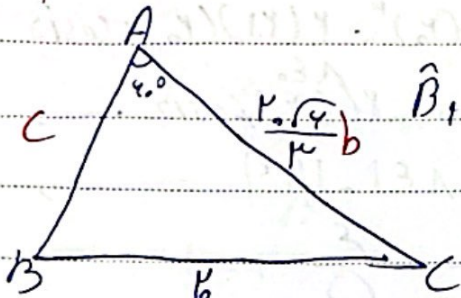


(A) دوازدهم

مسئله ۱۳۰

مسئله ۱۳۰

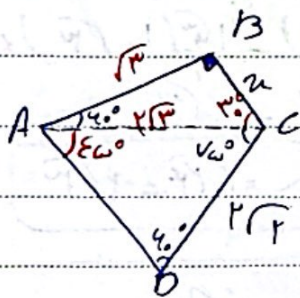


$$\hat{B} + \hat{C} = 120^\circ, \hat{A} = 40^\circ \quad \hat{B} = ? \quad \hat{C} = ?$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} \rightarrow \frac{10}{\sin 40^\circ} = \frac{10}{\sin B}$$

$$\frac{10}{\sin 40^\circ} = \frac{10}{\sin B} \rightarrow \sin B = \frac{10}{10} = 1 \rightarrow B = 90^\circ$$

$$\hat{B} + \hat{C} = 120^\circ, \hat{C} = 120^\circ - 90^\circ = 30^\circ \rightarrow \boxed{C = 30^\circ}$$



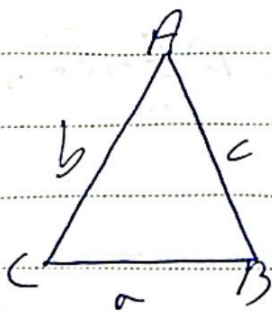
$$\frac{a}{\sin A} = \frac{d}{\sin D} \rightarrow \frac{10}{\sin 40^\circ} = \frac{10}{\sin D}$$

$$\frac{10}{\sin 40^\circ} = \frac{10}{\sin D} \rightarrow \sin D = 1 \rightarrow D = 90^\circ$$

$$AC = 10$$

$$AB = 10 \leftarrow AB = AC$$

$$AC^2 = BC^2 + AB^2 \rightarrow 10^2 = 10^2 + 10^2 \rightarrow 10^2 = 20 \rightarrow \boxed{10 = \sqrt{20}}$$

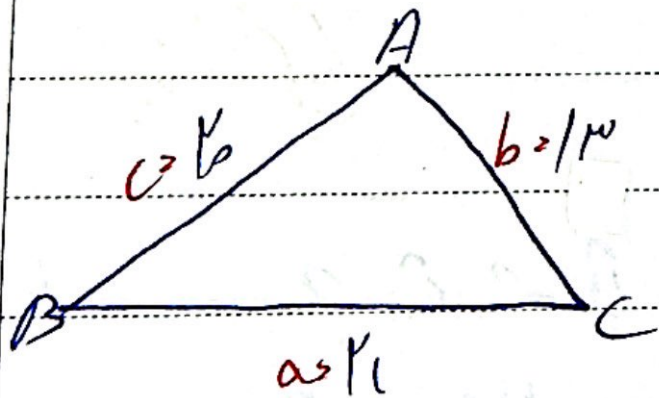


$$(b^2 - 2) \frac{\sin \hat{C}}{\sin \hat{B}} = c$$

$$\frac{b}{\sin \hat{B}} = \frac{c}{\sin \hat{C}} \rightarrow \frac{\sin \hat{C}}{\sin \hat{B}} = \frac{c}{b}$$

$$\frac{c}{b^2 - 2} = \frac{c}{b} \rightarrow b^2 - 2 = b \rightarrow b^2 - b - 2 = 0 \rightarrow b = 2$$

P4PCO



$\sin \hat{B} = ?$ *مقابل* $b^2 = a^2 + c^2 - 2ac \cos \hat{B}$

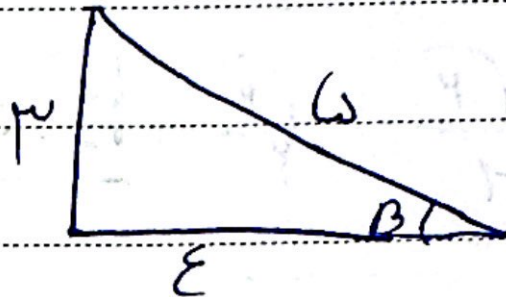
$$(1/\sqrt{2})^2 = (1)^2 + (1/\sqrt{2})^2 - 2(1)(1/\sqrt{2}) \times \cos \hat{B}$$

$$1/2 = 1 + 1/2 - \sqrt{2} \cos \hat{B} \rightarrow$$

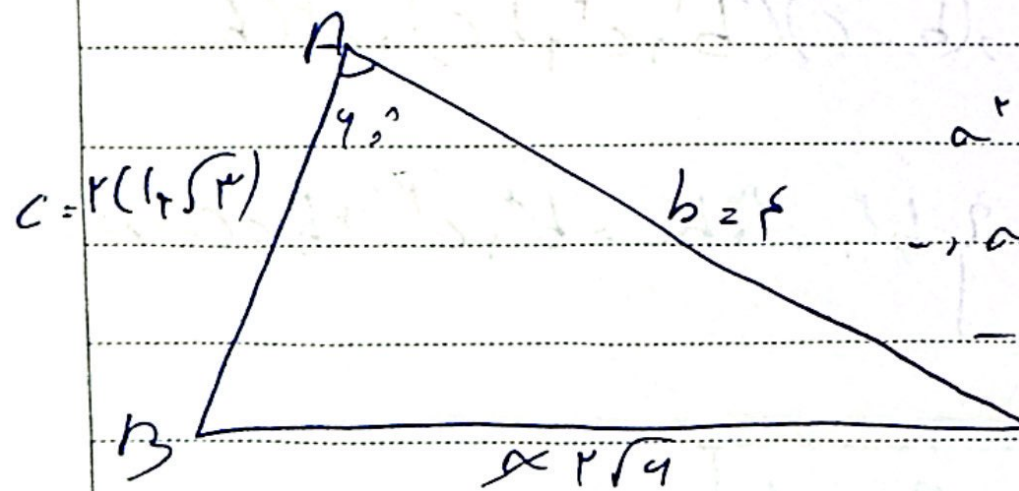
$$\Rightarrow \sqrt{2} \cos \hat{B} = 1.5$$

$$\Rightarrow \sqrt{2} \cos \hat{B} = 1.5 \rightarrow \cos \hat{B} = \frac{1.5}{\sqrt{2}} = \frac{\sqrt{2}}{2} \checkmark$$

(4)



$\sin \hat{B} = \frac{\text{مقابل}}{\text{وتر}} = \frac{1}{\sqrt{2}} \checkmark$

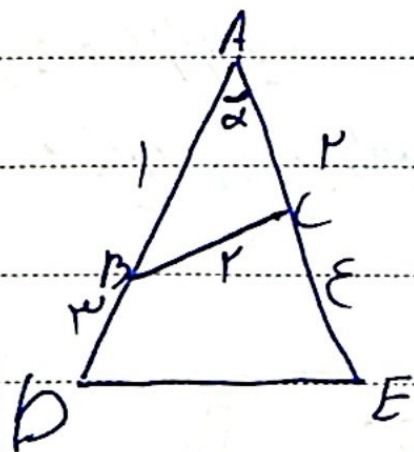


$$a^2, b^2, c^2 = 2bc \cos \hat{A} \quad a = ? \text{ (المف)} \\
a^2 = 16 + 4(1 + \sqrt{3}) - 2(4, 2\sqrt{3}) \\
\rightarrow a^2 = 14 + 4\sqrt{3} - 4\sqrt{3} = 10 \\
\rightarrow a = \sqrt{10} \quad \rightarrow \boxed{a = \sqrt{10} = 2\sqrt{4}} \quad \checkmark$$

$$\frac{b}{\sin B} = \frac{a}{\sin A} \rightarrow \frac{4}{\sin B} = \frac{2\sqrt{4}}{\frac{\sqrt{2}}{2}} \Rightarrow \sin B = \frac{4\sqrt{2}}{4\sqrt{4}} = \frac{\sqrt{2}}{2} \Rightarrow B = 45^\circ$$

$$\rightarrow \sin B = \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2} \rightarrow \boxed{B = 45^\circ} \quad \checkmark$$

$$\hat{A}, \hat{B}, \hat{C} = 180^\circ \rightarrow 45^\circ + 45^\circ + \hat{C} = 180^\circ \rightarrow \boxed{\hat{C} = 90^\circ} \quad \checkmark$$



$$DE = ? \quad a^2 = b^2 + c^2 - 2bc \cos \hat{A} \rightarrow \quad \text{4}$$

$$\rightarrow BC^2 = AC^2 + AB^2 - 2(AC \times AB \times \cos \alpha) \rightarrow$$

$$\rightarrow \epsilon = \epsilon + 1 - 2(\underbrace{r \times 1 \times \cos \alpha}_{r \cos \alpha}) \rightarrow$$

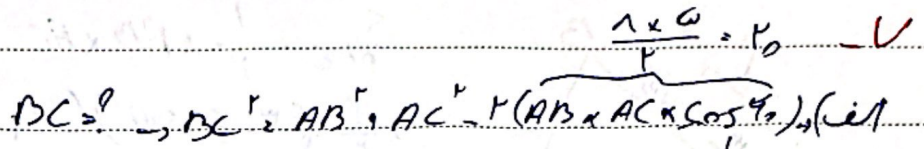
$$\rightarrow \epsilon = 0 - \epsilon \cos \alpha \rightarrow \epsilon \cos \alpha = 1 \rightarrow \cos \alpha = \frac{1}{\epsilon}$$

$$ADE \triangle \Rightarrow DE^2 = AD^2 + AE^2 - 2(AD \times AE \times \cos \alpha) \rightarrow$$

$$\rightarrow DE^2 = 1^2 + r^2 - \epsilon \times 1 \times \cos \alpha \rightarrow DE^2 = \epsilon \rightarrow DE = \sqrt{\epsilon}$$

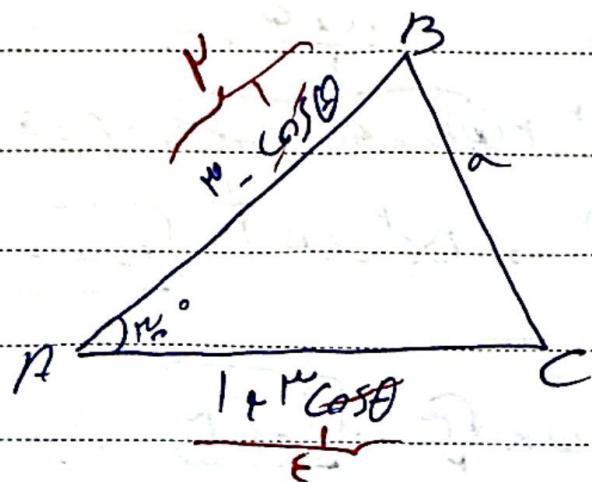
$$\rightarrow DE = \sqrt{10}$$

✓



$$S_{ABC} = \frac{1}{2} \times AB \times AC \times \sin 45^\circ = \frac{1}{2} \times 1 \times \sqrt{2} \times \frac{\sqrt{2}}{2} = \frac{1 \times \sqrt{2}}{2} \quad (c)$$

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$$S_{ABC} = \frac{1}{2} \times AB \times AC \times \sin 120^\circ \rightarrow 10$$

$$\rightarrow \frac{1}{2} (r - r \cos \theta)(1 + r \cos \theta) \times \frac{1}{2} = r$$

$$(m_1 \cos \theta)(1 + m_2 \cos \theta) = \dots$$

$$\rightarrow r + 9 \cos \theta - \cos \theta - r \cos^2 \theta = 1 \rightarrow r \cos^2 \theta - 1 \cos \theta + 10 = 0 \rightarrow$$

$\rightarrow \cos \theta = 1, \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|} \rightarrow \cos \theta = 1$

$\left\{ \begin{array}{l} \text{از اینجا} \\ \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|} = 1 \end{array} \right. \rightarrow -1 \leq \cos \theta \leq 1$

by principle $\rightarrow a^T = AB^T + AC^T - \underbrace{\gamma (AB \times AC \times \cos \theta)}_{\gamma}$

$\rightarrow a^T = 8.14 - 1\sqrt{2} \rightarrow a^T = 7.0 - 1\sqrt{2}$