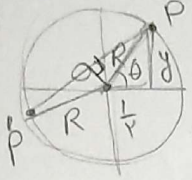


$$\frac{a \sin \frac{\sqrt{3}\pi}{4} + b \cos \frac{\sqrt{3}\pi}{4}}{a \sin \frac{\pi}{4} + b \cos \frac{\pi}{4}} = \frac{-\frac{\sqrt{3}}{2}a + \frac{\sqrt{3}}{2}b}{-\frac{1}{2}a + \frac{1}{2}b} = \frac{\sqrt{3}}{1} \Rightarrow \frac{-\sqrt{3}(a+b)}{\frac{1}{2}(b-a)}$$

$$\Rightarrow \frac{a+b}{b-a} = \frac{1}{\sqrt{3}} \Rightarrow \sqrt{3}a + \sqrt{3}b = b - a \Rightarrow 4b = -4a \Rightarrow \frac{b}{a} = -1$$

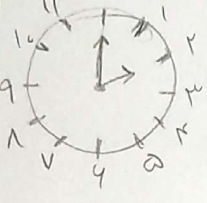


$\cos \theta = \frac{1}{2} \Rightarrow y = \frac{\sqrt{3}}{2}, \theta = 60^\circ \Rightarrow \theta' = 60^\circ - 21^\circ = 39^\circ \Rightarrow \theta' = 21^\circ$

$\sin \theta = \frac{\sqrt{3}}{2}$

$\Rightarrow \Delta \theta = 110^\circ - 40^\circ = 70^\circ \Rightarrow PP' = \sqrt{1 + 1 + 2 \cdot \frac{\sqrt{3}}{2}} \Rightarrow PP' = \sqrt{2 + \sqrt{3}}$

$\Rightarrow PP' = 2 + \sqrt{2 + \sqrt{3}}$



بین هر دو عدد ساعت $\frac{\pi}{6}$ است $\left[\frac{2\pi}{12} = \frac{\pi}{6} \right]$

$\frac{\pi}{9} = \frac{2}{3} \times \frac{\pi}{6}$

را (دقیقه) را می گردانیم $\Rightarrow \frac{2}{3} \times 2\pi \Rightarrow \frac{4\pi}{3} \Rightarrow$

که روی عدد ۸ می ایستد $\Rightarrow 2:40$

$M = 3 \Rightarrow \left| \frac{1}{2}M - 3H \right| = \left| \frac{1}{2}M - 90 \right| = 40 \Rightarrow \begin{cases} 11M - 180 = 40 \Rightarrow 11M = 220 \Rightarrow M = 20 \\ 11M + 180 = 40 \Rightarrow 11M = -140 \Rightarrow M = -\frac{140}{11} \end{cases}$

$\Rightarrow \frac{140}{11} < 20^\circ \Rightarrow$ دفعی دوم 20° دقیقه است

$-\frac{\pi}{6} < \alpha < \frac{5\pi}{6} \Rightarrow \sin \alpha = \frac{m-3}{5} \Rightarrow -\frac{1}{2} < \sin \alpha < 1 \Rightarrow -\frac{1}{2} < \frac{m-3}{5} < 1$

$\Rightarrow -\frac{5}{2} < m-3 < 5 \Rightarrow -\frac{1}{2} < m < 1 \Rightarrow D_m = \left(-\frac{1}{2}, 1 \right]$

$$\frac{\sin(10^\circ) + k \cos(140^\circ)}{\cos(140^\circ) + r \sin(190^\circ)} = r \Rightarrow \frac{+ \cos 10^\circ + k \sin 10^\circ}{- \cos 10^\circ - r \sin 10^\circ}$$

$$\tan 10^\circ = 0.176 \Rightarrow \frac{+1 - 0.176k}{-1 - 0.3} = r \Rightarrow -r \cdot 0.3 = +1 - 0.176k$$

$$\Rightarrow -0.3 = -0.176k \Rightarrow k = 1.7$$

$$\frac{1 - \cos \theta}{1 + \cos \theta} = r \Rightarrow r + r \cos \theta = 1 - \cos \theta \Rightarrow \boxed{\cos \theta = -\frac{1}{r}} \Rightarrow \sin \theta = \frac{\sqrt{r^2 - 1}}{r}$$

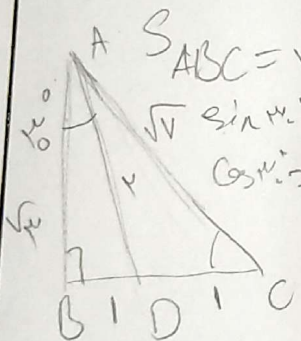
$$\frac{\tan(\frac{\pi}{2} - \alpha) - \cot(\pi - \alpha)}{\cot(\frac{\pi}{2} - \alpha) + r \tan(\pi - \alpha)} = \frac{\cot \alpha + \cot \alpha}{\tan \alpha - r \tan \alpha} = \frac{r \cot \alpha}{-\tan \alpha} = \frac{r \cos^2 \alpha}{\sin^2 \alpha}$$

$$\Rightarrow -\frac{r}{1} = \left(-\frac{1}{r}\right)$$

$$\frac{101}{140} = \frac{R}{\pi} \Rightarrow \boxed{R = \frac{4\pi}{10}} \Rightarrow R_1 \alpha_1 = R_2 \alpha_2 \Rightarrow \frac{4\pi}{10} \times R_1 = \frac{4\pi}{10} R_2$$

$$\Rightarrow \frac{R_1}{R_2} = \frac{1}{r} \Rightarrow \frac{S_1}{S_2} = \frac{\frac{1}{2} R_1^2}{\frac{1}{2} R_2^2} \Rightarrow \left(\frac{1}{r}\right)^2 = \frac{1}{9} \Rightarrow \boxed{\frac{S_2}{S_1} = 9}$$

$S_{ABC} = \sqrt{r} \Rightarrow \frac{AB \times BC}{2} \Rightarrow \frac{\sqrt{r} \times (1 + a)}{2} = \sqrt{r} \Rightarrow 1 + a = 2 \Rightarrow a = 1$
 $\sqrt{r} \sin \alpha = \frac{1}{r} \Rightarrow \sin \alpha = \frac{1}{\sqrt{r}}$
 $\cos \alpha = \frac{\sqrt{r-1}}{r} \Rightarrow \sin \alpha \cos \alpha = \frac{1}{r} \times \frac{\sqrt{r-1}}{r} = \frac{\sqrt{r-1}}{r^2}$



$MN = \sqrt{r}$
 $\hookrightarrow MN^2 = AN^2 + AM^2 - 2AN \times AM \times \cos \theta$
 $r = 1 + 1 - 2\sqrt{1} \times \sqrt{1} \times \cos \theta \Rightarrow \cos \theta = \frac{1}{2}$
 $\Rightarrow \cos \theta = \frac{1}{2} \Rightarrow \cos^2 \theta + \sin^2 \theta = 1 \Rightarrow \sin^2 \theta = \frac{3}{4} \Rightarrow \sin \theta = \frac{\sqrt{3}}{2}$
 $\Rightarrow \boxed{\sin \theta = \frac{\sqrt{3}}{2}}$

