نیما محقق دهم ریاضی B سری ۲۰

۱۸/۵۰

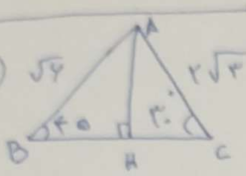
۱- الف) $(\sin 135 + \sin 300)(\cos 315 - \cos 150) = \left(\frac{\sqrt2}{2} + \left(-\frac{\sqrt3}{2}\right)\right)\left(\frac{\sqrt2}{2} - \left(-\frac{\sqrt3}{2}\right)\right)$

$= \left(\frac{\sqrt2}{2}\right)^2 - \left(\frac{\sqrt3}{2}\right)^2 = \frac{2}{4} - \frac{3}{4} = -\frac{1}{4}$ ✓

ب) $\frac{1 + 3\tan^2 210}{4\cos^2 330 + 2\cos^2 135} = \frac{1 + 3\times\left(\frac{\sqrt3}{3}\right)^2}{4\times\left(\frac{\sqrt3}{2}\right)^2 + 2\times\left(\frac{\sqrt2}{2}\right)^2} = \frac{1 + 3\times\frac{1}{3}}{4\times\frac{3}{4} + 2\times\frac{2}{4}} = \frac{1+1}{3+1} = \frac{2}{4} = \frac{1}{2}$ ✓

(۳)

۲- الف)



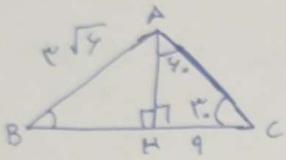
$AH = BH$

$AH = \sqrt6 \times \sin 45 = \sqrt6 \times \frac{\sqrt2}{2} = \frac{\sqrt{12}}{2}$

$AH = 2\sqrt3 \times \sin\hat C \Rightarrow \frac{\sqrt{12}}{2} \div \sqrt{12} = \sin\hat C \Rightarrow \sin\hat C = \frac{1}{2} \Rightarrow \hat C = 30$

$\Rightarrow HC = 2\sqrt3 \times \frac{\sqrt3}{2} = 3$ ✓

ب)



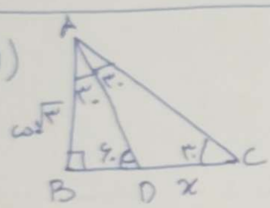
$AH = 9\times\sin 30 \Rightarrow AH = \frac{9}{\sqrt3}$

$AH = 3\sqrt6 \times \sin B \Rightarrow$ … $\Rightarrow \frac{9}{\sqrt3} = 3\sqrt6 \times \sin\hat B$

$\Rightarrow \sin\hat B = \frac{\sqrt{27}}{\sqrt{54}} \Rightarrow \sin\hat B = \frac{1}{\sqrt2} = \frac{\sqrt2}{2} \Rightarrow \hat B = 45$ ✓

(۴)

۳- الف)



$AB =$ … $AD \times \frac{\sqrt3}{2}$ (sin60) $\Rightarrow 50\sqrt3 = AD \times \frac{\sqrt3}{2} \Rightarrow AD = 100$

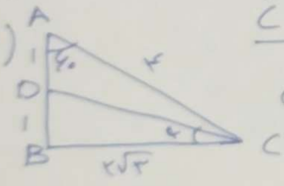
$AB = AC \times \sin 30 \Rightarrow AC = 50\sqrt3 \div \frac{1}{2} \Rightarrow AC = 100\sqrt3$

$CB - BD = x \Rightarrow 150 - 50 = 100$ ✓

$CB = 100\sqrt3 \times \frac{\sqrt3}{2} = 150$, $BD = 100 \times \frac{1}{2} = 50$

(۴)

ب)

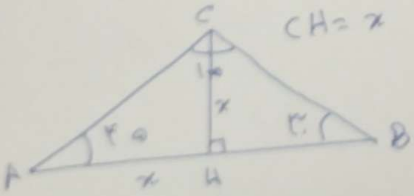


$\hat C = 30$, $AB = 2 \Rightarrow AB = AC \times \sin\hat C \Rightarrow AC = 2 \div \frac{1}{2} = 4$

$CB = AC \times \cos\hat C = CB = 4 \times \frac{\sqrt3}{2} = 2\sqrt3$

$\sin\alpha =$ … $\frac{1}{DC} \Rightarrow \sin\alpha = \frac{1}{\sqrt{1+12}} = \frac{1}{\sqrt{13}} = \frac{\sqrt{13}}{13}$ ✓

۴-



$CH = x \Rightarrow AC \times \frac{\sqrt2}{2} = x \Rightarrow AC = \sqrt2 x$

$AB = AH + HB \Rightarrow AB = x + \sqrt3 x \Rightarrow AB = x(1+\sqrt3)$

$AH = x$

$\frac{AB}{AC} = \frac{\sqrt2 x}{(1+\sqrt3)x}$ ↑↓

$HB = 2x \times \frac{\sqrt3}{2} = \sqrt3 x$

$CB = 2x$

$\frac{AB}{AC} = \frac{\sqrt6 + \sqrt2}{2}$ ✓

(۳)

$S_{BCD} = 3 \times 4 \times \frac{1}{2} \times \sin\hat{B}$

$S_{\triangle ABE} = 2 \times 3 \times \frac{1}{2} \times \sin\hat{B}$

$\frac{S_{BCD}}{S_{\triangle ABE}} = \frac{3 \times 4 \times \frac{1}{2} \times \sin\hat{B}}{2 \times 3 \times \frac{1}{2} \times \sin\hat{B}} = \frac{9}{4} = 2/25$ ✓ (۲)

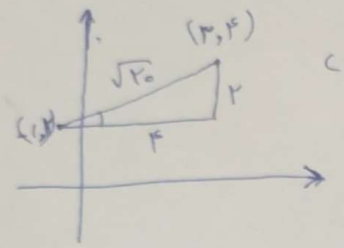
-ج

-۶

الف) $\frac{1}{2} \times 3 \times 4 \times \sin 120^\circ \times \frac{1}{2} = 3 \times 4 \times \frac{\sqrt{3}}{2} = 6\sqrt{3}$ ✓ (۱)

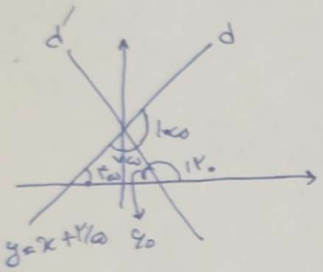
ب) $\frac{1}{2} \times 3 \times 4 \times \sin 120^\circ = \frac{\sqrt{3}}{2} \times 12 = 6\sqrt{3}$ ب) $\frac{1}{2} \times 4\sqrt{3} \times 4 \times \sin 120^\circ = 3\sqrt{3}$

-۷



$\cos x = \frac{4}{\sqrt{20}} = \frac{2}{\sqrt{5}}$ ✓ (۲)

-۸



$d = x + 2/5$

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

$d' = mx + b \Rightarrow d' = -\sqrt{3}x + b$

$\tan 120^\circ$

$m \times b = -2/5\sqrt{3}$ ✓ (۲)

نقطه برخورد با خط d: $x = 0$ ← $2/5$

-۹

$f(x) = \cos(\pi + x) + \sin(\frac{\pi}{2} - x) - \tan(\frac{3\pi}{2} - x) \Rightarrow f(x) = -(\cos x + \cos x + \cot x)$

$-\cos x$ ، $\cos x$ ، $\cot x$ ، مجموع = 0

$\Rightarrow f(\frac{5\pi}{2}) = \cot(\frac{5\pi}{2}) = -\sqrt{3}$ ✓ (۲)

-۱۰

$\frac{\sin(\frac{17\pi}{2} + x) + \cos(\frac{15\pi}{2} - x)}{\cos(3\pi + x) - \sin(2\pi - x)} = \frac{\sin x + \cos x}{\sin x - \cos x} = -1$ (۱٫۵)

$\sin x$ ، $-\cos x$

$\sin(\frac{17\pi}{2} + x) = \cos x$

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