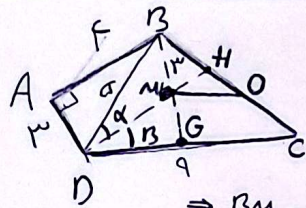


ارتفاع‌ها برابر  $\Rightarrow \frac{S_{\triangle BCE}}{S_{\triangle BDE}} = \frac{BC}{DE} = \frac{AB}{AD} = \frac{12}{8} = 1.5$



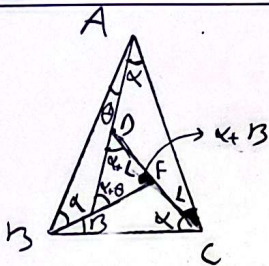
$BD^2 = AD^2 + AB^2 \Rightarrow BD = 5$

$ABD \sim BDM \Rightarrow BM = 3$

$\angle BDC = 2\angle BDM \Rightarrow \alpha = \beta \Rightarrow BMD \sim DMG \Rightarrow BD = DG = 5$

$\Rightarrow BM = MG = 3$  و  $(DG = 5) \Rightarrow CG = 9 - 5 = 4$

$BMO \sim BGC \Rightarrow \frac{BM}{BG} = \frac{BO}{BC} = \frac{MO}{GC} = \frac{1}{3} \Rightarrow \frac{MO}{4} = \frac{1}{3} \Rightarrow MO = \frac{4}{3}$



برای راس‌ها زوایای برابر در دو مثلث  $ABC$  و  $DEF$ ؛ این دو مثلث متشابه هستند.

$\triangle ABC \sim \triangle DEF \Rightarrow \frac{DE}{AC} = \frac{DF}{BC} = \frac{EF}{AB}$

$\Rightarrow \frac{2.5}{1} = \frac{3}{AB} \Rightarrow AB = 9.4$

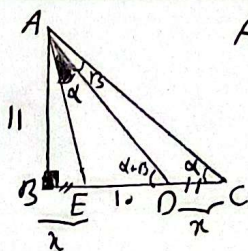
$AB$  وسط  $M \Rightarrow AM = MB = 3$  و  $MC^2 = BC^2 + MB^2 \Rightarrow MC = \sqrt{3^2 + 9} = 3\sqrt{2}$

$\hat{C} = \hat{M}$  و  $A = B = 90^\circ \Rightarrow \triangle ABC \sim \triangle AMF \Rightarrow \frac{AF}{MB} = \frac{AM}{CB} \Rightarrow \frac{AF}{3} = \frac{3}{4} \Rightarrow AF = \frac{9}{4}$

$MF^2 = AF^2 + AM^2 \Rightarrow MF = \sqrt{9 + \frac{9}{4}} = \frac{3\sqrt{5}}{2}$

$\triangle BEF \sim \triangle ECD \Rightarrow \frac{MB}{DC} = \frac{ME}{EC} \Rightarrow \frac{3}{4} = \frac{ME}{CE} \Rightarrow CE = 2ME$  و  $ME + EC = 3\sqrt{2}$

$\Rightarrow ME + 2ME = 3\sqrt{2} \Rightarrow ME = \sqrt{2}$   $S_{\triangle MEF} = \frac{MF \times ME}{2} = \frac{3\sqrt{5}}{2} \times \frac{1}{2} \times \sqrt{2} = \frac{3\sqrt{10}}{4}$



$\triangle AED \sim \triangle AEC \Rightarrow \frac{ED}{AE} = \frac{AE}{EC} = \frac{AD}{AC} \Rightarrow \frac{1}{\sqrt{121+x^2}} = \frac{\sqrt{121+x^2}}{10+x}$

$\Rightarrow 121 + x^2 = 100 + 10x \Rightarrow x^2 - 10x + 21 = 0 \Rightarrow x = 3$  و  $x = 7$

$$EF^2 = DF \times FC \Rightarrow 14 = 1 \times FC \Rightarrow FC = 14$$

$$BC^2 = CF \times AC \Rightarrow BC^2 = 14 \times 2 \Rightarrow BC = \sqrt{14 \times 2} = \underline{1\sqrt{5}}$$

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مثلث متساوی الساقین است پس میان آن، ارتفاع نیز است  
 $\Rightarrow$  نصف قاعه = ۱  $\Rightarrow$  ساق =  $\sqrt{1^2 + 1^2} = \sqrt{2}$



$$AM \text{ میان } M \Rightarrow AM = MB = \frac{AB}{2} = \frac{\sqrt{2}}{2} \Rightarrow \frac{1}{2} \times \sqrt{2} = \frac{\sqrt{2}}{2}$$

$$\hat{C} = \hat{B} = \hat{A}_1 = \hat{A}_2 = 45^\circ \Rightarrow \hat{A} = 90^\circ$$

$$ACM \Rightarrow MC^2 = AM^2 + AC^2 = (\frac{\sqrt{2}}{2})^2 + (\frac{\sqrt{2}}{2})^2 \Rightarrow MC = \frac{\sqrt{2}}{2}$$

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$$BC^2 = BD^2 + DC^2 \Rightarrow BC = \sqrt{14 + 4} \Rightarrow \sqrt{18} = 3\sqrt{2}$$

چون M و C با هم برابر هستند پس ارتفاع آن (ME) میان BC می شود پس:

$$BE = EC = \frac{BC}{2} = \sqrt{2}$$

$$AE^2 = BE \times CE \Rightarrow AE = \sqrt{2} \Rightarrow S_{ABE} = \frac{\sqrt{2} \times \sqrt{2}}{2} = \frac{2}{2}$$

$$\cot C = \frac{DC}{BD} = 2 \Rightarrow \tan C = \frac{AE}{EC} = 2 \Rightarrow AE = 2\sqrt{2} \Rightarrow S = \frac{1}{2} \times \sqrt{2} \times 2\sqrt{2} = \underline{2}$$

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$$AB^2 = AC^2 + BC^2 \Rightarrow AB = \sqrt{1 + 9} \Rightarrow AB = \sqrt{10} \Rightarrow \begin{cases} AN = x \\ BN = \sqrt{10} - x \end{cases}$$

$$AC^2 = AN \times AB \Rightarrow 9 = x \times (\sqrt{10}) \Rightarrow x = \frac{9\sqrt{10}}{10} \Rightarrow BN = \frac{9\sqrt{10}}{10} - \frac{9\sqrt{10}}{10} = \frac{9\sqrt{10}}{10}$$

$$BE \times BC = BN^2 \Rightarrow \frac{9\sqrt{10} \times 1}{10} = BE \times 9 \Rightarrow \underline{BE = 1}$$

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$$AB^2 + BC^2 = AC^2 \Rightarrow 16 + 144 = 160 \Rightarrow AC = 4$$

$$BC^2 = CH \times AC \Rightarrow 144 = CH \times 4 \Rightarrow CH = 36$$

$$AC = CH + AH \Rightarrow 4 = 36 + AH \Rightarrow AH = 32, AH = 2AE \Rightarrow AE = 16$$

$$AOF \sim ABC \Rightarrow \frac{OE}{BC} = \frac{AE}{AC} \Rightarrow OE = 12 \times \frac{16}{4} \Rightarrow \underline{OE = 48}$$

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