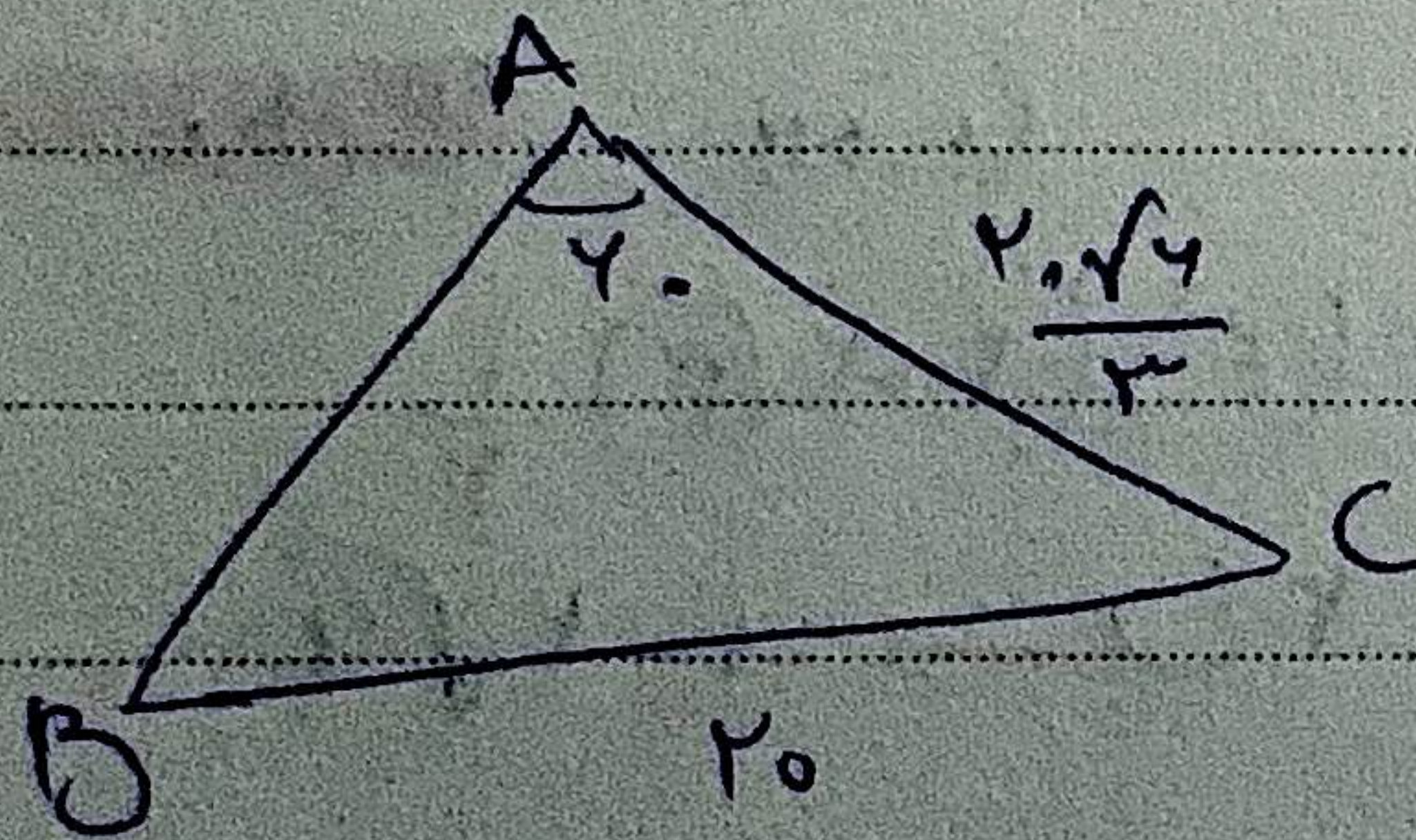


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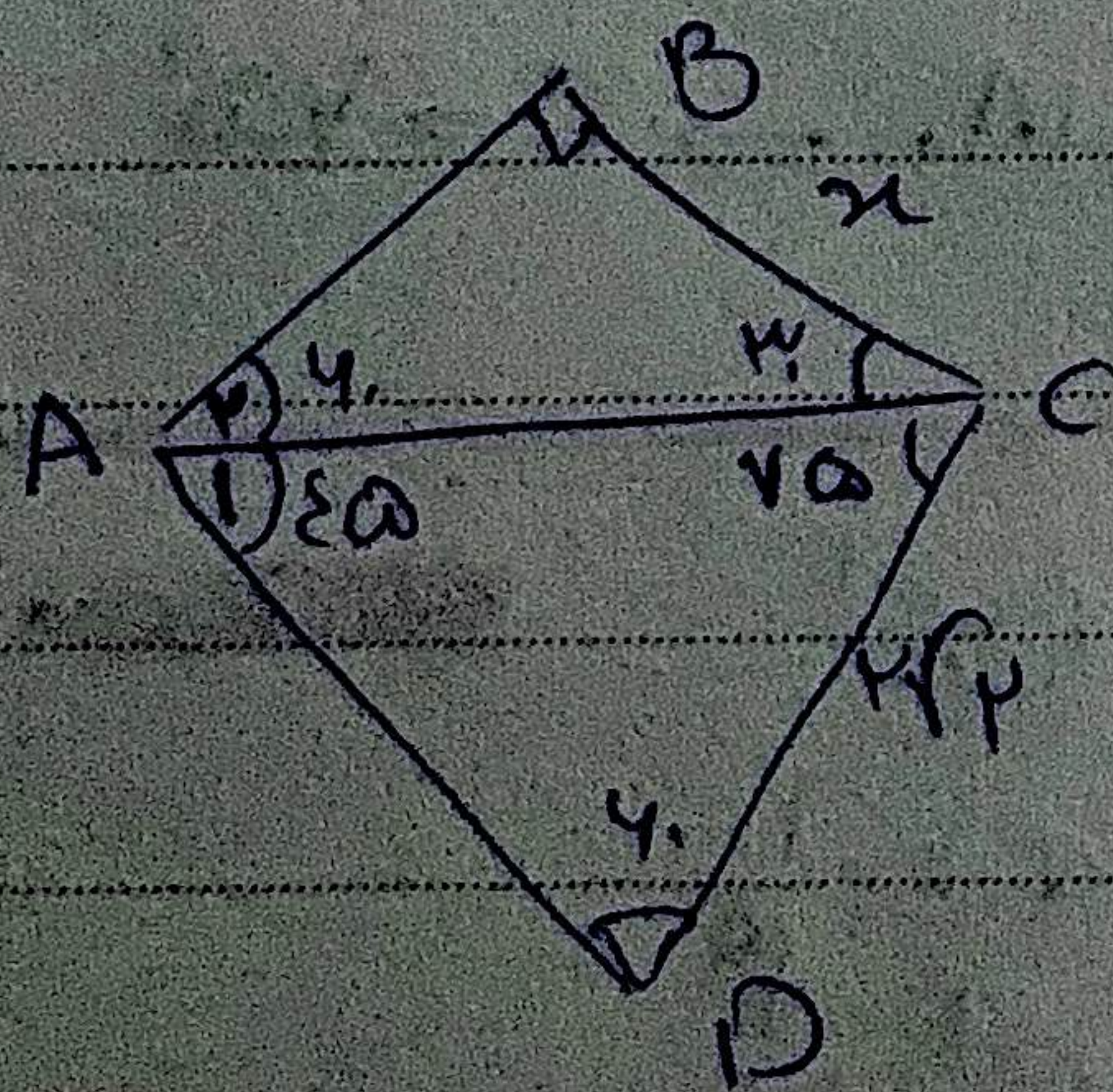


$$A + B + C = 180^\circ \rightarrow A = 40^\circ$$

$$\frac{\sin B}{AC} = \frac{\sin A}{BC} \rightarrow \frac{\sin B}{\frac{20\sqrt{4}}{3}} = \frac{\sin 40^\circ}{12} \rightarrow \sin B = \frac{\sqrt{4}}{2} \rightarrow \sin B = \frac{\sqrt{4}}{2}$$

سوال ۲

$$\rightarrow B = 140^\circ, C = 70^\circ$$



$$\frac{\sin A}{BC} = \frac{\sin D}{AC} \rightarrow \frac{\sin 40^\circ}{20} = \frac{\sin 40^\circ}{AC} \rightarrow AC = 20$$

سوال ۲

$$\sin 40^\circ = \frac{\sqrt{4}}{2} = \frac{x}{AC} = \frac{x}{2\sqrt{4}} \rightarrow x = 2$$

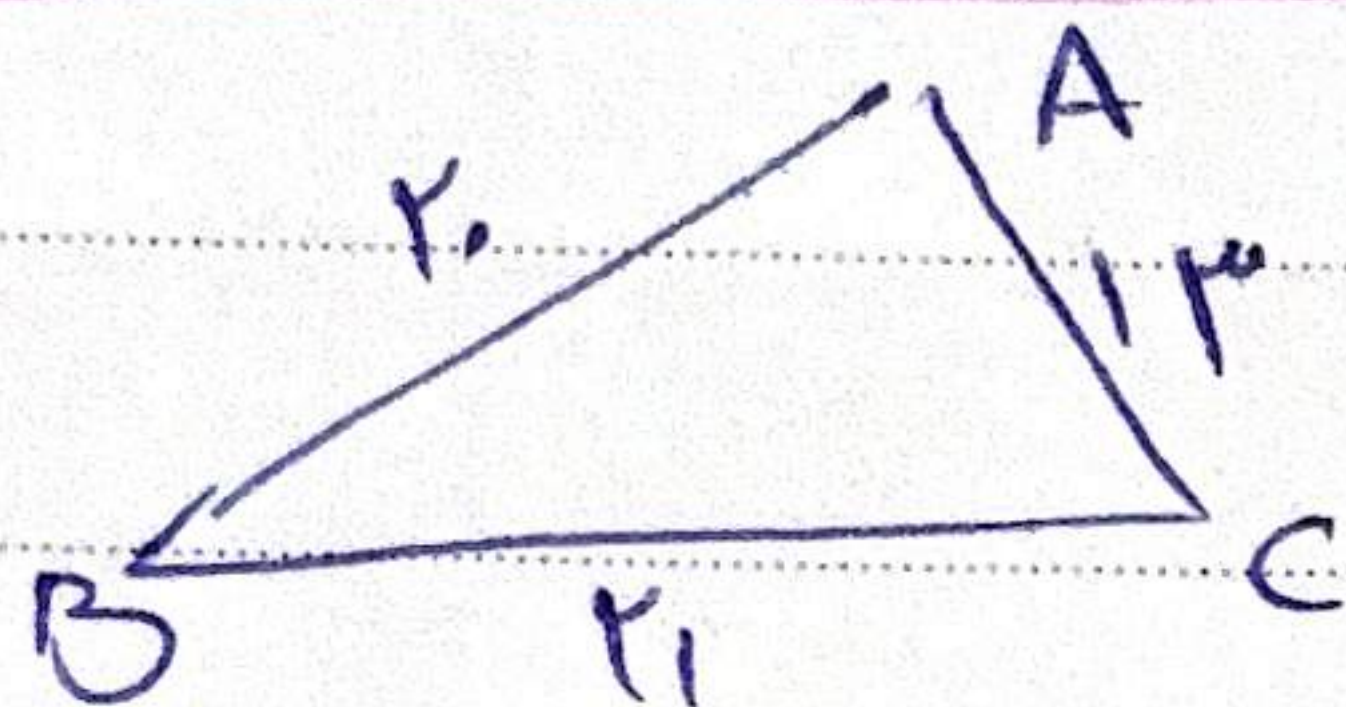
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$$\frac{\sin \hat{C}}{c} = \frac{\sin \hat{B}}{b} \quad (1) \quad \frac{\sin \hat{C}}{\sin \hat{B}} (b^2 - r^2) = c \rightarrow \frac{\sin \hat{C}}{c} = \frac{\sin \hat{B}}{b^2 - r^2} \quad (2) \quad \text{وال}$$

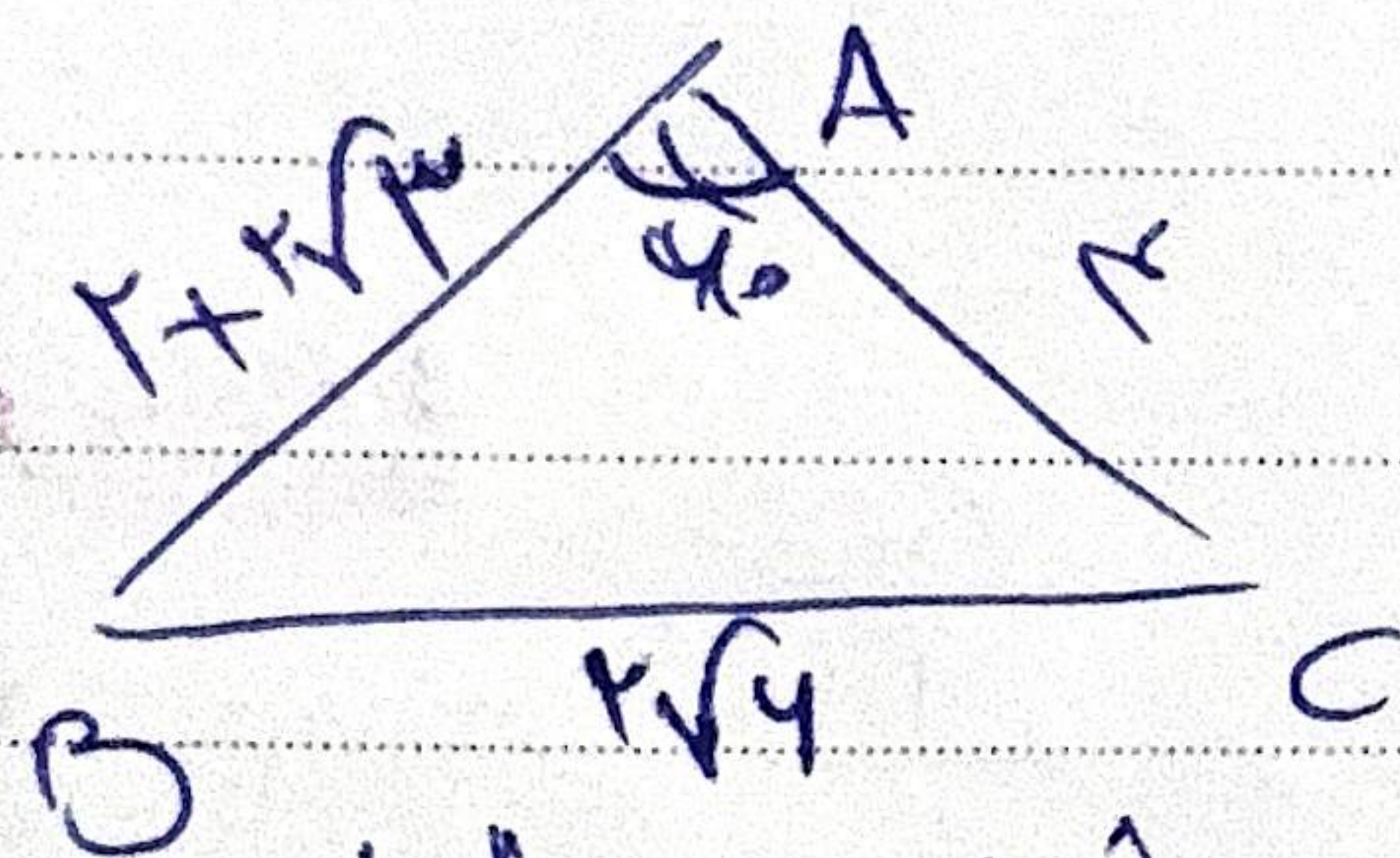
$$(1), (2) \rightarrow b = b^2 - r^2 \rightarrow b^2 - b - r^2 = 0 \quad \begin{cases} b = -1 \pm \sqrt{1 + 4r^2} \\ b = r^2 \checkmark \end{cases}$$



$$AB^2 + BC^2 - 2AB \times BC \times \cos \beta = AC^2 \quad \text{وال}$$

$$r_0^2 + r_1^2 - 2(r_0)(r_1) \cos \beta = r_2^2 \rightarrow \cos \beta = \frac{1}{2}$$

$$\sin \beta = \sqrt{1 - \cos^2 \beta} = \sqrt{1 - \frac{1}{4}} = \frac{\sqrt{3}}{2} \quad \checkmark$$



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

(قانون جيب

$$a^2 = 14 + r + 1r - 1\sqrt{r} - 2(\epsilon)(r + r\sqrt{r}) \frac{1}{r}$$

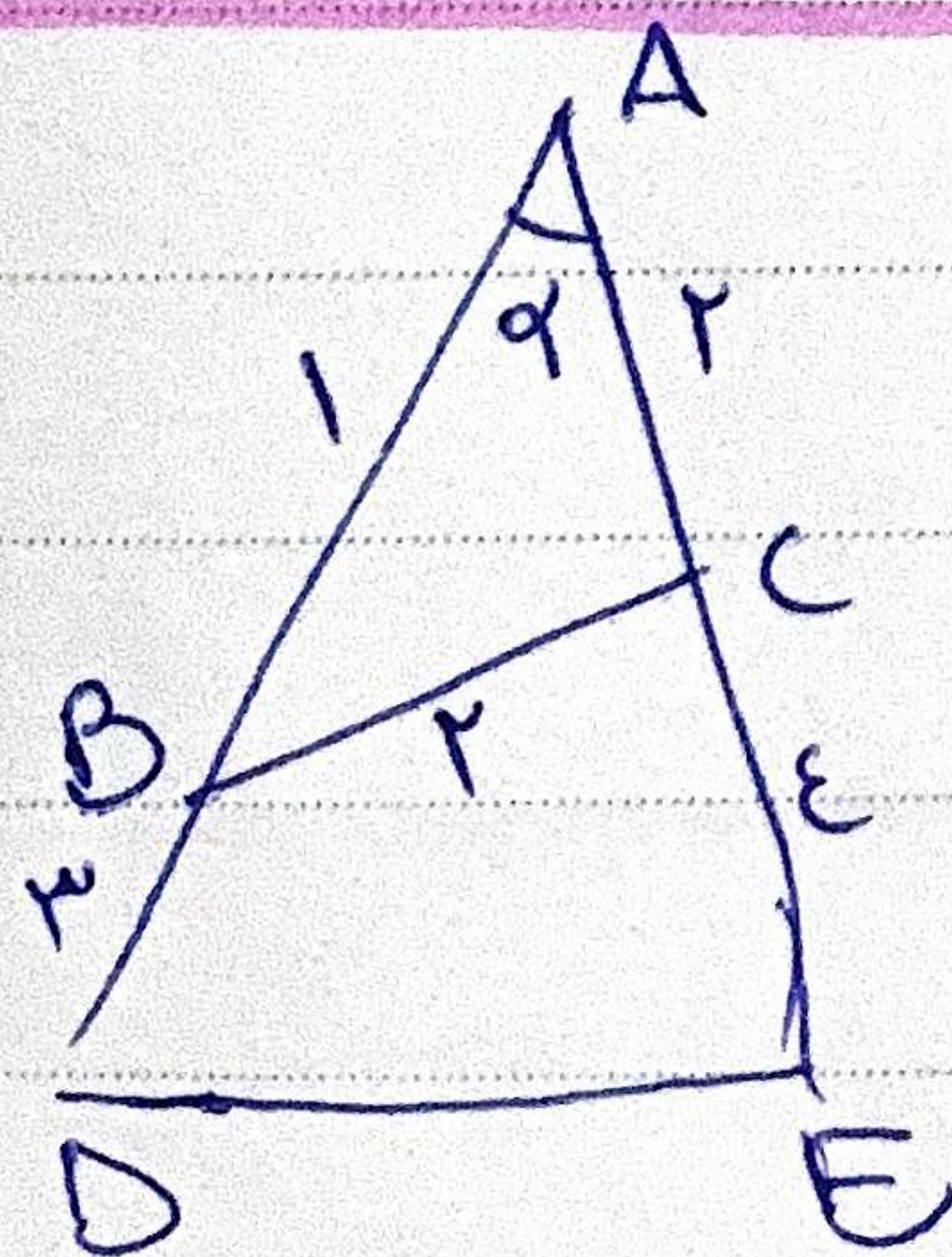
$$= 14 - 1\sqrt{r} - 1 - 1\sqrt{r} = 12 \rightarrow a = 2\sqrt{3}$$

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

✓ (جيب

$$\frac{\frac{\sqrt{r}}{r}}{\frac{r}{\sqrt{4}}} = \frac{\sin \hat{B}}{r} = \frac{\sin \hat{C}}{r(1 + \sqrt{r})} \rightarrow \sin \hat{B} = \frac{\sqrt{r}}{r} \rightarrow \hat{B} = 45^\circ$$

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



$$AC^2 + BA^2 - 2AC \times BA \times \cos \alpha = BC^2$$

قانون جيب

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

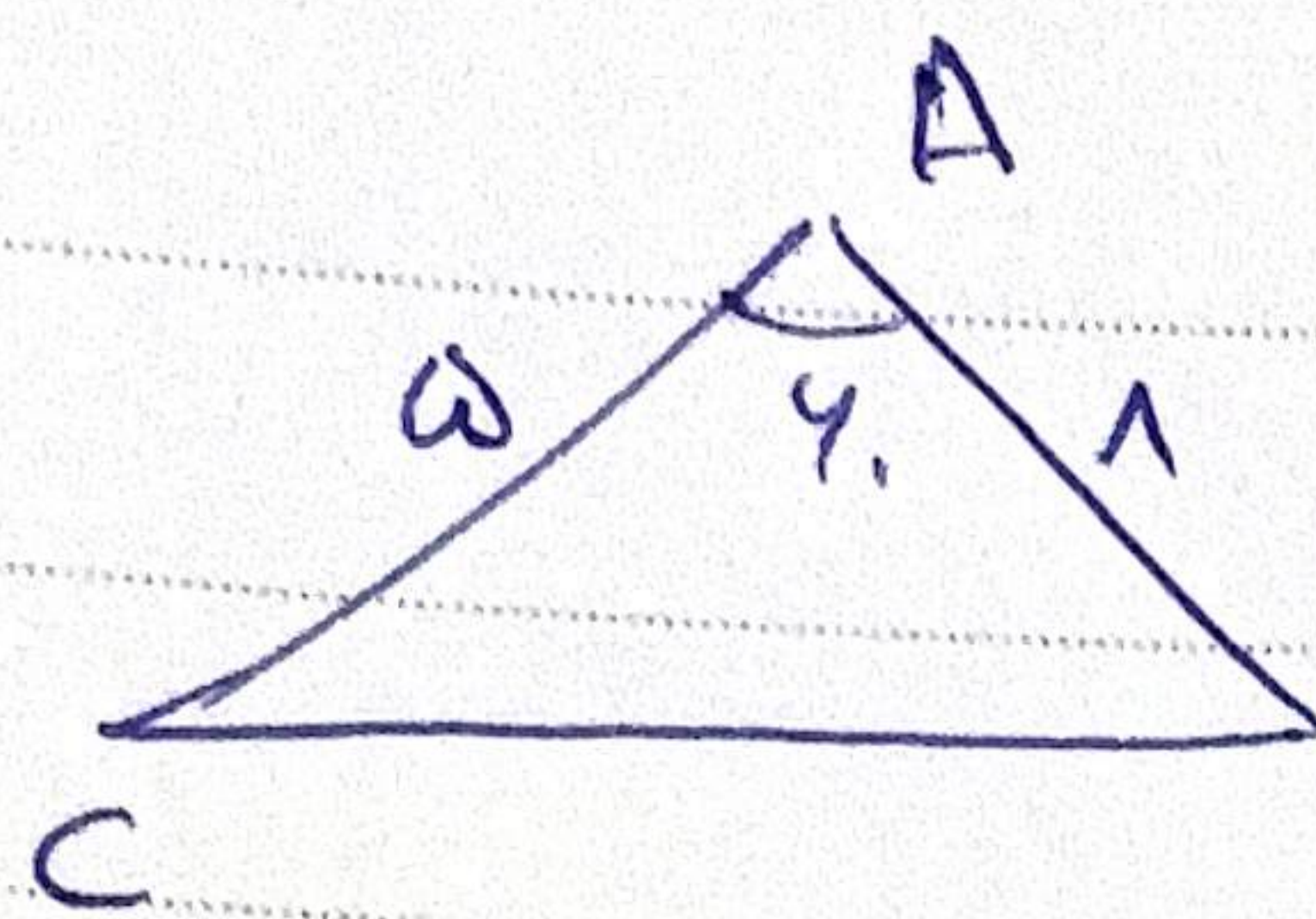
✓

$$AE^2 + DA^2 - 2AE \times AD \times \cos \alpha = DE^2$$

$$14 + 14 - 2(4)(\epsilon) \times \frac{1}{r} = r \rightarrow DE = \sqrt{\epsilon} = 2\sqrt{1}$$

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$$BC^2 = AB^2 + AC^2 - 2AB \times AC \times \cos \gamma$$

وال ۷

(الف)

$$\rightarrow BC^2 = 4E + r\omega - 2 \times \lambda \times \omega \times \frac{1}{r} = 4E \rightarrow BC = \sqrt{4E}$$

$$S_{ABC} = \frac{1}{r} \times AB \times AC \times \sin A = \frac{1}{r} \times \omega \times \lambda \times \frac{\sqrt{r}}{r} = \frac{\lambda \omega \sqrt{r}}{r}$$

(ج)

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

وال ۸

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

وال ۹

$$\cancel{a^2} + b^2 - c^2 = \cancel{a^2} + a^2(b - c)$$

وال ۹

$$(\cancel{b - c})(b^2 + c^2 + bc) = a^2(\cancel{b - c})$$

(د)

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

$$\rightarrow \cos A = \frac{1}{2}$$

$$S = \frac{1}{r} AB \times AC \times \sin A = \frac{1}{r} \times (r - \cos \theta)(1 + r \cos \theta)$$

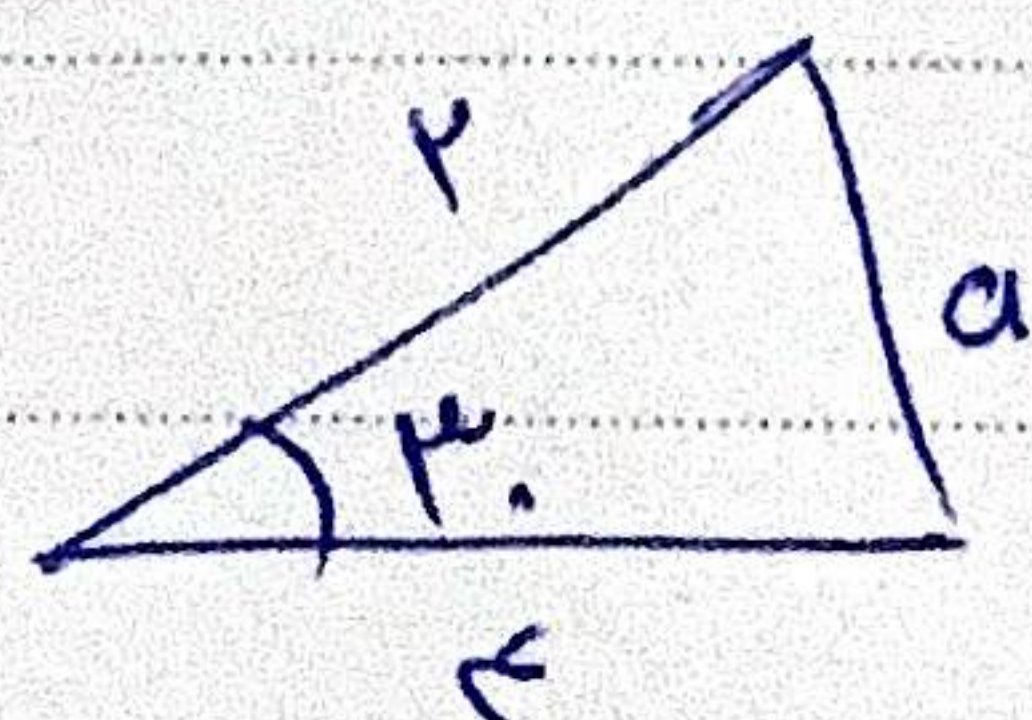
وال ۱۰

(ه)

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

$$-r \cos^2 \theta + 1 \cos \theta - a \rightarrow \cos^2 \theta + 1 \cos + 1a \rightarrow (\cos^2 - r)(\cos - a) =$$

$$\rightarrow \cos \theta = \frac{r}{1} = 1 \sqrt{\cos \theta} = \frac{a}{r} \quad \text{و } \cos \theta =$$



$$a^2 = r^2 + 1a - 2 \times r \times 1 \times \frac{\sqrt{r}}{r} = r^2 - 1\sqrt{r}$$