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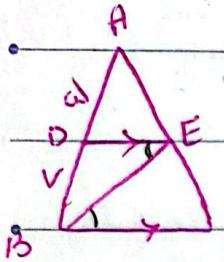
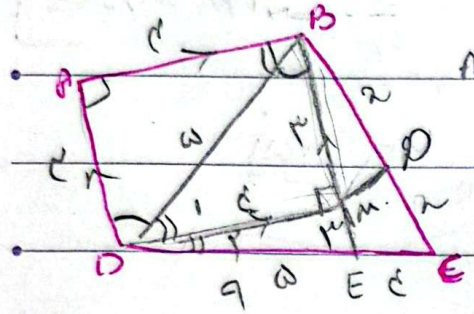
تالس عکس: $\frac{AD}{AB} = \frac{DE}{BC} = \frac{\omega}{12}$ — هستا جهی، تقلیف ۲۲ بیا زنم وضیفه.



(۱) $DE \parallel BC$, BE مورب $\rightarrow \hat{E} = \hat{B}$

$$\frac{S_{BEC}}{S_{BED}} = \frac{\frac{1}{2}\sin\hat{B} \times BE \times BC}{\frac{1}{2}\sin\hat{E} \times BE \times DE} = \frac{BC}{DE} = \frac{12}{\omega} = \frac{4}{1}$$



(۲) $AB \parallel DC$, BD مورب $\rightarrow \hat{B}_1 = \hat{D}_1$ (حرف B سوال) $\hat{B}_1 = \hat{D}_1 = \hat{D}_2$

مثلث‌ها: $BD = \omega$

BD نیمساز $\hat{B}$ و $\hat{D}$

$\hat{B} = \hat{D} = 2\hat{ADB} = \hat{DBE}$

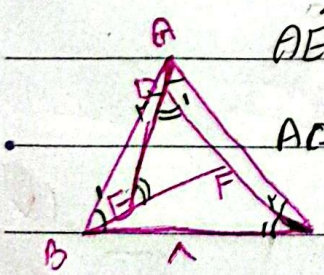
$\Rightarrow \triangle ABD \sim \triangle BMD \Rightarrow M = 90^\circ$

DM نیمساز $\hat{D}_1 = \hat{D}_2$, $\hat{M} = 90^\circ$

$\Rightarrow \triangle DMB \cong \triangle DME \Rightarrow DE = \omega, EC = 4, ME = BM = 3$ ★

عکس تالس: $EC \parallel MP$ ← $BP = PC$ (P وسط BC) و $ME = MB$ (M وسط BE)

$$\Rightarrow \frac{MP}{EC} = \frac{BP}{BC} = \frac{BM}{BE} = \frac{1}{2} \Rightarrow MP = \frac{1}{2} \times 4 = 2$$



(۳) $\triangle AEB$: زاویه خارجی $= \hat{B}_1 + \hat{A}_2 = \hat{A}_1 + \hat{A}_2 = \hat{A}$

$\triangle ADC$: $\hat{D}_2 = \hat{A}_1 + \hat{C}_2 = \hat{C}_1 + \hat{C}_2 = \hat{C}$ *

$\therefore \triangle ABC \sim \triangle DEF$

$$\Rightarrow \frac{AC}{DE} = \frac{AB}{EF} = \frac{BC}{FD} \rightarrow \frac{AB}{3} = \frac{8}{2.5} \rightarrow AB = 9.4$$

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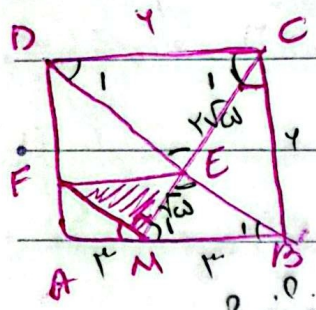


$\hat{E}_1 = \hat{E}_2$ متقابل به رأس

$\hat{C}_1 = \hat{M}_1$ متقابل D

$\hat{D}_1 = \hat{B}_1$ خطوط موازی

$\Rightarrow DEC \sim MEB \Rightarrow \frac{MB}{DC} = \frac{ME}{EC} = \frac{2\sqrt{3}}{4\sqrt{3}} = \frac{1}{2}$

فیثاغورث: $MC = \sqrt{6^2} = 3\sqrt{3} = 3x \Rightarrow x = \sqrt{3}$

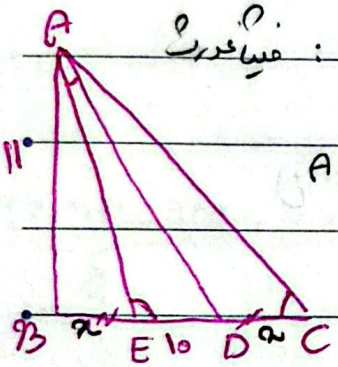
$BCM = FMA$ متقابل به رأس

$\hat{M} = \hat{B} = 90^\circ$

$\Rightarrow BCM \sim AMF \rightarrow \frac{BC}{AM} = \frac{CM}{FM} \Rightarrow FM = 3/2\sqrt{3}$

$S_{FME} = \frac{3}{2}\sqrt{3} \times \sqrt{3} \times \frac{1}{2} = \frac{15}{8} = 3,75$

۱۵.



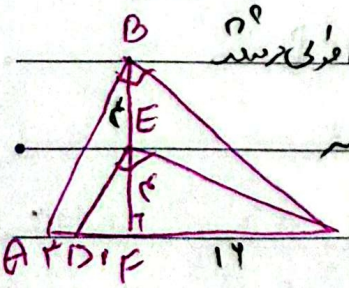
فیثاغورث: $AE^2 = 11^2 + 2^2$ (۱)

$AEC \sim AED$ $\begin{cases} DAE = ACD \\ \hat{E} \text{ مشترک} \end{cases} \Rightarrow \frac{AE}{ED} = \frac{EC}{AE} \Rightarrow AE^2 = EC \times ED$

$AE^2 = (10+2)10$ (۲)

(۱) و (۲) $\rightarrow x^2 - 10x + 21 \rightarrow \begin{matrix} 3 \\ 7 \end{matrix}$

۱۶.

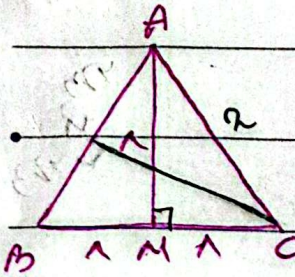


روابط طولی در مثلث: $EF^2 = DF \times FC = 1 \times FC = 14 \rightarrow FC = 14$

$\sim$: $BF^2 = AF \times FC = 4 \times 14 = 4^2 \rightarrow BF = 8$

فیثاغورث: $BC = \sqrt{12^2 + 4^2} = 8\sqrt{3}$

۱۷.



فیثاغورث: $x = 8\sqrt{2} \rightarrow (8\sqrt{2})^2 + (4\sqrt{2})^2 = 12^2 \rightarrow 4\sqrt{10}$

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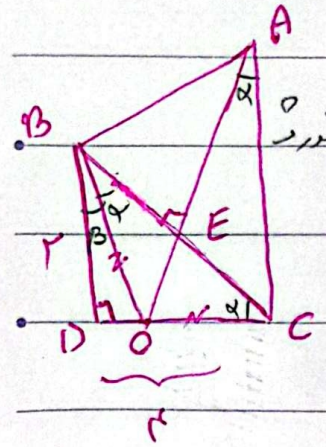
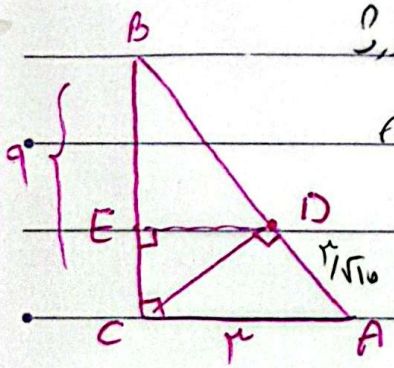


$BC = 2\sqrt{5} \Rightarrow BE = EC = \sqrt{5}$ مثلث قائم‌الزاویه

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

$\Rightarrow S_{ABE}^{\triangle} = \frac{\sqrt{5} \times 2\sqrt{5}}{2} = 5$

۹.



مثلث قائم‌الزاویه: $AB = \sqrt{90} = 3\sqrt{10}$

$ABC \sim ADE : \frac{AD}{AE} = \frac{AE}{AB} = \frac{DE}{BC} \Rightarrow AD = \frac{3}{\sqrt{10}}$

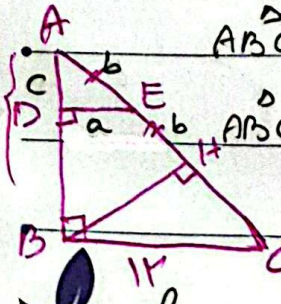
$\Rightarrow BD = 3\sqrt{10} - \frac{3\sqrt{10}}{10} = \frac{27\sqrt{10}}{10}$

$AC \perp BC$, $ED \perp BC \rightarrow AC \parallel ED$ تالس ← دو خط بر یک خط عمود باهم موازی‌اند

$\frac{BD}{BA} = \frac{27\sqrt{10}}{30\sqrt{10}} = 0.9 = K$ نسبت تشابه $\Rightarrow \frac{BE}{BC} = \frac{BE}{9} = 0.9 \Rightarrow$

$BE = 8.1$

۱۰.



$ABC \sim ADE$ $\left(\frac{20}{b}\right) = \frac{14}{c} = \left(\frac{12}{a}\right)$ ★

$ABC \sim BHC \rightarrow \frac{BH}{14} = \frac{20 - 4b}{12} = \frac{12}{20} \Rightarrow b = 4.8, BH = 9.4$

$\frac{20}{4.8} = \frac{16}{a} \rightarrow a = 3.84$

مثلث قائم‌الزاویه ★: $AC = 20$