

الف) $\alpha = \frac{1}{2} \times \frac{\pi}{180} = \frac{\pi}{360} \Rightarrow 1^\circ = \frac{\pi}{180} \text{ rad}$

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ج) $\alpha = \frac{\omega \pi}{12} \times \frac{180}{\pi} = 15^\circ \Rightarrow \frac{\omega \pi}{12} \text{ rad} = 15^\circ$

د) $\alpha = \frac{15\pi}{4} \times \frac{180}{\pi} = 112.5^\circ \Rightarrow \frac{15\pi}{4} \text{ rad} = 112.5^\circ$

$\frac{G}{180} = \frac{D}{180} \Rightarrow D = \frac{9}{10} G = \frac{9}{10} \times \frac{180a}{9} = 18a^\circ$

$\frac{\text{Rad}}{\pi} = \frac{D}{180} \Rightarrow D = \frac{180}{\pi} \text{ Rad} = \frac{180}{\pi} \times \frac{a\pi}{180} = 18a^\circ$

$10a + 18a + 18a = 180^\circ \Rightarrow 46a = 180^\circ \Rightarrow a = 4^\circ$

الف) $\cos 40^\circ = \sin 50^\circ$, $\sin 40^\circ = \cos 50^\circ \Rightarrow$

$\frac{\cos 40^\circ \cos 30^\circ - \sin 40^\circ \sin 30^\circ}{\sin 30^\circ \cos 30^\circ} = \frac{-1}{1} = -1$

ب) $\tan 40^\circ = \cot 50^\circ = \frac{\cos 50^\circ}{\sin 50^\circ} = \frac{\sin 40^\circ}{\cos 40^\circ} = \sqrt{r}$
 $\Rightarrow \frac{(\frac{\sqrt{r}}{r})^2 + 1 + (\sqrt{r})^2}{\sqrt{r} - \sqrt{r}} = \frac{\frac{1}{r} + 1 + r}{\sqrt{r}(1 - \frac{1}{r})} = \frac{1}{\sqrt{r} \times \frac{r-1}{r}} = \frac{1 \times \sqrt{r}}{r-1} = \frac{1 \times \sqrt{r}}{r-1}$

$\left. \begin{array}{l} \cos 40^\circ = \sin 50^\circ \\ \cos 50^\circ = \sin 40^\circ \end{array} \right\} \Rightarrow -\sin^2 50^\circ + \sin^2 40^\circ = \sin^2 \theta \Rightarrow \sin^2 \theta = -\frac{1}{4} + \frac{1}{4} = 0$

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

$\tan \theta = \frac{1}{\sqrt{3}} \Rightarrow \theta = 30^\circ$

$\cot 40^\circ = \tan 50^\circ \Rightarrow 1 - \cot^2 40^\circ = 1 - \tan^2 50^\circ \Rightarrow$

$\frac{1 - \tan^2 50^\circ}{1 + \tan^2 50^\circ} = \tan \theta \Rightarrow \tan \theta = \frac{1 - \tan^2 50^\circ}{1 + \tan^2 50^\circ} = \frac{1 - \frac{1}{r}}{1 + \frac{1}{r}} = \frac{r-1}{r+1}$

$1 + \tan^2 \theta = \frac{1}{\cos^2 \theta} \Rightarrow r = \frac{1}{\cos^2 \theta} \Rightarrow \cos^2 \theta = \frac{1}{r} \Rightarrow \cos \theta = \frac{1}{\sqrt{r}}$

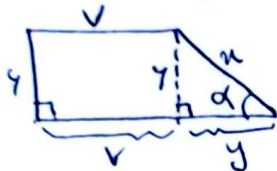
$\sin^2 \theta = 1 - \cos^2 \theta \Rightarrow \sin^2 \theta = 1 - \frac{1}{r} = \frac{r-1}{r} \Rightarrow \sin \theta = \frac{\sqrt{r-1}}{\sqrt{r}} \Rightarrow \theta = 40^\circ$

$\frac{D}{180} = \frac{\text{Rad}}{\pi} \Rightarrow \frac{4^\circ}{180} = \frac{\text{Rad}}{\pi} \Rightarrow 4^\circ = \frac{\pi}{45} \text{ Rad}$

$$\tan \theta = \omega \Rightarrow \frac{\sin \theta}{\cos \theta} = \omega \Rightarrow \sin \theta = \omega \cos \theta \Rightarrow$$

$$\frac{4 \sin \theta - \cos \theta}{\sin \theta - 4 \cos \theta} = \frac{10 \cos \theta - \cos \theta}{5 \cos \theta - 4 \cos \theta} = \frac{1 \cancel{\cos \theta}}{\cancel{\cos \theta}} = 1$$

(۲) ✓

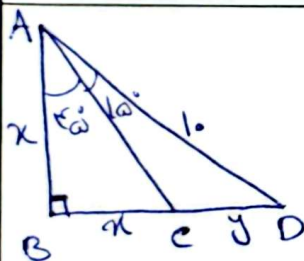


$$\sin \alpha = \frac{4}{10} = \frac{4}{10} \Rightarrow \alpha = 10$$

$$y^2 = 10^2 - 4^2 = 8^2 \Rightarrow y = 8$$

$$P = V + 10 + 8 + V + 4 = 32$$

(۲) ✓



$$\tan 40^\circ = 1 \Rightarrow AB = BC = x$$

$$\tan 40^\circ = \frac{\sin 40^\circ}{\cos 40^\circ} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3} \Rightarrow \frac{x+y}{x} = \sqrt{3}$$

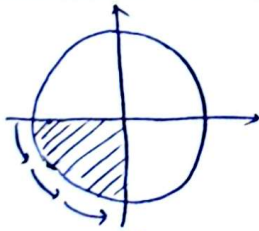
$$\Rightarrow x+y = \sqrt{3}x$$

$$x^2 + (x+y)^2 = 10^2 \Rightarrow x^2 + 3x^2 = 100 \Rightarrow 4x^2 = 100 \Rightarrow x = 5$$

$$DC = y = x(\sqrt{3}-1) = 5(\sqrt{3}-1) = 5\sqrt{3}-5$$

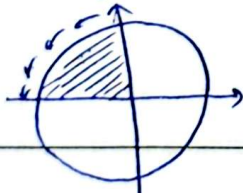
(۲) ✓

الف)



الف) در ناصیه سوم با اتراین θ ، مقدار $\sin$ کاهش و $\cos$ اتراین بسیار می‌کند.

ب)



ب) در ناصیه دوم با اتراین θ ، مقدار $\sin$ و $\cos$ هر دو کاهش بسیار می‌کند.

(۲) ✓

$$\tan x = \frac{1}{3}$$

$$\cos^2 x = \frac{9}{10}$$

$$1 + \tan^2 x = \frac{1}{\cos^2 x} \Rightarrow 1 + \frac{1}{9} = \frac{1}{\cos^2 x} \Rightarrow$$

$$\sin^2 x = 1 - \cos^2 x = 1 - \frac{9}{10} = \frac{1}{10} \xrightarrow{\text{در ناصیه سوم سینس مثبت است}} \sin x = \frac{1}{\sqrt{10}}$$

$$\sin x = -\frac{1}{\sqrt{10}} = -\frac{\sqrt{10}}{10}$$

(۲) ✓