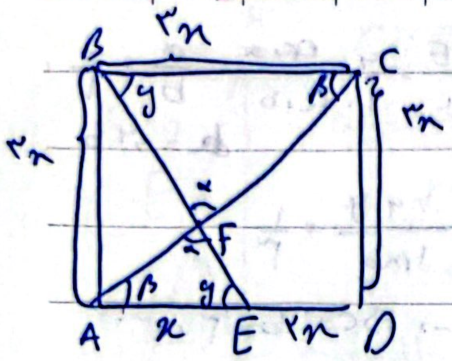
Subject. تکلیف ۲۱

اسم محمد مجتبائی یازدهم بیه B

۱)



$ED = 2AE$

$\left.\begin{array}{l}\hat{y}_B=\hat{y}_E\\ \hat{C}_B=\hat{A}_B\\ \alpha=\alpha\end{array}\right\}\ \overset{\triangle}{AFE}\simeq BFC \quad \frac{AE}{BC}=\frac{x}{3x}=\frac{1}{3}=k$

$AC^2=AD^2+DC^2 \Rightarrow AC=\sqrt{9x^2+9x^2} \quad AC=3\sqrt{2}x$

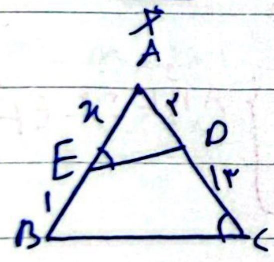
$\frac{AF}{FC}=\frac{AE}{BC}=\frac{1}{3} \quad AF+FC=3\sqrt{2}x \rightarrow AF=\frac{3\sqrt{2}x}{4}$

$BE^2=AE^2+AB^2 \Rightarrow BE=\sqrt{x^2+9x^2}=\sqrt{10}x$

$\frac{EF}{BF}=\frac{AE}{BC}=\frac{1}{3} \quad EF+FB=BE \Rightarrow FE=\frac{\sqrt{10}x}{4}$

$\frac{EF}{AF}=\frac{\frac{\sqrt{10}x}{4}}{\frac{3\sqrt{2}x}{4}}=\frac{\sqrt{5}}{3}$

۲)

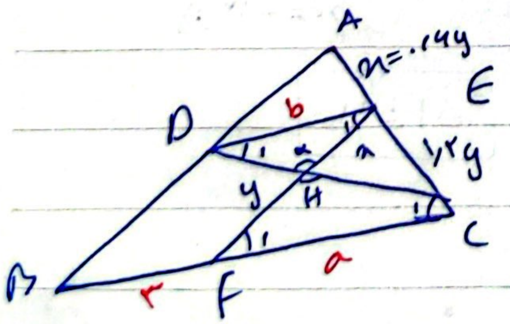


$\left.\begin{array}{l}A\hat{E}D=A\hat{C}B\\ \hat{A}=\hat{A}\end{array}\right\}\ \overset{\triangle}{AED}\simeq \overset{\triangle}{ABC}$

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

$\Rightarrow 30=x^2+x \rightarrow x^2+x-30=0 \rightarrow (x-5)(x+6)=0$ → $\boxed{x=5}$ ✓ , $x=-6$ ✗

۳)



$DE \parallel BC \Rightarrow \frac{AE}{AC}=\frac{DE}{BC}$

$3x=5y$

$x=\frac{5}{3}y,\ x=0.67y$

$\left.\begin{array}{l}D\hat{H}E=F\hat{H}C\\ E_1=F_1\\ C_1=D_1\end{array}\right\}\ \overset{\triangle}{DHE}\simeq FHC \quad \frac{DE}{FC}=\frac{EH}{FH}=\frac{DH}{HC}$

ادامه سوال ۱۳

$\Rightarrow \frac{DE}{FC} = \frac{EH}{FH} \Rightarrow \frac{DE}{FC} = \frac{x}{y} \xrightarrow{x=0.6y} \frac{DE}{FC} = \frac{6}{10} \quad DE=a,\ FC=b, \quad \frac{a}{b} = \frac{6}{10}$

$a = 0.6b$

تست، $\frac{DE}{BC} = \frac{AE}{AC} \Rightarrow \frac{0.6b}{b+3} = \frac{0.6y}{1.8y} = \frac{1}{3}$

$\frac{0.6b}{b+3} = \frac{1}{3} \quad b+3 = 1.8b \quad 3 = 0.8b \Rightarrow b = 3.75 \rightarrow BC = b+3$

$\boxed{BC = 3.75 + 3 = 6.75}$

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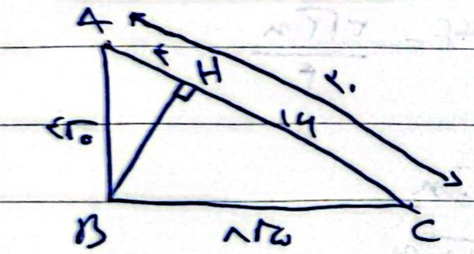

$AB^2 = AH \times AC$

$AB = \sqrt{4 \times 20} = \sqrt{80} = 4\sqrt{5}$

$BC^2 = HC \times AC =$

$BC = \sqrt{16 \times 20} = \sqrt{320} = 8\sqrt{5}$

$AB = 4\sqrt{5}$

$BC = 8\sqrt{5}$

$\hat{E}_1 = \beta \quad \hat{E}_2 = \beta$

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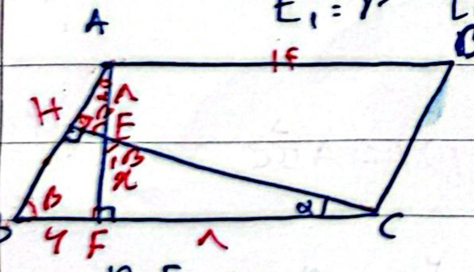

$AD = DC \Rightarrow FC = 8$

$\alpha + \beta = 90$

$\alpha + \hat{B} = 90$

$\Rightarrow \beta = \hat{B} \Big\} \ A\hat{B}F \sim E\hat{F}C$

$E_1 = \beta$

$BF = x$

$\frac{BF}{EF} = \frac{FC}{AF} \Rightarrow \frac{6}{x} = \frac{8+x}{\cancel{AE+8}}$

$\Rightarrow 8x + x^2 = 48 \Rightarrow x^2 + 8x - 48 = 0$

$(x-4)(x+12) = 0 \quad x = 4 \ \checkmark$

$x = -12 \ \times$

$x = 4 = BF = 4$

$AF = AE + BF = 4 + 8 = 12 \qquad \boxed{AF = 12}$

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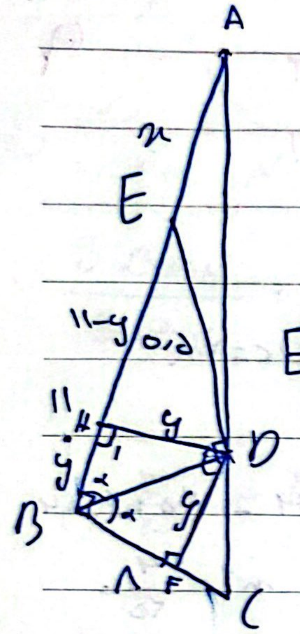

$DH \parallel BC \qquad DH \perp AB \ , \ DH \parallel BC$

$DF = HB = y \implies \hat{A}B \perp BC$

$\implies DH \perp DF \implies DF = HB = y$

$(11-y)(y) = y^2 \qquad 11y - y^2 = y^2$

$EH = 11 - y = 11 - 5.5 \qquad EH : 5.5 \qquad 0 = 2y^2 - 11y$

$\frac{5.5}{8} = \frac{x + 5.5}{11 + x} \qquad 0 = y(2y - 11)$

$y = 0 \ \text{✗} \qquad y = 5.5 \ \checkmark$

$60.5 + 5.5x = 8x + 44$

$16.5 = 2.5x$

$\boxed{x = 6.6}$

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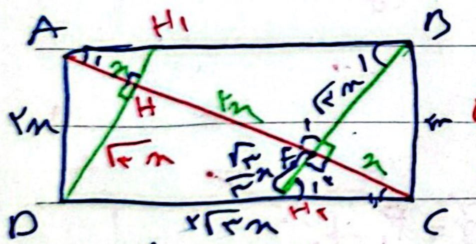


$A\hat{F}B =$

$DH^2 = x \cdot 3x \qquad \left.\begin{matrix} \hat{F}_1 = \hat{F}_2 \\ \hat{B}_1 = \hat{H}_{21} \\ \hat{C}_1 = \hat{A}_1 \end{matrix}\right\} \implies A\hat{F}B \sim H_2\hat{F}C$

$DH = \sqrt{3}x$

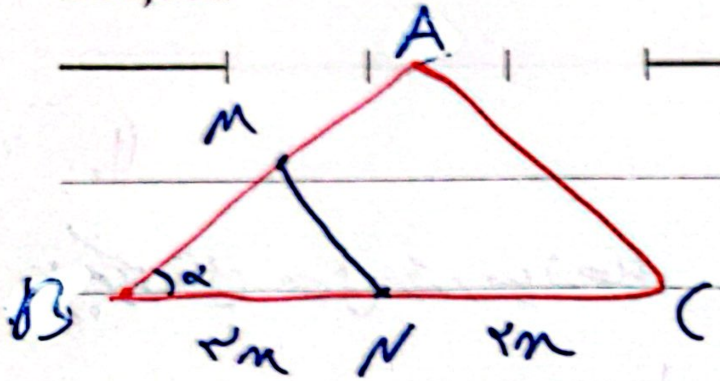
$AD^2 = x(4x) \qquad AD = \sqrt{4x^2} = AD = 2x$

$DC^2 = 3x(4x) \qquad DC = \sqrt{12x^2} = 2\sqrt{3}x$

$\implies A\hat{F}B \sim H_2\hat{F}C \qquad \frac{FH_2}{FB} = \frac{FC}{AF} \implies \frac{FH_2}{\sqrt{3}x} = \frac{x}{3x}$

$\frac{S_{ABCD}}{S_{FCH_2}} = \frac{2x \cdot 2\sqrt{3}x}{\frac{\sqrt{3}}{3}x \cdot x \cdot \frac{1}{2}} = \frac{4\sqrt{3}x^2}{\frac{\sqrt{3}}{6}x^2} = \boxed{24} \qquad 3FH_2 = \sqrt{3}x \qquad FH_2 = \frac{\sqrt{3}}{3}x$

Subject.



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$$\frac{BN}{NC} = \frac{3x}{2x}$$

$$\frac{S_{BMN}}{S_{ABC}} = \frac{1}{3} = \frac{\cancel{\tfrac{1}{2}} \times BM \times BN \times \sin\alpha}{\cancel{\tfrac{1}{2}} \times BC \times AB \times \sin\alpha} = \frac{1}{3} = \frac{\overset{3x}{BN}}{\underset{5x}{BC}} \times \frac{BM}{AB}$$

$$\frac{1}{3} = \frac{3}{5} \times \frac{BM}{AB} \Rightarrow \frac{BM}{AB} = \frac{5}{9} \qquad \frac{BM}{AM+MB} = \frac{5}{9} \qquad \frac{\text{تفضیل}}{\text{مخرج}}$$

$$\frac{BM}{AM} = \frac{5}{4} = 1.25$$

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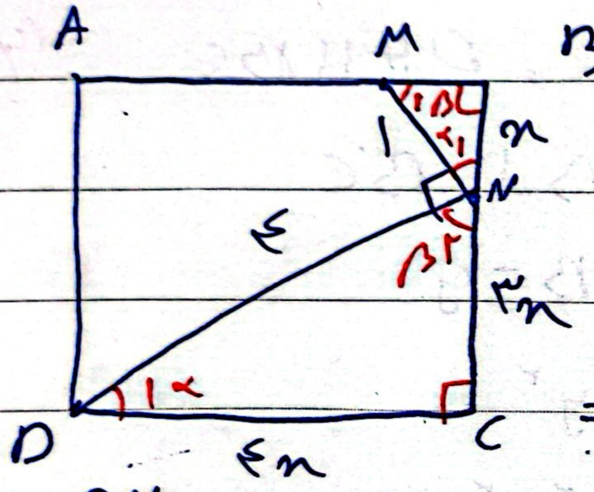


$M_1 + M_1 = ۹۰$

$D_1 + N_۲ = ۹۰$

$M_1 + N_۲ = ۹۰$

$\Rightarrow M_1 = N_۲$

$D_1 = N_1$

$\Rightarrow M\hat{B}N \simeq N\hat{C}D$

$\frac{DN}{MN} = \frac{1}{۴} = \frac{MB}{DC}$

$\frac{DN}{MN} = \frac{1}{۴} = \frac{BN}{DC} \xrightarrow{BN=x} DC = ۴x$

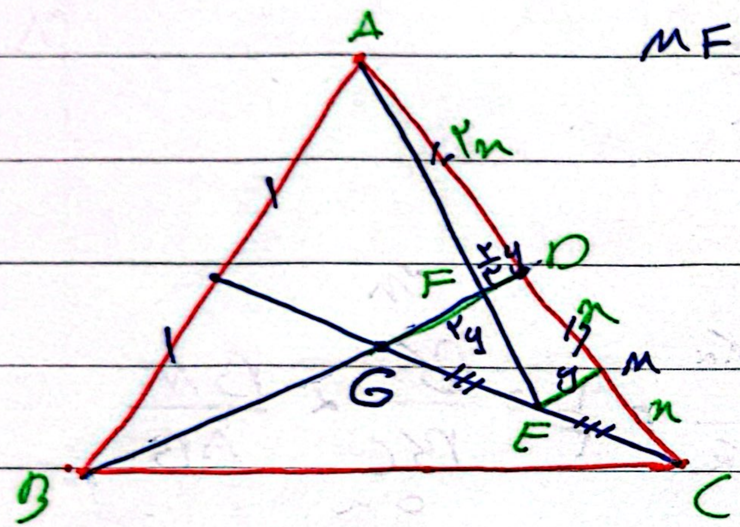
$BC = ۴x \quad \underline{BN = x} \quad NC = ۳x \Rightarrow (۳x)^۲ + (۴x)^۲ = ۱۶ \to ۲۵x^۲ = ۱۶$

$\Rightarrow x = \frac{۴}{۵}$ $\qquad x^۲ = \frac{۱۶}{۲۵}$

$S_{ABCD} = (BC)^۲ = (۴x)^۲ = (\frac{۱۶}{۵})^۲ = \frac{۲۵۶}{۲۵} = ۱۰٫۲۴$

Subject.

11.



$MF \parallel GD$

(مرکز ثقل محل برخورد میانه‌ها)

$$\frac{x}{2x} = \frac{FM}{GD} = \frac{1}{2}$$

تالس در مثلث $\overset{\triangle}{AFM}$ $\Rightarrow \frac{2x}{3x} = \frac{FD}{FM}$ $\quad \underline{FM = y} \quad \frac{2}{3} = \frac{FD}{y}$

$FD = \frac{2}{3}y \qquad GF = 2y - \frac{2}{3}y = \frac{4}{3}y$

میانه‌ها در مثلث همدیگر را با نسبت ۱ به ۲ قطع می‌کنند $\Rightarrow$

$$\frac{\overbrace{GD}^{2y}}{BD} = \frac{1}{3} \rightarrow BD = 6y \Rightarrow BD = 6y$$

$$FD = \frac{2}{3}y$$

$$\frac{BD}{FD} = \frac{6y}{\frac{2}{3}y} = 9$$