

۱) $27^\circ = (\alpha) \text{ Rad} = 27 \text{ Rad}$ $\frac{27}{180} = \frac{Ra}{\pi} \rightarrow \frac{27\pi}{180} = Ra$ $\alpha = \frac{27\pi}{180} \text{ rad}$

۲) $125^\circ = (\alpha) \text{ Rad} \rightarrow \frac{125}{180} = \frac{Ra}{\pi} \Rightarrow \frac{125\pi}{180} = Ra \Rightarrow \alpha = \frac{125\pi}{180} \text{ rad}$

۳) $\frac{5\pi}{18} \text{ Rad} = (\alpha)^\circ \Rightarrow \frac{5\pi}{18} = \frac{\alpha}{180} \Rightarrow \alpha = 15^\circ$

۴) $\frac{7\pi}{9} \text{ Rad} = (\alpha)^\circ \Rightarrow \frac{7\pi}{9} = \frac{\alpha}{180} \Rightarrow \alpha = 140^\circ$

$\times \frac{180}{\pi}$
Rad $\rightarrow$ $\circ$
 $\times \frac{\pi}{180}$
 $\frac{Rad}{\pi} = \frac{\circ}{180}$

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$\frac{a\pi}{18} = \frac{0}{180} \Rightarrow \frac{a}{18} = \frac{0}{180} = 0 = \frac{180}{18} a = 270a^\circ$

$\frac{D}{n} = \frac{G}{r} = \frac{Rad}{d}$

$\frac{115a}{180} = \frac{0}{180} \Rightarrow \frac{115a}{180} = \frac{0}{180} \Rightarrow 0 = 115a^\circ$

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$115a^\circ + 270a^\circ + 10a^\circ = 180^\circ \Rightarrow a = 1^\circ$

$\rightarrow 0$
 $\sin$ (صورت زائیه داخلی مثلث)

$\cos 4^\circ \times \cos 7^\circ - \sin 4^\circ \cdot \sin 7^\circ - \tan 5^\circ + 2 \cot 5^\circ = \frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} - \left(\frac{\sqrt{3}}{\sqrt{3}} \times \frac{1}{\sqrt{3}} \right) - 1 + 2 = +1$

$\cos 4^\circ = \sin 7^\circ$ (زاویه متمم دیگر است)

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$\frac{\tan 7^\circ + \tan 5^\circ + \tan 4^\circ}{\cot 7^\circ - \cot 4^\circ} = \frac{\frac{1}{\sqrt{3}} + 1 + \sqrt{3}}{\sqrt{3} - \frac{\sqrt{3}}{\sqrt{3}}} = \frac{\frac{1+\sqrt{3}+3}{\sqrt{3}}}{\frac{3-\sqrt{3}}{\sqrt{3}}} = \frac{1+\sqrt{3}+3}{3-\sqrt{3}} = \frac{1+\sqrt{3}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{1+\sqrt{3}}{\sqrt{3}}$

$-\sin 7^\circ \cos 4^\circ + \cos 7^\circ \sin 4^\circ = -\left(\frac{1}{\sqrt{3}}\right)\left(\frac{1}{\sqrt{3}}\right) + \frac{\sqrt{3}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = -\frac{1}{3} + \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}-1}{\sqrt{3}} = \sin \theta$

$\sin \theta = \frac{1}{\sqrt{3}} \Rightarrow \sin \theta = \pm \frac{\sqrt{3}}{3} \quad (\theta < 90^\circ)$
 $\sin \theta = \frac{\sqrt{3}}{3} \Rightarrow \theta = 35^\circ \Rightarrow \tan \theta = \frac{\frac{\sqrt{3}}{3}}{\frac{\sqrt{3}}{3}} = (+1)$
($\sin \theta > 0$)

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$\frac{2 \times \frac{\sqrt{3}}{3} \left(1 - \frac{1}{\sqrt{3}}\right)}{\left(1 - \frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2\sqrt{3}}{3}}{\frac{1}{3}} = \sqrt{3} = \tan \theta \Rightarrow \theta = 60^\circ = \frac{\pi}{3} \text{ rad}$ ($\theta < 90^\circ$)

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$$\tan \theta = \omega$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha}$$

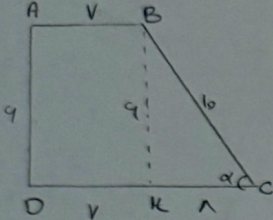
$$\cos^2 \alpha = \frac{1}{1 + \tan^2 \alpha}$$

$$\cos \alpha = \pm \frac{1}{\sqrt{1 + \tan^2 \alpha}}$$

$$\sin^2 \alpha + \cos^2 \alpha = 1 \Rightarrow \sin^2 \alpha = \frac{\tan^2 \alpha}{1 + \tan^2 \alpha} \Rightarrow \sin \alpha = \pm \frac{\tan \alpha}{\sqrt{1 + \tan^2 \alpha}}$$

$$\sin \alpha, \cos \alpha > 0 \Rightarrow \frac{\frac{1}{\sqrt{1 + \tan^2 \alpha}}}{\frac{\tan \alpha}{\sqrt{1 + \tan^2 \alpha}}} = \frac{1}{\tan \alpha} = 1$$

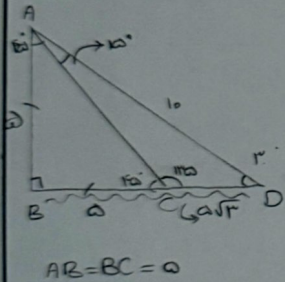
$$\sin \alpha, \cos \alpha < 0 \Rightarrow \frac{-\frac{1}{\sqrt{1 + \tan^2 \alpha}}}{-\frac{\tan \alpha}{\sqrt{1 + \tan^2 \alpha}}} = \frac{1}{\tan \alpha} = 1$$



$$\sin \alpha = \frac{4}{10} \Rightarrow \frac{BH}{BC} = \frac{4}{10} \Rightarrow BH = 4 \quad BC = 10$$

$$CH = BC - BH = 10 - 4 = 6 \Rightarrow CH = 6$$

$$\text{Perimeter} = 4 + 10 + 10 = 24$$

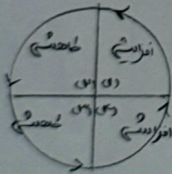


$$\hat{D} = 180^\circ - 135^\circ - 10^\circ = 35^\circ$$

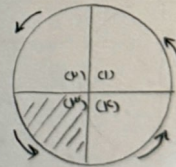
$$\sin \alpha = \frac{AB}{AD} = \frac{1}{\sqrt{2}} \Rightarrow AB = \omega$$

$$\sin \alpha = \frac{BD}{AD} = \frac{1}{\sqrt{2}} \Rightarrow BD = \omega \sqrt{2}$$

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



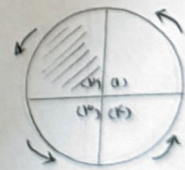
Signs of sine and cosine in the four quadrants



Signs of tangent and cotangent in the four quadrants



Signs of secant and cosecant in the four quadrants



Signs of secant and cosecant in the four quadrants

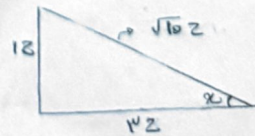
$$\tan \alpha = \frac{1}{\sqrt{2}} \Rightarrow \cot \alpha = \frac{1}{\tan \alpha} = \sqrt{2}$$

$$1 + \cot^2 \alpha = \frac{1}{\sin^2 \alpha} \Rightarrow 1 + 2 = \frac{1}{\sin^2 \alpha} \Rightarrow \sin^2 \alpha = \frac{1}{3} \Rightarrow \sin \alpha = \pm \frac{1}{\sqrt{3}}$$

Signs of sine and cosine in the four quadrants

Signs of sine and cosine in the four quadrants

$$\sin \alpha = \frac{1}{\sqrt{3}} = \frac{2}{\sqrt{12}} = \frac{1}{\sqrt{3}}$$



Signs of sine and cosine in the four quadrants