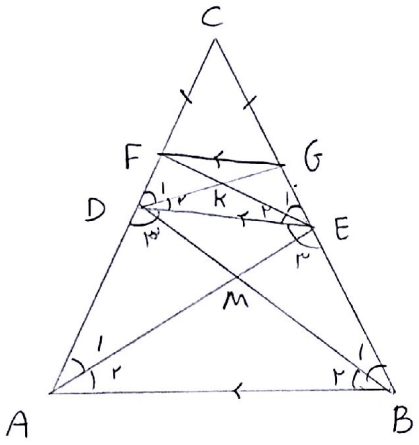
۱- الف)



$$\left.\begin{array}{l}\hat{C}=\hat{C} \quad \text{مشترک}\\ CF=CG \quad \text{فرض مسئله}\\ CE=CD \quad =\end{array}\right\} \Rightarrow C\hat{F}E \cong C\hat{D}G \Rightarrow \left\{\begin{array}{l}FE=DG \ (1)\\ \hat{E}_1=\hat{D}_1 \ (3)\\ E\hat{F}C=D\hat{G}C\end{array}\right.$$

ب)

$$\left\{\begin{array}{l}CD=CE\\ CF=CG \ (2) \Rightarrow DF=GE \ (2)\\ CD=CF+DF\\ CE=CG+GE\end{array}\right. \quad \begin{array}{l}FE=DG \ (1) \text{ بنابر}\\ GF=GF \text{ مشترک}\end{array} \Big\} \Rightarrow DFG \cong EFG \Rightarrow \left\{\begin{array}{l}\\ \\ \\ \end{array}\right.$$

ج)

$$CD=CE \xrightarrow{\text{فرض مسئله}} \left\{\begin{array}{l}\hat{E}=\hat{D} \xrightarrow{\text{قضیه تساوی الساقین}}\\ \hat{E}_1=\hat{D}_1\end{array}\right. \Rightarrow \hat{E}_2=\hat{D}_2 \Rightarrow$$

$\hat{E}_2=\hat{D}_2 \Rightarrow$ متساوی الساقین $\quad DK=EK$

د)

$$\left\{\begin{array}{l}CD=CE\\ CD=AD\\ BE=CE\end{array}\right. \Rightarrow BE=AD, \ \hat{E}=\hat{D} \Rightarrow \hat{E}_3=\hat{D}_3$$

(۵) (۴) — فرض مسئله

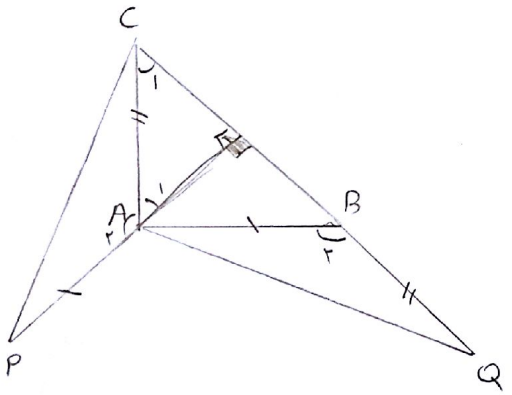
$$\left\{\begin{array}{l}BE=AD \ (5) \text{ بنابر}\\ \hat{E}_3=\hat{D}_3 \ (4) \text{ بنابر}\\ DE=DE \text{ مشترک}\end{array}\right. \Rightarrow A\hat{D}E \cong D\hat{E}B \Rightarrow \left\{\begin{array}{l}\hat{B}_1=\hat{A}_1 \ (6)\\ M\hat{D}E=A\hat{E}D\\ DB=AB\end{array}\right.$$

$$\left\{\begin{array}{l}BE=AD\\ CD=CE\\ CD=AD\\ CE=EB\end{array}\right. \Rightarrow AC=AB \xrightarrow{\text{قضیه تساوی الساقین}} \hat{A}=\hat{B}$$

$$\Rightarrow \left\{\begin{array}{l}\hat{A}=\hat{B}\\ \hat{A}_1=\hat{B}_1\end{array}\right. \Rightarrow \hat{A}_2=\hat{B}_2 \Rightarrow$$

$\hat{A}_2=\hat{B}_2 \xrightarrow{\text{قضیه تساوی الساقین}}$ $A\hat{M}B$ متساوی الساقین

۲-

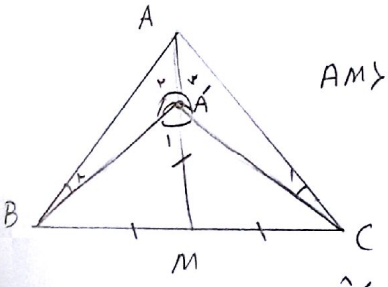


$$\hat{B}=m \Rightarrow \left\{\begin{array}{l}\hat{C}_1+90+\hat{A}_1=180\\ \hat{C}_1=90-m\end{array}\right. \Rightarrow \hat{A}_1=m$$

$$\Rightarrow \left\{\begin{array}{l}\hat{A}_2=180-\hat{A}_1=180-m\\ \hat{B}_2=180-m\end{array}\right. \Rightarrow \left\{\begin{array}{l}\hat{A}_2=\hat{B}_2\\ AB=AP \text{ فرض مسئله}\\ BQ=AC \ =\end{array}\right. \Rightarrow A\hat{P}C \cong A\hat{P}Q$$

$$\Rightarrow \boxed{AQ=CP}$$

۳-



ابتدا شکل را می‌کشیم چون $AM>\frac{1}{2}BC$ پس به اندازه $BM \ (\frac{1}{2}BC)$ از M کمان می‌زنیم و تقاطع آن با AM را A' می‌نامیم.

$AM>\frac{1}{2}BC$

$$\left\{\begin{array}{l}BM=A'M\\ MC=A'M\end{array}\right. \xrightarrow{\text{عکس قضیه میانه وارد بر وتر}}$$

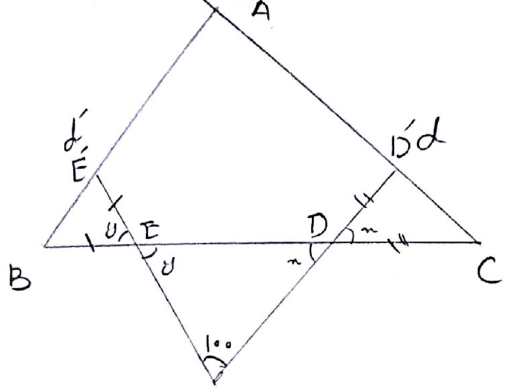
$$\hat{A'}_1=90 \Rightarrow \hat{A}'_2=270$$

$$\Rightarrow \hat{A}'_2+\hat{C}_1+\hat{B}_2+\hat{A}=360 \Rightarrow \hat{A}+\hat{C}_1+\hat{B}_1=90 \Rightarrow$$

A نمی‌تواند از ۹۰ درجه بزرگ‌تر باشد

چون C_1 و B_1 هم وجود دارند $\Leftarrow A<90 \Leftarrow$ A تند است

۴-



$y + x + 100 = 180 \Rightarrow y + x = 80$

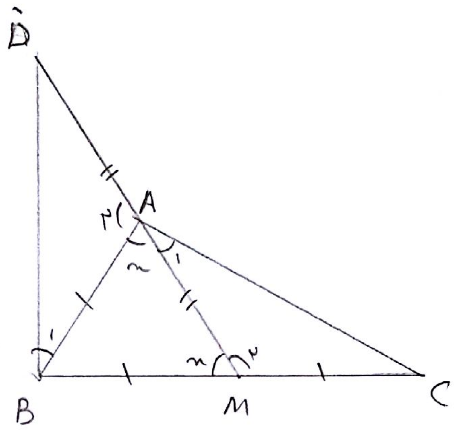
$\begin{cases} \hat{D} + \hat{C} + \hat{D'} = 180 \\ \hat{D} = x \\ \hat{D'} = \hat{C} \end{cases}$ (مجموع زوایای مثلث — فرض مسئله) $\Rightarrow \hat{C} = 90 - \frac{1}{2}x$

$\begin{cases} \hat{E} + \hat{B} + \hat{E'} = 180 \\ \hat{E} = y \\ \hat{B} = \hat{E'} \end{cases}$ (مجموع زوایای مثلث — فرض مسئله) $\Rightarrow B = 90 - \frac{1}{2}y$

$\Rightarrow \begin{cases} \hat{A} + \hat{B} + \hat{C} = 180 \\ B = 90 - \frac{1}{2}y \\ C = 90 - \frac{1}{2}x \end{cases} \Rightarrow \hat{A} = 180 - (90 + 90) + \frac{1}{2}(y + x) \Rightarrow \hat{A} = 40$

گزینه ۱

۵-



$AB = AM \xrightarrow{\text{تفضیه متساوی الساقین}} B\hat{A}M = A\hat{M}B = x \Rightarrow \hat{A}_2 = \hat{M}_2$

$\begin{cases} \hat{A}_2 = M_2 \\ AM = AD \\ AB = MC \end{cases} \Rightarrow A\hat{M}C \cong A\hat{D}B \Rightarrow \begin{cases} \hat{A}_1 = \hat{D} \quad (1) \\ C = \hat{B}_1 \quad (2) \\ AC = AD \end{cases}$

$\begin{cases} \hat{A}_1 = \hat{D} \quad \text{بنابر } (1) \\ \hat{A}_1 + C + M_2 = 180 \end{cases} \Rightarrow M_2 = 180 - (D + C) = 119°$

$\hat{A}_2 = \hat{M}_2 = 119 \Rightarrow x = 180 - 119 = 61 \Rightarrow \hat{B} = 180 - 2x = 180 - 122 = 58°$

گزینه ۳