حسن شیرازی

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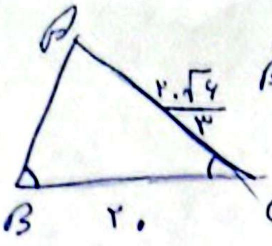

$\hat{B}+\hat{C}=120 \qquad \hat{A}=60 \qquad AC$

$$\frac{\sin\hat{B}}{\frac{20\sqrt{6}}{3}}=\frac{\sin\hat{A}}{20} \quad \frac{\sin 60^\circ=\frac{\sqrt{3}}{2}}{} \Rightarrow \sin B=\frac{20\sqrt{6}}{3}\times\frac{\sqrt{3}}{2}\times\frac{1}{20}=\frac{3\sqrt{2}}{3\times 2}$$

$\sin\hat{B}=\frac{\sqrt{2}}{2}$

$\hat{B}=45^\circ$

$C=120-45 \qquad \hat{C}=75^\circ \qquad \hat{B}=45^\circ$

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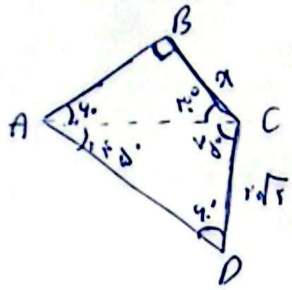

$$\hat{A}_2=180-(\overset{135}{60+75})=45^\circ$$

$$\frac{\sin 45^\circ}{2\sqrt{2}}=\frac{\sin 60^\circ}{AC} \Rightarrow AC=\frac{2\sqrt{2}\times\sin 60^\circ}{\sin 45^\circ}=\frac{2\sqrt{2}\times\sqrt{3}}{2\times\frac{\sqrt{2}}{2}}=2\sqrt{3}$$

$$\sin 60^\circ=\frac{x}{AC} \Rightarrow \frac{\sqrt{3}}{2}=\frac{x}{2\sqrt{3}} \qquad \boxed{x=3}$$

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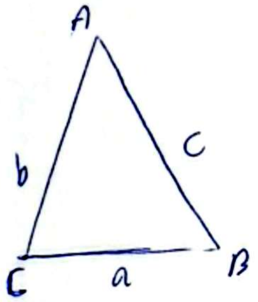

$$(b^2-2)\frac{\sin\hat{C}}{\sin\hat{B}}=\frac{c}{1}$$

$$\sin\hat{C}(b^2-2)=\sin\hat{B}\,c \qquad \frac{\sin\hat{C}}{c}=\frac{\sin\hat{B}}{b^2-2}$$

$b^2-2=b \qquad b^2-b-2=0$

$(b-2)(b+1)=0 \qquad b=2$ ق ق

$b=-1$ غ ق ق

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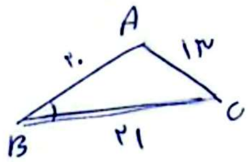

$\sin\hat{B}=?$ $\qquad 13=\sqrt{\underset{841}{400+441}-2\cos\hat{B}\,420}$

$169=841-2\cos\hat{B}\,420$

$672=2\cos\hat{B}\,420$

$336=\cos\hat{B}\,420 \qquad \cos\hat{B}=\frac{336}{420}=\frac{8}{10}$

$\cos\hat{B}=\frac{8}{10} \qquad \boxed{\sin\hat{B}=\frac{6}{10}}$

CamScanner

$b=4,\ c=2(1+\sqrt{3}),\ \hat{A}=60^\circ$

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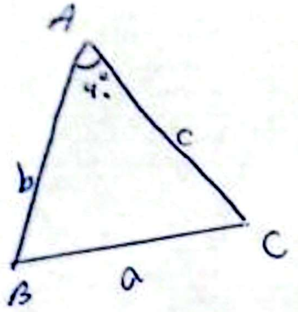
ب)



$a^2=16+4(1+\sqrt{3})^2-2\times\frac{1}{2}\times4\times2(1+\sqrt{3})$

$16+4(4+2\sqrt{3})$

$16+16+8\sqrt{3}-8-8\sqrt{3}=24$

$a^2=24 \quad a=\sqrt{24}$

$\hat{C}=120-45 \quad \hat{C}=75$

$\sin\hat{B}=\frac{\sqrt{2}}{2} \quad \hat{B}=45^\circ$

$\sin\hat{B}=\frac{\sqrt{3}}{\sqrt{6}}=\frac{\sqrt{3}}{\sqrt{3}\sqrt{2}}$

$\frac{\sin\hat{A}}{a}=\frac{\sin\hat{B}}{b}=\frac{\sin\hat{C}}{c} \Rightarrow \quad \frac{\sqrt{3}}{2}\times4=2\sqrt{6}\times\sin\hat{B}$

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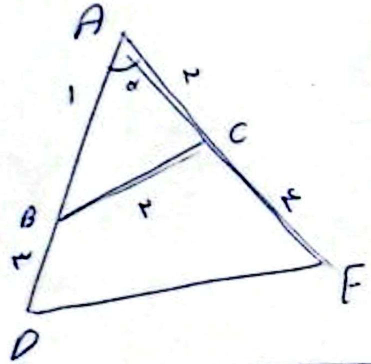

$2=\sqrt{1+4-4\cos\alpha} \quad 4=5-4\cos\hat{\beta} \quad \cos\hat{\beta}=\frac{1}{4}$

$DE=\sqrt{16+36-2\times\frac{1}{4}\times6\times4}$

$52-12$

$\Rightarrow DE=\sqrt{40}$

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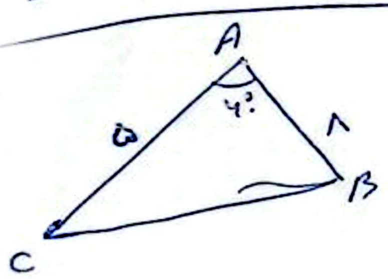
الف)



$\cos60^\circ=\frac{1}{2} \quad BC=\sqrt{25+64-2\times\frac{1}{2}\times40} \quad BC=\sqrt{49} \quad BC=7$

ب)

$\frac{1}{2}\times5\times8\times\sin60^\circ\left(\frac{\sqrt{3}}{2}\right)=10\sqrt{3}$

$$\frac{(b+c)^2-a^2}{bc(\cos\hat{A}+1)} = \frac{b^2+c^2+2bc-b^2-c^2+2\cos\hat{A}bc}{bc(\cos\hat{A}+1)} = \frac{2bc+2\cos\hat{A}bc}{bc(\cos\hat{A}+1)} = \frac{2bc(\cos\hat{A}+1)}{bc(\cos\hat{A}+1)} = 2$$

$$a^2 = b^2+c^2-2\cos\hat{A}bc$$

$$\frac{a^2+b^2-c^2}{a+b-c} = a$$

$$a^2+b^2-c^2 = a^2+ba^2-ca^2$$

$$b^2-c^2 = a^2(b-c)$$

$$(b-c)(b^2+bc+c^2) = a^2(b-c)$$

$$a^2 = b^2+c^2-2\cos\hat{A}\,bc$$

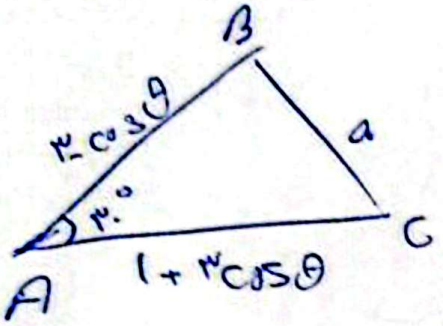
$$b^2+c^2+bc = a^2$$

$$b^2+c^2-2\cos\hat{A}\,bc = a^2$$

$$-2\cos\hat{A}bc = bc$$

$$-2\cos\hat{A} = 1$$

$$\cos\hat{A} = -\frac{1}{2}$$



$$a^2 = (2-\cos\theta)^2 + (1+2\cos\theta)^2 - 2\times\frac{\sqrt{3}}{2}(2-\cos\theta)(1+2\cos\theta)$$

$$4 - 4\cos\theta + \cos^2\theta + 1 + 4\cos\theta + 4\cos^2\theta - \sqrt{3}(2 + 4\cos\theta - \cos\theta - 2\cos^2\theta)$$

$$a^2 = 5 + 5\cos^2\theta - \sqrt{3}(2 + 3\cos\theta - 2\cos^2\theta) \Rightarrow \boxed{a^2 = 5 - 2\sqrt{3} + (5+2\sqrt{3})\cos^2\theta - 3\sqrt{3}\cos\theta} = \boxed{a^2 = 7 - 3\sqrt{3}}$$

$$\frac{1}{2}\times 3\times\sin 30^\circ \times (2-\cos\theta)(1+2\cos\theta) = 2 \qquad 2 - \cos\theta + 4\cos\theta - 2\cos^2\theta = 4$$

$$-2\cos^2\theta + 3\cos\theta - 2 = 0 \qquad \cos^2\theta - 3\cos\theta + 2 = 0 \qquad (\cos\theta - 2)(\cos\theta - 1) = 0$$

$\cos\theta = 2$ ق ق ع

$\cos\theta = 1$ ق ق