

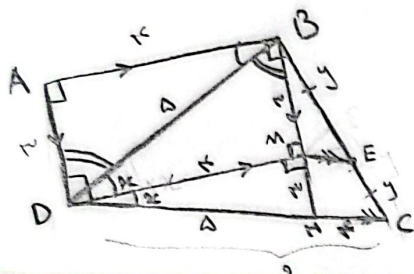
$$\frac{SBCE}{SBDE}$$

$$\frac{A}{11} = \frac{DE}{BC} \rightarrow \Delta BC = 11 DE$$

$$\rightarrow = \frac{\frac{1}{2} \times BE \times BC \times \sin \alpha}{\frac{1}{2} \times DE \times BE \times \sin \alpha} = \frac{11}{1} = 11 \checkmark$$

(۲) (۱)

DM



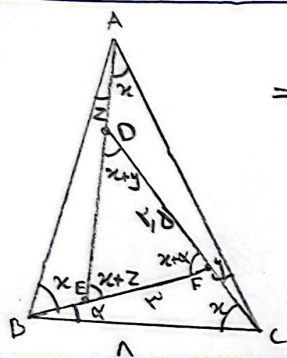
$$\frac{BE}{BC} = \frac{ME}{HC}$$

(۲) م از E برابر؟ در مثلث BHC قائم می زنیم

$$\frac{5}{11} = \frac{ME}{4} \rightarrow ME = 2 \checkmark$$

HC و ME

طبق عکس قضیه تالس با هم موازی اند.

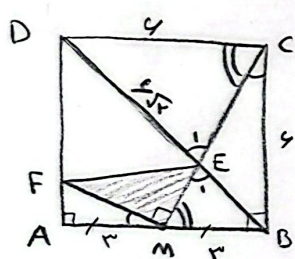


$$\Rightarrow \begin{cases} \hat{A} = \hat{E} \\ \hat{B} = \hat{F} \\ \hat{C} = \hat{D} \end{cases}$$

$$\Delta ABC \sim \Delta DFE$$

(۳) زاویه خارج یک راس = مجموع دو زاویه داخلی دیگر

$$\frac{DF}{FE} = \frac{BC}{AB} \rightarrow \frac{2\sqrt{5}}{3} = \frac{11}{AB} \rightarrow AB = 9,6 \checkmark$$

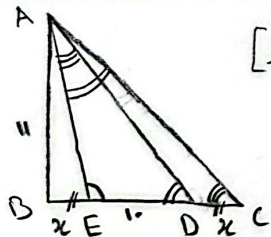


$$\Delta AMF \sim \Delta MBC \rightarrow \frac{6}{3} = \frac{3}{AF} \rightarrow AF = \frac{3}{2} / MC = \sqrt{3^2 + 9} = 3\sqrt{2}$$

$$[ز] \Delta DCE \sim \Delta MBE \rightarrow \frac{DC}{MB} = \frac{EC}{ME} \rightarrow \frac{6}{3} = \frac{EC}{ME} \rightarrow 2ME = EC \rightarrow 3ME = 3\sqrt{2} \rightarrow ME = \sqrt{2}$$

$$FM = \sqrt{9 + \frac{9}{4}} = \sqrt{\frac{45}{2}} = \frac{3\sqrt{10}}{2} \Rightarrow S_{FME} = \frac{3\sqrt{2} \times \sqrt{2}}{2} = \frac{15}{2} \checkmark$$

(۲) (۴)



$$[ز] \Delta AED \sim \Delta AEC$$

$$AE = \sqrt{11 + 2^2}$$

$$\frac{AE}{EC} = \frac{ED}{AE}$$

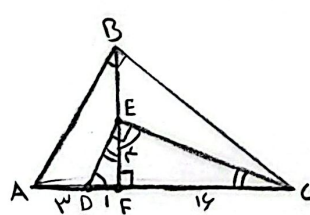
$$\rightarrow \frac{\sqrt{11 + 2^2}}{1 + 2} = \frac{1}{\sqrt{11 + 2^2}} \rightarrow 11 + 2^2 = 1 + 4 \rightarrow 2^2 - 1 \cdot 2 + 11 = 0$$

$$\checkmark x = 7,3 \leftarrow (x - 7)(x - 11) = 0$$

DC = ?

(۵)

(۲)

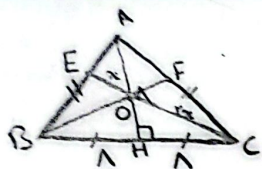


$$\Delta DFE \sim \Delta EFC \rightarrow \frac{EF}{DF} = \frac{CF}{EF} \rightarrow \frac{4}{1} = \frac{CF}{4} \rightarrow CF = 16$$

BC = ?

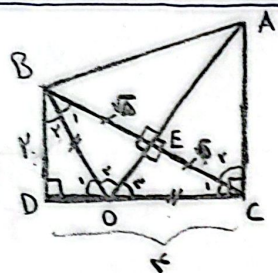
(۶)

$$\Rightarrow BC^2 = CF \times CA \rightarrow BC = \sqrt{16 \times 20} = 4\sqrt{10} \checkmark$$



(V) میانه‌ها با نسبت ۲ و ۱ تقسیم می‌شوند. در مثلث $\triangle OHC$ $OH = \frac{1}{3} \cdot AO = \frac{2}{3} \cdot \frac{a}{2} = \frac{a}{3}$ $\leftarrow$ $OH = \frac{a}{3}$ $\leftarrow$ OHC در مثلث $\triangle OHC$ $OC = \sqrt{\left(\frac{a}{3}\right)^2 + \left(\frac{a}{2}\right)^2} = \sqrt{\frac{a^2}{9} + \frac{a^2}{4}} = \sqrt{\frac{4a^2 + 9a^2}{36}} = \sqrt{\frac{13a^2}{36}} = \frac{a\sqrt{13}}{6} = 2x$ (۲)

$EC = 2x \rightarrow \left(\frac{a}{3} + \frac{a}{3}\right) \cdot \frac{1}{2} = \frac{11}{3} \cdot \frac{1}{2} = \frac{11}{6} \cdot \frac{1}{2} = \frac{11}{12}$ ✓



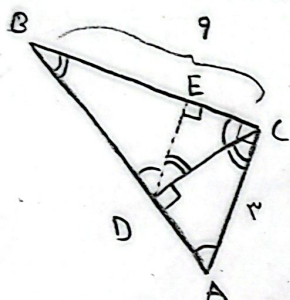
$S_{ABE} = ?$

(۸) در مثلث $\triangle BOC$ چون متساوی الساقین است و $\angle O = 90^\circ = \angle E$ میانه نیز است

$B_1 + B_2 + C_1 = 90^\circ \rightarrow 2B_1 + B_2 = 90^\circ \rightarrow O_1 = B_1 + C_1 = 2B_1 \rightarrow O_1 + O_2 + O_3 = 180^\circ = 2B_1 + 2O_2$
 $B_1 = C_1 \rightarrow B_1 + O_2 = 90^\circ = 2B_1 + B_2 \rightarrow O_2 = B_1 + B_2$ (۲)

$BC = \sqrt{4+16} = \sqrt{20} \rightarrow EB = EC = \sqrt{5} \xrightarrow{C_1=B_1} \triangle ACE \sim \triangle BDC \quad \frac{DC}{EA} = \frac{BD}{EC}$

$\rightarrow \frac{4}{EA} = \frac{2}{\sqrt{5}} \rightarrow EA = 2\sqrt{5} \Rightarrow S_{ABE} = \frac{\sqrt{5} \times 2\sqrt{5}}{2} = (5)$ ✓



$AB = \sqrt{1+9} = \sqrt{10}$

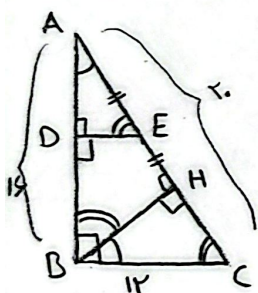
$\triangle ABC \sim \triangle ADC \rightarrow \frac{CD}{BC} = \frac{CA}{AB}$

$\frac{CD}{9} = \frac{4}{\sqrt{10}} \rightarrow CD = \frac{36}{11}$

$BE = ?$ (۹)

$\rightarrow \triangle ABC \sim \triangle EDC \rightarrow \frac{ED}{BC} = \frac{DC}{BA} \rightarrow \frac{ED}{9} = \frac{\frac{36}{11}}{\sqrt{10}} \rightarrow ED = \frac{36}{11} = 3\sqrt{10}$

$\Rightarrow \triangle BED \sim \triangle ABC \Rightarrow \frac{EB}{BC} = \frac{ED}{CA} \rightarrow EB = \frac{9 \times 3\sqrt{10}}{1 \times \sqrt{10}} = (27)$ ✓



$AC = \sqrt{1+9+4} = \sqrt{14} = \sqrt{2} \cdot \sqrt{7}$

$\triangle ABC \sim \triangle BHC \rightarrow \frac{HC}{BC} = \frac{BC}{AC} \rightarrow \frac{HC}{12} = \frac{12}{\sqrt{14}} \rightarrow HC = \frac{144}{\sqrt{14}}$

$HC = \frac{144}{\sqrt{14}}$

$DE = ?$ (۱۰)

$AH = 2AE = 2 \cdot \frac{144}{\sqrt{14}} = \frac{288}{\sqrt{14}}$

$\rightarrow AE = \frac{144}{\sqrt{14}}$

$\Rightarrow \triangle ADE \sim \triangle ABC \rightarrow \frac{AE}{AC} = \frac{DE}{BC} \rightarrow \frac{\frac{144}{\sqrt{14}}}{\sqrt{14}} = \frac{DE}{12} \rightarrow DE = \frac{144}{7}$ ✓