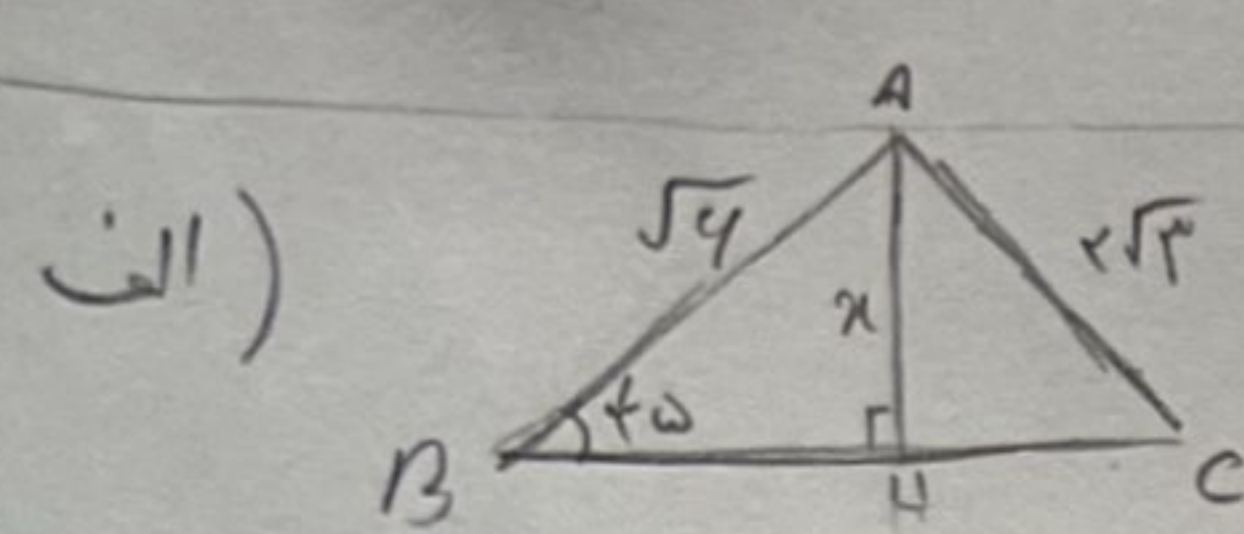
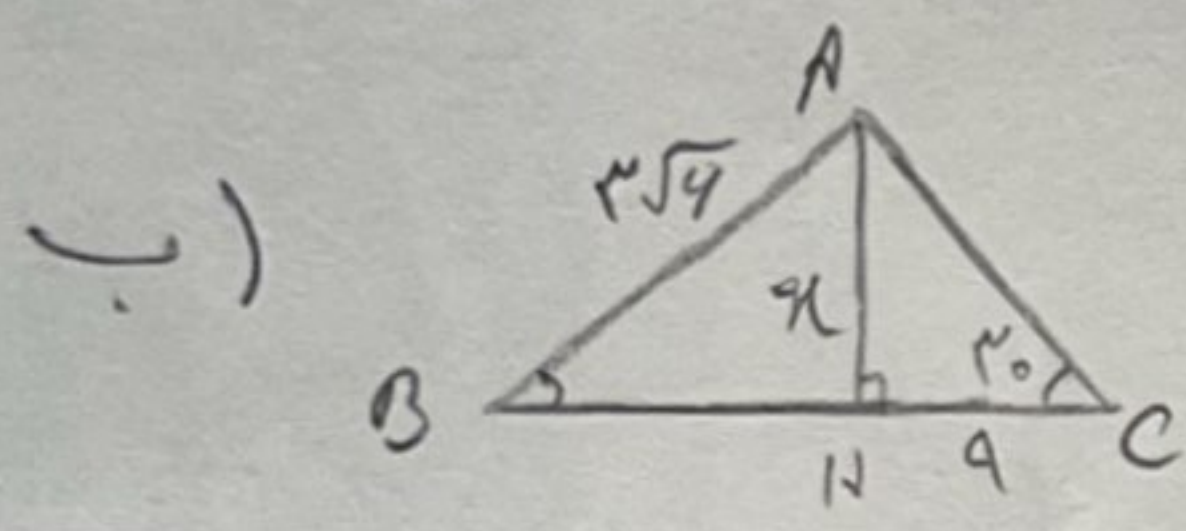


الف) $(\sin 135^\circ + \sin 225^\circ)(\cos 135^\circ - \cos 225^\circ) = \left(\frac{\sqrt{2}}{2} + (-\frac{\sqrt{2}}{2})\right)\left(\frac{\sqrt{2}}{2} - (-\frac{\sqrt{2}}{2})\right) = \left(\frac{\sqrt{2}}{2}\right)^2 - \left(-\frac{\sqrt{2}}{2}\right)^2 = \frac{2}{4} - \frac{2}{4} = -\frac{1}{2}$ ①

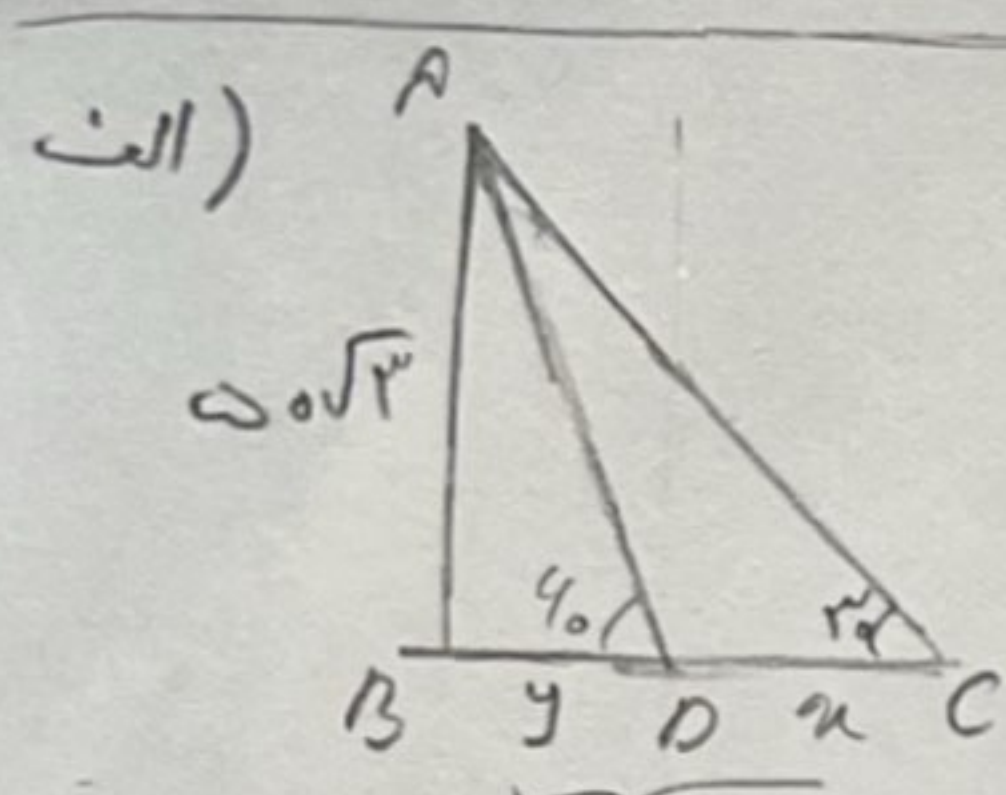
ب) $\frac{1 + 3 \tan^2 15^\circ}{1 + \cos^2 30^\circ + 2 \cos^2 15^\circ} = \frac{1 + 3 \times \frac{1}{3}}{1 + \frac{3}{4} + 2 \times \frac{1}{4}} = \frac{2}{2} = 1$



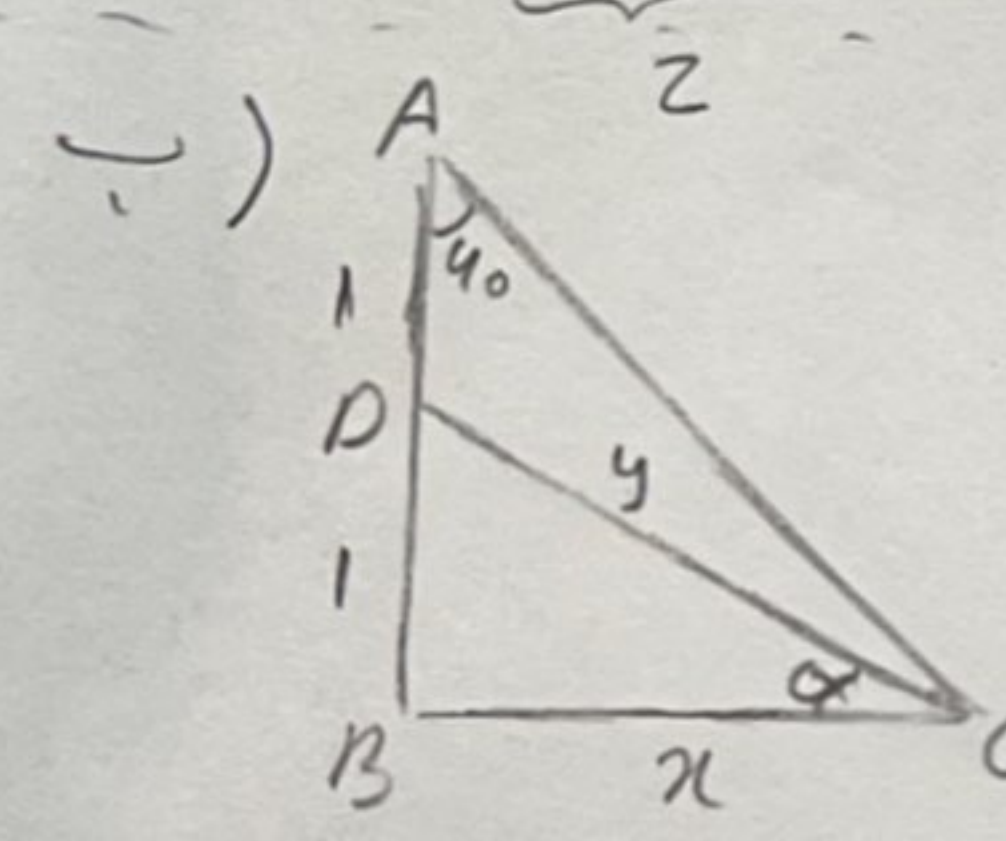
الف) $\sin 45^\circ = \frac{\sqrt{2}}{2} = \frac{x}{\sqrt{4}} \Rightarrow x = \sqrt{2}$ $HC = \sqrt{12 - 3} = \sqrt{9} = 3$ ②



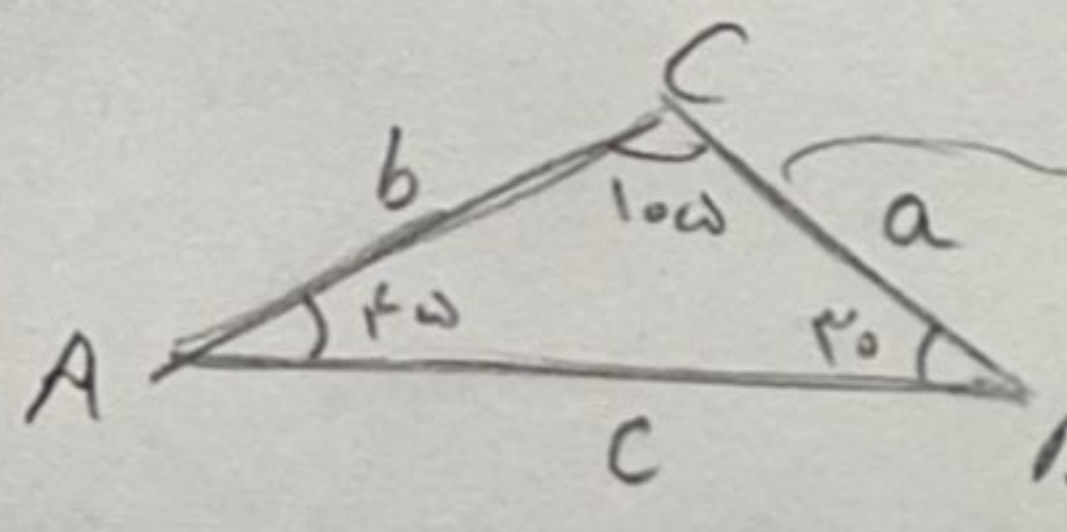
ب) $\cot 30^\circ = \frac{\sqrt{3}}{1} = \frac{9}{x} \Rightarrow x = 3\sqrt{3}$ $\sin B = \frac{3\sqrt{3}}{4\sqrt{4}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \Rightarrow B = 45^\circ$



$\tan 45^\circ = \sqrt{3} = \frac{5\sqrt{3}}{y} \Rightarrow y = 5$
 $\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{5\sqrt{3}}{z} \Rightarrow z = 15$
 $x = z - y = 10$

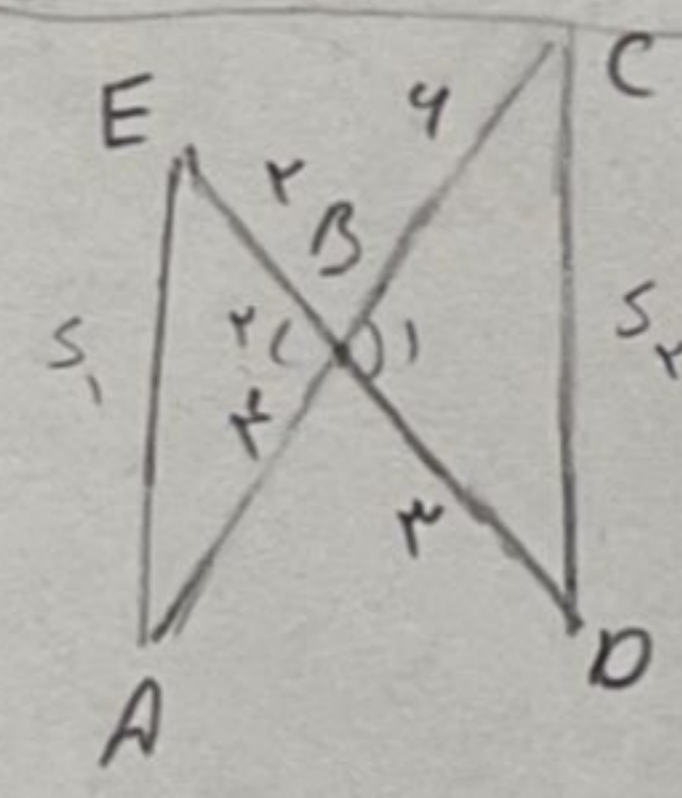


$\tan 45^\circ = \sqrt{3} = \frac{x}{y} \Rightarrow x = y\sqrt{3}$
 $y = \sqrt{1 + 12} = \sqrt{13}$
 $\sin \alpha = \frac{1}{\sqrt{13}}$



$\frac{c}{\sin 105^\circ} = \frac{b}{\sin 30^\circ}$
 $\frac{c}{b} = \frac{\frac{\sqrt{2}+\sqrt{6}}{2}}{\frac{1}{2}} = \sqrt{2+\sqrt{3}}$

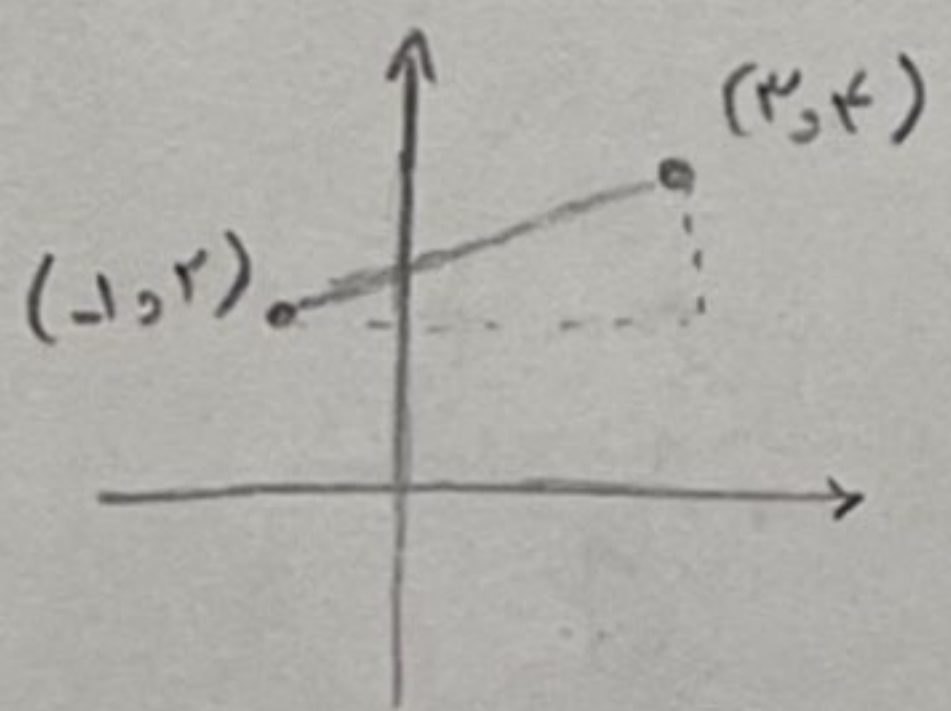
$\sin 105^\circ = \frac{1 - \cos 30^\circ}{2} = \frac{1 - \frac{\sqrt{3}}{2}}{2} = \frac{2 - \sqrt{3}}{4}$
 $\Rightarrow \sin 105^\circ = \frac{\sqrt{2+\sqrt{3}}}{4}$



$\hat{B}_1 = \hat{B}_2$
 $K = \frac{AB}{BC} = \frac{EB}{BD} = \frac{r}{y}$
 $\Rightarrow ABE \sim DBC$
 $\frac{S_1}{S_2} = K^2 = \left(\frac{r}{y}\right)^2 = \frac{r}{9}$

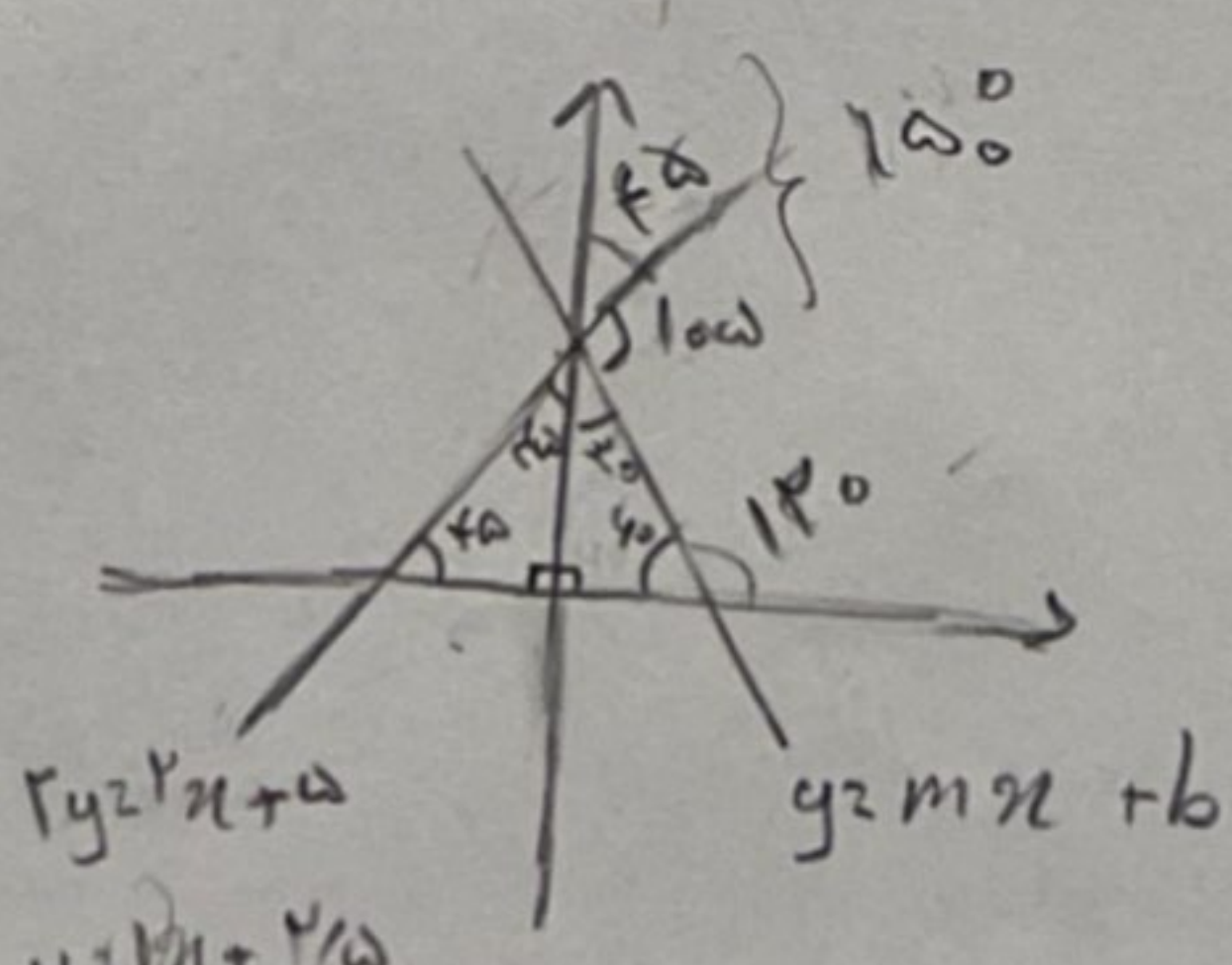
الف) $S = 2 \times \left(\frac{1}{2} \times 3 \times 4 \times \sin 120^\circ\right) = 9\sqrt{3}$ ④

ب) $S = 3 \times \frac{1}{2} \times \frac{1}{\sqrt{3}} \times \sin 120^\circ = 3\sqrt{3}$



$a = \tan \theta = \frac{\Delta y}{\Delta x} = \frac{4-2}{2-(-2)} = \frac{2}{4} = \frac{1}{2}$

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



$(0, 1/5)$
 $mx + b = x + 1/5$
 $b = 1/5$
 $\tan 150^\circ = -\sqrt{3} = m$

$b \times m = -1/5 \times \sqrt{3}$

$\tan \theta = 1 \Rightarrow \theta = 45^\circ$

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$$f\left(\frac{5\pi}{4}\right) = \cos\left(\frac{11\pi}{4}\right) + \sin\left(-\frac{4\pi}{4}\right) - \tan\left(\frac{14\pi}{4}\right) = \cos 315^\circ - \sin 180^\circ + \tan 45^\circ =$$

$$\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} - \sqrt{2} = -\sqrt{2}$$

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$$\frac{\sin\left(\frac{14\pi}{5} + \pi\right) + \cos\left(\frac{15\pi}{5} - \pi\right)}{\cos(3\pi + \pi) - \sin(4\pi - \pi)} = \frac{\sin\left(\frac{2\pi}{5} + \pi\right) + \cos\left(\frac{3\pi}{5} - \pi\right)}{\cos(\pi + \pi) + \sin(-\pi)} = \frac{\cos(\pi) + \sin(\pi)}{-\cos(\pi) + \sin(\pi)} = -1$$

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