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कक्षा - 10

गणित

अध्याय - 8

त्रिकोणमिति का परिचय

भाग - 2

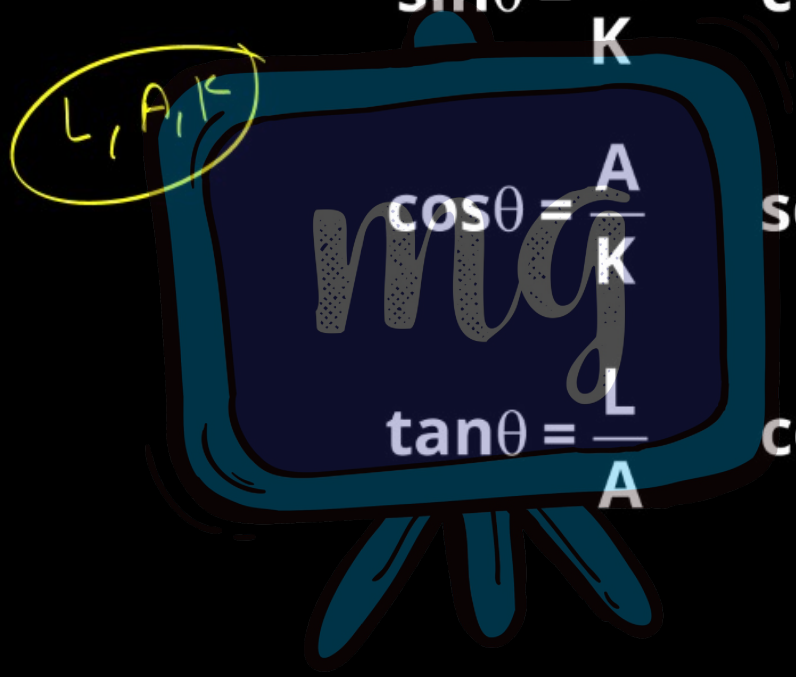
केशव शर्मा

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रिवीजन

$$\sin\theta = \frac{L}{K} \qquad \operatorname{cosec}\theta = \frac{K}{L}$$

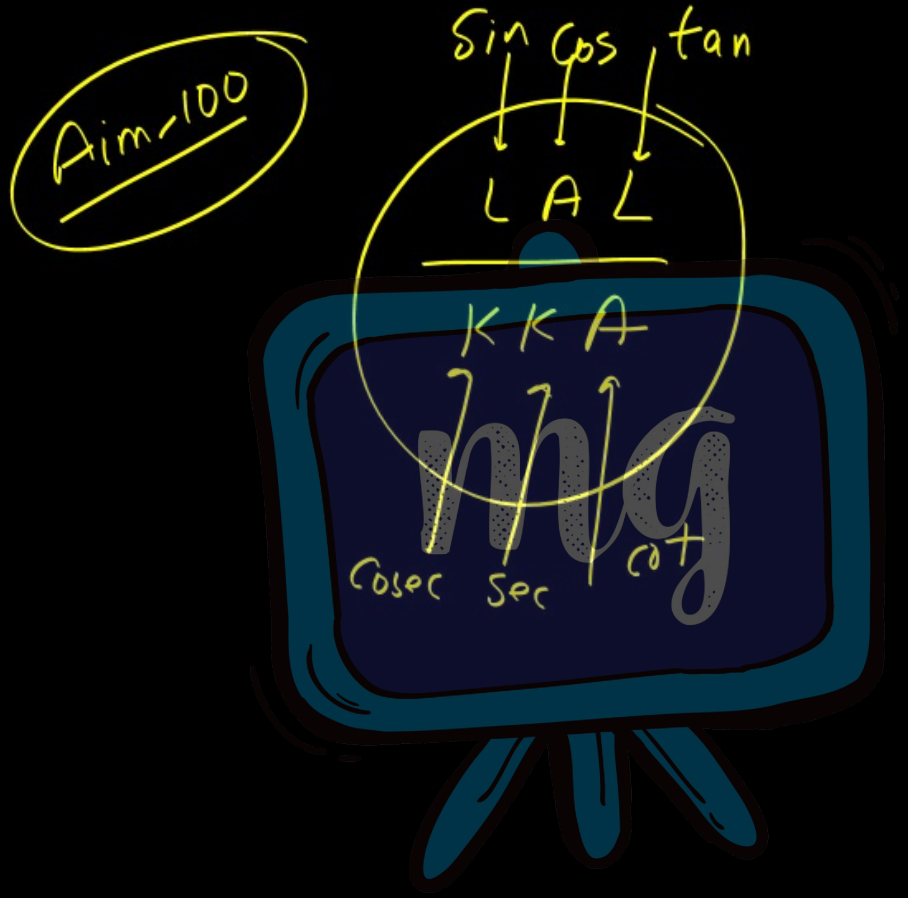


$$\cos\theta = \frac{A}{K} \qquad \sec\theta = \frac{K}{A}$$

$$\tan\theta = \frac{L}{A} \qquad \cot\theta = \frac{A}{L}$$

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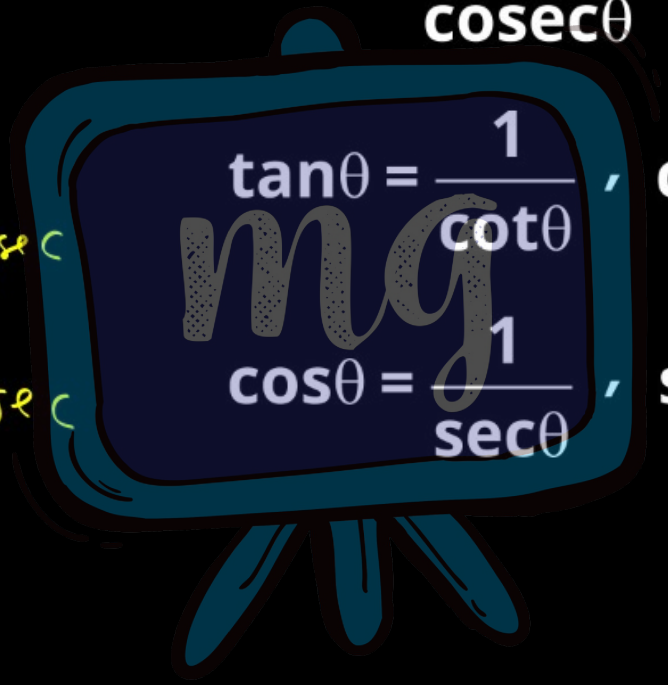
$$\sin\theta = \frac{1}{\operatorname{cosec}\theta} \quad , \quad \operatorname{cosec}\theta = \frac{1}{\sin\theta}$$

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

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

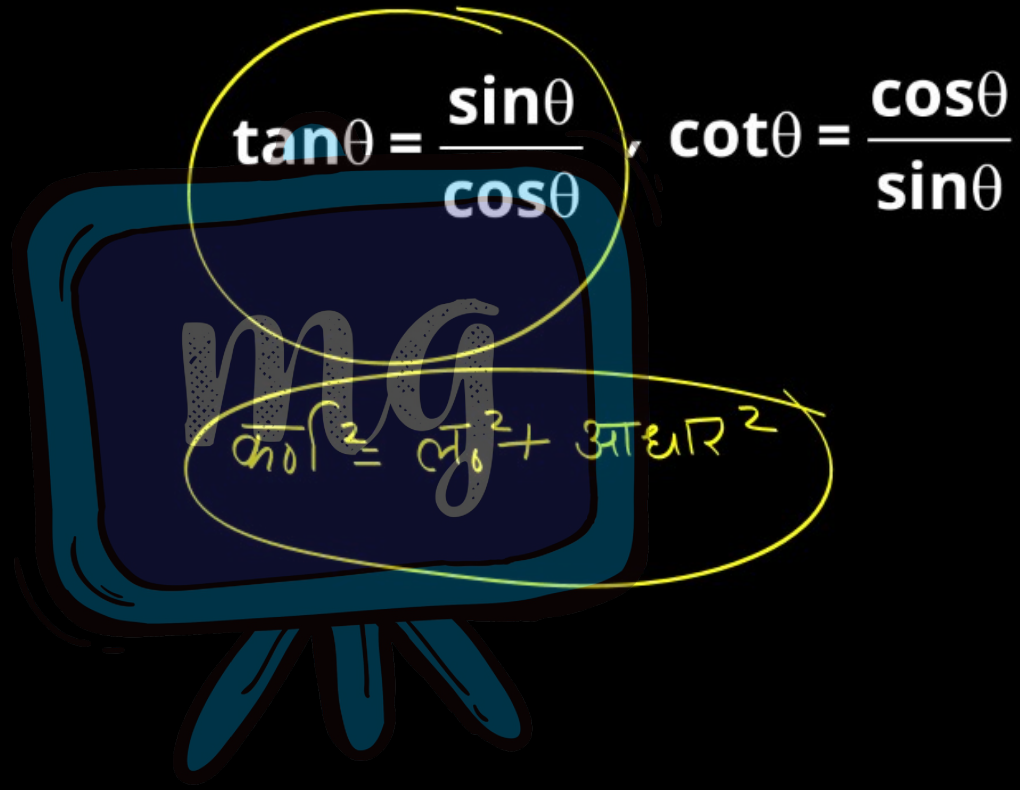
Sin Cosec

Cos Sec



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7, 24 — 25

प्रश्न.1 ΔABC में, जिसका कोण B समकोण है, AB = 24 cm और BC = 7 cm है। निम्नलिखित का मान ज्ञात कीजिए :

(i) sinA, cosA

कर्ण² = लम्ब² + आधार²

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

$(AC)^2 = (7)^2 + (24)^2$

$= 49 + 576$

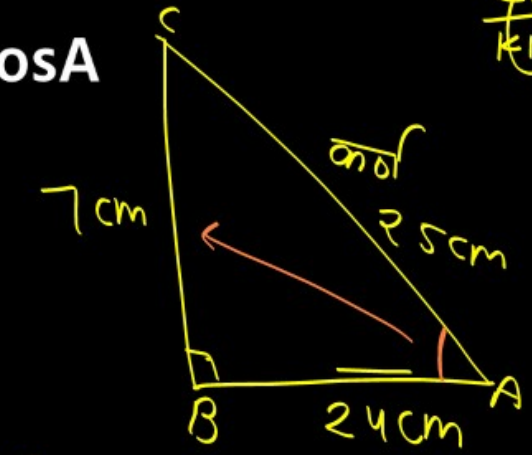
$AC^2 = 625$

$AC = \sqrt{625}$

$AC = 25$

$\sin A = \frac{L}{K} = \frac{BC}{AC}$

$\sin A = \frac{7}{25}$



$\cos A = \frac{A}{K} = \frac{AB}{AC} = \frac{24}{25}$

$\cos A = \frac{24}{25}$

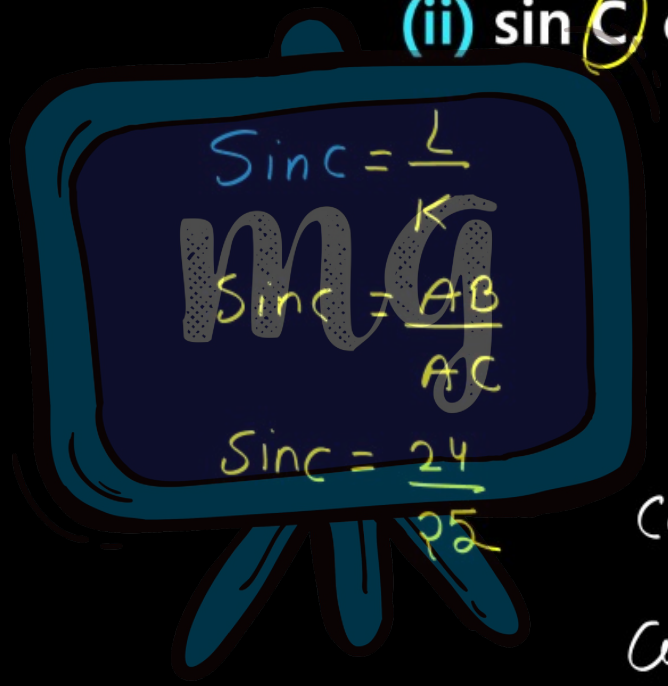
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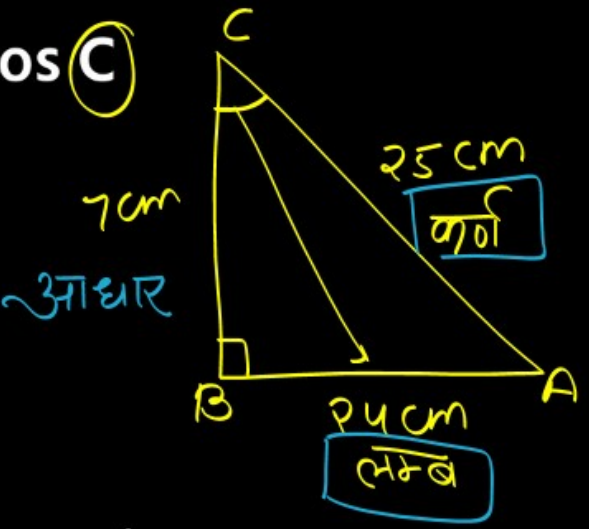
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LAL
TKCA

प्रश्नावली 8.1

(ii) sin C cos C





$$\text{Cosc} = \frac{A}{K}$$

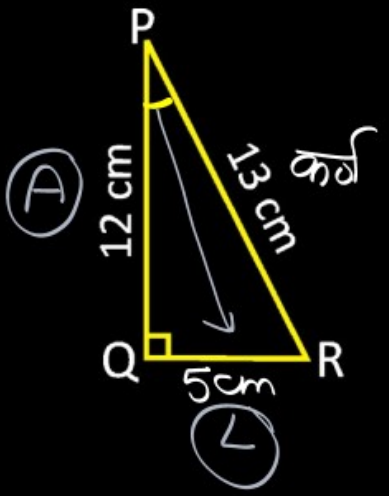
$$\text{Cos C} = \frac{BC}{AC} = \frac{7}{25}$$

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प्रश्नावली 8.1

प्रश्न.2 आकृति में, tan P – cot R का मान ज्ञात कीजिए।



पाइथागोरस प्रमेय

कर्ण^2 = लम्ब^2 + आधार^2

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

$169 = 144 + QR^2$

$169 - 144 = QR^2$

$\sqrt{25} = QR$

$5 = QR$

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

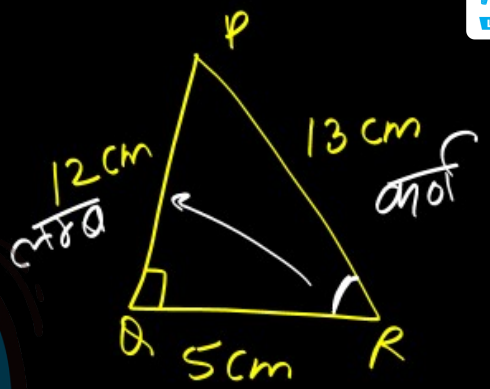
$\tan P = \frac{QR}{PQ}$

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

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



~ मतलब

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

$\tan\theta - \cot R = \frac{5}{12} - \frac{5}{12} = 0$

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प्रश्नावली 8.1

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

$\sin A = \frac{3}{4} = \frac{L}{K}$

$L = 3,\ K = 4,\ A = ?$

पाइथागोरस प्रमेय

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

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

$16 = 9 + A^2$

$16 - 9 = A^2$

$7 = A^2$

$A = \sqrt{7}$

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

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

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

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प्रश्नावली 8.1

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

$K^2 = 225 + 64$

$K^2 = 289$

$K = \sqrt{289}$

$K = 17$

$15 \cot A = 8$

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

$A = 8,\ L = 15,\ K = ?$

पाइथोगोरस प्रमेय

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

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

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



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प्रश्नावली 8.1

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

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

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

$169 - 144 = L^2$

$25 = L^2$

$L = \sqrt{25} = 5$

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

$K = 13,\ A = 12,\ L = 5$

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

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

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

$\cot\theta = \frac{1}{\tan\theta} = \frac{12}{5}$

$\operatorname{cosec}\theta = \frac{1}{\sin\theta} = \frac{13}{5}$

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प्रश्नावली 8.1

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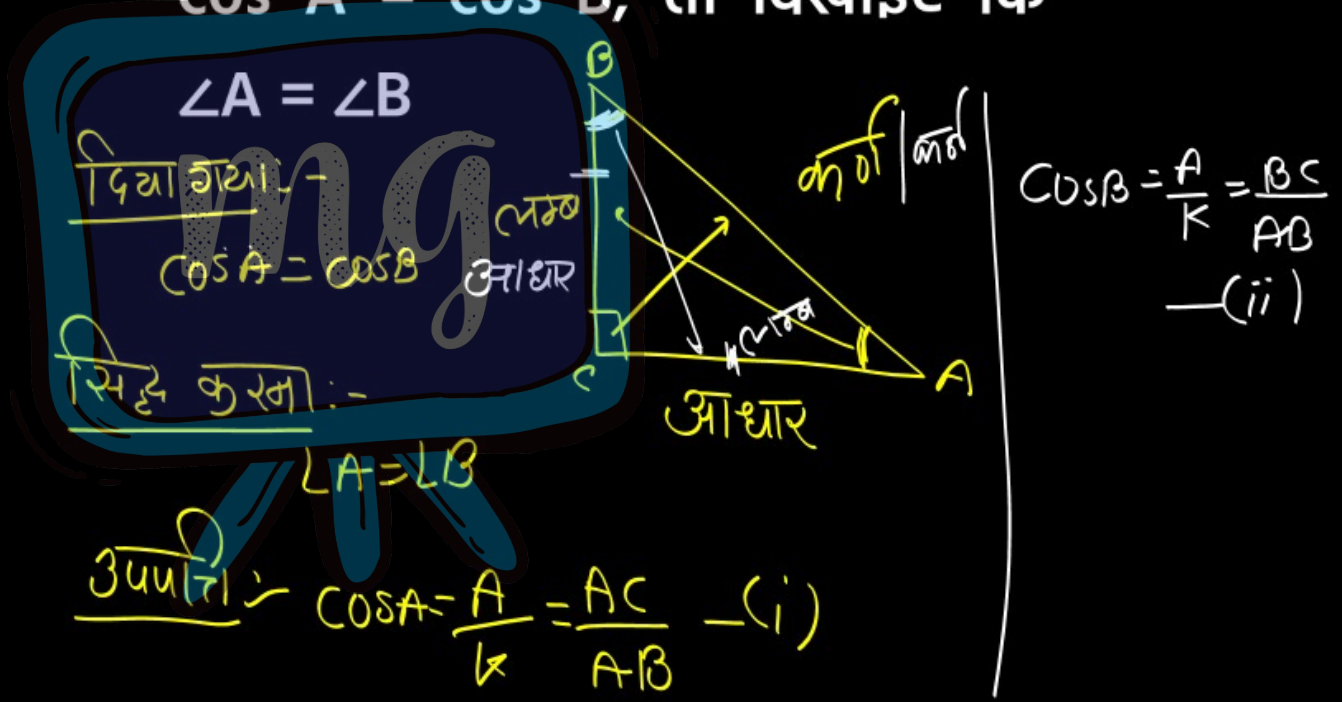
प्रश्न.6 यदि ∠A और ∠B न्यून कोण हो, जहाँ cos A = cos B, तो दिखाइए कि ∠A = ∠B

दिया गया :-

$\cos A = \cos B$

सिद्ध करना :-

$\angle A = \angle B$



उपपत्ति :-

$\cos A = \frac{\text{आधार}}{\text{कर्ण}} = \frac{AC}{AB}$ —(i)

$\cos B = \frac{\text{आधार}}{\text{कर्ण}} = \frac{BC}{AB}$ —(ii)

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$\cos A = \cos B$ (दिया हुआ)

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

$AC = BC$

किसी त्रिभुज में समान भुजाओं के सम्मुख समान (बराबर) होते हैं।

अतः

$\angle A = \angle B$

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प्रश्नावली 8.1

प्रश्न.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?

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

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

$A = 7,\ L = 8,\ K = ?$

पाइथागोरस प्रमेय से

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

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

$= 64 + 49$

$K^2 = 113$

$K = \sqrt{113}$

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

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

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

$$= \frac{1-\left(\frac{8}{\sqrt{113}}\right)^2}{1-\left(\frac{7}{\sqrt{113}}\right)^2} = \frac{1-\frac{64}{113}}{1-\frac{49}{113}} = \frac{\frac{113-64}{113}}{\frac{113-49}{113}}$$

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