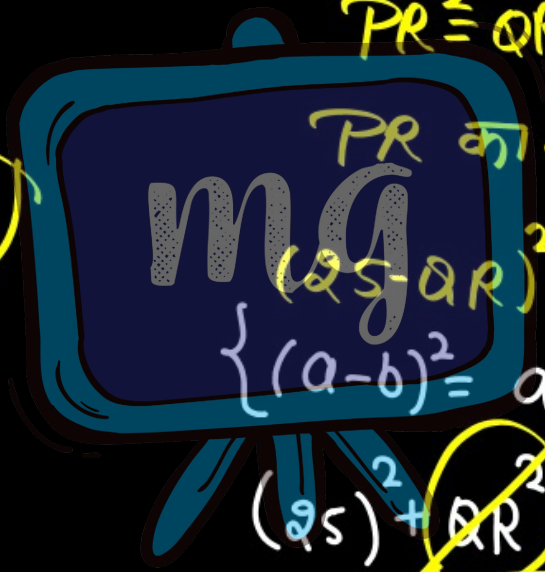
$\sin P = \frac{\text{ल.}}{\text{कर्ण}}$

$= \frac{QR}{PR}$

$\sin P = \frac{12}{13}$

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$PR^2 = QR^2 + 5^2$

PR का मान रखने पर

$PR = 25 - QR$

$(25 - QR)^2 = QR^2 + 5^2$

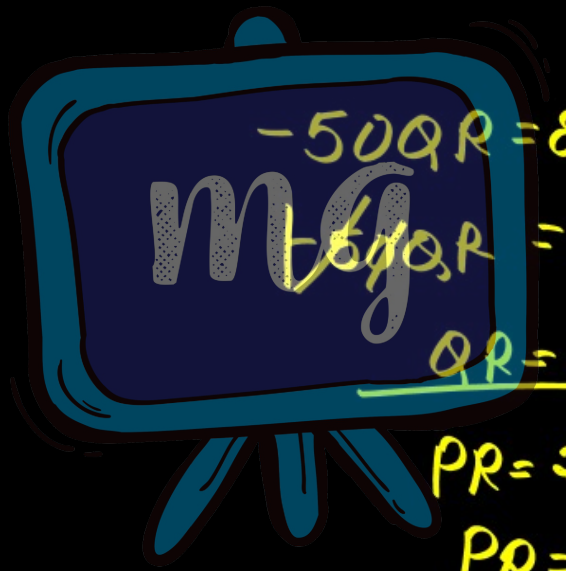
$\{(a-b)^2 = a^2 + b^2 - 2ab\}$

$(25)^2 + QR^2 - 2 \times 25 \times QR = QR^2 + 25$

$625 - 50QR = 25$

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$-50QR = 25 - 625$

12

$+60QR = +1600$

$QR = 12\,cm$

$PR = 25 - 12$

$PR = 13\,cm$

प्रश्नावली 8.1

11. बताइए कि निम्नलिखित कथन सत्य हैं या असत्य। कारण सहित अपने उत्तर की पुष्टि कीजिए।

(i) tan A का मान सदैव 1 से कम होता है।

(ii) कोण A के किसी मान के लिए $\sec A = \frac{12}{5}$

प्रश्नावली 8.1

(iii) cos A, कोण A के cosecant के लिए प्रयुक्त एक संक्षिप्त रूप है।

(iv) cot A, cot और A का गुणनफल होता है।

(v) किसी भी कोण θ के लिए $\sin\theta = \frac{4}{3}$