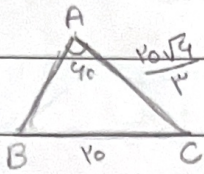


$$BC = r_0 \quad \hat{B} + \hat{C} = 120^\circ \quad AC = \frac{r_0 \sqrt{3}}{2} \quad \hat{C}, \hat{B} = ? \quad (1)$$

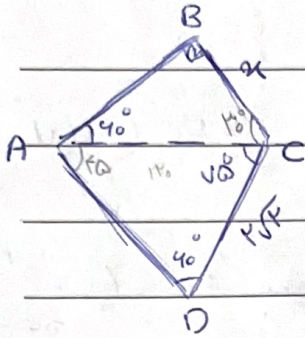


$$\Downarrow \\ A = 90^\circ$$

$$\frac{BC}{\sin A} = \frac{AC}{\sin B} = \frac{AB}{\sin C}$$

$$\sin B = \frac{r_0 \sqrt{3} \times \frac{\sqrt{3}}{2} \times 1}{r_0 \times \frac{\sqrt{3}}{2}} = \frac{\sqrt{3}}{2} \Rightarrow \hat{B} = 60^\circ$$

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

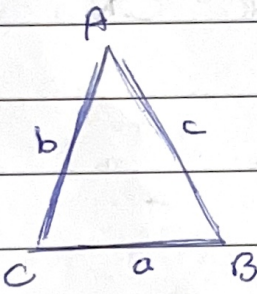


$$\frac{\frac{\sqrt{3}}{2}}{\sin 60^\circ} = \frac{\frac{\sqrt{3}}{2}}{\sin 30^\circ}$$

$$AC = \frac{r_0 \sqrt{3}}{2} = r_0 \sqrt{3}$$

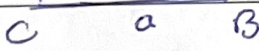
$$\frac{\frac{\sqrt{3}}{2}}{\sin 90^\circ} = \frac{\sin 90^\circ}{r_0 \sqrt{3}} \Rightarrow r = \frac{r_0 \sqrt{3} \times \frac{\sqrt{3}}{2}}{1} = r_0$$

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



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

$$(b^2 - r^2) \frac{c}{k} = c$$

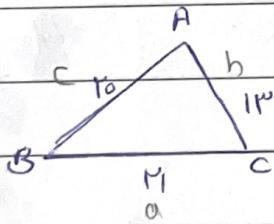


$$\sin C = \frac{c}{k}$$

$$(b^2 - r^2) \frac{c}{b} = c \Rightarrow b^2 - b^2 - r^2 = 0$$

$$\sin B = \frac{b}{k}$$

$$\sin B = ?$$



$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$\cos B = \frac{1}{2} \Rightarrow \hat{B} = 60^\circ$$

$$149 = 1^2 + 1^2 - 2(1)(1) \cos B$$

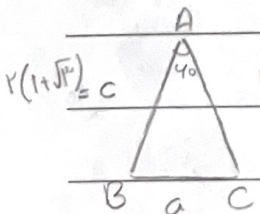
$$\sin^2 + \cos^2 = 1$$

$$149 = 1^2 + 1^2 - 2(1)(1) \cos B$$

$$\sin B = \frac{1}{2}$$

$$AC \cos B = 1 \times \frac{1}{2}$$

$$\hat{A} = 90^\circ \quad b = r \quad C = r(1 + \sqrt{3}) \quad (2)$$



$$b = r$$

$$a^2 = 1^2 + (r + r\sqrt{3})^2 - 2(1)(r + r\sqrt{3}) \cos 90^\circ$$

$$r \text{ a صاع (c)}$$

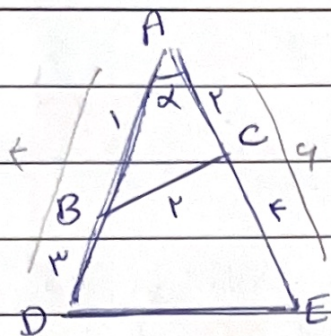
$$a^2 = 1 + 1 + 1 + 1 + 1 + 1 - 1 - 1 = 4 \Rightarrow a = 2$$

$$a = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$\hat{C}, \hat{B} \text{ صاع (c)}$$

$$\frac{\frac{\sqrt{3}}{2}}{\sin 90^\circ} = \frac{\sin B}{r}$$

$$\sin B = \frac{\sqrt{3}}{2} \quad B = 60^\circ \Rightarrow C = 180^\circ - 90^\circ - 60^\circ = 30^\circ$$



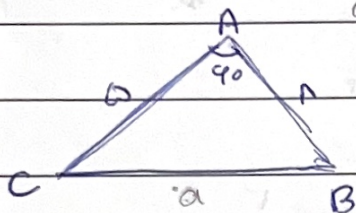
$$\cos \alpha = \frac{AC^2 + AB^2 - BC^2}{2(AB)(AC)}$$

(4) اندازه‌ی ضلع بزرگتر چقدر است؟

$$\frac{f+1-f}{r(1)(r)} = \frac{1^2 + 4^2 - DE^2}{2(4)(r)} \Rightarrow 11 = 17 - DE^2$$

$$DE^2 = 17 - 11 = 6$$

$$DE = \sqrt{6}$$



$$a^2 = 1^2 + 4^2 - 2(1)(4)\cos \alpha \quad a^2 = 17 \quad a = \sqrt{17} \quad r = BC \text{ (ضلع بزرگ)}$$

$$S = \frac{1}{2} \times 1 \times 4 \times \sin 90^\circ = 2$$

(ب) مساحت ضلع چقدر است؟

$$\frac{(b+c)^2 - a^2}{bc(\cos A + 1)}$$

(1) ضلع ABC چقدر است؟

$$\frac{b^2 + c^2 + 2bc - a^2}{bc(\cos A + 1)}$$

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

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

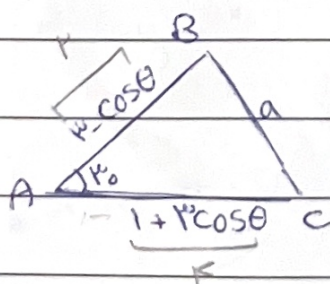
سینوس قانون

$$\frac{a^2 + b^2 - c^2}{a+b-c} = a^2 \quad (4)$$

$$a^2 + b^2 - c^2 = a^2 + a^2b - a^2c$$

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

$$\frac{b^2 + c^2 - a^2}{\cos A \times 2bc} = -bc \Rightarrow \cos A = -\frac{1}{2}$$



$$\frac{1}{r} \times (1 - \cos \theta) \times (1 + 4 \cos \theta) \times \frac{1}{r} = 1 \quad r = \text{مساحت ضلع}$$

$$1 + 4 \cos \theta - \cos \theta - 4 \cos^2 \theta = 1 \quad r = \text{مساحت ضلع}$$

$$\cos \theta = 1 \quad \cos \theta = \frac{1}{2}$$

$$a^2 = 1^2 + 4^2 - 2(1)(4)\cos \theta = 17 - 8\cos \theta$$