نام و نام خانوادگی ...[illegible] ملکوتی جوان... پاسخنامه تشریحی تکلیف شماره ...۲۱... کلاس ...یازدهم (A)...

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$ED = 2AE \rightarrow AE = \frac{1}{3}AD$

$\frac{EF}{AF}$ $\quad \left.\begin{matrix} F_1 = F_2 \\ AD \parallel BC \end{matrix}\right\} \rightarrow \frac{AF}{AC} = \frac{EF}{EB} = \frac{AE}{BC} = \frac{1}{3}$

$\frac{EF}{AF} = \frac{EB}{AC}$ $\quad AC = a\sqrt{2}$

$BE = \sqrt{(\frac{1}{3}a)^2 + a^2} = \sqrt{\frac{1}{9}a^2 + a^2} = \sqrt{\frac{10}{9}a^2} = \frac{\sqrt{10}}{3}a$

$\frac{EF}{AF} = \frac{EB}{AC} = \frac{\frac{\sqrt{10}}{3}a}{\sqrt{2}a} = \frac{\sqrt{10}}{3\sqrt{2}}$

$\frac{EF}{AF} = \frac{\sqrt{20}}{6} = \frac{2\sqrt{5}}{6} = \boxed{\frac{\sqrt{5}}{3}}$

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$\left.\begin{matrix} A\hat{E}D = A\hat{C}B \\ A_1 = A_1 \end{matrix}\right\} \overset{\triangle}{AED} \sim \overset{\triangle}{ABC} \rightarrow \frac{AD}{AB} = \frac{AE}{AC} = \frac{ED}{BC} \rightsquigarrow \frac{2}{x+1} = \frac{x}{15}$

$x^2 + x = 30$

$x^2 + x - 30 = 0$

$(x+6)(x-5) = 0$ $\quad \begin{cases} x = -6 \text{ غیرقابل قبول} \\ x = +5 \checkmark \end{cases}$

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$\left.\begin{matrix} DE \parallel BC \\ y = \frac{5x}{3} \end{matrix}\right\} \rightarrow \frac{AE}{AC} = \frac{AD}{AB} = \frac{DE}{BC} \rightsquigarrow \frac{x}{2x+x} = \frac{AD}{AB} = \frac{DE}{BC} = \frac{1}{3}$ $\quad DE = \frac{1}{3}BC$

$\frac{EH}{FH} = \frac{DH}{CH} = \frac{DE}{CF} \rightsquigarrow \frac{x}{\frac{5}{3}x} = \frac{DH}{CH} = \frac{DE}{CF} = \frac{3}{5}$ $\quad DE = \frac{3}{5}(BC - 3)$

$1{,}2y = \frac{12}{10} \times \frac{5}{3}x = 2x$

$\frac{1}{3}BC = \frac{3}{5}BC - \frac{9}{5} \rightsquigarrow 5BC = 9BC - 27$ $\quad 4BC = 27 \rightarrow BC = \frac{27}{4}$

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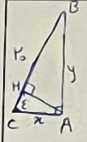

$\left.\begin{matrix} C_1 = C_1 \\ H_1 = 90 \\ A = 90 \end{matrix}\right\} \xrightarrow{\overset{\triangle}{ACH} \sim \overset{\triangle}{ABC}} \frac{4}{x} = \frac{x}{20} \Rightarrow x^2 = 80 \rightsquigarrow x = \sqrt{80} = \boxed{4\sqrt{5}}$

$(4\sqrt{5})^2 + y^2 = 20^2$

$80 + y^2 = 400$

$y^2 = 400 - 80 = 320 \rightsquigarrow y = \sqrt{320} = \boxed{8\sqrt{5}}$

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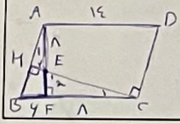
$AF = ?$ $\quad AF = AE + EF = 8 + EF$ $\quad AB \parallel DC,\ CH \perp AB \rightarrow CH \perp DC$

$A = C \rightarrow A - 90 = C - 90 \rightarrow A_1 = C_1$



$\left.\begin{matrix} A_1 = C_1 \\ H = F \end{matrix}\right\} \rightarrow \overset{\triangle}{ABF} \sim \overset{\triangle}{ECF} \rightarrow \frac{6}{x} = \frac{8+x}{8} = \frac{BA}{EC}$

$x^2 + 8x = 48 \Rightarrow \begin{cases} -12 \times \\ +4 \checkmark \end{cases} \rightarrow EF = 4$

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

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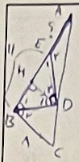

$HD \parallel BC$, BD / : $B_2 = D_1$, $B_2 = B_1 \rightarrow B_1 = D_1 \rightarrow B\hat{H}D$ متساوی‌الساقین

$B_1 = D_1$, $H = 90 \rightarrow B_1 = D_1 = 45$, $D_1 + D_2 = 90$, $H = 90 \rightarrow E_1 = 45$

$B_1 = E_1$, DH نیمساز $\rightarrow \underline{BH = HD = \frac{11}{2}}$, $\underline{BD = DE = \frac{11}{2}\sqrt{2}}$, $\underline{HB = HE = \frac{11}{2}}$

$HD \perp AB$, $HD \parallel BC \rightarrow BC \perp AB \rightarrow \underline{B_1 + B_2 = 90}$

$\left.\begin{array}{l} A = A \\ H = B \end{array}\right\} \rightarrow A\hat{H}D \sim A\hat{B}C \rightarrow \frac{AH}{AB} = \frac{AD}{AC} = \frac{HD}{BC} \rightsquigarrow \frac{x + \frac{11}{2}}{x + 11} = \frac{11/2}{8}$

$8x + 44 = \frac{11}{2}x + \frac{121}{2} \rightsquigarrow x = \frac{33}{5} \rightsquigarrow AE = \frac{33}{5}$

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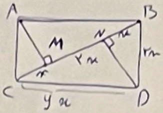

$MN = 2NB = 2MC$, $S\,A\hat{M}C = S\,B\hat{N}D < S\,A\hat{M}B = S\,C\hat{N}D$,

$\frac{S_{\text{مستطیل}} = AB \times AC}{S_{AMC} = \frac{CM}{2} \times AC} = \frac{2AB}{CM} = ? = \frac{2AB}{x} = \frac{2\sqrt{12}\,x}{x} = \boxed{2\sqrt{12}}$

$\left.\begin{array}{l} B = B \\ D = N \end{array}\right\} C\hat{B}D \sim N\hat{B}D \rightarrow \frac{BN}{DB} = \frac{ND}{CD} = \frac{BD}{BC} \Rightarrow \frac{x}{BD} = \frac{ND}{CD} = \frac{BD}{4x} \rightsquigarrow BD^2 = 4x^2 \rightarrow BD = 2x$

$(2x)^2 + (yx)^2 = (4x)^2 \rightarrow y^2 = 12 \rightsquigarrow y = \sqrt{12} \Rightarrow CD = AB = \sqrt{12}\,x$

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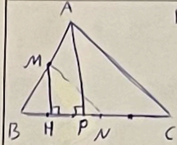

$2BN = 3CN$ $\quad BN + CN = 5x \rightsquigarrow \frac{BN}{BC} = \frac{3x}{5x} = \frac{3}{5}$

$\frac{S\,A\hat{B}C}{S\,B\hat{M}N} = 3 \rightarrow \frac{\text{ارتفاع} \times \text{قاعده}}{\frac{3}{5}\text{قاعده} \times \square\,\text{ارتفاع}} = 3 \longrightarrow \square = \frac{5}{9} \rightarrow \frac{AP}{HM} = \frac{9}{5}$

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

$\left.\begin{array}{l} \hat{B} = \hat{B} \\ \hat{H} = \hat{P} \end{array}\right\} B\hat{M}H \sim A\hat{B}P \Rightarrow \frac{AP}{MH} = \frac{AB}{MB} = \frac{9}{5} \Rightarrow \frac{MB + AM}{MB} = \frac{9}{5} \rightarrow \frac{AM}{MB} = \frac{9}{5} - 1 = \frac{4}{5}$

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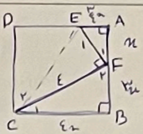

$F_1 + 90 = C_1 + B$, $B = 90 \rightarrow F_1 = C_1$

زاویه خارجی

$FB = 4AE$

$\left.\begin{array}{l} F_1 = C_1 \\ A = B \end{array}\right\} \rightarrow A\hat{E}F \sim C\hat{B}F \Rightarrow \frac{AE}{FB} = \frac{AF}{BC} = \frac{EF}{CF} = \frac{1}{4} \Rightarrow BC = 4AF$

$(3x)^2 + (4x)^2 = 4^2$

$9x^2 + 16x^2 = 16$

$25x^2 = 16 \rightarrow x = \frac{4}{5} \rightsquigarrow 4x = \frac{16}{5} \rightarrow BC = \frac{16}{5}$

$S = (BC)^2 = \left(\frac{16}{5}\right)^2 = \frac{256}{25} = \boxed{10{,}24}$

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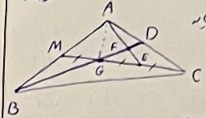
$\frac{BD}{FD} = ?$ $\quad$ میانه $MC \rightarrow \frac{MG}{CG} = \frac{1}{2} \rightarrow MG = GE = EC$



میانه $BD \rightarrow \frac{GD}{BG} = \frac{1}{2}$, GD میانه $\rightarrow GF = 2FD \rightarrow GD = 3FD$ ①

① $\rightarrow \frac{3FD}{BG} = \frac{1}{2} \rightarrow BG = 6FD$ ②

$BD = BG + GD \xrightarrow{①②} = 6FD + 3FD = 9FD$ $\quad \frac{BD}{FD} = \frac{9FD}{FD} = \boxed{9}$