

الف) $120^\circ = (x) \text{ Rad} \rightarrow x = \frac{120\pi}{180} \text{ Rad}$

ب) $110^\circ = (x) \text{ Rad} \rightarrow x = \frac{110\pi}{180} \text{ Rad}$

ج) $\frac{5\pi}{12} \text{ Rad} = (x)^\circ \rightarrow x = 75^\circ$

د) $\frac{5\pi}{9} \text{ Rad} = (x)^\circ \rightarrow x = 100^\circ$

$\frac{120a}{9} = \frac{D}{110} \rightarrow \frac{5a}{12} = \frac{D}{110} = 120a$
 $\frac{a\pi}{1} = \frac{a\pi}{120} = \frac{a}{120} = \frac{D}{110} \rightarrow D = 120a$
 $120a + 120a + 10a = 80a$
 $80a = 110^\circ \rightarrow a = 1.375^\circ$

الف) $\cos 40^\circ \cos 30^\circ - \sin 40^\circ \sin 30^\circ - \tan 40^\circ + \cot 40^\circ =$
 $\frac{1}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \times \frac{1}{2} - 1 + 1 = 0$

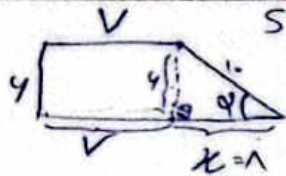
ب) $\frac{\tan^2 30^\circ + \tan^2 45^\circ + \tan^2 60^\circ}{\cot^2 30^\circ - \cot^2 45^\circ} = \frac{\frac{1}{3} + 1 + 3}{\sqrt{3} - \frac{1}{\sqrt{3}}} = \frac{1+3+9}{\frac{3}{\sqrt{3}}} = \frac{13}{\sqrt{3}} = \frac{13\sqrt{3}}{3}$

$-\sin 30^\circ \cos 40^\circ + \cos 30^\circ \sin 40^\circ = \sin^2 \theta$
 $-\frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = \sin^2 \theta$
 $-\frac{1}{4} + \frac{3}{4} = \frac{2}{4} = \frac{1}{2} = \sin^2 \theta \rightarrow \sin^2 \theta + \cos^2 \theta = 1 \rightarrow \frac{1}{2} + \cos^2 \theta = 1 \rightarrow \cos^2 \theta = \frac{1}{2}$
 $\tan \theta = \frac{\sin}{\cos} = \pm 1$
 چون زاویه حاده است فقط مثبت جواب است

$\frac{r \tan 30^\circ (1 - \tan^2 30^\circ)}{(1 - \cot^2 40^\circ)^2} = \frac{r \times \frac{1}{\sqrt{3}} (1 - \frac{1}{3})}{(\frac{2}{\sqrt{3}})^2} = \frac{r \times \frac{2}{3}}{\frac{4}{3}} = \frac{r}{2}$
 $\rightarrow \tan \theta = \sqrt{3} \rightarrow 1 + \tan^2 = \frac{1}{\cos^2} \rightarrow \frac{4}{3} = \frac{1}{\cos^2} \rightarrow \cos = \frac{1}{2}$
 $1 + \cot^2 = \frac{1}{\sin^2} \rightarrow \frac{4}{3} = \frac{1}{\sin^2} \rightarrow \sin = \frac{\sqrt{3}}{2}$
 $\frac{40^\circ}{180^\circ} = \frac{\text{Rad}}{\pi} \rightarrow \text{Rad} = \frac{40\pi}{180} = \frac{2\pi}{9}$

$$\frac{r \sin \theta - \cos \theta}{\sin \theta - \epsilon \cos \theta} = ? \quad \text{و} \quad \tan \theta = \alpha \rightarrow \frac{\sin \theta}{\cos \theta} = \alpha \rightarrow \sin \theta = \alpha \cos \theta$$

$$\rightarrow \frac{r(\alpha \cos \theta) - \cos \theta}{\alpha \cos \theta - \epsilon \cos \theta} = \frac{1 \alpha \cos \theta - \cos \theta}{\cos \theta} = \frac{1 \epsilon \cos \theta}{\cos \theta} = 1 \epsilon$$

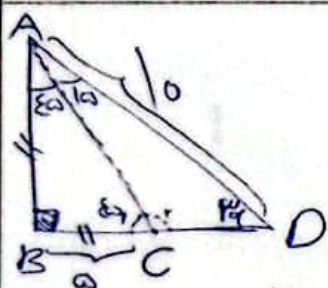


$$\sin \theta = \frac{y}{10} \rightarrow \frac{\text{ضلع مقابل}}{\text{وتر}} = \frac{y}{10} \rightarrow y = 10$$

$$x^2 + y^2 = 10^2 \rightarrow x^2 = 100 - 100$$

$$x^2 = 4 \epsilon \rightarrow x = 2$$

$$P_{\text{زیاده}} = y + v + x + 10 + v = 14$$



$$C_1 = 90^\circ - \epsilon \alpha^\circ = \epsilon \alpha^\circ$$

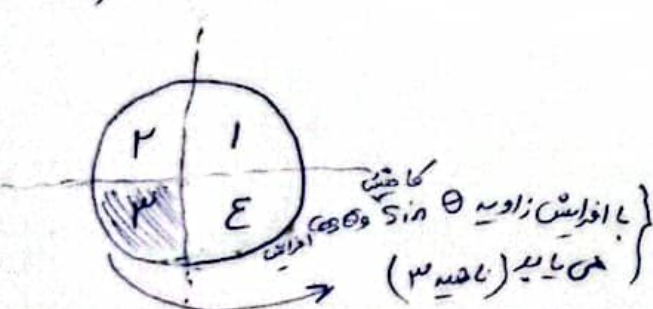
$$D = (90 + 40) = 130 \quad 110 - 130 = 20 \quad \left. \begin{array}{l} \text{در مثل قائم الزاویه مثلث} \\ \text{با وتر 100 و ضلع مقابل 10} \end{array} \right\} \rightarrow AD = 10 \rightarrow AB = a$$

$$BC = AB \rightarrow BC = a$$

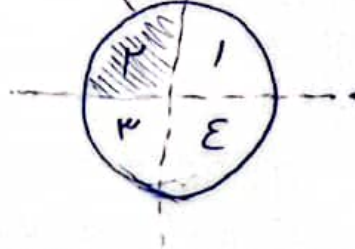
$$AD^2 = AB^2 + BD^2 \rightarrow 100 = 100 + BD^2 \rightarrow BD = \sqrt{100} = 10 \rightarrow CD = BD - BC$$

$$10 - a = a(\sqrt{3} - 1) \rightarrow \text{جواب}$$

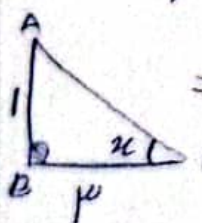
الف)



ب) با افزایش زاویه Sin و Cos کاهش می یابند (تایید می شود)



$$\tan x = \frac{1}{3} \rightarrow \frac{\text{ضلع مقابل}}{\text{ضلع مجاور}} \rightarrow$$



$$\Rightarrow AC^2 = 1^2 + 3^2 = 10 \rightarrow AC = \sqrt{10}$$

$$\sin x = \frac{1}{\sqrt{10}} \rightarrow \text{چون در نامعین است}$$