الف) $37^\circ = (x)\,rad \rightarrow \frac{D}{180} = \frac{Rad}{\pi} \cdot \frac{37}{180} = \frac{Rad}{\pi}$ $37\pi = 180\,Rad = Rad = \frac{180\,Rad}{\pi}$

$Rad = \frac{37\pi}{180} = \frac{37\pi}{60}$

ب) $45^\circ = (x)\,rad \rightarrow \frac{D}{180} = \frac{Rad}{\pi} = Rad = \frac{45\pi}{180} = \frac{5\pi}{20}$

ج) $\frac{5\pi}{12}\,Rad = (x)^\circ$ $\frac{\pi}{4} = 30^\circ \rightarrow \frac{\pi}{12} = 15^\circ$ $5 \times 15 = 75^\circ$

د) $\frac{4\pi}{9} = (x)^\circ$ $\frac{\pi}{2} = 90^\circ \rightarrow \frac{\pi}{9} = 20^\circ$ $4 \times 20^\circ = 80^\circ$

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۲. $\frac{125a}{9}\,G$ ، $\frac{a\pi}{8}\,Rad$ $\frac{G}{100} \times \frac{125a}{9} = \frac{D}{180}$ $\frac{125a}{1800} = \frac{D}{180} = 112,5^\circ$

$80^\circ + \frac{125a}{9}\,G + \frac{a\pi}{8}\,Rad = 180^\circ$

$\frac{a\pi}{8}\,Rad = \frac{D}{180}$ $\frac{a}{2} = \frac{D}{45}$ $\frac{45a}{4}$ $\frac{45a}{2} = 22,5^\circ$

$80^\circ + 22,5a^\circ + 112,5a^\circ = 180^\circ \rightarrow 45a^\circ = 180^\circ \rightarrow a = \frac{180}{45} = 4^\circ$ $a = 2^\circ$

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۳. الف) $\cos 60^\circ \times \cos 30^\circ - \sin 60^\circ \times \sin 30^\circ - \tan 45^\circ + 9 \cot 45^\circ$

$= \frac{1}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \times \frac{1}{2} - 1 + 9 = \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} - 1 + 9 = 1$

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

$\tan^2 30^\circ = \left(\frac{1}{\sqrt{3}}\right)^2 = \frac{1}{3}$

$\tan^2 45 = 1$ $\cot 30\sqrt{3} - \frac{1}{\sqrt{3}}$

$= \frac{\frac{1}{3} + 1 + 3}{\sqrt{3} - \frac{1}{\sqrt{3}}} = \frac{\frac{13}{3}}{\frac{2}{\sqrt{3}}} = \frac{13\sqrt{3}}{6}$

---

۴. $-\sin 30 \times \cos 60^\circ + \cos 30^\circ \times \sin 60^\circ = \sin^2 \theta$

$-\frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = \sin^2 \theta = -\frac{1}{4} + \frac{3}{4} = \sin^2 \theta \rightarrow \frac{2}{4} = \sin^2 \theta$

$\pm\sqrt{\frac{2}{4}} = \sin\theta$ $= \pm\frac{\sqrt{2}}{2} = \sin\theta$ $\begin{cases} 45^\circ, 225 \rightarrow 1 \\ 135, 315 \rightarrow -1 \end{cases}$ زاویه حاده $\rightarrow 45 \rightarrow 1$

سوال ۵:

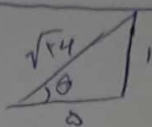
$$\frac{2\tan 20^\circ\left(1-\tan^2 20^\circ\right)}{\left(1-\cot^2 40^\circ\right)^2}=\tan\theta \qquad ,\theta<90$$

$$\frac{2\times\frac{1}{\sqrt{2}}\left(1-\frac{1}{2}\right)^{\tan}}{\left(1-\frac{1}{2}\right)^{2}}=\frac{\frac{2}{\sqrt{2}}\times\frac{2}{2}}{\frac{2^2}{2}}=\frac{\frac{4}{2\sqrt{2}}}{\frac{2^2}{2}}=\frac{1}{\sqrt{2}}=\tan\theta$$

$\theta=20^\circ$

سوال ۶:

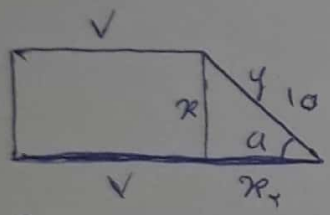
$$\frac{2\sin\theta-\cos\theta}{\sin-4\cos\theta}$$



$\tan\theta=5$

$$=\frac{2\sin\theta\times}{\sin-4\cos\theta}-\frac{\cos\theta}{\sin-4\cos\theta}=\frac{2\times\frac{5}{\sqrt{24}}\frac{1}{\sqrt{24}}}{\frac{5}{\sqrt{24}}-4\frac{1}{\sqrt{24}}}=14$$

سوال ۷:



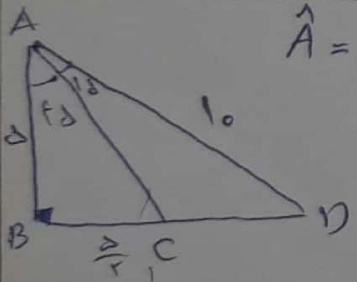
$\sin a=\frac{9}{10}$

$y=\frac{\sin a}{}=\frac{9}{10}=\frac{9}{y}\rightarrow y=10$

$x_2^2=10^2-9^2-100-24=\sqrt{64}=8$

$\rightarrow$ $S_{\square}=8+2\times7+10+9=28$

سوال ۸:



$\hat{A}=\hat{A}_1+\hat{A}_2=90^\circ$

$A\hat{B}D$: $AB=\cos 90^\circ=\frac{1}{2}=\frac{AB}{10}\rightarrow AB=\frac{10}{2}=5$

$BD=\sin 90^\circ=\frac{\sqrt{2}}{2}=\frac{BD}{10}\rightarrow DB=\frac{5\sqrt{2}}{1}=5\sqrt{2}$

ABC: $AB=\cos 45^\circ=\frac{\sqrt{2}}{2}=\frac{5}{AC}\rightarrow AC=$

$2AC=5\sqrt{2}\rightarrow AC=\frac{5\sqrt{2}}{2}$

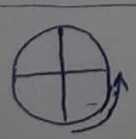
$BC=\sin 45^\circ=\frac{BC}{\frac{5\sqrt{2}}{2}}=\frac{\sqrt{2}}{2}\rightarrow BC=\frac{\sqrt{2}}{2}\times\frac{5\sqrt{2}}{2}=\frac{10}{4}=\frac{5}{2}$

$DC=BD-BC=5\sqrt{2}-\frac{5}{2}$

سوال ۹:

الف) ناحیه ۴

ب) ناحیه دوم



$\theta\uparrow$ sin$\downarrow$ cos$\uparrow$

$\theta\uparrow$ sin$\downarrow$ cos$\downarrow$

سوال ۱۰:

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

فرض

$\sin^2 x + \cos^2 x = 1 \rightarrow$ [redacted] $1x^2 + 3x^2 = 1 \quad 1x + 9x = 1$

$\rightarrow x = 0,1 \qquad \frac{1}{10} \times 90 = 9^\circ$

10

$r = \sqrt{1^2 + 3^2} = \sqrt{10}$

فرض $\rightarrow$ $\sin < 0$, $\cos < 0$ $\qquad \sin x = -\frac{1}{\sqrt{10}} = -\frac{\sqrt{10}}{10}$