باران مرادی

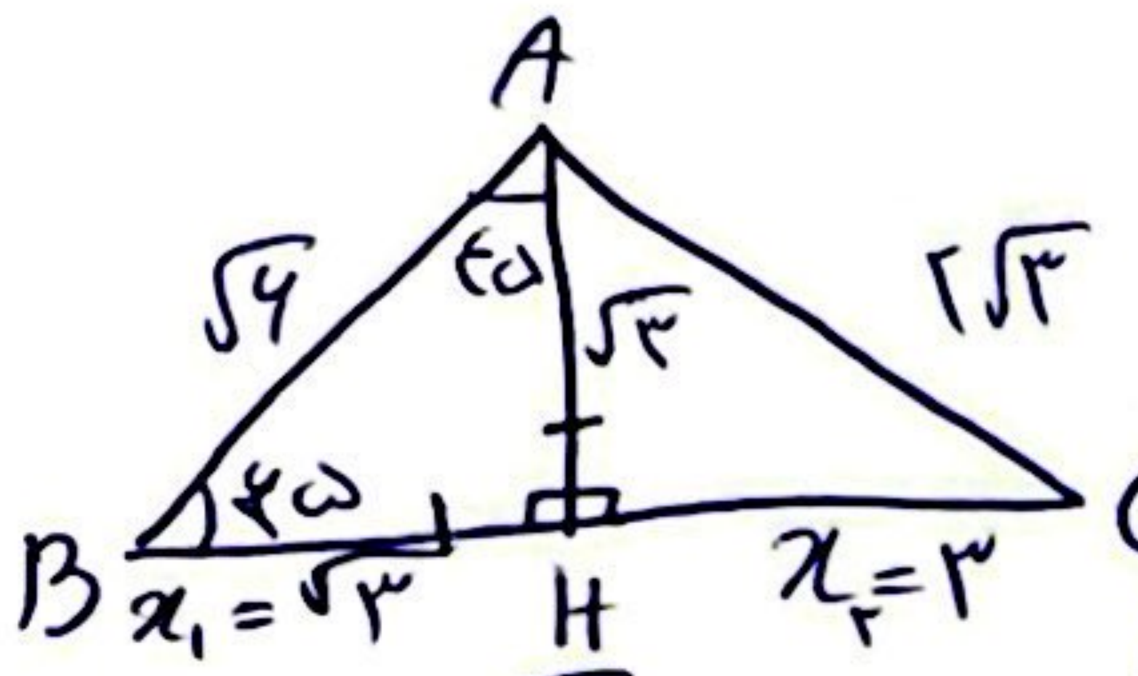
۱)

الف) $(\frac{\sqrt{۲}-\sqrt{۳}}{۲})\times(\frac{\sqrt{۲}+\sqrt{۳}}{۲}) = \frac{۲-۳}{۴} = -\frac{۱}{۴}$

ب) $\frac{۱+۳\times\frac{۱}{۳}}{۴\times\frac{۳}{۴}+۲\times\frac{۲}{۲۴}} = \frac{۲}{۴} = \frac{۱}{۲}$

۲)

الف)

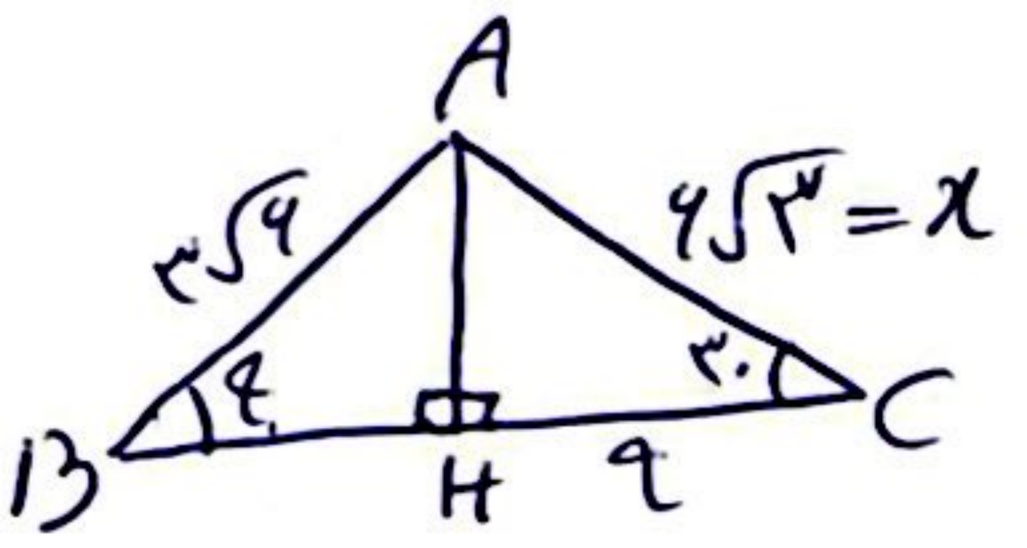


$(۲\sqrt{۳})^۲-(\sqrt{۳})^۲=x_۲^۲$

$۱۲-۳=۹ \to x_۲=۳=HC$

$\frac{x_۱}{\sqrt{۶}}=\frac{\sqrt{۲}}{۲} \to x=\frac{\sqrt{۶\times۲}}{۲}=\frac{۲\sqrt{۳}}{۲}=\sqrt{۳}$

ب)

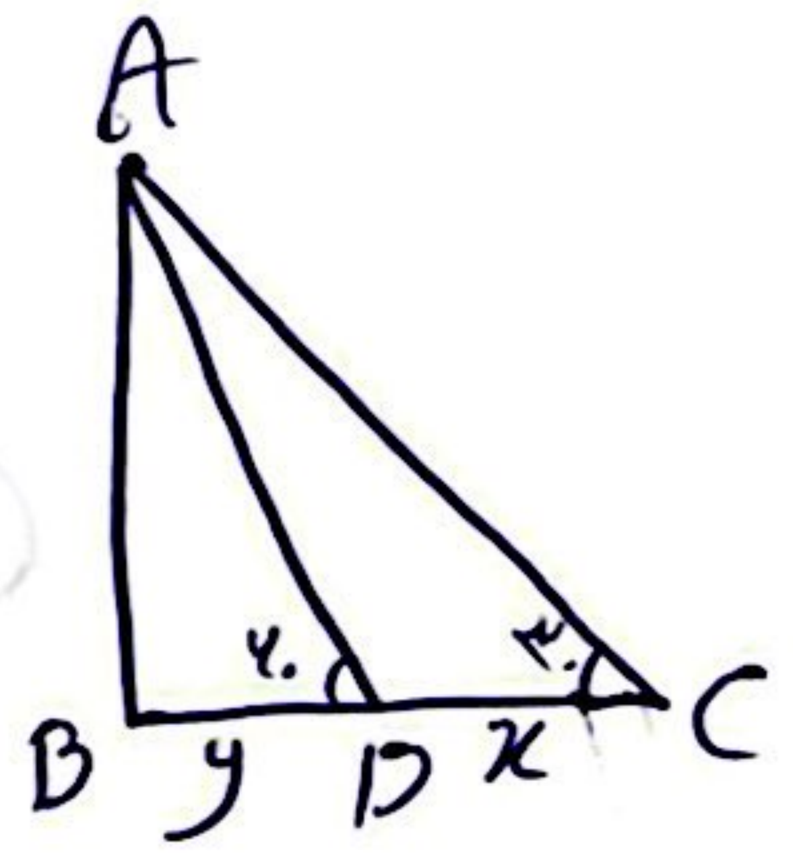


$\frac{\sqrt{۳}}{۲}=\frac{۹}{x} \to x=\frac{۱۸}{\sqrt{۳}}\times\frac{\sqrt{۳}}{\sqrt{۳}}=۶\sqrt{۳}$

$\frac{۶\sqrt{۳}}{\sin B}=\frac{۳\sqrt{۶}}{\frac{۱}{۲}}=۶\sqrt{۶} \to \sin B=\frac{۶\sqrt{۳}}{۶\sqrt{۶}}\times\frac{\sqrt{۶}}{\sqrt{۶}}=\frac{\sqrt{۱۸}}{۶}=\frac{۳\sqrt{۲}}{۶}=\frac{\sqrt{۲}}{۲} \to B=۴۵$

۳)

الف)

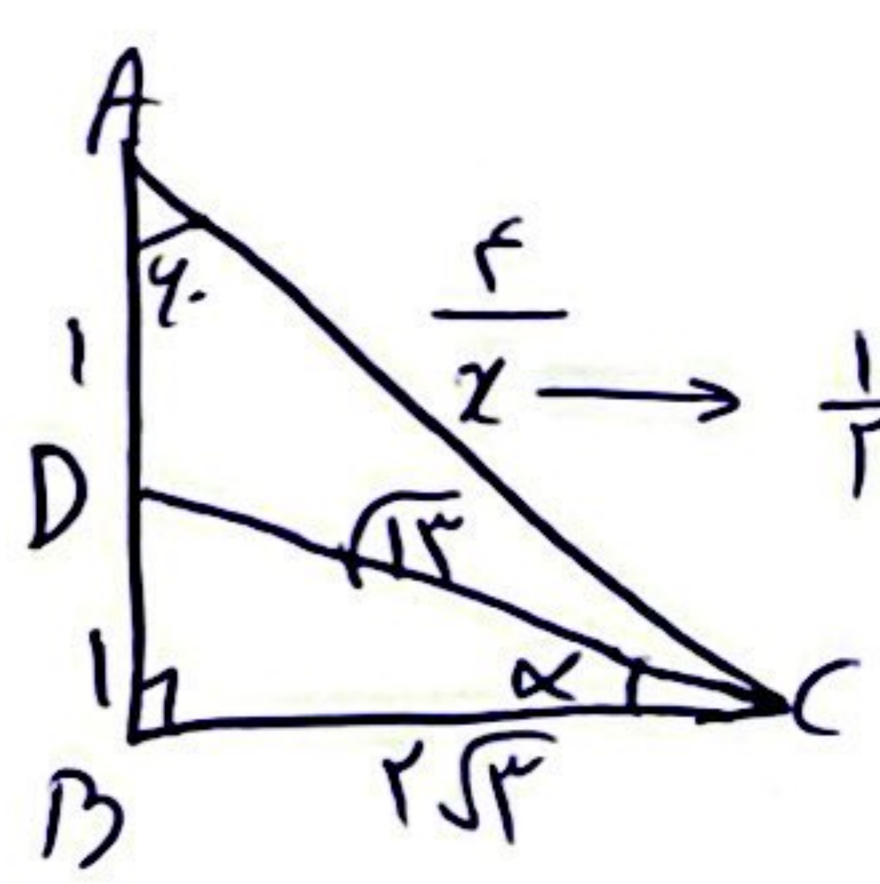


$\tan ۶۰=\sqrt{۳}$ $\tan ۳۰=\frac{۱}{\sqrt{۳}}$ $y=\sqrt{۳}=\frac{۵۰\sqrt{۳}}{y} \to y=۵۰$

$x \to \frac{۱}{\sqrt{۳}}=\frac{۵۰\sqrt{۳}}{۵۰+x} \to ۵۰+x=۱۵۰$

$x=۱۰۰$

ب)



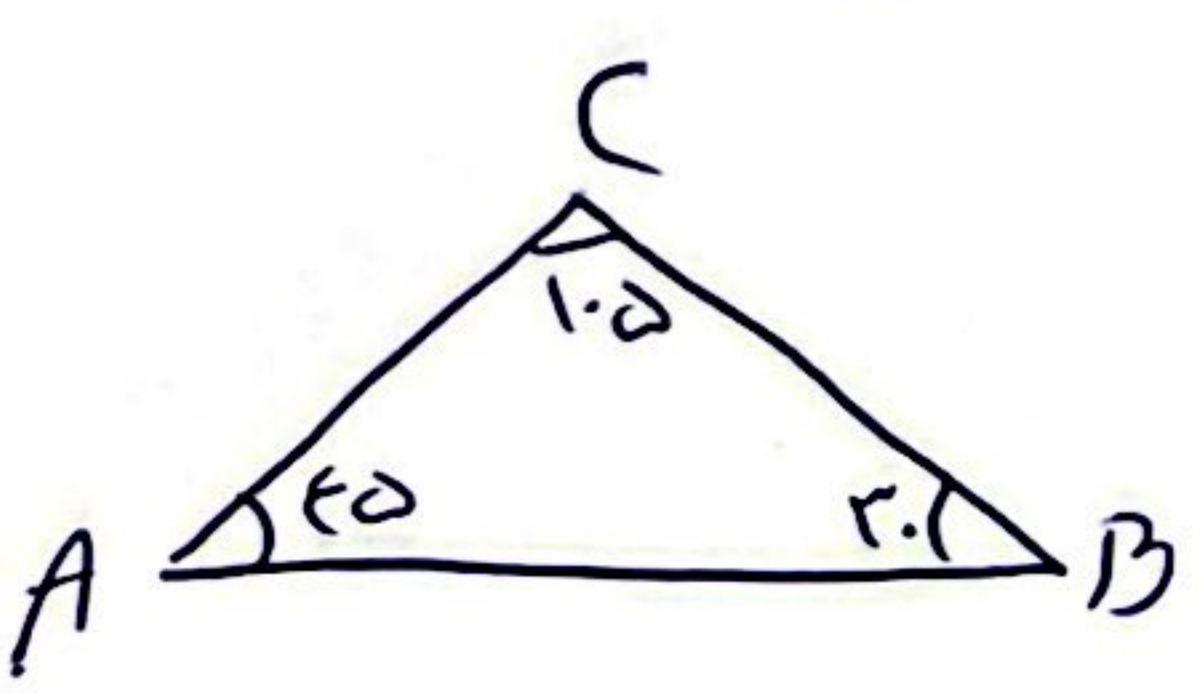
$\frac{۴}{x} \to \frac{۱}{۲}=\frac{۲}{x} \to x=۴$

$BC \to BC^۲=۱۶-۴=۱۲ \to BC=۲\sqrt{۳}$

$DC=\sqrt{۱۲+۱}=\sqrt{۱۳}$

$\frac{۱}{\sin\alpha}=\sqrt{۱۳} \to \sin\alpha=\frac{۱}{\sqrt{۱۳}}$

۴)



$\frac{AC}{\sin ۳۰}=\frac{AB}{\sin ۱۰۵} \to \frac{AB}{AC}=\frac{\sin ۱۰۵}{\sin ۳۰}=\frac{\frac{\sqrt{۶}+\sqrt{۲}}{۴}}{\frac{۱}{۲}}=\frac{\sqrt{۶}+\sqrt{۲}}{۲}$

$\sin(\underbrace{۶۰+۴۵}_{۱۰۵})=\sin ۶۰\cos ۴۵+\sin ۴۵\cos ۶۰=\frac{\sqrt{۳}}{۲}\times\frac{\sqrt{۲}}{۲}+\frac{۱}{۲}\times\frac{\sqrt{۲}}{۲}=\frac{\sqrt{۶}+\sqrt{۲}}{۴}$

⑥

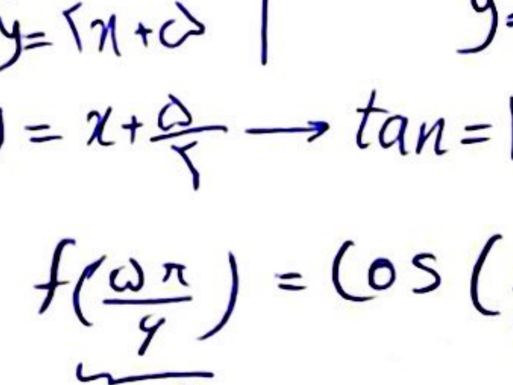
$$\frac{S_{ABE}}{S_{BCD}} = \frac{\sin\beta \times \frac{1}{2} \times 2 \times 4}{\sin\beta \times \frac{1}{2} \times 2 \times 6} = \frac{4}{6}$$

⑨

الف) $S_{\square} = ab\sin\alpha = 2 \times 6 \times \frac{\sqrt{3}}{2} = 6\sqrt{3}$ ب) $S_{\triangle} = \frac{1}{2}ab\sin x =$

$$\frac{1}{2} \times 6 \times 2 \times \frac{\sqrt{3}}{2} = 3\sqrt{3}$$

⑦



$\cos\theta = ?$ $\rightarrow$ $1 + \tan^2 = \frac{1}{\cos^2}$

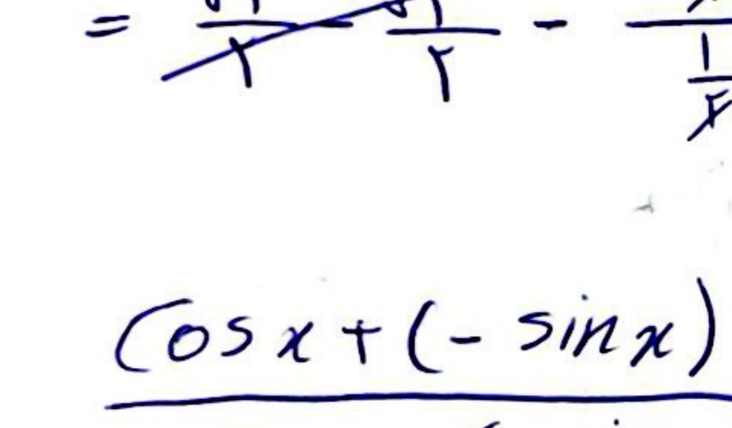
$4 = 3a + b$

$-(2 = -a + b)$

$1 + \frac{1}{4} = \frac{5}{4} \rightarrow \cos^2 = \frac{4}{5} \rightarrow \cos\theta = \frac{2}{\sqrt{5}}$

$2 = 4a \rightarrow a = \frac{1}{2} = \tan\theta$

⑧



$x = 0 \rightarrow y = 0 + \frac{5}{2} \Rightarrow y = 2/5$

$2/5 = m \times 0 + b \rightarrow b = 2/5$

$mb = \frac{5}{2} \times \sqrt{3} = \frac{5\sqrt{3}}{2}$

$m = \tan 120^\circ = \sqrt{3}$

$y = x + \frac{5}{2} \rightarrow \tan = 1 = \tan 45^\circ \rightarrow 45^\circ = x, y \rightarrow y + z = 180 - 105 \rightarrow z = 30, 9 = 90$

⑨

$$f\left(\frac{5\pi}{6}\right) = \cos\left(\underbrace{\pi + \frac{5\pi}{6}}_{180+150=330}\right) + \sin\left(\underbrace{\frac{\pi}{2} - \frac{5\pi}{6}}_{90-150=-60}\right) - \tan\left(\underbrace{\frac{3\pi}{2} + \frac{5\pi}{6}}_{270+150=420-360=60}\right)$$

$$= \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} - \frac{\frac{\sqrt{3}}{3}}{\frac{1}{3}} = -\sqrt{3}$$

⑩

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