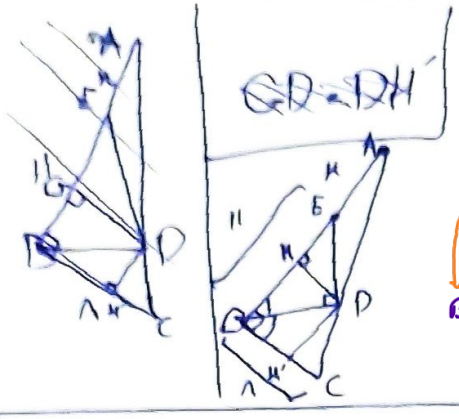
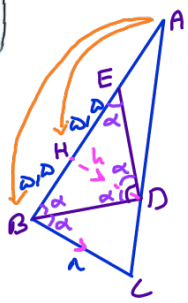


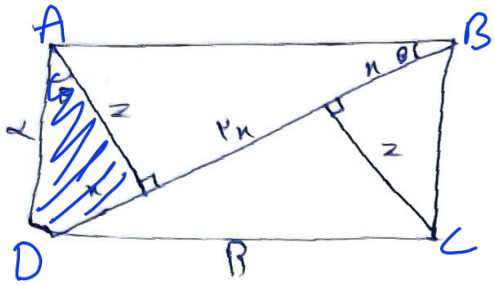
$DH = DH'$



$h^2 = 5/5 \times 5/5 \rightarrow \boxed{h = 5/5}$

$\text{تالس} = \frac{x + 5/5}{11 + x} = \frac{5/5}{8} \rightarrow \boxed{x = \frac{33}{5}}$

۵ — ۶



$\sin\theta = \frac{x}{\alpha} = \frac{\alpha}{4x} \rightarrow \alpha^2 = 4x^2 \rightarrow \alpha = 2x$

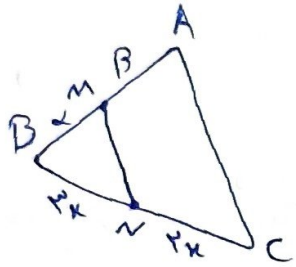
$\cos\theta = \frac{z}{\alpha} = \frac{\beta}{4x} = \frac{3x}{\beta} \rightarrow 12x^2 = \beta^2 \rightarrow \beta = 2\sqrt{3}x$

$\rightarrow z = \frac{2x \times 3x}{2\sqrt{3}x} = \sqrt{3}x$

$S_{\square} = 2\left(\frac{\alpha\beta}{2}\right) = \alpha\beta = 4\sqrt{3}x^2$

$S_{\triangle} = \frac{xz}{2} = \frac{x \times \sqrt{3}x}{2} = \frac{\sqrt{3}x^2}{2} \rightarrow \frac{S_{\square}}{S_{\triangle}} = \frac{4\sqrt{3}x^2}{\frac{\sqrt{3}x^2}{2}} = 8$

۵ — ۷



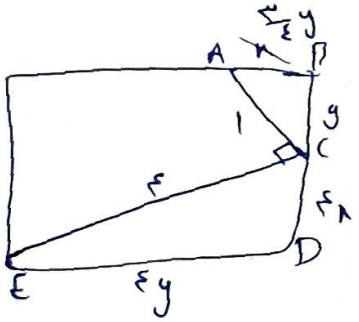
$S_{BMN} = \frac{\alpha \times 3x \times \sin B}{2}$

$S_{ABC} = \frac{(\alpha+\beta) \times 8x \times \sin B}{2}$

$\rightarrow \frac{S_{ABC}}{S_{BMN}} = \frac{(\beta+\alpha) \times 3}{(\alpha+\beta) \times 2} = 3 \rightarrow 2\alpha = 3\alpha + 3\beta \rightarrow 4\alpha = 3\beta$

$\rightarrow \frac{BM}{AM} = \frac{\alpha}{\beta} = \boxed{\frac{3}{4}}$ ✓

۲ — ۸



$1^2 = \left(\frac{3}{4}y\right)^2 + (y)^2 \rightarrow 1 = \frac{25}{16}y^2 \rightarrow y = \frac{4}{5}, x = \frac{3}{5}$

$\rightarrow S = (2y)^2 = 16y^2 = 16 \times \frac{16}{25} = \boxed{\frac{256}{25}}$ ✓

۲ — ۹

$ADC \simeq EDC \rightarrow \frac{1}{4} = \frac{AB}{DC} = \frac{BC}{ED} \rightarrow$

$4x + y = 4y \rightarrow 4x = 3y \rightarrow x = \frac{3}{4}y$

ACG ▷: $GE = EC \rightarrow G\hat{A}E = E\hat{A}C$

$GAC = BAG \Leftrightarrow BAG = 2EAC$

$\rightarrow BAC = 2EAC \Rightarrow 2FAD = BAD$

۵ — ۱۰

$\rightarrow BD = 2FD \rightarrow \boxed{\frac{BD}{FD} = 2}$ ✗

محل برخورد میانه‌ها $G \rightarrow BG = 2x \quad GD = x \rightarrow BD = 3x$

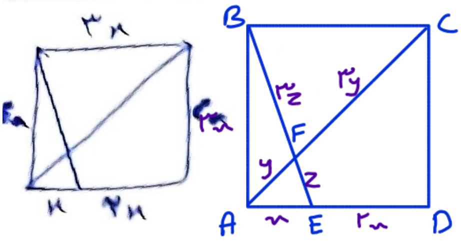
از A به G وصل کنیم، AE و GD میانه‌های مثلث AGC می‌شوند:

$GF = \frac{2}{3}x$

$FD = \frac{1}{3}x$

$\rightarrow \frac{BD}{FD} = \frac{3x}{\frac{1}{3}x} = \boxed{9}$

۱۱



خانم رحمی‌زاده

دو مثلث AEF و BFC با نسبت ۳ متشابه‌اند:

$(BE)^2 = (AE)^2 + (AB)^2 \to BE = \sqrt{10}\,x$

$4z = \sqrt{10}\,x \to z = \frac{\sqrt{10}}{4}x$

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

$4y = 3\sqrt{2}\,x \to y = \frac{3\sqrt{2}}{4}x$

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

۵ / ۱

۲

$\left.\begin{array}{l} E\hat{A}D = C\hat{A}D \text{ مشترک} \\ E_1 = C \end{array}\right\} \xrightarrow{\text{زز}} AED \simeq ABC \Rightarrow \frac{x}{15} = \frac{2}{x+1}$

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

(۲)

۳

متوازی‌الاضلاع $DEFB \to DE = BF = 3$

$H_1 = H_2$, $DE \parallel FC$, EF مورب $\to E = F$ $\xrightarrow{\text{دو زاویه}} D\hat{E}H \sim F\hat{H}C \Rightarrow$ ✓

$\frac{DE}{FC} = \frac{x}{y} \xrightarrow{3y = 5x} \frac{DE}{FC} = 0{,}6$ ✓

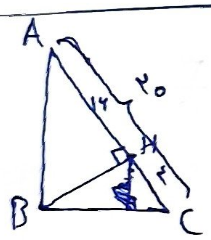
$DE \parallel BC \xrightarrow{\text{تالس}} \frac{AE}{AC} = \frac{DE}{BC} \Rightarrow \frac{0{,}6y}{\ldots y} \Rightarrow \frac{BF + FC}{DE} = 2$

$BC = BF + FC$

$\frac{10}{6} + \frac{BF}{DE} = 2 \to DE = 9 \to FC = 15 \to BC = 3 + 15 = 18$ ✗

(۱)

۴



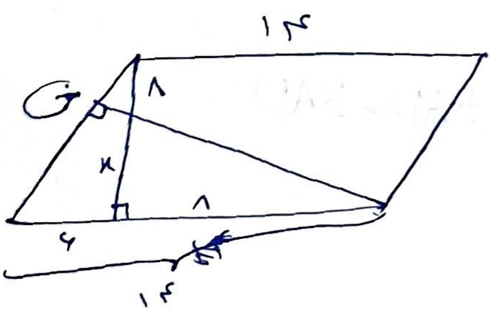
$AB^2 = AH \times 20$

$BC^2 = CH \times 20$

$\boxed{\frac{AB}{BC} = 2}$ ✓

(۲)

۵



$ECF \simeq AEG \simeq ABF \to \frac{FC}{AF} = \frac{EF}{BF} \to x^2 + 8x - 48 = 0$

$(x-4)(x+12) = 0$

$\to \boxed{x = 4} \to \boxed{AF = 12}$ ✓

(۲)

۳-

$DE \parallel BC \xrightarrow{\text{جزء به کل}} \frac{AE}{AC} = \frac{DE}{BC} \rightarrow \frac{۲}{۳} = \frac{DE}{BC} \rightarrow BC = ۳DE$

$۱,۲y = ۲$ ✓

$\hat{D} = \hat{C}$, $\hat{E} = \hat{F}$ $\rightarrow \triangle DHE \sim \triangle CHF \rightarrow \frac{EH}{FH} = \frac{DE}{CF} \rightarrow CF = \frac{۵}{۳}DE$

y به $\frac{۲}{\frac{۵}{۳}}$

$BC = BF + FC \rightarrow ۳DE = ۳ + \frac{۵}{۳}DE \rightarrow ۱DE = \frac{۹}{۴}$ $\quad BC = \boxed{\frac{۲۷}{۴}}$

-۷

$A\hat{B}D = ۱۲۰^\circ = ۳۰ \times ۴ \rightarrow h = \sqrt{۳}$

$S_{\text{هاشور خورده}} = \frac{hw}{۲} = \frac{\sqrt{۳}w^۲}{۲}$

$S_{\square} = ۲S_{\triangle ABD} = ۲ \times \frac{\text{ارتفاع} \times \text{قاعده}}{۲} = ۴\sqrt{۳}w^۲$

$\frac{۴\sqrt{۳}w^۲}{\frac{\sqrt{۳}}{۲}w^۲} = \boxed{۸}$

توشکت مشخص نبود