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कक्षा-10

गणित

अध्याय - 8

त्रिकोणमिति का परिचय

(Introduction To Trigonometry)

भाग - 2

प्रश्नावली 8.1

By : Rajendra Yadav Sir

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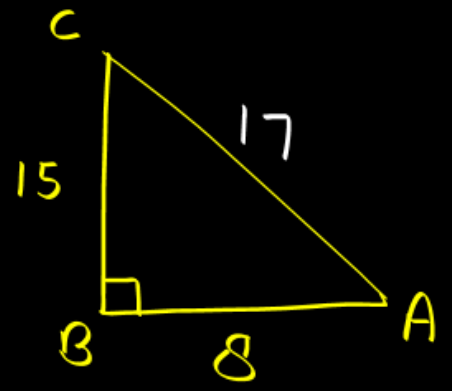
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4. यदि 15 cot A = 8 हो तो sin A और sec A का मान ज्ञात कीजिए।

$15 \cot A = 8$

$\Rightarrow \cot A = \frac{8}{15} = \frac{A}{L}$



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

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

$K^2 = 64 + 225$

$K^2 = 289$

$K = 17$

अत :

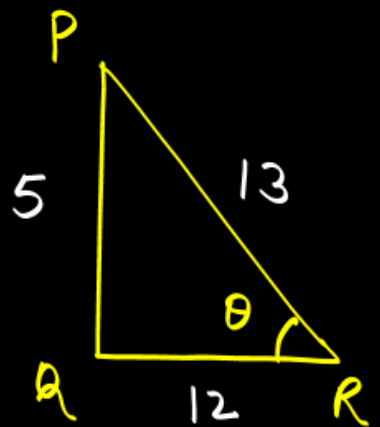
$\sin A = \frac{L}{K} = \frac{15}{17}$

$\sec A = \frac{K}{A} = \frac{17}{8}$

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

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

$L^2 + (12)^2 = (13)^2$

$L^2 + 144 = 169$

$L^2 = 169 - 144$

$L^2 = 25$

$\boxed{L = 5}$

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

1) $\sin\theta = \frac{L}{K} = \frac{5}{13}$

2) $\cos\theta = \frac{A}{K} = \frac{12}{13}$

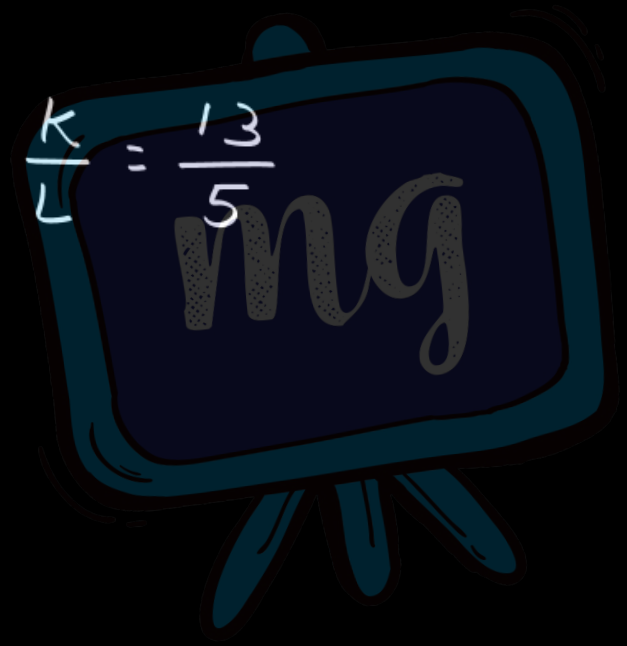
3) $\tan\theta = \frac{L}{A} = \frac{5}{12}$

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4) $\cot\theta = \frac{A}{L} = \frac{12}{5}$

5) $\operatorname{cosec}\theta = \frac{K}{L} = \frac{13}{5}$



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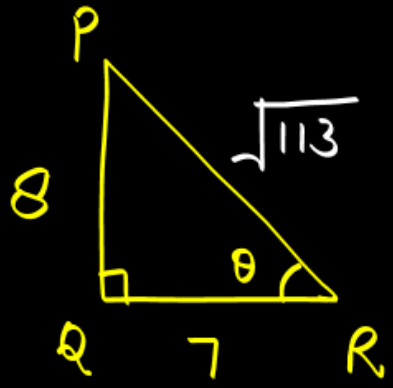
6. यदि $\angle A$ और $\angle B$ न्यून कोण हो, जहाँ $\cos A = \cos B$, तो दिखाइए कि $\angle A = \angle B$



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7. यदि $\cot\theta = \frac{7}{8}$, $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ का मान निकालिए?

$\cot\theta = \frac{7}{8} = \frac{A}{L}$

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

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

$K^2 = 49 + 64$

$K^2 = 113 \Rightarrow K = \sqrt{113}$

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

$$= \frac{1-\sin^2\theta}{1-\cos^2\theta} = \frac{1-\left(\frac{8}{\sqrt{113}}\right)^2}{1-\left(\frac{7}{\sqrt{113}}\right)^2}$$

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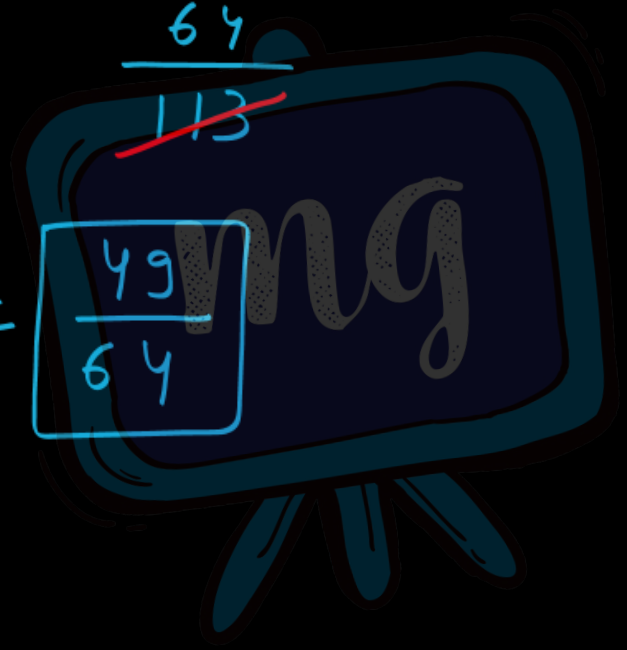
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$$= \frac{1 - \frac{64}{113}}{1 - \frac{49}{113}}$$

$$= \frac{\frac{113 - 64}{113}}{\frac{113 - 49}{113}}$$

$$= \frac{\frac{49}{\cancel{113}}}{\frac{64}{\cancel{113}}}$$

$$= \boxed{\frac{49}{64}}$$



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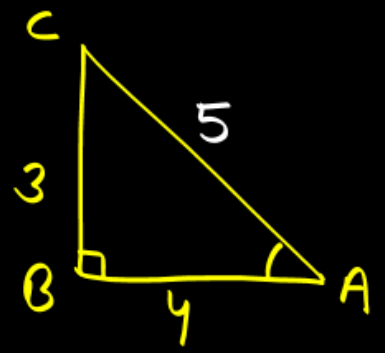
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8. यदि $3 \cot A = 4$, तो जाँच कीजिए कि $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ है या नहीं।

$3 \cot A = 4$

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



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

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

$K = 5$

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

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

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$$= \frac{\frac{16-9}{\cancel{16}}}{\frac{16+9}{\cancel{16}}}$$

$$= \boxed{\frac{7}{25}}$$

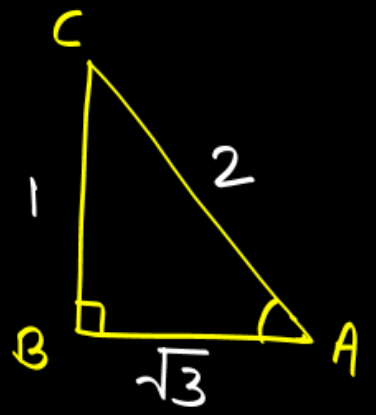
RHS: $\cos^2 A - \sin^2 A$

$$= \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2$$

$$= \frac{16}{25} - \frac{9}{25}$$

$$= \boxed{\frac{7}{25}}$$

$\Rightarrow$ LHS = RHS



$\tan A = \frac{1}{\sqrt{3}} = \frac{L}{A}$

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

$K^2 = (\sqrt{3})^2 + (1)^2$

$K^2 = 3 + 1 = 4$

$K = 2$

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

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

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

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

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

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

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

$$= 0$$

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



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(ii) cos A cos C – sin A sin C

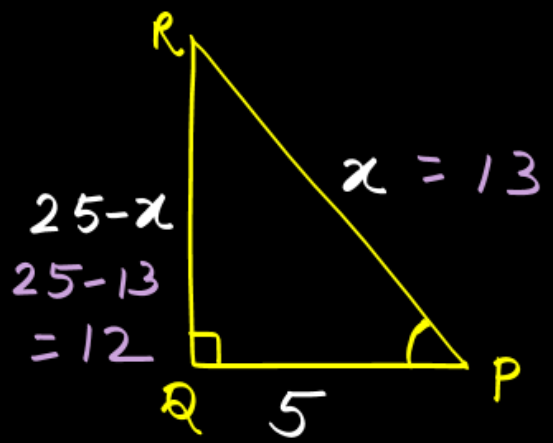


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10. Δ PQR में, जिसका कोण Q समकोण है, PR + QR = 25 cm और PQ = 5 cm है। sin P, cos P और tan P के मान ज्ञात कीजिए।



$PR + QR = 25$

$x + QR = 25$

$\Rightarrow QR = 25 - x$

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

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

$x^2 = 25 + 625 + x^2 - 50x$

$\Rightarrow 50x = 650$

$\Rightarrow x = \frac{650}{50}$

$\Rightarrow \boxed{x = 13}$

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1) $\sin p = \frac{L}{K} = \frac{12}{13}$

2) $\cos p = \frac{A}{K} = \frac{5}{13}$

3) $\tan p = \frac{L}{A} = \frac{12}{5}$



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

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

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

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

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

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

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



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



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



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



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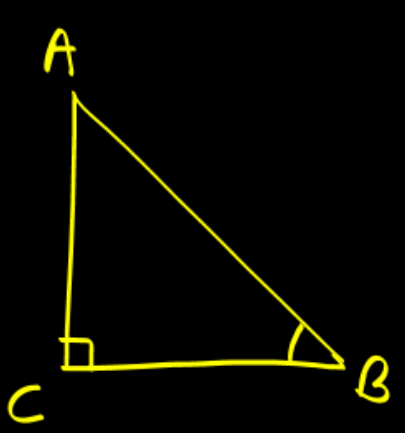
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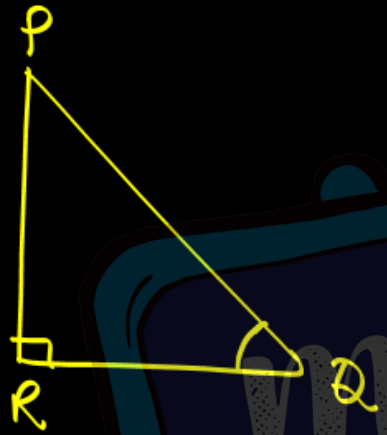
(v) किसी भी कोण θ के लिए $\sin\theta = \frac{4}{3}$



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उदाहरण 2. यदि $\angle B$ और $\angle Q$ ऐसे न्यूनकोण हों जिससे कि $\sin B = \sin Q$, तो सिद्ध कीजिए कि $\angle B = \angle Q$

$\sin B = \sin Q$

$\frac{AC}{AB} = \frac{PR}{PQ} = k$

$\Rightarrow AC = kAB$, $PR = kPQ$

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

$\Rightarrow BC^2 = AB^2 - AC^2$

$\Rightarrow BC^2 = AB^2 - k^2AB^2$

$\Rightarrow BC^2 = AB^2(1 - k^2)$

$\Rightarrow \frac{BC^2}{AB^2} = 1 - k^2$