

$$B+C=120 \Rightarrow A=180-120=60$$

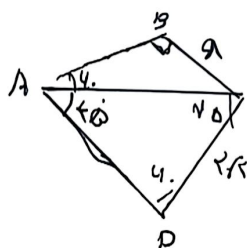
$$\frac{BC}{\sin A} = \frac{AC}{\sin B} \Rightarrow \frac{20}{\sin 40} = \frac{10\sqrt{3}}{\sin B}$$

$$\Rightarrow \sin B = \frac{\sqrt{3}}{2} \Rightarrow B=60$$

قضیه سینوسها

$$B+C=120 \xrightarrow{B=60} C=60$$

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$$\frac{20}{\sin 40} = \frac{AC}{\sin 40} \Rightarrow AC=20$$

$$\frac{x}{\sin 40} = \frac{10}{\sin 90} \Rightarrow x=10$$

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$$\frac{b}{\sin B} = \frac{c}{\sin C} \Rightarrow c = \frac{b \sin C}{\sin B} \Rightarrow (b-2) \frac{\sin C}{\sin B} = \frac{b \sin C}{\sin B}$$

$$\Rightarrow b-2=b \Rightarrow b-2-b=0 \Rightarrow b=2, -1 \Rightarrow b=2$$

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$$b^2 = a^2 + c^2 - 2ac \cos B \Rightarrow 13^2 = 21^2 + 2^2 - 2(21)(2) \cos B \Rightarrow \cos B = 0.11$$

$$\Rightarrow 1 - \cos^2 B = \sin^2 B \Rightarrow 1 - 0.11^2 = 0.134 \Rightarrow \sin^2 B = 0.124 \Rightarrow \sin B = 0.14$$

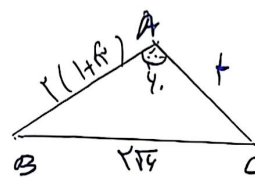
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$$a^2 = b^2 + c^2 - 2bc \cos A \Rightarrow a^2 = 14^2 + 14^2 + 18\sqrt{3} - 2(14)(14\sqrt{3}) \cos 40$$

$$\Rightarrow a^2 = 24 \Rightarrow a = \sqrt{24} = 2\sqrt{6}$$

$$\frac{2\sqrt{6}}{\sin 40} = \frac{1}{\sin B} \Rightarrow \sin B = \frac{1}{2\sqrt{6}} \Rightarrow B=40$$

$$C=180-(60+40)=80$$



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ثقله
مستوي

$$a^2 = c^2 + b^2 - 2bc \cos \alpha$$

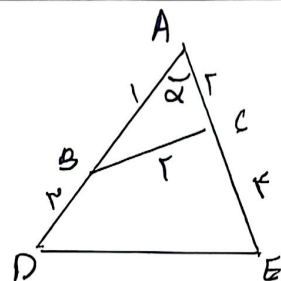
$$1 = 1 + 4 - 2(1)(2) \cos \alpha \rightarrow \cos \alpha = \frac{1}{2}$$

$$DE^2 = AD^2 + AE^2 - 2(AD)(AE) \cos \alpha$$

$$\rightarrow DE^2 = 1^2 + 2^2 - 2(1)(2)\left(\frac{1}{2}\right) = 5 - 2 = 3$$

$$\rightarrow DE^2 = 3 \rightarrow DE = \sqrt{3} = \underline{2\sqrt{3}}$$

ضع برآبرها را



ان) $BC^2 = AC^2 + AB^2 - 2(AB)(AC) \cos A \rightarrow BC^2 = 2^2 + 4^2 - 2(1)(2) \frac{1}{2}$

ثقله
مستوي

$$BC^2 = 4 \Rightarrow BC = \underline{2}$$

ب) $S_{ABC} = \frac{1}{2} AC \times AB \times \sin A = \frac{1}{2} \times 2 \times 1 \times \frac{\sqrt{3}}{2} = \underline{1.5\sqrt{3}}$

ثقله
مستوي

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

صورت کبر

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

$$\rightarrow \frac{2bc + 2bc \cos A}{bc(1 + \cos A)} = \frac{2bc(1 + \cos A)}{bc(1 + \cos A)} = \underline{2}$$

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

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

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

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

ثقله
مستوي

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

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

$$\rightarrow bc = -2bc \cos A \rightarrow \cos A = \underline{-\frac{1}{2}}$$

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

$$\rightarrow 3 + 4 \cos \theta - 2 \cos^2 \theta = 4 \rightarrow 2 \cos^2 \theta - 4 \cos \theta + 1 = 0 \rightarrow \begin{cases} \cos \theta = 1 \\ \cos \theta = \frac{1}{2} \end{cases}$$

ثقله
مستوي

$$a^2 = b^2 + c^2 - 2bc \cos A = 1^2 + 2^2 - 2(1)(2) \cos 3$$

$$= 5 - 4 \cos 3 \rightarrow \underline{a^2 = 5 - 4 \cos 3}$$

