

$$\text{الف) } \frac{r\omega}{180} = \frac{?}{\pi} \quad ? = \frac{r\omega\pi}{180} = \frac{3\pi}{20}$$

$$\text{ب) } \frac{11\omega}{180} = \frac{?}{\pi} \rightarrow \frac{11\omega\pi}{180} = \frac{r\omega\pi}{36}$$

$$\text{ج) } \frac{\omega r}{12} = \frac{?}{180} \rightarrow \frac{180 \times \omega}{12} = 15^\circ$$

$$\text{د) } \frac{r\omega}{9} = \frac{?}{180} \rightarrow \frac{180 \times r\omega}{9} = 10^\circ$$

$$\frac{\frac{a\pi}{1}}{r} = \frac{?}{180} \rightarrow \frac{180a}{Ar} = \frac{r\omega a}{r} \quad \frac{\frac{11\omega a}{9}}{\frac{r\omega a}{r}} = \frac{?}{180} \rightarrow \frac{180 \times 11\omega a}{9 \times r\omega a} = \frac{r\omega a}{r}$$

$$10a + \frac{r\omega a}{r} + \frac{r\omega a}{r} = 180^\circ \Rightarrow \frac{r\omega a}{r} = 180^\circ \Rightarrow a = r^\circ$$

$$\text{سوال ۱) } \cos 40^\circ \cos 30^\circ - \sin 40^\circ \sin 30^\circ - \tan 40^\circ + \cot 30^\circ$$

$$\frac{1}{r} \times \frac{\sqrt{r}}{r} - \frac{\sqrt{r}}{r} \times \frac{1}{r} - 1 + \frac{r}{r} = 1$$

$$\text{ب) } \frac{\tan^2 30^\circ + \tan^2 40^\circ + \tan^2 50^\circ}{\cot 30^\circ - \cot 40^\circ} = \frac{\frac{r}{9} + 1 + r}{\sqrt{r} - \frac{\sqrt{r}}{r}} = \frac{\frac{r+9}{r}}{\frac{r-1}{r}} = \frac{r+9}{r-1} = \frac{12\sqrt{r}}{9}$$

$$\tan 30^\circ = \frac{\sin 30^\circ}{\cos 30^\circ} = \frac{1}{\sqrt{r}} = \frac{\sqrt{r}}{r} \Rightarrow \cot 30^\circ = \frac{r}{\sqrt{r}} = \sqrt{r} \quad \tan 40^\circ = 1$$

$$\tan 40^\circ = \frac{\sin 40^\circ}{\cos 40^\circ} = \frac{\frac{\sqrt{r}}{r}}{\frac{1}{r}} = \sqrt{r} \Rightarrow \cot 40^\circ = \frac{1}{\sqrt{r}}$$

$$-\sin 30^\circ \cos 40^\circ + \cos 30^\circ \sin 40^\circ = \sin^2 \theta$$

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

غرف چون زاویه حاده است

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{\sqrt{r}}{r}}{\frac{\sqrt{r}}{r}} = 1$$

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

$$\Rightarrow \cos \theta = \frac{\sqrt{r}}{r} \quad \leftarrow \text{چون تند است فقط } \frac{\sqrt{r}}{r}$$

سوال ۵)

$$\tan 30^\circ = \frac{\sin 30^\circ}{\cos 30^\circ} = \frac{1}{\sqrt{r}} = \frac{\sqrt{r}}{r}$$

$$\cot 40^\circ = \frac{\sqrt{r}}{r}$$

$$\frac{r \times \frac{\sqrt{r}}{r} \left(1 - \frac{r}{9}\right)}{\left(1 - \frac{r}{9}\right)^2} = \frac{r\sqrt{r} \times \frac{9}{r}}{9 \times 9} = \frac{r\sqrt{r} \times 9}{10 \times 9} = \sqrt{r} = \tan \theta \Rightarrow \theta = \begin{cases} \frac{\pi}{4} \\ \frac{5\pi}{4} \end{cases}$$

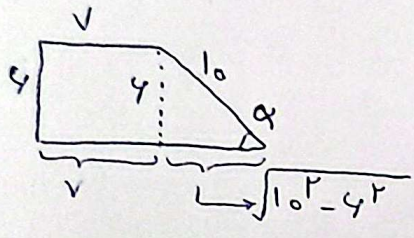
$$\frac{r \tan 30^\circ (1 - \tan^2 30^\circ)}{(1 - \cot^2 40^\circ)^2} = \tan \theta$$

$$\frac{r \sin \theta - \cos \theta}{\sin \theta - r \cos \theta} = A$$

$$A \sin \theta - r A \cos \theta = r \sin \theta - \cos \theta \Rightarrow$$

$$\cos \theta (1 - rA) = \sin \theta (r - A) \Rightarrow \frac{\sin \theta}{\cos \theta} = \frac{1 - rA}{r - A} = \omega \Rightarrow$$

$$1\omega - \omega A = 1 - rA \Rightarrow \boxed{r = A}$$

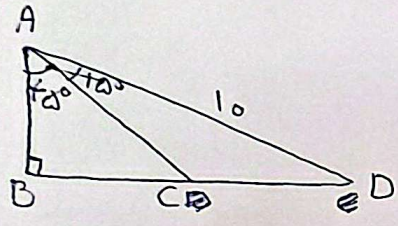


~~Sin alpha =~~

$$\sin \alpha = \frac{\text{مقابل}}{\text{وتر}} = \frac{4}{10}$$

سوال ۷)

$$\Rightarrow \frac{1}{\cos \alpha} = 1 + 7 + 4 + 7 + 10 = \boxed{38}$$



سوال ۸)

$$\hat{A} = 40^\circ \quad \cos 40^\circ = \frac{1}{r} \quad \sin 40^\circ = \frac{\sqrt{3}}{r}$$

$$\frac{AB}{AD} = \frac{\text{مجاور}}{\text{وتر}} = \cos \hat{A} \quad AB = 10 \times \frac{\cos \hat{A}}{\cos 40^\circ} = 10 \times \frac{1}{r} = \omega$$

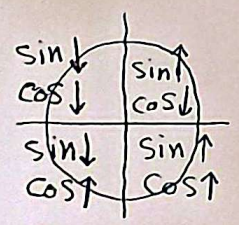
$$\xrightarrow{\text{مساوی ساقین}} \triangle ABC \quad BC = AB \Rightarrow BC = AB = \omega$$

$$\frac{BD}{AD} = \frac{\text{مقابل}}{\text{وتر}} = \sin \hat{A} \Rightarrow BD = 10 \times \sin 40^\circ = 10 \times \frac{\sqrt{3}}{r} = \omega \sqrt{3}$$

$$CD = BD - CB = \boxed{\omega \sqrt{3} - \omega}$$

سوال ۹)

$\Rightarrow$ زاویه



الف) ناحیه سوم

ب) ناحیه دوم

$$\tan \alpha = \frac{1}{r} \Rightarrow \cot \alpha = r$$

سوال ۱۰)

$$1 + \cot^2 \alpha = \frac{1}{\sin^2 \alpha}$$

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

$$\boxed{\sin \alpha = -\frac{\sqrt{10}}{10}}$$

$$\Rightarrow \sin \alpha = \pm \frac{\sqrt{10}}{10}$$

غیر ق چون $\sin \alpha$ در ناحیه سوم منفی است