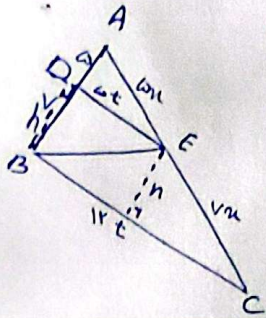
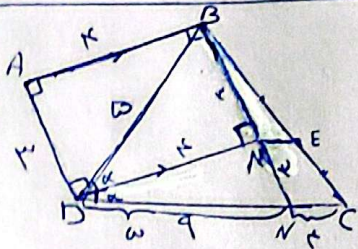


(۱)



$$\frac{S_{BCE}}{S_{BDE}} = \frac{h \times 12}{h \times 60} = \frac{12}{60}$$

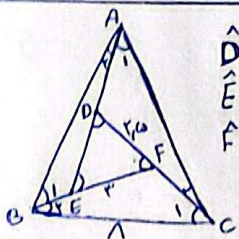
(۲)



$$\hat{BDC} \sim \hat{BDM} \rightarrow DM \text{ خط میانه } BM \sim MN \sim 3$$

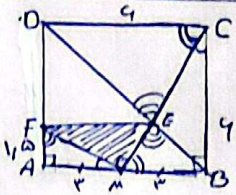
$$\frac{BM}{MN} = \frac{BE}{EC} = \frac{1}{1} \Rightarrow ME \parallel NC \xrightarrow{\text{خط میانه}} \frac{BM}{BN} = \frac{ME}{NC} = \frac{1}{2} \Rightarrow \frac{1}{2} = \frac{n}{k} \Rightarrow n = 2$$

(۳)



$$\left. \begin{array}{l} \hat{D} = \hat{C}_1 + \hat{A}_1 = \hat{A} \\ \hat{E} = \hat{B}_1 + \hat{A}_1 = \hat{A} \\ \hat{F} = \hat{C}_1 + \hat{B}_1 = \hat{B} \end{array} \right\} B_1 \sim A_1 \sim C_1 \Rightarrow \hat{ABC} \sim \hat{DEF} \Rightarrow \frac{DF}{AB} = \frac{EF}{AC} = \frac{1}{2} \Rightarrow \frac{12}{60} = \frac{1}{5} \Rightarrow 12 = 60 \times \frac{1}{5} \Rightarrow 12 = 12$$

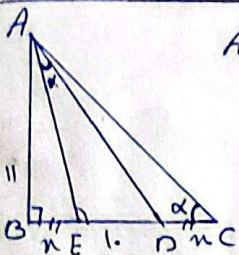
(۴)



$$\hat{MCB} \sim \hat{AFM} \Rightarrow \frac{AM}{CB} = \frac{FA}{MB} = \frac{FM}{MC} = \frac{1}{2} \Rightarrow \frac{FM}{MC} = \frac{1}{2} \Rightarrow \frac{FM}{\sqrt{60}} = \frac{1}{2} \Rightarrow FM = \frac{\sqrt{60}}{2} = \frac{\sqrt{15}}{2}$$

$$DCE \sim MEB \Rightarrow \frac{MB}{DC} = \frac{DE}{CE} = \frac{1}{2} \Rightarrow ME = \sqrt{60} \Rightarrow S_{EFM} = \frac{1}{2} \times \sqrt{60} \times \frac{\sqrt{15}}{2} = \frac{15\sqrt{3}}{4}$$

(۵)

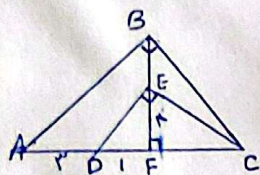


$$AE = \sqrt{n^2 + 121}$$

$$\hat{CEA} \sim \hat{AED} \Rightarrow \frac{AE}{DE} = \frac{CE}{AE} \Rightarrow AE^2 = DE \times CE \Rightarrow n^2 + 121 = 100 + 10n \Rightarrow n^2 - 10n + 21 = 0$$

$$(n-3)(n-7) \Rightarrow \begin{cases} n=3 \\ n=7 \end{cases}$$

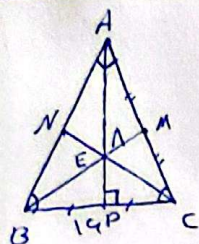
(۶)



$$EF^2 = DF \times FC \Rightarrow 16 = 1 \times FC \Rightarrow FC = 16$$

$$BF^2 = 4 \times 16 \Rightarrow BF = 8 \Rightarrow BC^2 = BF^2 + FC^2 \Rightarrow BC^2 = 64 + 256 = 320 \Rightarrow BC = \sqrt{320} = 8\sqrt{5}$$

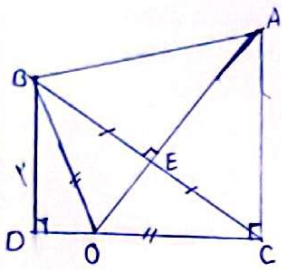
(۷)



میان نصف اضلاع وارد بر آن - قائم الزامی در رأس A

$$169 = n^2 + n^2 \Rightarrow 121 = n^2 \Rightarrow n = \sqrt{121} = 11 \Rightarrow AM \sim MC = 4\sqrt{2}$$

$$AMB: MB^2 = (4\sqrt{2})^2 + (1\sqrt{2})^2 = 32 + 2 = 34 \Rightarrow MB = \sqrt{34} = 2\sqrt{8.5}$$



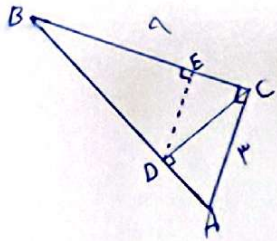
$$CD \cdot f \quad BC^2 = BD^2 + DC^2 = 10^2 + 10^2 \Rightarrow BC = \sqrt{20}$$

$$\widehat{BOE} \cong \widehat{COE} \Rightarrow BE = EC = \sqrt{10}$$

$$BA^2 = BE \cdot BC \Rightarrow \sqrt{10} \cdot \sqrt{20} = \sqrt{20} \Rightarrow AB = \sqrt{10} \Rightarrow AB^2 = BE^2 + AE^2 = 10 \Rightarrow AE = \sqrt{10}$$

$$S_{ABE} = \sqrt{10} \times \sqrt{10} \times \frac{1}{2} = \frac{10}{2} = 5$$

①



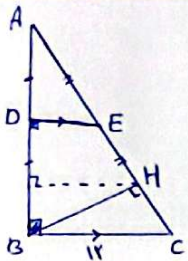
$$BA^2 = BC^2 + AC^2 \Rightarrow BA^2 = 10^2 + 10^2 \Rightarrow BA = \sqrt{20}$$

$$9 \cdot x = \sqrt{20} \cdot DC \Rightarrow CD = \frac{9}{\sqrt{10}} \Rightarrow 9 = \frac{11}{\sqrt{10}} \Rightarrow DA^2 = DC^2 \Rightarrow BD = \sqrt{10} - \frac{9}{\sqrt{10}}$$

$$BD^2 = BE \cdot BC = \left(\sqrt{10} - \frac{9}{\sqrt{10}}\right) \cdot 10 = 10 - 9 = 1 \Rightarrow BE = \frac{1}{10}$$

$$BE = \frac{1 \cdot 10}{10} = 1$$

②



$$AB = 10$$

$$BC = 10$$

$$AC^2 = 10^2 + 10^2 \Rightarrow AC = \sqrt{20}$$

$$AB^2 = BH^2 + AH^2$$

$$BC^2 = HC^2 + BH^2 \Rightarrow 10^2 = HC^2 + BH^2 \Rightarrow BH^2 = 10^2 - HC^2$$

$$AB^2 = 10^2 - HC^2 + (10 - HC)^2 \Rightarrow 10^2 = 10^2 - HC^2 + 100 - 20HC + HC^2$$

$$HC = 10$$

$$\frac{10 - 10}{10} = \frac{10}{10} \Rightarrow AE = 10$$

$$DE \parallel BC \rightarrow \frac{AE}{AC} = \frac{DE}{BC} \Rightarrow \frac{10}{10} = \frac{DE}{10} \Rightarrow DE = 10$$

③