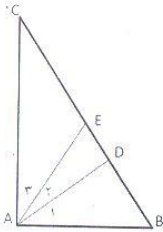
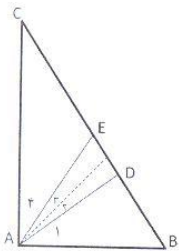




پایه: اول

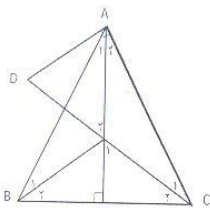


الف) $A_3 = C$, $A_1 + A_3 = B$
 $A_3 + A_3 + C = B + C \rightarrow A_3 + 2C = B + C \Rightarrow A_3 = B - C$

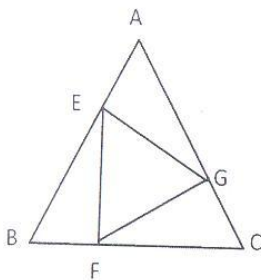


فرض می کنیم $A_3 = A_4$ ثابت میکنیم $A_1 + A_3 = A_3 + A_4$

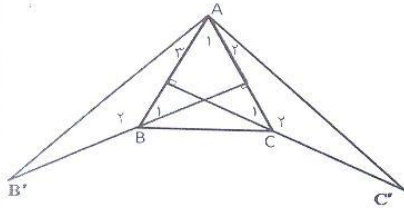
ب) $A_4 = C$ (۱) , $A_1 + B = 90 \rightarrow A_1 = C$ (۲)
 $B + C = 90$
 $1, 2 \Rightarrow A_1 = A_4 \Rightarrow A_1 + A_3 = A_3 + A_4$



۲ $D = 90 - C$ (۱)
 $\Delta ABI \cong \Delta ACI$
 $AI = AI$
 $BI = CI \Rightarrow A_1 = A_2 \rightarrow AI$ نیمساز و ارتفاع می باشد
 $AB = AC$
 $I = 90 - C \Rightarrow I_2 = 90 - C$ (۲)
 $1, 2 \Rightarrow AD = AI$



۳ $AB = BC = AC$
 $AE = BF = CG \Rightarrow BE = FC = AG$
 $\Delta AEG \cong \Delta BEF \cong \Delta FGC : \begin{cases} AE = BF = CG \\ \angle A = \angle B = \angle C \\ AG = FC = BE \end{cases} \Rightarrow EG = FG = EF \rightarrow EFG$
 متساوی الاضلاع

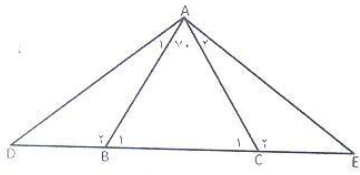


$$\left. \begin{aligned} B_1 + A_1 &= 90 \\ C_1 + A_1 &= 90 \end{aligned} \right\} \Rightarrow B_1 = C_1 \Rightarrow B_2 = C_2$$

الف

$$\Delta ABB' \cong \Delta ACC' \left\{ \begin{aligned} BB' &= AC & AB' &= AC' \\ AB &= CC' & \Rightarrow A_2 &= C' \\ B_2 &= C_2 & A_2 &= B' \end{aligned} \right.$$

$$A_1 + A_2 + A_2 = A_1 + A_2 + C' = 90$$

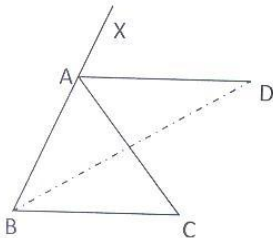


$$\begin{aligned} D &= A_1, \quad E = A_2 \\ B_1 + C_1 &= 110 \Rightarrow B_2 + C_2 = 25 \\ B_2 + 2A_1 &= 180 \quad (1) \\ C_2 + 2A_2 &= 180 \quad (2) \end{aligned}$$

$$1, 2 \Rightarrow B_2 + C_2 + 2(A_1 + A_2) = 360 \rightarrow 2(A_1 + A_2) = 110$$

$$A_1 + A_2 = 55$$

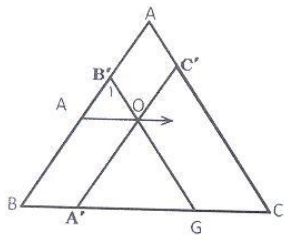
$$\hat{DAE} = A_1 + A_2 + 70 = 125^\circ$$



$$2A_1 = 2C \Rightarrow A_1 = C$$

$$AD \parallel BC$$

$$AD \parallel BC, \quad BD \parallel \Rightarrow D = B_1 = B_2 \Rightarrow AD = AB$$



$$OEBA' \text{ متوازی الاضلاع } \Rightarrow OE = BA' \quad (1)$$

$$E_1 = B_1 = 60 \Rightarrow OB' = OE \quad (2)$$

$$1, 2 \Rightarrow OB' = BA'$$

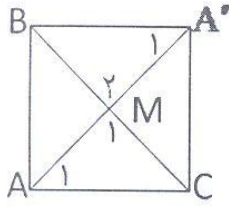
$$OA' = A'G \quad \text{و} \quad OC' = GC$$

به همین ترتیب ثابت می شود که

$$OA' + OB' + OC' = A'G + BA' + GC = BC$$

داریم:

میانۀ AM را از طرف M به اندازه خودش امتداد می‌دهیم داریم:



$$\triangle AMC \cong \triangle A'MB$$

$$AM = A'M$$

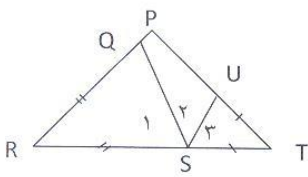
$$MB = MC \Rightarrow A'B = AC \Rightarrow A'_1 = A_1 \Rightarrow$$

$$M_1 = M_2$$

مستطیل $ABA'C$ متوازی الاضلاع است و چون $A = 90^\circ$ بنابراین $ABA'C$ مستطیل است در مستطیل قطرها با هم برابرند و همدیگر را نصف می‌کنند. پس:

$$AA' = 2AM = BC \Rightarrow AM = \frac{BC}{2}$$

هم برابرند و همدیگر را نصف می‌کنند. پس:



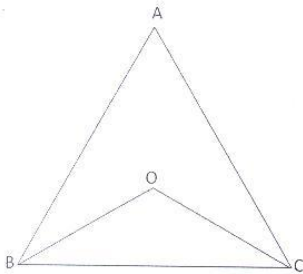
$$R = 180 - 2S_1$$

$$T = 180 - 2S_2$$

$$T + R = 360 - 2(S_1 + S_2) \Rightarrow 180 - P = 360 - 2(S_1 + S_2) \Rightarrow \frac{P}{2} + 90 = S_1 + S_2$$

$$S_1 + S_2 + S_3 = 180 \rightarrow \frac{P}{2} + 90 + S_3 = 180$$

$$S_3 = 90 - \frac{P}{2}$$



$$\triangle ABC: A + B + C = 180 \rightarrow B + C = 180 - A$$

$$\triangle OBC: O + \frac{B+C}{2} = 180 \rightarrow O + \frac{180-A}{2} = 180 \rightarrow O + 90 - \frac{A}{2} = 180 \rightarrow O = 90 + \frac{A}{2}$$