نام و نام خانوادگی ......نیمن ابهری...... پاسخنامه تشریحی تکلیف شماره .۱۲۷.. کلاس .....یازدهم تجربی.B......

۱

$S = \frac{1}{2}\times\sqrt{12}\times 4\times \sin\alpha = \frac{9}{2} \rightarrow \sin\alpha = \frac{3}{2\sqrt{3}} = \frac{\sqrt{3}}{2} \rightarrow \alpha = 60^\circ ,\ \alpha = 120^\circ$

$\rightarrow \frac{120}{60} = 2$ برابر.

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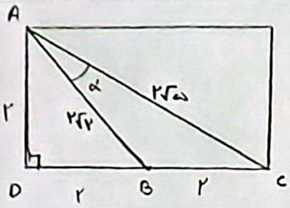

$\hat{ABD}: AB^2 = (2)^2 + (2)^2 = 4+4 = 8 \rightarrow AB = 2\sqrt{2}$

$\hat{ADC}: AC^2 = (2)^2 + (4)^2 = 4+16 = 20 \rightarrow AC = 2\sqrt{5}$

$S_{\hat{ABC}} = \frac{\text{قاعده} \times \text{ارتفاع}}{2} = 2\times 2\times\frac{1}{2} = 2 = \frac{1}{2}AB\cdot AC\cdot \sin\alpha$

$\rightarrow 2 = \frac{1}{2}\times 2\sqrt{2}\times 2\sqrt{5}\times\sin\alpha \rightarrow \sin\alpha = \frac{1}{\sqrt{10}}$

$1+\cot^2\alpha = \frac{1}{\sin^2\alpha} = 10 \rightarrow \cot^2\alpha = 9 \rightarrow \cot\alpha = \pm 3 \rightarrow$ حاده $\alpha \rightarrow \cot\alpha = 3$

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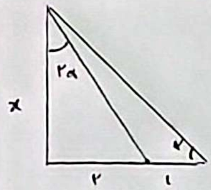

$\tan\alpha = \frac{x}{3}$

$\tan 2\alpha = \frac{2}{x} = \frac{2\tan\alpha}{1-\tan^2\alpha} = \frac{\frac{2x}{3}}{1-\frac{x^2}{9}} = \frac{\frac{2x}{3}}{\frac{9-x^2}{9}} = \frac{6x}{9-x^2}$

$\rightarrow 18 - 2x^2 = 6x^2 \rightarrow 8x^2 = 18 \rightarrow x^2 = \frac{18}{8} = \frac{9}{4} \rightarrow x = \frac{3}{2}$

$\cot\alpha = \frac{3}{\frac{3}{2}} = 2$

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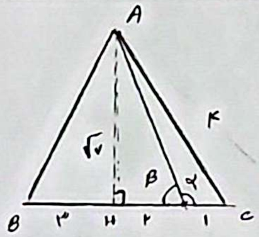

(در مثلث متساوی‌الساقین ارتفاع، نیمساز بر هم منطبق‌اند (شکل روبه‌رو))

$\hat{AHC}: AH^2 = 16 - 9 = 7 \rightarrow AH = \sqrt{7}$

$\tan\beta = \frac{\sqrt{7}}{2} \rightarrow \tan\alpha = \tan(\pi-\beta) = -\tan(\beta) = -\frac{\sqrt{7}}{2}$

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$2\sin^2\alpha + \cos^2\alpha = \sin^2\alpha + 1 = \frac{5}{4} \rightarrow \sin^2\alpha = \frac{5}{4} - 1 = \frac{1}{4}$

$\cos^2\alpha = 1 - \sin^2\alpha = 1 - \frac{1}{4} = \frac{3}{4}$

$\tan^2\alpha + 1 = \frac{1}{\cos^2\alpha} = \frac{1}{\frac{4}{9}} = \frac{9}{4} \rightarrow \tan^2\alpha = \frac{9}{4} - 1 = \frac{5}{4}$

$(1+\sin^2\alpha)^2 = 1+2\sin^2\alpha+\sin^4\alpha = (1+1-\cos^2\alpha)^2 = (2-\cos^2\alpha)^2 = 4-4\cos^2\alpha+\cos^4\alpha$

$\longrightarrow \quad \sin^4\alpha + 4\cos^2\alpha = 4+\cos^4\alpha - 1 - 2\sin^2\alpha = 3+\cos^4\alpha - 2\sin^2\alpha = 3+\cos^4\alpha - 2(1-\cos^2\alpha)$

$= 3+\cos^4\alpha - 2 + 2\cos^2\alpha = \cos^4\alpha + 2\cos^2\alpha + 1 = (\cos^2\alpha+1)^2$

$(1+\cos^2\alpha)^2 = 1+2\cos^2\alpha+\cos^4\alpha = (1+1-\sin^2\alpha)^2 = (2-\sin^2\alpha)^2 = 4-4\sin^2\alpha+\sin^4\alpha$

$\cos^4\alpha + 4\sin^2\alpha = 4-1-2\cos^2\alpha+\sin^4\alpha = 3-2(1-\sin^2\alpha)+\sin^4\alpha = 3-2+2\sin^2\alpha+\sin^4\alpha$

$= 1+\sin^4\alpha+2\sin^2\alpha = (\sin^2\alpha+1)^2$

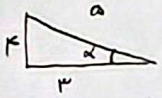
$\frac{(1+\cos^2\alpha)^2}{1+\cos^2\alpha} - \frac{(1+\sin^2\alpha)^2}{(1+\sin^2\alpha)} = 1+\cos^2\alpha - 1 - \sin^2\alpha = \cos^2\alpha - \sin^2\alpha = \cos(2\alpha)$

۶

$\sin(\frac{9\pi}{2}+\alpha) = \sin(4\pi+\frac{\pi}{2}+\alpha) = \sin(\frac{\pi}{2}+\alpha) = \cos(\alpha)$

$\cos(\frac{7\pi}{2}-\alpha) = \cos(3\pi+\frac{\pi}{2}-\alpha) = \cos(\pi+\frac{\pi}{2}-\alpha) = \cos(\frac{3\pi}{2}-\alpha) = -\sin(\alpha)$

$\tan(\alpha-\frac{3\pi}{2}) = -\tan(\frac{3\pi}{2}-\alpha) = -\cot(\alpha)$



$\cos(\alpha)(-\sin(\alpha)) - (-\cot(\alpha)) = -\frac{3}{5}\times(-1-\frac{4}{3})) + \frac{3}{4} = \frac{3}{4} - \frac{12}{20} = \frac{15-48}{100} = \frac{27}{100}$

۷

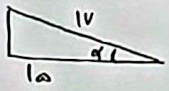
$\sqrt{2}\sin x - \sqrt{2}\cos x = 2(\frac{\sqrt{2}}{2}\sin x - \frac{\sqrt{2}}{2}\cos x) = 2(\cos 45\sin x - \sin 45\cos x)$

$= 2\sin(x-45) \rightarrow \frac{\pi}{12\pi} = \frac{D}{180} = \frac{1}{12} \rightarrow D = 15 \rightarrow 2\sin(x-45) = 2\sin(-30) = -2\sin(30) = -2\times\frac{1}{2} = -1$

$2\cos 4x = 2\cos\frac{\pi}{3} = 2\times\frac{1}{2} = \frac{2}{2} \longrightarrow \frac{2}{2} - 1 = \frac{1}{2}$

۸

$\tan\alpha = \frac{2\tan(\frac{\alpha}{2})}{1-\tan(\frac{\alpha}{2})^2} = \frac{2\times\frac{1}{4}}{1-\frac{1}{16}} = \frac{\frac{1}{2}}{\frac{15}{16}} = \frac{8}{15}$



$\frac{\tan\alpha - \sin\alpha}{\sin\alpha - \cos\alpha} = \frac{\frac{8}{15} - \frac{8}{17}}{\frac{8}{17} - \frac{15}{17}} = \frac{8(\frac{17-15}{2\times 15})}{\frac{-7}{17}} = \frac{\frac{14}{2\times 15}}{\frac{-7}{17}} = \frac{14\times 17}{2\times 15\times(-7)} = \frac{-14}{105}$

۹

$\frac{\cot\alpha}{\sin\alpha} = \frac{\frac{\cos\alpha}{\sin\alpha}}{\sin\alpha} = \frac{\cos\alpha}{\sin^2\alpha} > 0 \longrightarrow \sin^2\alpha > 0 \Rightarrow \cos\alpha > 0$

$2\sin\alpha < \sin 2\alpha \rightarrow 2\sin\alpha - 2\sin\alpha\cos\alpha < 0 \qquad 2\sin\alpha(1-\cos\alpha) < 0$

اگر $(1-\cos\alpha) < 0, \sin\alpha > 0 \rightarrow \cos\alpha > 1$ غ‌ق‌ق

اگر $(1-\cos\alpha) > 0, \sin\alpha < 0 \rightarrow \cos\alpha < 1$ ق‌ق $\rightarrow \begin{matrix}\cos\alpha > 0\\ \sin\alpha < 0\end{matrix} \rightarrow$ ناحیه‌ی چهارم

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