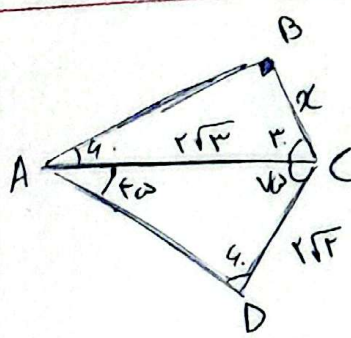


$$\hat{B} + \hat{C} = 180^\circ \Rightarrow \hat{A} = 4^\circ$$

$$\frac{b}{\sin \hat{B}} = \frac{c}{\sin \hat{C}} = \frac{a}{\sin \hat{A}} \Rightarrow \frac{2}{\sin \hat{B}} = \frac{\frac{2\sqrt{4}}{3}}{\sin \hat{C}} \Rightarrow \frac{1}{\sin \hat{B}} = \frac{\sqrt{4}}{3 \sin \hat{C}}$$

$$\Rightarrow \sin \hat{B} = \frac{1 \cdot \sqrt{4}}{3 \cdot 2} = \frac{\sqrt{4}}{6} \Rightarrow \hat{B} = 4^\circ \text{ و } 180^\circ - 4^\circ - 4^\circ = 172^\circ = \hat{C}$$

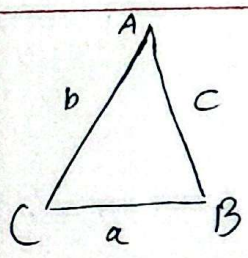
(۲)



$$\frac{a}{\sin \hat{A}} = \frac{d}{\sin \hat{D}} \Rightarrow \frac{2\sqrt{4}}{\sin 4^\circ} = \frac{d}{\sin \hat{D}} \Rightarrow d = \frac{2\sqrt{4} \sin \hat{D}}{\sin 4^\circ}$$

$$\Rightarrow \frac{2\sqrt{4}}{\sin 4^\circ} = \frac{2\sqrt{4}}{\sin 4^\circ} \Rightarrow \hat{D} = 4^\circ$$

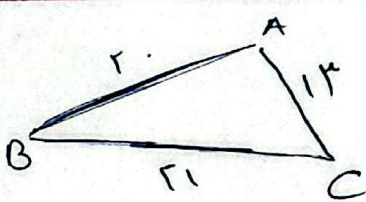
(۲)



$$c = (b^2 - r^2) \frac{\sin \hat{C}}{\sin \hat{B}}, \quad \frac{b}{\sin \hat{B}} = \frac{c}{\sin \hat{C}} = \frac{a}{\sin \hat{A}}$$

$$\Rightarrow (b^2 - r^2) \frac{c}{b} = c \Rightarrow \frac{b^2 - r^2}{b} = 1 \Rightarrow b^2 - b - r^2 = 0 \Rightarrow b = \frac{1 \pm \sqrt{1 + 4r^2}}{2}$$

(۲)

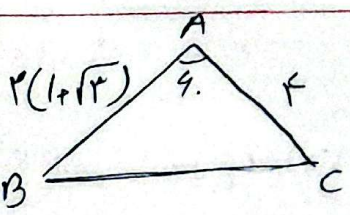


$$b^2 = a^2 + c^2 - 2ac \cos \hat{B} \Rightarrow 149 = 4 + 1 - 2(2)(\frac{2\sqrt{4}}{3}) \cos \hat{B} \Rightarrow \cos \hat{B} = \frac{149 - 4}{-8\sqrt{4}} = \frac{145}{-8\sqrt{4}}$$

$$\Rightarrow \cos \hat{B} = \frac{145}{-8\sqrt{4}} \Rightarrow \hat{B} = 172^\circ$$

$$\cos \hat{B} = 1 - \sin \hat{B} \Rightarrow 0,48 = 1 - \sin \hat{B} \Rightarrow \sin \hat{B} = 0,52 \Rightarrow \hat{B} = 31,3^\circ$$

(۲)



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

$$a^2 = 14 + 14 + 8\sqrt{4} - 8\sqrt{4} \Rightarrow a^2 = 14 \Rightarrow a = \sqrt{14}$$

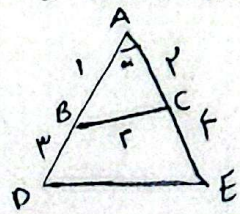
الف) اندازه P

$$\frac{a}{\sin \hat{A}} = \frac{b}{\sin \hat{B}} \Rightarrow \frac{\sqrt{14}}{\sin 4^\circ} = \frac{2}{\sin \hat{B}} \Rightarrow \sin \hat{B} = \frac{2 \sin 4^\circ}{\sqrt{14}} \Rightarrow \hat{B} = 4^\circ$$

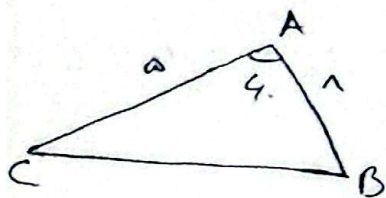
(۲)

$$BC^2 = AC^2 + AB^2 - 2AC \cdot AB \cdot \cos \alpha \Rightarrow 4 = 4 + 1 - 2(2)(1) \cos \alpha \Rightarrow \cos \alpha = \frac{1}{2}$$

$$DE^2 = AD^2 + AE^2 - 2AD \cdot AE \cdot \cos \alpha \Rightarrow DE^2 = 14 + 14 - 2 \cdot 14 \cdot \frac{1}{2} \Rightarrow DE = \sqrt{14}$$



(۲)



$$BC^2 = AC^2 + AB^2 - 2AC \cdot AB \cdot \cos 4^\circ$$

$$BC^2 = 16 + 49 - 2(4)(7)(\frac{1}{2}) \Rightarrow BC = 5 \checkmark$$

(2)

(7) الف

$$S_{ABC} = \frac{1}{2} \cdot AC \cdot AB \cdot \sin 4^\circ = \frac{1}{2} \cdot 4 \cdot 7 \cdot \frac{\sqrt{2}}{2} = 7\sqrt{2} \checkmark$$

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

$$\Rightarrow \frac{2bc + 2bc \cos A}{bc(\cos A + 1)} = \frac{2bc(\cos A + 1)}{bc(\cos A + 1)} = 2 \checkmark$$

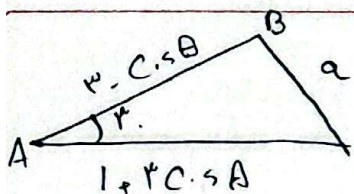
(2)

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

$$a^2 \frac{(a+b-c)}{(a+b-c)} \rightarrow \frac{a^2(a+b-c)}{(a+b-c)} \rightarrow \frac{a^2(b-c)(b+bc+c^2)}{b+a-c} \quad (9)$$

(10)

$$\begin{cases} a^2 = b^2 + c^2 - 2bc \cos A \Rightarrow \cos A = \frac{b^2 + c^2 - a^2}{2bc} \\ a^2 = b^2 + c^2 - 2bc \cos A \Rightarrow \cos A = \frac{1}{2} \rightarrow A = 60^\circ \end{cases}$$



$$S_{ABC} = \frac{1}{2} \cdot AB \cdot AC \cdot \sin 60^\circ = \frac{1}{2} \cdot 1 \cdot 2 \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2} \quad (1)$$

$$b^2 + AC \cos \theta = c^2 \cos \theta \Rightarrow -c^2 \cos \theta + AC \cos \theta = a^2 \Rightarrow \cos \theta = \frac{a^2}{c^2 - b^2} \checkmark$$

$$\Rightarrow AC = 2, AB = 1$$

(2)

$$a^2 = b^2 + c^2 - 2bc \cos A \Rightarrow 14 + 1 - 2(4)(1)(\frac{1}{2}) = 2 - \sqrt{3} \checkmark$$