

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

$$\hat{B} + \hat{C} = 180^\circ \Rightarrow \boxed{A = 90^\circ}$$

$$\sin 90^\circ = \frac{a}{c}$$

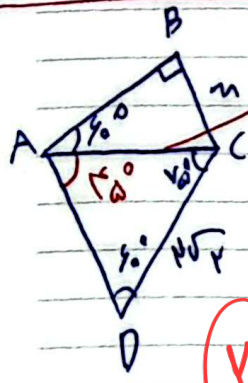
24 Sep. 2024
ربیع الاول ۱۴۴۶

$$\frac{20}{\sin A} = \frac{10\sqrt{2}}{\sin B} \Rightarrow \frac{20}{\sqrt{2}} = \frac{10\sqrt{2}}{\sin B}$$

$$\sin B = \frac{10\sqrt{2}}{20\sqrt{2}} = \frac{1}{2}$$

$$\sin B = \frac{1}{2} \Rightarrow \boxed{B = 30^\circ}$$

$$180 = 90 + 30 + \hat{C} \Rightarrow \boxed{C = 60^\circ}$$



$$180 - (90 + 60) = 30^\circ$$

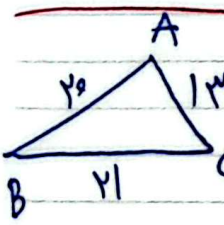
$$\frac{\sin 90^\circ}{\frac{20}{\sqrt{2}}} = \frac{\sin 60^\circ}{\frac{10\sqrt{2}}{\sqrt{2}}} \Rightarrow \frac{\sqrt{2}}{20} = \frac{\frac{\sqrt{3}}{2}}{10}$$

$$\Rightarrow \frac{\sqrt{2}}{20} = \frac{\sqrt{3}}{20} \Rightarrow \sqrt{2} = \sqrt{3}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = k \Rightarrow b = k \sin B, c = k \sin C$$

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

$$\Rightarrow b^2 - b - 2 = 0 \Rightarrow \boxed{b = 2}$$



$$\cos B = \frac{a^2 + c^2 - b^2}{2ac} \Rightarrow \cos B = \frac{20^2 + 10^2 - 10^2}{2 \cdot 20 \cdot 10} = \frac{400}{400} = 1$$

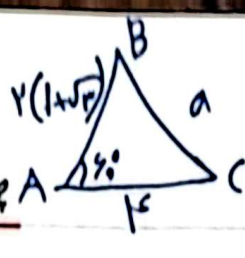
$$\Rightarrow \cos B = 1 \Rightarrow B = 0^\circ$$

$$\sin B + \cos B = 1 \Rightarrow \sin B + \cos B = 1$$

$$\sin B = 0, \cos B = 1 \Rightarrow \boxed{\sin B = 0}$$

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$$\cos 120^\circ \Rightarrow a^2 = (2)^2 + [2(1+\sqrt{3})]^2 - 2 \times 2 \times 2(1+\sqrt{3}) \cos 60^\circ$$

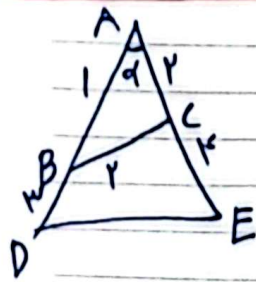
$$a^2 = 4 + 4 + 4\sqrt{3} - 4 - 4\sqrt{3} = 4$$

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

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

$$C = 90^\circ \leftarrow A + B + C = 180^\circ \Rightarrow 60^\circ + 30^\circ + C = 180^\circ$$

$$B = 30^\circ$$



$$BC^2 = AB^2 + AC^2 - 2ABAC \cos 60^\circ$$

$$1 = 1 + 1 - 2 \cos 60^\circ \rightarrow \cos 60^\circ = \frac{1}{2}$$

$$DE^2 = AD^2 + AE^2 - 2ADAE \cos 60^\circ = 1 + 1 - 2 \times 1 \times 1 \times \frac{1}{2} = 1 \rightarrow DE = \sqrt{1} = 1$$



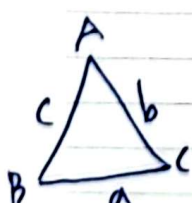
$$S_{ABC} = \frac{1}{2} \times 1 \times 1 \times \sin 60^\circ = \frac{1}{2} \times 1 \times 1 \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$$

$$\cos 120^\circ \Rightarrow (BC)^2 = 1^2 + 1^2 - 2 \times 1 \times 1 \times \cos 120^\circ$$

$$BC = \sqrt{3} \leftarrow (BC)^2 = 1 + 1 - 2 \times (-1) = 3$$

$$\frac{(b+c)^2 - a^2}{bc(\cos A + 1)} = ? \quad b = a, c = a, a = b \Rightarrow \frac{(a+a)^2 - (a)^2}{a \times a (\frac{1}{2} + 1)} = \frac{1 + 1 - 1}{1 \times 1 \times \frac{3}{2}} = \frac{1}{\frac{3}{2}} = \frac{2}{3}$$

فرض: $\cos 60^\circ = \frac{1}{2}$



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

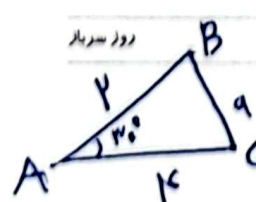
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

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

$$S = \frac{1}{2} \times \sin 120^\circ \times (1 + \sqrt{3} \cos \theta) \times (1 + \sqrt{3} \cos \theta) \Rightarrow$$

$$1 = \frac{1}{2} \times [1 + 1 \cos \theta - \cos \theta - \sqrt{3} \cos^2 \theta] \Rightarrow 1 = 1 + \cos \theta - \sqrt{3} \cos^2 \theta$$



$$\Rightarrow \cos 120^\circ \Rightarrow a^2 = 1 + 1 - 2 \times 1 \times 1 \times \cos 120^\circ$$

$$\Rightarrow a^2 = 2 - 2 \times (-1) = 4$$