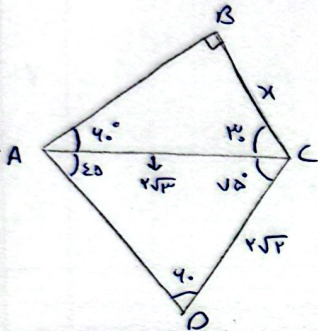


$$\hat{B} + \hat{C} = 120^\circ \rightarrow \hat{A} = 180^\circ - 120^\circ = 60^\circ$$

$$\frac{\sin 4^\circ}{r_0} = \frac{\sin \hat{B}}{\frac{r_0 \sqrt{4}}{10}} \quad \sin \hat{B} = \frac{\sqrt{4}}{r} \rightarrow \hat{B} = 48^\circ \rightarrow \hat{C} = 120^\circ - 48^\circ = 72^\circ$$

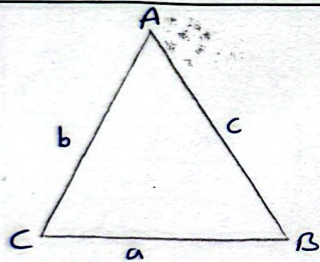
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$$\frac{DC}{\sin 40^\circ} = \frac{AC}{\sin 4^\circ} \rightarrow \frac{r_0 \sqrt{4}}{\frac{\sqrt{4}}{r}} = \frac{AC}{\frac{\sqrt{4}}{r}} \rightarrow AC = r_0 \sqrt{4}$$

$$BC = x = \frac{\sqrt{4}}{r} \times r_0 \sqrt{4} = 10$$

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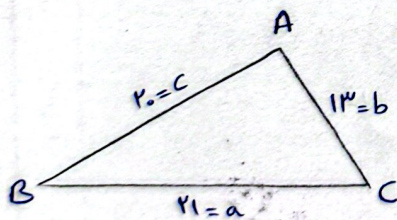
$$(b^2 - r^2) \frac{\sin \hat{C}}{\sin \hat{B}} = c \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\rightarrow b \frac{\sin C}{\sin B} = c \rightarrow b^2 - r^2 = b \rightarrow b^2 - b - r^2 = 0$$

$$(b+1)(b-r) = 0$$

$$\rightarrow b = -1 \text{ (مردود)} \rightarrow b = r$$

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

$$\rightarrow 14^2 = 4^2 + 4^2 - 2 \cdot 4 \cdot 4 \cdot (\cos \hat{B}) \rightarrow \cos \hat{B} = \frac{4}{5}$$

$$\rightarrow \sin^2 \hat{B} + \cos^2 \hat{B} = 1 \rightarrow \sin^2 \hat{B} = \frac{9}{25} \rightarrow \sin \hat{B} = \frac{3}{5}$$

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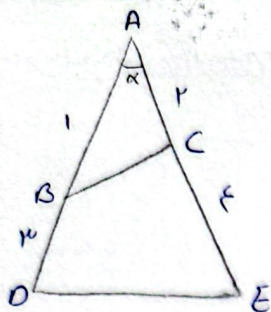
$$\text{الف) } a^2 = 14^2 + 4^2 + 4^2 - (14 \cdot 4 + 14 \cdot 4) \cdot \frac{1}{5} \quad a^2 = 14^2 + 4^2 + 4^2 - 14 \cdot 4 = 24$$

$$a = 2\sqrt{4}$$

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$$\text{ب) } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \rightarrow \frac{2\sqrt{4}}{\frac{\sqrt{4}}{r}} = \frac{4}{\sin B} \rightarrow \sin B = \frac{\sqrt{4}}{r} \rightarrow \hat{B} = 48^\circ$$

$$\rightarrow \hat{C} = 72^\circ$$



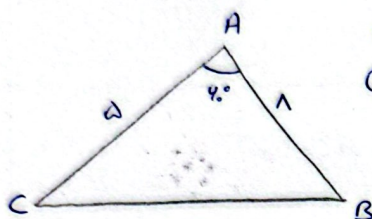
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$E = 2 + 1 - 2 \cos \alpha \rightarrow \cos \alpha = \frac{1}{2}$$

$$(DE)^2 = 14 + 14 - 2 \times 1 \times 1 \times \left(\frac{1}{2}\right) = 12$$

$$DE = 2\sqrt{3}$$

9



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

$$(BC)^2 = 4 + 16 - 2 \times 2 \times 4 \times \left(\frac{1}{2}\right) = 12$$

$$BC = 2\sqrt{3} \leftarrow \text{Ans}$$

$$S = \frac{1}{2} bc \sin A = \frac{1}{2} \times 4 \times 4 \times \frac{\sqrt{3}}{2} = 4\sqrt{3} \leftarrow \text{Ans}$$

9

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

1

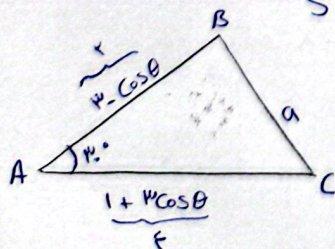
$$\frac{a^2 + b^2 - c^2}{a+b-c} = a^2 \rightarrow a^2 + b^2 - c^2 = a^2 + a^2 b - a^2 c \rightarrow b^2 - c^2 = a^2 b - a^2 c$$

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

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

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

9



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

$$- 2 \cos \theta + 1 \cos \theta - 1 = 0 \rightarrow \cos \theta = 1$$

$$\cos \theta = \frac{8}{10} \times \frac{10}{10} = \frac{8}{10}$$

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

$$a^2 = 14 + 16 - (2 \times 4 \times 4 \times \frac{8}{10}) = 10$$

10