الف) $(\sin 120 + \sin 240)(\cos 45 + \cos 135) = \left(\frac{\sqrt{3}+\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}+\sqrt{2}}{2}\right)$ -۱

$\underbrace{\sin 120}_{\frac{\sqrt{3}}{2}} \quad \underbrace{\sin 240}_{-\frac{\sqrt{3}}{2}} \quad \underbrace{\cos 45}_{\frac{\sqrt{2}}{2}} \quad \underbrace{\cos 135}_{-\frac{\sqrt{2}}{2}}$

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

۱۲٫۲۵

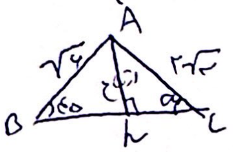
ایلیا براری B

ب) $\frac{1+3\tan^2 30}{4\cos^2 45 + 2\cos^2 135} = \frac{2}{2} = \boxed{1}$ ۱

$\frac{1+3\left(\frac{\sqrt{3}}{3}\right)^2}{4\left(\frac{\sqrt{2}}{2}\right)^2+2\left(-\frac{\sqrt{2}}{2}\right)^2} = \frac{1+1}{3+1} = \frac{2}{4} = \frac{1}{2}$

-۲ ۱٫۵

الف)



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

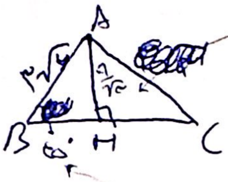
الف) $\hat{B} = 45° \rightarrow BH = AH \rightarrow AH^2 + AH^2 = 6 \rightarrow AH = \sqrt{3}$

$\sin \hat{C} = \frac{AH}{AC} = \frac{\sqrt{3}}{2\sqrt{3}} = \frac{1}{2} \rightarrow \hat{C} = 30°$

$\cos 30 = \frac{HC}{2\sqrt{3}} = \frac{\sqrt{3}}{2} \rightarrow HC = 3$

ارتفاع $\rightarrow \cos a$

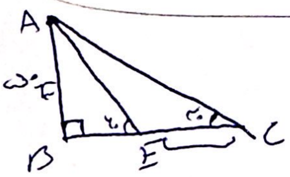
ب)



$\frac{9}{\frac{1}{\frac{\sqrt{2}}{2}}} = \frac{18}{\sqrt{2}}$ $\qquad AH = \frac{9}{\sqrt{2}} \rightarrow \left(\frac{18}{\sqrt{2}} \times \frac{1}{2}\right)$

$\sin B = \frac{1}{2} = \frac{\sqrt{2}}{2} \Rightarrow B = \boxed{45°}$

الف) -۳



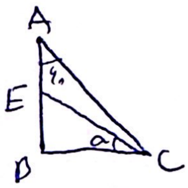
$AC = \frac{50\sqrt{3}}{\frac{1}{2}} = 100\sqrt{3}$ $\qquad BC = 150$

$AD = \frac{50\sqrt{3}}{\frac{\sqrt{3}}{2}} = 100 \Rightarrow BE = 50$

$EC = 150 - 50 = \boxed{100}$

۱٫۷۵

ب)

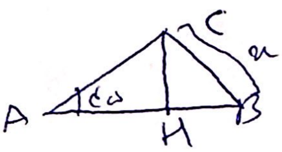


$AC = \frac{2}{\frac{1}{2}} = 4$ $\qquad \tan a = \frac{1}{2\sqrt{3}} = \frac{\sqrt{3}}{6}$

$BC = 2\sqrt{3}$ $\qquad 1+\cot^2 a = \frac{1}{\sin^2 a} \Rightarrow 1+\left(\frac{6}{\sqrt{3}}\right)^2 = \frac{1}{\sin^2 a} \Rightarrow 13 = \frac{1}{\sin^2 a}$

$\Rightarrow \sin a = \cancel{\boxed{13}}$

$\sin a = \frac{1}{\sqrt{13}}$



$CH = \frac{a}{2} \Rightarrow CA = \frac{a}{\sqrt{2}} = \frac{\sqrt{2}\,a}{2}$ ۰٫۵ -۴

$AH = \frac{a}{2}$ $\qquad BH = \frac{\sqrt{3}}{2}a$ $\qquad \frac{AB}{AC} = \frac{4\sqrt{3}}{\sqrt{2}}$

$AB = AH + BH = \frac{1+\sqrt{3}}{2}a$

-۵

مساحت $ABE = \frac{1}{2} \times 2 \times 4 \times \sin B_1$

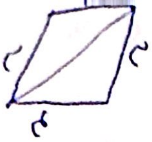
$B_1 = B_2$ مکمل‌اند $\qquad$ $\frac{\text{مساحت } ABE}{BCD} = \frac{\frac{1}{2} \times 2 \times 4 \times \sin B_1}{\frac{1}{2} \times 4 \times 4 \times \sin B_2} = \frac{4}{9}$ ۲

مساحت $BCD = \frac{1}{2} \times 4 \times 6 \times \sin B_2$

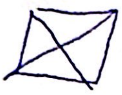
سوال ۴

$AC = a \rightarrow \begin{cases} AH^2 + HC^2 = a^2 \\ AH = CH = \frac{a\sqrt{2}}{2} \end{cases}$ $\qquad \frac{AB}{AC} = \frac{a(\sqrt{6}+\sqrt{2})}{2} = \frac{\sqrt{6}+\sqrt{2}}{2}$

$\tan 30° = \frac{\frac{a\sqrt{2}}{2}}{BH} \rightarrow BH = \frac{\frac{a\sqrt{2}}{2}}{\frac{\sqrt{3}}{3}} = \frac{a\sqrt{6}}{2} \rightarrow AB = BH + AH = \frac{a\sqrt{6}}{2} + \frac{a\sqrt{2}}{2}$

الف)  مساحت $\frac{1}{2} \times \sin 120^\circ \times 4 \times 4 \times 2 = 8\sqrt{3}$ ✓ —۶

۲

ب)  $S = \frac{1}{2} \times ab \sin a = 4\sqrt{3}$ ✓

$1+\tan^2\theta = \frac{1}{\cos^2\theta} \xrightarrow{a=4 \quad b=2} 1+\frac{1}{4} = \frac{1}{\cos^2\theta} \to \cos^2\theta = \frac{4}{5} \xrightarrow[\cos\theta>0]{\text{ناحیه } \theta} \cos\theta = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$ —۷

$\tan PQ = \frac{\Delta y}{\Delta x} = \frac{2}{4} = \frac{1}{2}$

۱

$1+\tan^2 = \frac{1}{\cos^2} \Rightarrow \frac{5}{4} = \frac{1}{\cos^2 a} \Rightarrow \cos a = \frac{2}{\sqrt{5}}$

$2y = 2x+5 \to m=1 \to \tan\theta = 1 \to \theta = 45^\circ \to y = mx+b \to m = \tan 120^\circ = -\sqrt{3}$ —۸

$y=0 \Rightarrow \frac{2x+5}{2} \Rightarrow x = -\frac{5}{2}$ $\quad mx + \frac{5}{2} = 0 \Rightarrow mx = \frac{5}{2}$ ۱

$m = -1$

$x = \frac{x+5}{2}$ $\quad y = \frac{0+5}{2} \Rightarrow b = \frac{5}{2}$ $\quad x = \frac{5}{2}$ $\quad mb = \frac{5}{2} \times (-\sqrt{3}) = \frac{-5\sqrt{3}}{2}$

$m = 1$ $\quad mb = -1 \times \frac{5}{2} = \frac{-5}{2}$

$f(x) = \cos(\pi+x) + \sin(\frac{\pi}{2} - x) - \tan(\frac{3\pi}{2} + x) \Rightarrow \frac{-1}{\sqrt{3}+1}$ —۹ ۰.۷۵

$f(x) = -\cos x + \cos x + \cot x$

$f(\frac{5\pi}{6}) = \boxed{?}$ $\quad f(x) = \cot x \to f(\frac{5\pi}{6}) = \cot(\frac{5\pi}{6}) = -\sqrt{3}$

$\cos(180+150) \Rightarrow \frac{\sqrt{3}}{2}$ $\quad \tan(270+150) = \frac{1}{\sqrt{3}+1}$

$\sin(90-150) \Rightarrow \frac{\sqrt{3}}{2}$ } ⇐ صفر

$\frac{\sin(\frac{17\pi}{2}+x) + \cos(\frac{15\pi}{2} - x)}{\cos(3\pi+x) - \sin(6\pi - x)} \Rightarrow \frac{\cos x + \cancel{\sin x}}{-\cos + \sin} \Rightarrow$ —۱۰ ۱

$\frac{17\pi}{2} = 90$
$6\pi = 360$
$3\pi = 180$
$\frac{15\pi}{2} = 270$

$\cos(\frac{15\pi}{2} - x) = -\sin x$

$\to \frac{\cos x - \sin x}{-\cos x + \sin x} = -1$