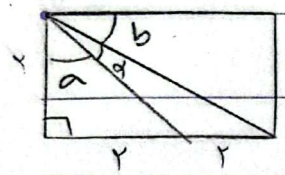
Year: Month: Day: ۲۵ Subject:

۱- مساحت $= \frac{1}{2} \times a \times b \times \sin\alpha = \frac{1}{2} \times 2 \times 2\sqrt{3} \times \sin\alpha = \frac{\pi}{3} \rightarrow \sin\alpha = \frac{\sqrt{3}}{2}$

$\alpha = \frac{\pi}{3}, \frac{2\pi}{3} \rightarrow$ دو زاویه ✓

۲- چهارضلعی مستطیل:

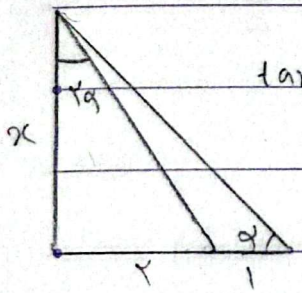


$\alpha + a + b = 90 \rightarrow \alpha = 90 - (a+b)$

$\tan a = \frac{2}{2} = 1 \quad , \quad \tan b = \frac{1}{2}$

$\cot\alpha = \cot\left(\frac{\pi}{2} - (a+b)\right) = \tan(a+b) = \frac{\tan a + \tan b}{1 - \tan a \cdot \tan b} = \frac{\frac{3}{2}}{\frac{1}{2}} = 3$ ✓

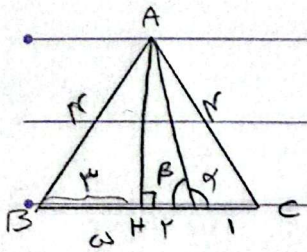
۳-



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

$3x^2 = 9 - x^2 \rightarrow x = \frac{3}{2} \quad \cot\alpha = \frac{3}{x} = \frac{3}{\frac{3}{2}} = 2$ ✓

۴- تساوی الساقین بس میانه و ارتفاع یکی هستند.



$\triangle AHC: 9 + AH^2 = 16 \rightarrow AH = \sqrt{7}$

$\tan\alpha = -\tan(\beta) = -\tan(180 - \alpha) = -\frac{\sqrt{7}}{2}$ ✓

۵- $\sin^2 x + \sin^2 x + \cos^2 x = \frac{4}{3} \rightarrow \sin^2 x = \frac{1}{3} \rightarrow \cos^2 x = 1 - \frac{1}{3} = \frac{2}{3}$

$\rightarrow \tan^2 x = \frac{\frac{1}{3}}{\frac{2}{3}} = \frac{1}{2}$ ✓

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$$\frac{\sin^2\alpha + 2\cos^2\alpha}{1+\cos^2\alpha} = \frac{\sin^2\alpha + 2 - 2\sin^2\alpha}{1+1-\sin^2\alpha} = \frac{(2-\sin^2\alpha)^2}{(2-\sin^2\alpha)} = 2-\sin^2\alpha \quad -6$$

$$\frac{\cos^2\alpha + 2\sin^2\alpha}{1+\sin^2\alpha} = \frac{\cos^2\alpha + 2 - 2\cos^2\alpha}{1+1-\cos^2\alpha} = \frac{(2-\cos^2\alpha)^2}{2-\cos^2\alpha} = 2-\cos^2\alpha \quad (5)$$

$$2-\sin^2\alpha - 2 + \cos^2\alpha = \cos^2\alpha - \sin^2\alpha = \cos 2\alpha \quad -7$$

$$\sin\left(\frac{9\pi}{2}+\alpha\right) \times \cos\left(\frac{7\pi}{2}-\alpha\right) - \tan\left(9-\frac{3\pi}{2}\right) =$$

$$+\cos\alpha \times -\sin\alpha - \cancel{(-\cot\alpha)} = \frac{-3}{5} \times \frac{4}{5} + \frac{3}{4} = 0,27 \quad (5)$$

$$1+\tan^2\alpha = \frac{1}{\cos^2\alpha} \rightarrow \cos\alpha = \frac{3}{5}, \sin\alpha = \sqrt{1-\cos^2\alpha} = \frac{4}{5}$$

$$\text{مثلثاتی: } \sin x - \cos x = \sqrt{2}\sin\left(x - \frac{\pi}{4}\right) \quad -8$$

$$\sqrt{2}(\sin x - \cos x) = \sqrt{2} \times \sqrt{2} \times \sin\left(\frac{\pi}{12} - \frac{\pi}{6}\right) = 2 \times \sin\left(-\frac{\pi}{4}\right) = -1$$

$$2\cos\left(12 \times \frac{\pi}{12}\right) = 2\cos\left(\frac{\pi}{3}\right) = \frac{3}{2} \quad (2)$$

$$\frac{3}{2} - 1 = \frac{1}{2}$$

$$\sin\alpha = \frac{2\tan\left(\frac{\alpha}{2}\right)}{1+\tan^2\left(\frac{\alpha}{2}\right)} = \frac{\frac{1}{2}}{\frac{17}{14}} = \frac{8}{17}, \cos\alpha = \frac{1-\tan^2\left(\frac{\alpha}{2}\right)}{1+\tan^2\left(\frac{\alpha}{2}\right)} = \frac{\frac{15}{14}}{\frac{17}{14}} = \frac{15}{17} \quad -9$$

$$\Rightarrow \tan\alpha = \frac{\frac{8}{17}}{\frac{15}{17}} = \frac{8}{15} \quad \frac{\tan\alpha - \sin\alpha}{\sin\alpha - \cos\alpha} = \frac{\frac{8}{15} - \frac{8}{17}}{\frac{8}{17} - \frac{15}{17}} = \frac{\frac{14}{255}}{-\frac{7}{17}} = \frac{-14}{105} \quad (4)$$

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$\sin 2\alpha = 2\sin\alpha\cos\alpha \rightarrow 2\sin\alpha < 2\sin\alpha\cos\alpha \xrightarrow{\sin\alpha > 0} \cos\alpha > 1$ ← لا يمكن

(1) $\sin\alpha < 0$ $\cos\alpha < 1$ ✓

$\frac{\cot\alpha}{\sin\alpha} = \frac{\frac{\cos\alpha}{\sin^2\alpha}}{+}$ $> 0 \rightarrow \cos\alpha > 0$ (2)

(1), (2) ← لا يمكن