۱- الف) $(\sin 120 + \sin 240)(\cos 150 + \cos 405) = \left(\frac{\sqrt{3}-\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}+\sqrt{2}}{2}\right)$

$\frac{\sqrt{3}}{2} \quad -\frac{\sqrt{2}}{2} \quad \frac{\sqrt{3}}{2} \quad -\frac{\sqrt{2}}{2}$

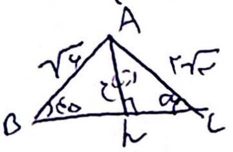
$\frac{1}{2}\times\frac{1}{2}(\sqrt{2}-\sqrt{3})(\sqrt{2}+\sqrt{3}) \Rightarrow \frac{1}{4}(2-3) = -\frac{1}{4}$

ایراد برای B

ب) $\frac{1+3\tan^2 210}{4\cos^2 240 + 2\cos^2 225} = \frac{2}{2} = 1$

$\frac{1}{3} \quad \frac{1}{4} \quad \frac{1}{2}$

۲- الف)



$\frac{\sqrt{12}}{2} = \sqrt{3} \qquad \frac{\sqrt{3}}{2\sqrt{3}} = \frac{1}{2} = \sin\alpha \Rightarrow \alpha = 30$

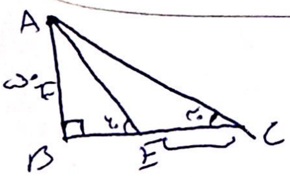
ب)

$\cos\alpha \leftarrow$ ارتفاع

$\frac{9}{\frac{1}{\frac{\sqrt{3}}{2}}} = \frac{18}{\sqrt{3}} \qquad AH = \frac{9}{\sqrt{3}} \;(\frac{18}{\sqrt{3}}\times\frac{1}{2})$

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

۳- الف)

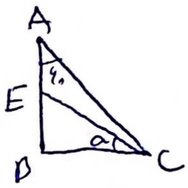


$AC = \frac{50\sqrt{3}}{\frac{1}{2}} = 100\sqrt{3} \qquad BC = 150$

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

$EC = 150 - 50 = 100$

ب)



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

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

$\Rightarrow \sin\alpha = \frac{1}{\sqrt{13}}$

۴-

$CH = \frac{a}{2} \Rightarrow CA = \frac{a}{\sqrt{2}} = \frac{\sqrt{2}\,a}{2}$

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

$AB = AH + BH = \frac{1+\sqrt{3}}{2}a \qquad \frac{AB}{AC} = \frac{4\sqrt{3}}{\sqrt{2}}$

۵-

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

$B_1 = B_2$ نیمساز

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

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

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