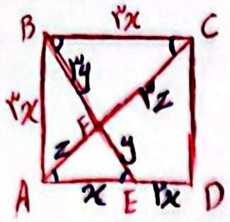
سهیل بهرامی تکلیف ۲۱ یازدهم B

۱۹٫۷۵ آفرین!

۱) ۲



$ED = 2AE \Rightarrow AE + ED = AD = 3x = AB$

$\frac{EF}{AF} = ?$

$AE \parallel BC,\ BE \Rightarrow \hat{B}_1 = \hat{E}_1$

$AE \parallel BC,\ AC$ مورب $\Rightarrow \hat{C}_1 = \hat{A}_1$

$\overset{زز}{\Rightarrow} A\hat{E}F \sim C\hat{B}F \Rightarrow \frac{BF}{EF} = \frac{CB}{AE} = \frac{FC}{FA} = 3$

$\Rightarrow \underbrace{BF}_{3y} = 3\underbrace{EF}_{y} = 3y,\ \underbrace{FC}_{3z} = 3\underbrace{FA}_{z} = 3z$

$A\hat{B}E: AB^2 + AE^2 = BE^2 \Rightarrow 9x^2 + x^2 = 16y^2 \Rightarrow 10x^2 = 16y^2 \Rightarrow EF = y = \frac{\sqrt{10}}{4}x$

$A\hat{B}C: AB^2 + BC^2 = AC^2 \Rightarrow 9x^2 + 9x^2 = 16z^2 \Rightarrow 18x^2 = 16z^2 \Rightarrow AF = z = \frac{3}{2\sqrt{2}}x = \frac{3\sqrt{2}}{4}x$

$\Rightarrow \frac{EF}{AF} = \frac{\sqrt{5}}{3}$ ✓

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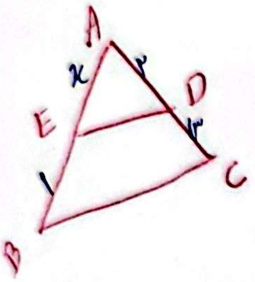
۲) ۲



$A\hat{E}D = A\hat{C}B$

$x = ?$

$\Rightarrow \hat{A} = \hat{A},\ A\hat{E}D = A\hat{C}B \overset{زز}{\Rightarrow} A\hat{E}D \sim A\hat{C}B \Rightarrow \frac{\overset{x}{AE}}{\underset{15}{AC}} = \frac{\overset{2}{AD}}{\underset{x+1}{AB}}$

$\Rightarrow (x+1)x = 30 = 5 \times 6 \Rightarrow x = 5$ ✓

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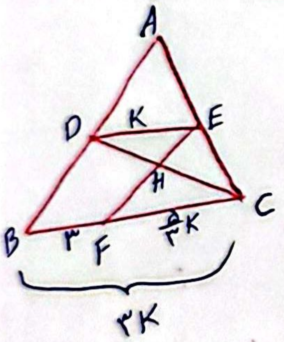
۳) ۲



$BF = 3$

$3y = 5x \overset{x=3a}{\Longrightarrow} y = 5a$

$DE \parallel BC$

$BC = ?$

$DE \parallel BC \Rightarrow \frac{AE}{AC} = \frac{DE}{BC} = \frac{x}{1,2} = \frac{3a}{9a} = \frac{1}{3}$

$\Rightarrow 3\underbrace{DE}_{K} = \underbrace{BC}_{3K} = 3K$

$DE \parallel BC,$ مورب $EF \Rightarrow \hat{E}_1 = \hat{F}_1$

$DE \parallel BC,$ مورب $DC \Rightarrow \hat{D}_1 = \hat{C}_1$

$\overset{زز}{\Rightarrow} D\hat{H}E \sim C\hat{H}F \Rightarrow \frac{EH}{FH} = \frac{DE}{FC} = \frac{x}{y} = \frac{3}{5}$

$\Rightarrow DE = \frac{3}{5}FC = K$

$BC = BF + FC \Rightarrow 3K = \frac{5}{3}K + 3 \Rightarrow \frac{4}{3}K = 3 \Rightarrow K = \frac{9}{4}$

$\Rightarrow 3K = \frac{27}{4} = BC$ ✓

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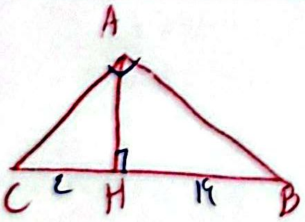
۴) ۱٫۷۵



$BH = 16$

$CH = 4$

$\frac{AB}{AC} = ?$

$(AB)^2 = BH \times BC$

$(AC)^2 = CH \times BC$

$\Rightarrow \left(\frac{AB}{AC}\right)^2 = \frac{BH}{CH} = \frac{16}{4} = 4$

$\frac{AB}{AC} = \boxed{2}$

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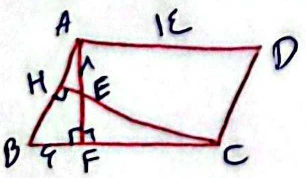
۵) ۲



$AD = 14$

$AE = 8$

$BF = 6$

$AF = ?$

ABCD متوازی‌الاضلاع $\Rightarrow AD = BC = 14 \Rightarrow FC = 8$

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

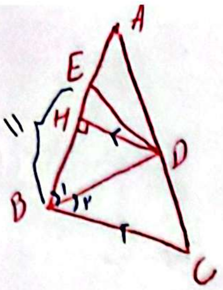
$A\hat{F}B: \hat{B} + \hat{A}_1 = 90^\circ$

$\Rightarrow \hat{A}_1 = \hat{C}_1,\ \hat{F}_1 = \hat{F}_2 = 90^\circ \overset{زز}{\Rightarrow} A\hat{B}F \sim C\hat{F}E \Rightarrow \frac{\overset{6}{BF}}{FE} = \frac{\overset{8+FE}{AF}}{\underset{8}{FC}}$

$\Longrightarrow (FE + 8)FE = 48 \Rightarrow 4 \times 12 = 48 \Rightarrow FE = 4$ ✓

$AF = FE + AE = 4 + 8 = 12$ ✓

۶) ۲



BD نیمساز ، $BH \parallel BC$ ، $AE = ?$

BD نیمساز $\Rightarrow \hat{B}_۱ = \hat{B}_۲$

$BH \parallel BC$ ، مورب $BD \Rightarrow \hat{B}_۲ = \hat{D}_۱$

$\Rightarrow \hat{B}_۱ = \hat{D}_۱ ,\ \hat{B}_۱ + \hat{D}_۱ = ۱۸۰° - \hat{H}_۱ = ۹۰° \Rightarrow \hat{B}_۱ = \hat{D}_۱ = ۴۵ ,\ \hat{D} = \hat{D}_۱ + \hat{D}_۲ = ۹۰°$

$\Rightarrow \hat{D}_۲ = ۴۵° ,\ \hat{A}_۲ = ۹۰° ,\ \hat{E}_۱ = ۱۸۰° - (\hat{D}_۲ + \hat{A}_۲) \Rightarrow \hat{E}_۱ = ۴۵° \Rightarrow B\hat{D}E$ متساوی الساقین

$\Rightarrow DH$ میانه $\Rightarrow HE = BH = ۵٫۵ = HD$

$HD \parallel BC \Rightarrow \frac{HA}{BA} = \frac{HD}{BC} = \frac{۵٫۵}{۸} \Rightarrow \frac{AE + ۵٫۵}{AE + ۱۱} = \frac{۵٫۵}{۸} \Rightarrow AE = ۶٫۶$

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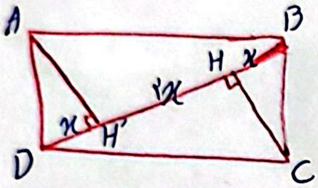
۷) ۲



$S_{A\hat{B}D} = \frac{AD \times AB}{۲}$

$S_{B\hat{C}D} = \frac{BC \times CD}{۲}$

مستطیل $ABCD \Rightarrow BC = AD ,\ DC = AB$

$\Rightarrow S_{A\hat{B}D} = S_{B\hat{C}D} ,\ S_{ABCD} = S_{A\hat{B}D} + S_{B\hat{C}D} \Rightarrow S_{ABCD} = ۲S_{A\hat{B}D}$

$S_{A\hat{B}D} = \frac{AH' \times BD}{۲} ,\ S_{A\hat{D}H'} = \frac{AH' \times DH'}{۲} \Rightarrow \frac{S_{A\hat{B}D}}{S_{A\hat{D}H'}} = \frac{BD}{DH'} = \frac{۴x}{x} = ۴ \Rightarrow \frac{S_{ABCD}}{S_{A\hat{D}H'}} = ۲ \times ۴ = ۸$

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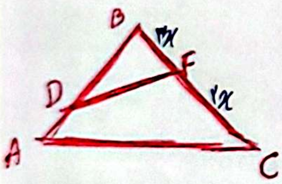
۸) ۲



$۲BF = ۳FC$ ، $S_{A\hat{B}C} = ۳S_{B\hat{D}F}$

$S_{A\hat{B}C} = \frac{۱}{۲} AB \times BC \sin B$

$S_{B\hat{D}F} = \frac{۱}{۲} BD \times BF \sin B$

$\Rightarrow \frac{S_{A\hat{B}C}}{S_{B\hat{D}F}} = \frac{AB}{BD} \times \frac{BC}{BF} = ۳$

$\Rightarrow \frac{AB}{BD} \times \frac{۵x}{۳x} = ۳ \Rightarrow \frac{AB}{BD} = \frac{۹}{۵} \Rightarrow \frac{AD}{BD} = \frac{۴}{۵} \Rightarrow \frac{BD}{AD} = \frac{۵}{۴}$

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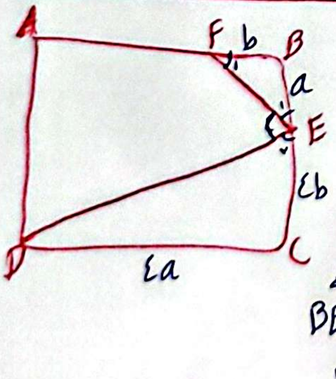
۹) ۲



$\hat{E}_۱ + \hat{F}_۱ = ۹۰°$

$\hat{E}_۱ + \hat{E}_۲ + ۹۰° = ۱۸۰° \Rightarrow \hat{E}_۱ + \hat{E}_۲ = ۹۰°$

$\Rightarrow \hat{F}_۱ = \hat{E}_۲ ,\ \hat{B} = \hat{C} = ۹۰° \overset{زز}{\Rightarrow} B\hat{F}E \sim C\hat{E}D$

$\Rightarrow \frac{BF}{CE} = \frac{FE}{ED} = \frac{BE}{CD} = \frac{۱}{۴} \Rightarrow \frac{۴BE}{a} = \frac{CD = ۴a}{۴a} ,\ \frac{۴FB}{b} = \frac{CE = ۴b}{۴b}$

$B\hat{E}F : BE^۲ + BF^۲ = EF^۲ \Rightarrow a^۲ + b^۲ = ۱$

$BC = CD \Rightarrow ۴a = a + ۴b \Rightarrow b = \frac{۳}{۴}a$

$\Rightarrow a^۲ + \frac{۹}{۱۶}a^۲ = ۱ \Rightarrow a^۲ = \frac{۱۶}{۲۵} \Rightarrow a = \frac{۴}{۵}$

$DC = ۴a = \frac{۱۶}{۵} \Rightarrow S = DC^۲ = \frac{۲۵۶}{۲۵} = ۱۰٫۲۴$

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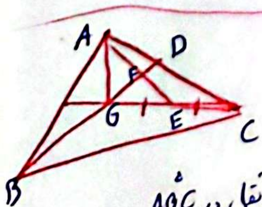
۱۰) ۲



$GE = EC$

$A\hat{G}C : GE = EC \Rightarrow AE$ میانه بر GC

$A\hat{B}C$ در G مرکز ثقل $\Rightarrow BD$ میانه بر AC در $A\hat{B}C$ $\Rightarrow AD = DC \Rightarrow GD$ میانه بر AC در $A\hat{G}C$

$\Rightarrow F$ مرکز ثقل در $A\hat{G}C$ $\Rightarrow \frac{GF}{FD} = ۲ \Rightarrow \frac{GF + FD}{FD} = \frac{۲+۱}{۱} = \frac{GD}{FD} = ۳$

G مرکز ثقل در $A\hat{B}C$ $\Rightarrow \frac{BG}{GD} = \frac{۲}{۱} \Rightarrow \frac{BG + GD}{GD} = \frac{۲+۱}{۱} \Rightarrow \frac{BD}{GD} = ۳$

$\Rightarrow \frac{GF}{FD} \times \frac{BD}{GF} = \frac{BD}{FD} = ۳ \times ۳ = ۹$