فاطمه متقی - ۴۲

«به نام خدا»

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۱) $DE \parallel BC \Rightarrow h_1, h_2 \perp DE, BC$

$\hookrightarrow h_1 = h_2$ فاصله دو خط موازی

$S_{BCE} = \frac{1}{2} \times BC \times h_2 \qquad S_{BDE} = \frac{1}{2} \times DE \times h_1$

$DE \parallel BC \Rightarrow \frac{AD}{AB} = \frac{DE}{BC} \rightarrow \frac{5}{12} = \frac{DE}{BC}$ $\begin{matrix} DE = 5k \\ BC = 12k \end{matrix} \Rightarrow \frac{S_{BCE}}{S_{BDE}} = \frac{BC}{DE} = \frac{12}{5} = 2/4$

۲) ۴ خط دو به دو موازی و AD عمود بر $AB \Leftarrow$ ۴ ضلعی هستیم عمود

$\left.\begin{matrix} \hat{D}_1 = \hat{D}_2 \\ DM \text{ مشترک} \\ \hat{M}_1 = \hat{M}_2 = 90^\circ \end{matrix}\right\} \Rightarrow DMG \cong DMB \Rightarrow DB = DG = 6$

$BGC \rightarrow GC \parallel MH \Rightarrow \frac{BH}{HC} = \frac{BM}{MG} \rightarrow \frac{MH}{GC} = \frac{BC}{BG} \rightarrow \frac{MH}{4} = \frac{1}{2} \Rightarrow MH = 2$

۳) $E\hat{F}D \Rightarrow F\hat{B}C$ زاویه خارجی $\Rightarrow E\hat{F}D = \beta - \alpha + \alpha = \beta$

$F\hat{D}E \Rightarrow A\hat{B}E$ زاویه خارجی $\Rightarrow F\hat{D}E = \hat{A} - \alpha + \alpha = \hat{A}$

$\hookrightarrow AB\hat{C} \sim DE\hat{F} \Rightarrow \frac{2/5}{8} = \frac{3}{AB} \Rightarrow AB = \frac{24}{2/5} = 9/6$

۴) $MC^2 = 36 + 9 = 45 \rightarrow MC = 3\sqrt{5}$

$\left.\begin{matrix} DC \parallel AB, CM \text{ مورب} \Rightarrow \hat{C}_1 = \hat{M}_1 \\ \text{متقابل به رأس } \hat{E}_1 = \hat{E}_2 \end{matrix}\right\} \Rightarrow \frac{DC}{MB} = \frac{CE}{ME}$

$\rightarrow \frac{CE}{ME} = \frac{6}{3} = 2 \Rightarrow CE + ME = 3\sqrt{5} \rightarrow ME = \sqrt{5}$

$\left.\begin{matrix} \hat{C}_2 = \hat{M}_2 = 2 \\ \hat{A} = \hat{B} = 90^\circ \end{matrix}\right\} \Rightarrow CB\hat{M} \sim E\hat{M}A \rightarrow \frac{MB}{AE} = \frac{BC}{AM} = \frac{MC}{ME} \rightarrow \frac{3\sqrt{5}}{ME} = \frac{6}{3}$

$\hookrightarrow ME = \frac{3}{2}\sqrt{5}$

$S_{MFE} = \frac{1}{2} \times \frac{3}{2} \times \sqrt{5} \times \sqrt{5} = 7/5$

Arman

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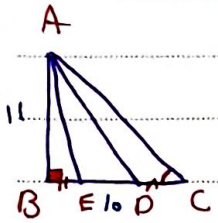
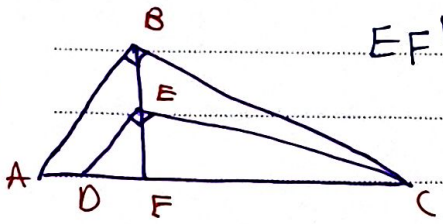


$11^2 + x^2 = AE \Rightarrow \sqrt{121+x^2}$ (۵

$AEC \sim ACD \Rightarrow \frac{AE}{ED} = \frac{EC}{AE} \Rightarrow AE^2 = ED \times EC$

$121 + x^2 = ED \times EC \Rightarrow 121 + x^2 = 100 + 10x \rightarrow x^2 - 10x + 21$

$x = 3, 7$

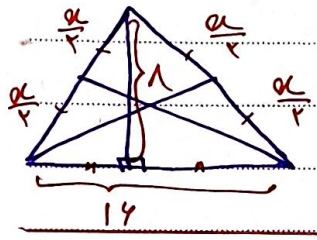


$EF^2 = DF \times FC \rightarrow 16 = 1 \times FC \Rightarrow FC = 16$ (۶

$ED = \sqrt{16+1} = \sqrt{17}$ $\quad 16^2 - (\sqrt{17})^2 = EC^2 \rightarrow EC = 4\sqrt{17}$

$BF^2 = AF \times FC = 4 \times 16 \rightarrow BF = 8$ قضیه نردبان

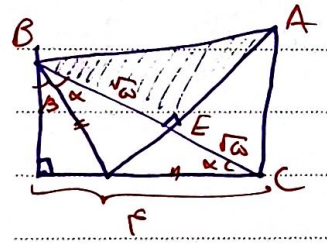
$BC^2 = 8^2 + 16^2 = 320 \rightarrow BC = 8\sqrt{5}$



$x^2 = 8^2 + 16^2 \rightarrow x = 8\sqrt{2}$ (۷

میانه وارد بر وتر، نصف وتر ← با ساق ها قائم الزاویه

$\sqrt{(8\sqrt{2})^2 + (4\sqrt{2})^2} = 4\sqrt{2}$



$BC = \sqrt{16+4} = 2\sqrt{5}$ (۸

$BE = BC = \sqrt{5}$

$\frac{2}{\sqrt{5}} = \frac{4}{AE} \Rightarrow AE = 2\sqrt{5}$

$S_{ABE} = \frac{AE \times BE}{2} = \frac{2\sqrt{5} \times \sqrt{5}}{2} = 5$

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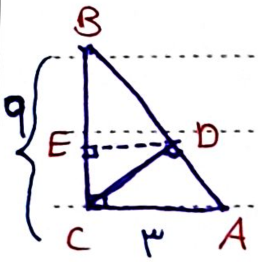
۹)



$AB = \sqrt{۸۱+۹} = ۳\sqrt{۱۰}$

$AC^۲ = AD \times AB \Rightarrow ۹ = AD \times ۳\sqrt{۱۰}$

$AD = ۰/۳\sqrt{۱۰}$　　$BD = ۳\sqrt{۱۰} - ۰/۳\sqrt{۱۰} = ۲/۷\sqrt{۱۰}$

$\left.\begin{matrix} DE \perp BC \\ AC \perp BC \end{matrix}\right\} \Rightarrow DE \parallel AC \longrightarrow \frac{BE}{BC} = \frac{BD}{AD} \rightsquigarrow \frac{BE}{۹} = \frac{۲/۷\sqrt{۱۰}}{۳\sqrt{۱۰}}$

$\Rightarrow BE = ۸/۱$

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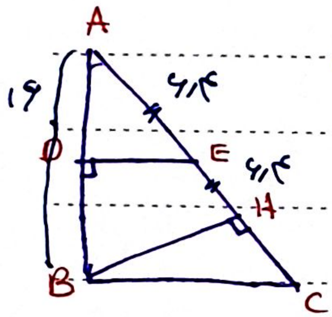
۱۰)



$AC = \sqrt{۱۶^۲+۱۲^۲} = ۲۰$

$BC^۲ = CH \times AC \Rightarrow ۱۴۴ = CH \times ۲۰ \Rightarrow CH = ۷/۲$

$AE = AH = ۶/۴$ / $\frac{DE}{۱۲} = \frac{۶/۴}{۲۰} \Rightarrow DE = ۳/۸۴$ ← تالس