

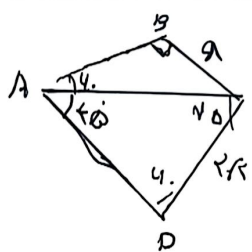
$$B+C=120 \Rightarrow A=180-120=60^\circ$$

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

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

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

قانون سینوسها



$$\frac{20 \cdot \sqrt{3}}{\sin 40^\circ} = \frac{AC}{\sin 40^\circ} \Rightarrow AC=20\sqrt{3}$$

$$\frac{20}{\sin 40^\circ} = \frac{20 \cdot \sqrt{3}}{\sin 90^\circ} \Rightarrow 2=3$$

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

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

بافت

$$b^2 = a^2 + c^2 - 2ac \cos B \Rightarrow 12^2 = 21^2 + 2^2 - 2(21)(2) \cos B \Rightarrow \cos B = 0.11$$

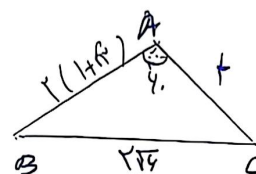
$$\Rightarrow 1 - \cos^2 B = \sin^2 B \Rightarrow 1 - 0.11^2 = 0.134 \Rightarrow \sin^2 B = 0.124 \Rightarrow \sin B = 0.114$$

الف) $a^2 = b^2 + c^2 - 2bc \cos A \Rightarrow a^2 = 14 + 14 + 18\sqrt{3} - 2(4)(2+\sqrt{3}) \cos 40^\circ$

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

ب) $\frac{2\sqrt{6}}{\sin 40^\circ} = \frac{4}{\sin B} \Rightarrow \sin B = \frac{\sqrt{3}}{2} \Rightarrow B=60^\circ$

$$C=180-(60+40)=80^\circ$$



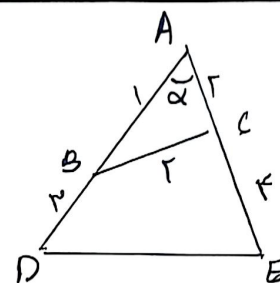
قضیه کسینوسها $a^2 = b^2 + c^2 - 2bc \cos A$

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

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

$\rightarrow DE^2 = 14 + 24 - 2(14)(2)\left(\frac{1}{2}\right) = 52 - 28 = 24$

$\rightarrow DE^2 = 24 \rightarrow DE = \sqrt{24} = 2\sqrt{6}$ ✓
ضلع برائے زاویه مقابل



الف) $BC^2 = AC^2 + AB^2 - 2(AB)(AC) \cos A \rightarrow BC^2 = 25 + 49 - 2(1)(5) \frac{1}{2}$

قضیه کسینوسها $BC^2 = 79 \rightarrow BC = \sqrt{79}$ ✓

ب) $S_{ABC} = \frac{1}{2} AC \times AB \times \sin A = \frac{1}{2} \times 5 \times 1 \times \frac{\sqrt{3}}{2} = \frac{5\sqrt{3}}{4}$ ✓

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

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

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

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

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

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

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

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

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

$\rightarrow bc = -2bc \cos A \rightarrow \cos A = -\frac{1}{2}$ ✓
 $A = 120^\circ$

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

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

قضیه کسینوسها $a^2 = b^2 + c^2 - 2bc \cos A = 14 + 5 - 2(14)(5) \cos 3$

$= 19 - 140 \cos 3 \rightarrow \{a^2 = 19 - 140 \cos 3\}$ ✓

