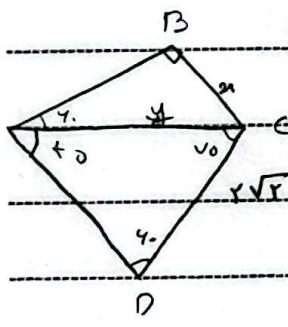


مسئله میدان

$\hat{B} + \hat{C} = 120^\circ \rightarrow A = 60^\circ$ (1)

$\frac{B}{\sin B} = \frac{A}{\sin A} \rightarrow \frac{10\sqrt{3}}{\sin B} = \frac{10}{\sin 60^\circ} \rightarrow \sin B = \frac{\sqrt{3}}{2} \rightarrow \hat{B} = 60^\circ$ ✓

$60^\circ + \hat{C} = 120^\circ \rightarrow C = 60^\circ \rightarrow B = 60^\circ \quad C = 60^\circ$ ✓



$\frac{BC}{\sin A} = \frac{AC}{\sin D} \rightarrow \frac{x\sqrt{3}}{\sin 60^\circ} = \frac{y}{\sin 60^\circ} \rightarrow y = x\sqrt{3}$ (2)

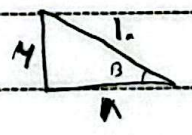
$\triangle ABC \sim \triangle ADC \rightarrow \sin 40^\circ = \frac{x}{y} \rightarrow x = x\sqrt{3} \times \frac{\sqrt{3}}{2} = \frac{3}{2}x$ ✓

$\frac{c}{\sin C} = \frac{b}{\sin B} \rightarrow \frac{c}{\sin 60^\circ} = \frac{b}{\sin 60^\circ} \rightarrow c = b$ (3)

$\frac{b^2 - r^2}{b} = 1 \rightarrow b^2 - b - r^2 = 0 \rightarrow b = -1 \times$
 $b = r^2 \checkmark$ (4)

$b^2 = a^2 + c^2 - 2ac \cos B \Rightarrow 149 = 4^2 + 4^2 - 2(4)(4) \cos B \rightarrow \cos B = 0.1$ ✓

$\sin B = 0.14$ ✓ (5)



$a^2 = 14 + 14 + 1\sqrt{3} = 1\sqrt{3} = 24 \rightarrow a = \sqrt{24} = 2\sqrt{6}$ ✓ (6)

$\frac{4}{\sin B} = \frac{2(1+\sqrt{3})}{\sin C} = \frac{2\sqrt{3}}{\frac{\sqrt{3}}{2}} \rightarrow \sin B = \frac{\sqrt{3}}{2} \rightarrow B = 60^\circ$ ✓
 $\sin C = 120^\circ - (60^\circ + 60^\circ) = 60^\circ$ ✓ (7)

Subject :

$$\triangle ABC \rightarrow BC^2 = AC^2 + AB^2 - 2AC \cdot AB \cos \alpha \Rightarrow r = 10 - r \cos \alpha \quad (4)$$

$\hookrightarrow \cos \alpha = \frac{1}{r}$

$$\triangle ADE \rightarrow DE^2 = 34 + 14 - 2 \times 1 \cos \alpha \Rightarrow DE = \sqrt{48} \quad (5)$$

$$BC = \sqrt{4r + 20 - 20 \times \frac{1}{r}} = \sqrt{\quad} \quad (6)$$

$$S = \frac{1}{2} \times 10 \times 10 \times \frac{\sqrt{14}}{r} = 10\sqrt{14} \quad (7)$$

$$\frac{b^2 + c^2 + 2bc - (b^2 + c^2 - 2bc \cos A)}{bc(\cos A + 1)} = \frac{2bc(1 + \cos A)}{bc(1 + \cos A)} = 2 \quad (8)$$

$$\cancel{a^2 + b^2 - c^2} = \cancel{a^2 + ab - ac} \rightarrow (b-c)(b^2 + bc + c^2) = a^2(b-c) \quad (9)$$

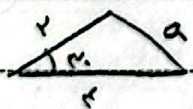
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$$b^2 + c^2 + bc = a^2 \rightarrow bc = -2bc \cos A \rightarrow \cos A = -\frac{1}{2} \rightarrow \hat{A} = 120^\circ$$

$$\frac{1}{2} \times (3 \cos \theta) \times (1 + \cos \theta) \times \frac{1}{r} = 2 \quad (10)$$

$$-3 \cos^2 \theta + 1 \cos \theta + 3 = 4 \rightarrow 3 \cos^2 \theta - 1 \cos \theta + 1 = 0$$

$\cos \theta = 100$
 $\cos \theta = \frac{1}{3}$



$$a^2 = 5 + 14 - 14 \frac{\sqrt{3}}{r} = 19 - 14\sqrt{3} \quad (11)$$