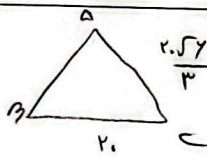


نام و نام خانوادگی: کلاس: پاسخنمه تشریحی تکلیف شماره: (داریج)

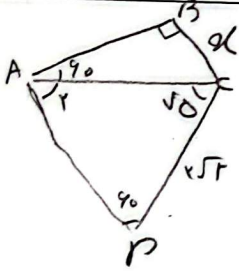
$BC = 2$, $AC = \frac{2\sqrt{3}}{3}$
 $\hat{B} + \hat{C} = 120^\circ$



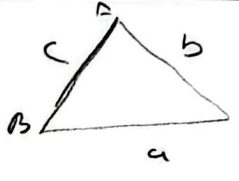
$B + C + A = 180^\circ \rightarrow 120^\circ + A = 180^\circ \rightarrow A = 60^\circ$
 $\rightarrow \sin B = \frac{\sqrt{3}}{2} \rightarrow B = 60^\circ$
 $B + C = 120^\circ \rightarrow 60^\circ + C = 120^\circ \rightarrow C = 60^\circ$

$\frac{BC}{\sin A} = \frac{AC}{\sin B} \rightarrow \frac{2}{\sin 90^\circ} = \frac{\frac{2\sqrt{3}}{3}}{\sin B} \rightarrow \sin B = \frac{\sqrt{3}}{2}$

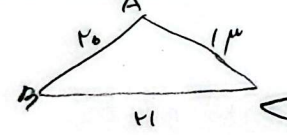
$B = 60^\circ \rightarrow C = 60^\circ$



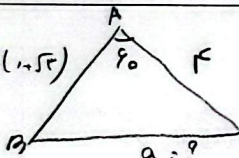
$AD + \sqrt{3} + 2 = 120^\circ \rightarrow A = 60^\circ$
 $\frac{DC}{\sin A} = \frac{AC}{\sin D} \rightarrow \frac{DC}{\sin 90^\circ} = \frac{\frac{2\sqrt{3}}{3}}{\sin 60^\circ} \rightarrow DC = \frac{4}{3}$
 $\rightarrow \sin 40^\circ = \frac{BC}{AC} = \frac{DC}{\frac{2\sqrt{3}}{3}} \rightarrow \frac{4}{3} = \frac{2\sqrt{3}}{3} \sin 40^\circ$



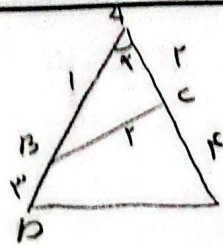
$(b^2 - r^2) \frac{\sin C}{\sin B} = C$
 $\rightarrow \frac{1}{\sin C} \Rightarrow \frac{b^2 - r^2}{\sin B} = \frac{C}{\sin C} = \frac{b}{\sin B} \rightarrow b^2 - r^2 = b$
 $b^2 - b - r^2 = 0 \rightarrow (b - r)(b + r) = 0 \rightarrow b = r$



$AC^2 = AB^2 + BC^2 - 2AB \cdot BC \cos B$
 $\rightarrow 149 = 800 + 881 - 180 \cos B$
 $\rightarrow \cos B = 21 \rightarrow \sin^2 B + \cos^2 B = 1 \rightarrow \sin B = \frac{2}{3}$



$a^2 = b^2 + c^2 - 2bc \cos A \rightarrow a^2 = 4 + 14 + 18\sqrt{3} - 18\sqrt{3}$
 $a^2 = 18 \rightarrow a = \sqrt{18} = 3\sqrt{2}$
 $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \rightarrow \frac{3\sqrt{2}}{\sin 90^\circ} = \frac{2}{\sin B} \rightarrow \sin B = \frac{2}{3\sqrt{2}}$
 $\sin B = \frac{\sqrt{2}}{3} \rightarrow B = 30^\circ \rightarrow C = 60^\circ$

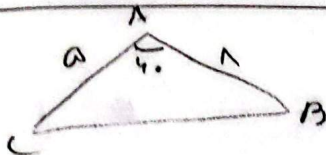


$$ABC \rightarrow BC^2 = AB^2 + AC^2 - 2 \times AB \times AC \cos \alpha$$

$$\rightarrow 9 = 1 + 4 - 2 \times 1 \times 2 \cos \alpha \rightarrow \cos \alpha = \frac{1}{2}$$

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

$$\rightarrow DE^2 = 4 + 4 - 2 \times 4 \times 2 \times \frac{1}{2} \rightarrow DE = \sqrt{4} = 2$$



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

$$\rightarrow 9 = 16 + 25 - 2 \times 4 \times 5 \cos \alpha$$

$$\rightarrow BC = 3$$

$$S = \frac{1}{2} \times AC \times AB \times \sin A = \frac{1}{2} \times 5 \times 4 \times \frac{\sqrt{3}}{2} = 5\sqrt{3}$$

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

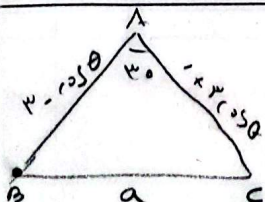
$$\rightarrow a^2 = b^2 + c^2 - 2bc \cos A$$

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

$$\frac{a^3 + b^3 - c^3}{a+b-c} \geq a^2 \rightarrow a^3 + b^3 - c^3 \geq a^2(a+b-c)$$

$$\rightarrow (b-c)(b^2 + c^2 + bc) \geq a^2(b-c) \xrightarrow{a \neq c} a^2 \geq b^2 + c^2 + bc$$

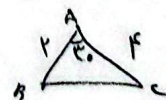
$$\xrightarrow{\text{فرض کنیم}} a^2 \geq b^2 + c^2 - 2bc \cos A \rightarrow \cos A \geq \frac{1}{2} \rightarrow A \leq 60^\circ$$



$$S = \frac{1}{2} \times AB \times AC \times \sin \theta \rightarrow \frac{1}{2} \times (1 - \cos \theta)(1 + \cos \theta) \geq 1$$

$$\rightarrow 1 + \cos \theta - \cos^2 \theta - 1 \geq 0 \rightarrow -\cos^2 \theta + \cos \theta + 1 \geq 0$$

$$\cos \theta \geq 1 \quad \cos \theta \leq \frac{1}{2} \rightarrow \cos \theta \geq \frac{1}{2}$$



$$\rightarrow a^2 \geq AB^2 + AC^2 - 2 \times AB \times AC \times \cos \theta \rightarrow a^2 \geq 1 + 1 - 2 \times 1 \times 1 \times \frac{1}{2} = 1 \rightarrow a \geq 1$$