شماره ۲۷ — یازدهم تیر A — آرین اسلامی

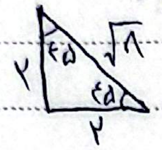
۱ -

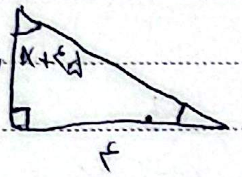
$$\frac{300}{60} = 5$$

قانون سینوس‌ها $= \frac{1}{2} \times 6 \times \sqrt{3} \times \sin\alpha = \frac{9}{2} \rightarrow \sin\alpha = \frac{\sqrt{3}}{2}$ → $\alpha = 60$, $\alpha = 300$

---

۲ -





$$\tan\left(\alpha + \frac{\pi}{4}\right) = +\cot \quad \tan\left(\alpha + \frac{\pi}{4}\right) = ②$$

---

۳ -

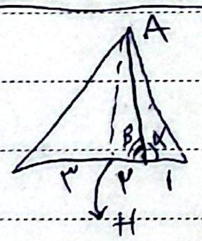
$$\tan\alpha = \frac{x}{3} \quad , \quad \tan 2\alpha = \frac{2}{x}$$

$$\tan 2\alpha = \frac{2\tan\alpha}{1-\tan^2\alpha} \Rightarrow \frac{2}{x} = \frac{2\left(\frac{x}{3}\right)}{1-\left(\frac{x}{3}\right)^2} \Rightarrow \frac{2}{x} = \frac{\frac{2x}{3}}{\frac{9-x^2}{9}} \Rightarrow \frac{2}{x} = \frac{6x}{9-x^2}$$

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

---

۴ -



ارتفاع رسم می‌کنیم و محل برخورد را H می‌گیریم

$$AH = \sqrt{(AC)^2 - (CH)^2} = \sqrt{16-9} = \sqrt{7}$$

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

---

۵ -

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

$$\sin^2 x = \frac{1}{3} \rightarrow \tan^2 = \frac{\sin^2}{\cos^2} = \frac{\sin^2}{1-\sin^2} = \frac{\frac{1}{3}}{\frac{2}{3}} = \frac{1}{2}$$

$$\frac{\sin^4+4\cos^2}{1+\cos^2}-\frac{\cos^4+4\sin^2}{1+\sin^2}$$ ۶

$$\frac{\sin^4+4(1-\sin^2)}{1+(1-\sin^2)}-\frac{\cos^4+4(1-\cos^2)}{1+(1-\cos^2)}$$

$$\frac{\sin^4-4\sin^2+4}{2-\sin^2}-\frac{\cos^4-4\cos^2+4}{2-\cos^2}=\frac{(2-\sin^2)^2}{2-\sin^2}-\frac{(2-\cos^2)^2}{2-\cos^2}$$

$$(2-\sin^2)-(2-\cos^2)=\cos^2-\sin^2=\underline{\cos 2\alpha}$$

$$\sin\left(\frac{9\pi}{2}+\alpha\right)=\sin\left(\frac{\pi}{2}+\alpha\right)=+\cos\alpha$$ ۷

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

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

$$0.27$$

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

فیثاغورث $\rightarrow x=5\rightarrow \cos\alpha=-\frac{3}{5}\rightarrow \sin=-\frac{4}{5},\ \cot\alpha=\frac{3}{4}$

$$3\cos\frac{\pi}{3}+\sqrt{2}\sin\frac{\pi}{12}-\sqrt{2}\cos\frac{\pi}{12}=\frac{3}{2}+\sqrt{2}\left(\sin\frac{\pi}{12}-\cos\frac{\pi}{12}\right)$$ ۸

$$A:\sin\frac{\pi}{12}-\cos\frac{\pi}{12}\xrightarrow{A<0}A^2=\left(\sin\frac{\pi}{12}-\cos\frac{\pi}{12}\right)^2=\sin^2\frac{\pi}{12}+\cos^2\frac{\pi}{12}$$

$$-2\sin\frac{\pi}{12}\cos\frac{\pi}{12}\longrightarrow A^2=1-\sin\frac{\pi}{6}=1-\frac{1}{2}=\frac{1}{2}\rightarrow A=-\frac{1}{\sqrt{2}}$$

$$\frac{3}{2}+\sqrt{2}\left(\sin\frac{\pi}{12}-\cos\frac{\pi}{12}\right)=\frac{3}{2}+\sqrt{2}\times\left(-\frac{1}{\sqrt{2}}\right)=\frac{3}{2}-1=\frac{1}{2}$$

$$\tan\alpha=\frac{2\tan\frac{\alpha}{2}}{1-\tan^2\frac{\alpha}{2}}=\frac{2\left(\frac{1}{4}\right)}{1-\frac{1}{16}}=\frac{\frac{1}{2}}{\frac{15}{16}}=\frac{8}{15}\ \begin{cases}\sin=\frac{8}{17}\\ \cos=\frac{15}{17}\end{cases}$$ ۹

$$\frac{\tan-\sin}{\sin-\cos}=\frac{\frac{8}{15}-\frac{8}{17}}{\frac{8}{17}-\frac{15}{17}}=\frac{\frac{8(17-15)}{15}}{-\frac{7}{17}}=-\frac{16}{105}$$

NOTEBOOK

$2\sin\alpha < \sin 2\alpha \rightarrow 2\sin\alpha < 2\sin\alpha\cos\alpha$ ۱۰ـ

$2\sin\alpha - 2\sin\alpha\cos\alpha < 0 \rightarrow 2\sin\alpha\underbrace{(1-\cos\alpha)}_{\text{همواره مثبت}} < 0$

$\sin\alpha < 0$ ⟶ ربع چهارم
$\cos\alpha > 0$