

الف) $27^\circ = (n) \text{ rad}$ $27 \times \frac{\pi}{180} \Rightarrow \frac{3\pi}{20} = n$

ب) $120^\circ = (n) \text{ rad}$ $120 \times \frac{\pi}{180} \Rightarrow \frac{2\pi}{3} = n$

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

د) $\frac{5\pi}{4} \text{ rad} = (n)^\circ$ $\frac{5\pi}{4} \times \frac{180}{\pi} \Rightarrow 225 = n$

(2)

$\frac{a\pi}{1} \times \frac{180}{\pi} = \frac{a \times 180}{1}$

$\frac{60a}{1} + \frac{20a}{1} + \frac{40a}{1} = 180 \Rightarrow 120a = 180 \Rightarrow a = \frac{180}{120} = 1.5$

$\frac{120a}{1} = \frac{180}{1} \Rightarrow \frac{120 \times 1.5}{1} = \frac{180}{1}$

$60a = 180$

$a = \frac{180}{60} \Rightarrow a = 3$

(3)

الف) $\cos 40^\circ \cos 50^\circ - \sin 40^\circ \sin 50^\circ - \tan 60^\circ + \cot 60^\circ = \left(\frac{1}{2} \times \frac{\sqrt{3}}{2}\right) - \left(\frac{\sqrt{3}}{2} \times \frac{1}{2}\right) - 1 + 1 = 0$

$\frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} - 1 + 1 = 0$

ب) $\frac{\tan^2 30^\circ + \tan^2 60^\circ + \tan^2 40^\circ}{\cot 30^\circ - \cot 40^\circ} = \frac{\left(\frac{1}{\sqrt{3}}\right)^2 + 1^2 + (\sqrt{3})^2}{\sqrt{3} - \frac{1}{\sqrt{3}}} = \frac{\frac{1}{3} + 1 + 3}{\frac{\sqrt{3}-1}{\sqrt{3}}} = \frac{\frac{4}{3}}{\frac{\sqrt{3}-1}{\sqrt{3}}} = \frac{4\sqrt{3}}{3(\sqrt{3}-1)}$

$\frac{4\sqrt{3}}{3(\sqrt{3}-1)} \Rightarrow \frac{4\sqrt{3} \times \sqrt{3}}{3(\sqrt{3}-1) \times \sqrt{3}} = \frac{4 \times 3}{3(\sqrt{3}-1) \times \sqrt{3}} = \frac{4}{\sqrt{3}-1} = \frac{4(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)} = \frac{4(\sqrt{3}+1)}{3-1} = 2(\sqrt{3}+1)$

$-\sin 30^\circ \cos 40^\circ + \cos 30^\circ \sin 40^\circ = \sin \theta$

$\tan \theta = ?$

$\left(-\frac{1}{2} \times \frac{1}{2}\right) + \left(\frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}\right) = -\frac{1}{4} + \frac{3}{4} = \frac{2}{4} = \frac{1}{2} \Rightarrow \frac{1}{2} = \sin \theta \Rightarrow \sin \theta = \pm \frac{1}{2}$

چون نکتہ حادہ پس فقط $+\frac{1}{2}$ قبول و نتیجہ زاویہ حادہ $\sin \theta = \frac{1}{2}$ اس سے زیادہ 60° اور کم 30° اس سے بڑا نہیں

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

(4)

$\frac{\tan 30^\circ (1 - \tan^2 40^\circ)}{(1 - \cot^2 40^\circ)} = \tan \theta \Rightarrow \frac{\frac{1}{\sqrt{3}} \left(1 - \frac{1}{3}\right)}{\left(1 - \frac{1}{3}\right)} = \frac{\frac{1}{\sqrt{3}} \left(\frac{2}{3}\right)}{\left(\frac{2}{3}\right)} = \frac{1}{\sqrt{3}}$

$\cot 40^\circ = \frac{1}{\tan 40^\circ} \Rightarrow \frac{1}{\tan 40^\circ} = \frac{1}{\sqrt{3}} \Rightarrow \tan 40^\circ = \sqrt{3} \Rightarrow \theta = 60^\circ$

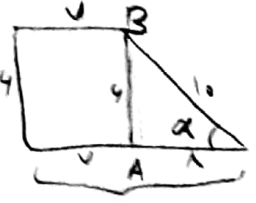
$40 \times \frac{\pi}{180} = \frac{2\pi}{9}$

$$\tan \theta = \omega \Rightarrow \frac{\sin \theta}{\cos \theta} = \omega \Rightarrow \frac{3 \sin \theta - \cos \theta}{\sin \theta - 4 \cos \theta} \Rightarrow \frac{3x(\omega \cos \theta) - \cos \theta}{\omega \cos \theta - 4 \cos \theta} = \frac{1 - \cos \theta}{\cos \theta} = \frac{4}{1-4} = \frac{4}{-3}$$

$\sin \theta = \omega \cos \theta$ ← جایگزینی

$$\sin \alpha = \frac{4}{10} \quad P_{\sin} = ? \quad \sin \alpha = \frac{AB}{BC} = \frac{4}{10} \Rightarrow \frac{4}{BC} = \frac{4}{10} \Rightarrow BC = \frac{4 \times 10}{4} = 10$$

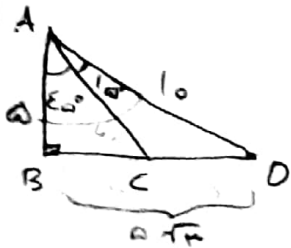
$BC = 10$



$AB = 4$
 $AC^2 = 100 - 34 \Rightarrow AC^2 = 66 \Rightarrow AC = \sqrt{66}$

دورانی $P = 10 + 10 + 4 + 4 = 38$

دورانی $P = ?$



$$\sin 45^\circ = \frac{\sqrt{2}}{2} = \frac{BD}{10} \Rightarrow BD = \frac{10 \cdot \sqrt{2}}{2} = 5\sqrt{2}$$

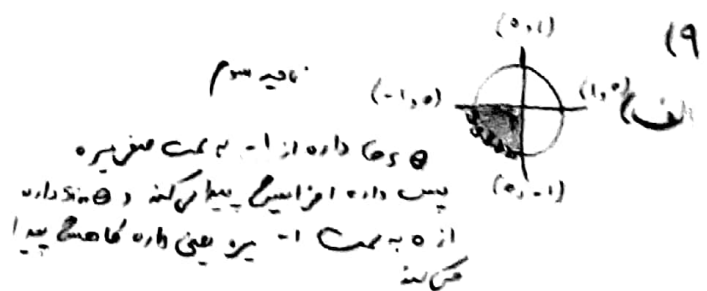
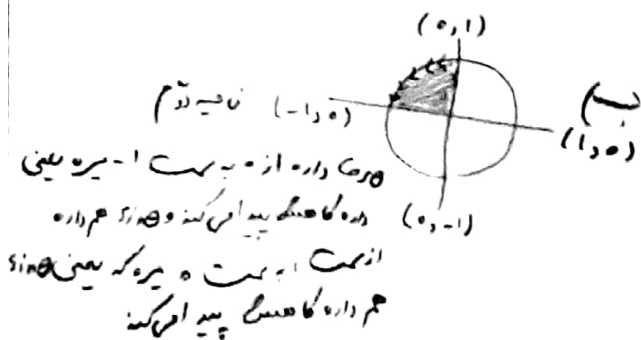
$$AB^2 = 100 - (\omega \times \omega) \Rightarrow 100 - \omega^2 \Rightarrow AB^2 = \omega^2 \Rightarrow AB = \omega$$

$$\cos 45^\circ = \frac{\sqrt{2}}{2} = \frac{\omega}{AC} \Rightarrow AC = \frac{10}{\sqrt{2}} \rightarrow 5\sqrt{2}$$

$$\sin 45^\circ = \frac{\sqrt{2}}{2} = \frac{BC}{\omega \sqrt{2}} \Rightarrow BC = \omega$$

$BC = \omega$

$DC = \omega(\sqrt{2} - 1)$



$\tan \alpha = \frac{1}{3}$ $\sin \alpha = ?$
 $\Rightarrow 3 \sin \alpha = \cos \alpha$



$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$\sin^2 \alpha + 9 \sin^2 \alpha = 1 \Rightarrow 10 \sin^2 \alpha = 1 \Rightarrow \sin^2 \alpha = \frac{1}{10} \Rightarrow \sin \alpha = \frac{1}{\sqrt{10}}$$

$\frac{1}{\sqrt{10}}$

چون $\sin \alpha$ منفی باشد $\Rightarrow \frac{1}{\sqrt{10}}$