

۱۲° و ۳۰

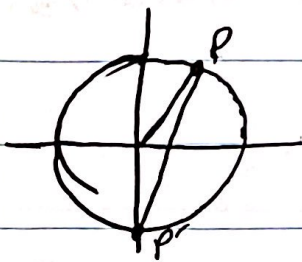
شنتا برای ۲۰

①

$$\frac{a \sin(\frac{5\pi}{6}) + b \cos(\frac{5\pi}{6})}{a \sin(\frac{11\pi}{6}) + b \cos(\frac{11\pi}{6})} = \tan \frac{5\pi}{6} \Rightarrow \frac{-\frac{\sqrt{3}}{2}a - \frac{1}{2}b}{-\frac{1}{2}a + \frac{\sqrt{3}}{2}b} = -\frac{\sqrt{3}}{1} \Rightarrow \frac{a+b}{b-a} = \frac{1}{\sqrt{3}} \Rightarrow \sqrt{3}a + \sqrt{3}b = b-a \Rightarrow 2a = -2b \Rightarrow a = -b \Rightarrow \frac{b}{a} = -1$$

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②



$$\cos \alpha = \frac{1}{\sqrt{2}} \Rightarrow 0^\circ < \alpha < 90^\circ \Rightarrow \alpha = 45^\circ \Rightarrow \alpha + 110^\circ = 155^\circ \Rightarrow P'(\cos 155^\circ, \sin 155^\circ)$$

③

$$\sin \alpha = \frac{1}{\sqrt{2}} \Rightarrow \alpha = 45^\circ \Rightarrow P'(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}})$$

$$PP' = \sqrt{(x_P - x_{P'})^2 + (y_P - y_{P'})^2} = \sqrt{(\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}})^2 + (\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}})^2} = \sqrt{0 + 0} = 0$$

$$= \sqrt{\frac{1}{2} + (\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}})^2} = \sqrt{\frac{1}{2} + 2} = \sqrt{\frac{5}{2}} = \frac{\sqrt{10}}{2}$$

$$\Rightarrow PP' = \frac{1 + \sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2} + \sqrt{2}}{2} = \frac{2\sqrt{2}}{2} = \sqrt{2}$$

④

$$\frac{\pi}{9} = \frac{\text{Degree}}{180} \Rightarrow \text{Deg} = 20^\circ$$

⑤

③ ابتدا از مکان را به درجه تبدیل می‌کنیم

در دایره ۳۶۰ درجه است ۴:۳۰ عقربه ساعت‌شمار ۱۵ درجه از ۱۲ به ۱ درجه ۱۵ دقیقه (۱۵ درجه و ۳۰ دقیقه) در دایره ۳۶۰ درجه است

$$\frac{M}{2} = 20^\circ \Rightarrow M = 40' \Rightarrow \boxed{4:40' \text{ ساعت}}$$

تفاوت این ساعت ۴:۴۰ دایره:

$$\alpha = \left| \frac{11}{2}M - 30H \right| \Rightarrow 20^\circ = \left| \frac{11}{2}M - 30(3) \right| = \left| \frac{11}{2}M - 90 \right|$$

⑥

$$\Rightarrow \left\{ \begin{array}{l} 20^\circ = \frac{11}{2}M - 90 \Rightarrow \frac{11}{2}M = 110 \Rightarrow \boxed{M = 20'} \\ 20^\circ = 90 - \frac{11}{2}M \Rightarrow \frac{11}{2}M = 70 \Rightarrow M = \frac{140}{11} = 12 \frac{8}{11} \end{array} \right.$$

⑦

$$\Rightarrow \frac{11}{2}M - 90 = -20 \Rightarrow \frac{11}{2}M = 70 \Rightarrow M = \frac{140}{11} = 12 \frac{8}{11} \rightarrow \text{نادرست}$$



$$\Rightarrow \frac{-\pi}{2} < \theta < \frac{\pi}{2} \Rightarrow -\frac{1}{2} < \sin \theta < \frac{1}{2} \Rightarrow -\frac{1}{2} < \frac{m-1}{2} < \frac{1}{2} \Rightarrow -\frac{1}{2} < m-1 < \frac{1}{2}$$

$$\Rightarrow \frac{1}{2} < m < \frac{3}{2} \rightarrow m = \{1, 2, 3, 4, 5, 6, 7, 8\} \rightarrow \boxed{\text{مجموعه } m}$$

$$\tan 10^\circ = \frac{1}{k} \Rightarrow \frac{\sin 10^\circ}{\cos 10^\circ} = \frac{1}{k} \Rightarrow \cos 10^\circ = k \sin 10^\circ$$

$$= \frac{\sin(90^\circ + 10^\circ) + k \cos(90^\circ - 10^\circ)}{\cos(110^\circ - 10^\circ) + k \sin(110^\circ + 10^\circ)} = \frac{\cos 10^\circ - k \sin 10^\circ}{-\cos 10^\circ - k \sin 10^\circ} = \frac{k \sin 10^\circ - k \sin 10^\circ}{-k \sin 10^\circ - k \sin 10^\circ}$$

$$= \frac{(1-k) \sin 10^\circ}{-2k \sin 10^\circ} = \frac{1-k}{-2k} = \frac{1}{2} \Rightarrow 1-k = 1 \Rightarrow \boxed{k=2}$$

$$\frac{1 - \cos \theta}{1 + \cos \theta} = \frac{1}{2} \Rightarrow 1 - \cos \theta = \frac{1}{2}(1 + \cos \theta) \Rightarrow \frac{1}{2} = \cos \theta \Rightarrow \cos \theta = \frac{1}{2} \Rightarrow \theta = 60^\circ$$

$$\Rightarrow \frac{1}{\cos \theta} = 2 \Rightarrow 1 + \tan^2 \theta = 4 \Rightarrow \tan^2 \theta = 3 \Rightarrow \tan \theta = \sqrt{3} \Rightarrow \cot \theta = \frac{1}{\sqrt{3}}$$

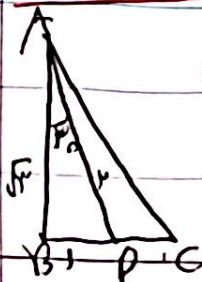
$$\frac{\tan(\frac{\pi}{4} - \theta) - \cot(\pi - \theta)}{\cot(\frac{\pi}{4} - \theta) + \tan(\pi - \theta)} = \frac{\cot \theta - (-\cot \theta)}{\tan \theta - \cot \theta} = \frac{2 \cot \theta}{-\tan \theta} = -2 \cot^2 \theta = -2 \left(\frac{1}{\sqrt{3}}\right)^2 = -\frac{2}{3}$$

$$\frac{10\pi}{180} = \frac{\text{Rad}}{\pi} \Rightarrow \text{Rad} = \frac{3\pi}{20}$$

$$l = R\theta$$

① ابتدا زاویه 10° را به رادیان تبدیل می‌کنیم

$$\begin{aligned} \text{طول کمان } A &= R_A \times \frac{3\pi}{20} \\ \text{طول کمان } B &= R_B \times \frac{9\pi}{10} \\ \Rightarrow \frac{S_A}{S_B} &= \frac{9}{1} \end{aligned}$$



$$\sin 30^\circ = \frac{BD}{AD} = \frac{1}{2} \Rightarrow AD = 2, \cos 30^\circ = \frac{AB}{AD} = \frac{\sqrt{3}}{2} \Rightarrow AB = \sqrt{3}$$

$$S_{ABC} = \frac{1}{2} \times \sqrt{3} \times BC = \sqrt{3} \Rightarrow BC = 2 \Rightarrow AC^2 = (AB)^2 + (BC)^2 = 3 + 4 = 7 \Rightarrow AC = \sqrt{7}$$

$$\Rightarrow \sin \hat{C} = \frac{AB}{AC} = \frac{\sqrt{3}}{\sqrt{7}}, \cos \hat{C} = \frac{BC}{AC} = \frac{2}{\sqrt{7}} \Rightarrow \sin \hat{C} = \frac{\sqrt{3}}{\sqrt{7}}, \cos \hat{C} = \frac{2}{\sqrt{7}}$$

$$\Rightarrow \sin \hat{C} = \frac{\sqrt{3}}{\sqrt{7}} \Rightarrow \boxed{\frac{\sqrt{3}}{\sqrt{7}}}$$

$$EH \perp AD, CD \perp AD \Rightarrow EH \parallel CD \xrightarrow{\text{قصد ثالث}} \frac{EH}{ND} = \frac{AH}{AD} \Rightarrow \frac{EH}{y} = \frac{y}{y} \Rightarrow EH = \frac{y}{y} \quad (10)$$

$$\tan \alpha = \frac{\frac{y}{y}}{y} = \frac{y}{y}, \quad \tan(\alpha + \theta) = \frac{y}{y} \quad (\text{رابطه تانژانت})$$

$$\tan(\alpha + \theta) = \frac{\tan \alpha + \tan \theta}{1 - \tan \alpha \tan \theta} \Rightarrow \frac{\frac{y}{y} + \tan \theta}{1 - \frac{y}{y} \tan \theta} = \frac{y}{y} \Rightarrow \frac{y}{y} + \tan \theta = \frac{y}{y} - \tan \theta \quad (2)$$

$$\Rightarrow y \tan \theta = \frac{y}{y} - \frac{y}{y} = \frac{0}{y} \Rightarrow \tan \theta = \frac{0}{y} \Rightarrow \cot \theta = \frac{y}{0} \Rightarrow 1 + \cot^2 \theta = \frac{1}{\sin^2 \theta}$$

$$\Rightarrow 1 + \frac{y^2}{y^2} = \frac{y^2}{y^2} = \frac{1}{\sin^2 \theta} \Rightarrow \sin^2 \theta = \frac{y^2}{y^2} \Rightarrow \sin \theta = \pm \frac{y}{y}$$

$\alpha + \theta < 90^\circ$
 کوسین از ضلع مجاور
 مربع (90°)

