نام و نام خانوادگی ...نیلنازمحمدرضایی... پاسخنامه تشریحی تکلیف شماره ...۲۱... کلاس ...یازدهم دختر A...

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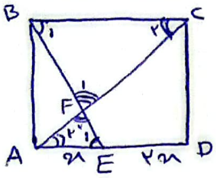

$BC \parallel AD \rightarrow \hat{B}_1 = \hat{E}_1$

$\hat{A}_2 = \hat{C}_2$

$\hat{F}_1 = \hat{F}_2$ $\} \rightarrow A\hat{F}E \overset{\text{زز}}{\sim} B\hat{F}C$

$AE = x$, $ED = 2x$ $\} \rightarrow AD = 3x$ ؛ چهارضلعی مربع

$CD = AB = AD = BC = 3x$

$$\frac{BC}{AE} = \frac{\overbrace{CF}^{AC-AF}}{AF} = \frac{\overbrace{BF}^{BE-EF}}{FE} \rightarrow \frac{AC-AF}{AF} = \frac{BE-EF}{EF}$$

طبق فیثاغورس $(BE)^2 = (AE)^2 + (AB)^2 = x^2 + 9x^2 = 10x^2 \rightarrow BE = \sqrt{10}\,x$

$(AC)^2 = (AD)^2 + (CD)^2 = 9x^2 + 9x^2 = 18x^2 \rightarrow AC = 3\sqrt{2}\,x$

مخرج را در صورت جمع می‌زنیم $\Downarrow$

$$\frac{3\sqrt{2}}{\sqrt{10}} = \frac{AC}{BE} = \frac{AF}{EF} \leftarrow \frac{AC}{AF} = \frac{BE}{EF}$$

$$\rightarrow \frac{EF}{AF} = \frac{\sqrt{10}}{3\sqrt{2}} = \frac{\sqrt{5}}{3}$$

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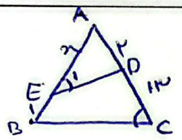

مشترک $\hat{A} = \hat{A}$

$\hat{C} = \hat{E}_1$ $\} \rightarrow A\hat{B}C \overset{\text{زز}}{\sim} E\hat{A}D$

$$\frac{AB}{AD} = \frac{BC}{ED} = \frac{AC}{AE} \rightarrow \frac{1+x}{2} = \frac{BC}{AD} = \frac{15}{x} \rightarrow \frac{1+x}{2} = \frac{15}{x} \rightarrow x + x^2 = 30$$

$x^2 + x - 30 = 0 \rightarrow (x+6)(x-5) = 0 \rightarrow \boxed{x = 5}$

$\rightarrow x = -6$ غ ق ق ضلع منفی نمی‌تواند باشد

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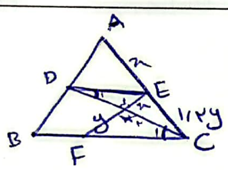

$DE \parallel BC \rightarrow$ طبق تعمیم تالس : $\frac{DE}{BC} = \frac{AE}{AC} \rightarrow \frac{DE}{\cancel{BF}^{\,3} + FC} = \frac{x}{x + 1.2y}$

$1.2(\frac{5}{3}x) = 2x$

$3y = 5x \rightarrow \boxed{y = \frac{5}{3}x}$ (1)

$\hat{H}_1 = \hat{H}_2$

$\hat{D}_1 = \hat{C}_1$ $\} \rightarrow D\hat{H}E \overset{\text{زز}}{\sim} F\hat{H}C \rightarrow \frac{DE}{FC} = \frac{x}{y} \xrightarrow{(1)} \frac{DE}{FC} = \frac{x}{\frac{5}{3}x} = \frac{3}{5} \rightarrow \boxed{DE = \frac{3}{5}FC}$ (2)

$$\frac{DE}{3+FC} = \frac{\cancel{x}}{3\cancel{x}} \xrightarrow{(2)} \frac{\frac{3}{5}FC}{3+FC} = \frac{1}{3} \rightarrow \frac{9}{5}FC = 3 + FC \rightarrow \frac{4}{5}FC = 3 \rightarrow FC = \frac{15}{4} \rightarrow BC = BF + FC = \frac{15}{4} + 3 = \frac{27}{4}$$

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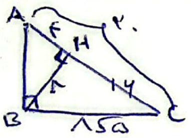

$(BH)^2 = AH \times HC \rightarrow BH^2 = 16 \times 4 = 64 \rightarrow \boxed{BH = 8}$

$HC = AC - AH = 20 - 4 = 16$

در مثلث $B\hat{H}C$: طبق فیثاغورس ؛ $(BC)^2 = (BH)^2 + (HC)^2 = (8)^2 + (16)^2 \rightarrow \boxed{8\sqrt{5} = BC}$

در مثلث $A\hat{H}B$: 〃 〃 : $(AB)^2 = (BH)^2 + (AH)^2 = (8)^2 + (4)^2 \rightarrow \boxed{AB = 4\sqrt{5}}$

$$\frac{AB}{BC} = \frac{4\sqrt{5}}{8\sqrt{5}} = \frac{1}{2}$$

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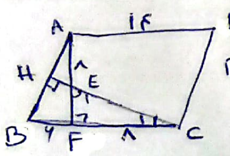

$ABCD \rightarrow AD = BC = 14$

$CF = BC - BF = 14 - 6 = 8$

$B\hat{H}C : \hat{C}_1 + \hat{B} = 90$

$E\hat{F}C : \hat{E}_1 + \hat{C}_1 = 90$ $\} \hat{B} = \hat{E}_1$

$\hat{H} = \hat{F} = 90$ $\} \rightarrow A\hat{F}B \overset{\text{زز}}{\sim} C\hat{F}E \rightarrow \frac{EF}{F} = \frac{Fc}{\underset{8+EF}{\cancel{AF}}}$

$$\rightarrow \frac{EF}{6} = \frac{8}{8+EF} \rightarrow \underset{x}{(EF)^2} + 8EF = 48 \rightarrow x^2 + 8x - 48 = 0 \rightarrow (x+12)(x-4) = 0$$

$\rightarrow x = -12$ غ ق ق

$\rightarrow \boxed{x = 4}$

$AF = AE + EF = 8 + 4 = 12$

نوناز محمدرضایی

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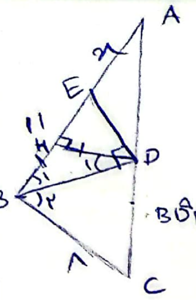

BD نیمساز $\to \hat B_1=\hat B_2$
$DH \parallel BC \to D_1 = B_2$
$D_1=B_1 \to B\hat HD$ متساوی الساقین $\to BH = DH$ (1)

$D\hat HB$ درمثلث : $\hat B_1+\hat D_1=90 \xrightarrow{\hat D_1=\hat B_1} 2\hat B_1=90 \to \hat B_1=\hat D_1=45^\circ$

$\hat D_1+\hat D_2=90 \xrightarrow{\hat D_1=45^\circ} \hat D_2=45^\circ$

$B\hat DE$ درمثلث $\to \hat E_1+\hat B_1=90 \to \hat E_1=45$ $\to B\hat DE$ متساوی الساقین $\to DH=HE$ (عمود منصف) $\xrightarrow{(1)} DH=HE=BH=\frac{11}{2}=5/5$

$HD \parallel BC \to$ طبق تالس : $\frac{AH}{AB}=\frac{HD}{BC} \to \frac{x+5/5}{11+x}=\frac{5/5}{8}$ $\to 8x+44=60/5+5/5x$ $\to 2/5x=16/5$ $\to AE = \boxed{x=6/6}$

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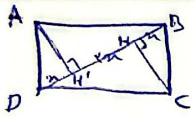

$S_{D\hat BC}=\frac{BC\times DC}{2}$
$S_{D\hat AB}=\frac{AD\times AB}{2}$
$\overset{\square}{ABCD} \to BC=AD , AB=DC$

$S_{D\hat AB}=S_{D\hat BC}$
$S_{\overset{\square}{ABCD}}=S_{D\hat AB}+S_{D\hat BC}$ $\to \boxed{S_{\overset{\square}{ABCD}}=2S_{D\hat BC}}$ (1)

$S_{D\hat CB}=\frac{CH\times BD}{2}$
$S_{H\hat CB}=\frac{CH\times BH}{2}$
$\frac{S_{D\hat CB}}{S_{H\hat CB}}=\frac{BD}{BH}=\frac{x+2x+x}{x}=4 \to \frac{S_{\overset{\square}{ABCD}}}{S_{B\hat HC}} \overset{(1)}{=} \frac{2S_{D\hat BC}}{S_{BHC}}=2(4)=\boxed{8}$

کوچکترین مثلث

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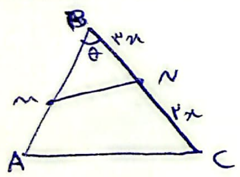

$2BN=3NC$

$S_{A\hat BC}=3S_{BMN} \to \frac{1}{2}BC\times AB\times \cancel{\sin\theta}=3\times\frac{1}{2}\times BM\times BN\times\cancel{\sin\theta}$

$\to \underset{5x}{\cancel{BC}}\times AB=3\,BM\times \underset{3x}{\cancel{BN}} \to 5AB=9BM$

$\frac{BM}{AB}=\frac{5}{9} \to \frac{BM}{AM+MB}=\frac{5}{9} \xrightarrow{\text{تفضیل صورت در مخرج}} \boxed{\frac{BM}{AM}=\frac{5}{4}}$

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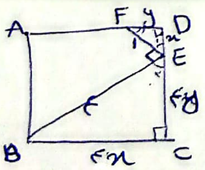

$\hat E_1+\hat E_2=90$
$\hat E_1+\hat F_1=90$ $\to \hat E_2=\hat F_1$
$\overset{\square}{ABCD} \to \hat C=\hat D=90^\circ$

$B\hat CE \overset{\text{زز}}{\sim} F\hat DE$

$\frac{AE}{EF}=\frac{EC}{\underset{y}{FD}}=\frac{BC}{\underset{x}{DE}}=\frac{4}{1}$ $\to EC=4y$, $BC=4x$

$F\hat DE$ درمثلث : طبق فیثاغورس : $x^2+y^2=1$

$\overset{\square}{AFDB} \to BC=CD \to 4x=4y+x \to x=\frac{4}{3}y$

$y^2+\frac{16}{9}y^2=1 \to \frac{25}{9}y^2=1 \to \boxed{y=\frac{3}{5}}$, $\boxed{x=\frac{4}{5}}$

$S_{\text{مربع}}=(4x)^2=16x^2=16\times\frac{16}{25}=10/24$

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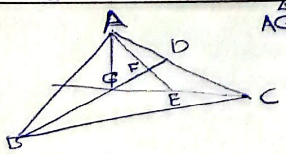

$A\hat GC$ درمثلث $\to GE=EC \to$ AE میانه وارد بر GC (1)

G مرکز ثقل $\to$ G محل برخورد میانه هاست $\to$ درمثلث $A\hat BC$ $\to$ BD میانه وارد بر AC $\to AD=DC \to$ درمثلث AGC میانه است GD (2)

(1) و (2) $\Longrightarrow$ F محل برخورد میانه های مثلث $A\hat GC$ (مرکز ثقل AGC) $\to \frac{GF}{FD}=\frac{2}{1} \xrightarrow[\text{در صورت جمع می کنیم}]{\text{مخرج را}} \frac{\overset{GD}{GF+FD}}{FD}=\frac{3}{1}$ (3)

$A\hat BC$ مرکز ثقل G $\to \frac{BG}{GD}=\frac{2}{1} \xrightarrow[\text{جمع می کنیم}]{\text{مخرج را در صورت}} \frac{\overset{BD}{BG+GD}}{GD}=\frac{3}{1}$ (4)

(3),(4) $\to \frac{GD}{FD}\times\frac{BD}{GD}=\frac{BD}{FD}=3\times3=9$