1

$\overset{\triangle}{ADC} = \sqrt{9x^2+9x^2} = \sqrt{18x^2} = 3\sqrt{2}x = AC$ $\qquad \frac{EF}{AF} = \frac{\frac{\sqrt{10}}{4}x}{\frac{\sqrt{18}}{4}x} = \frac{\sqrt{5}}{3}$

$\overset{\triangle}{ABE} = \sqrt{9x^2+x^2} = \sqrt{10}x = BE$

$\overset{\triangle}{AFE} \sim \overset{\triangle}{CFB} \to \frac{AF}{EF} = \frac{FE}{FB} = \frac{AE}{BC} = \frac{x}{3x} = \frac{1}{3}$ $\qquad EF = y \to y+3y = \sqrt{10}x \to y = \frac{\sqrt{10}}{4}x$

$AF = z \to z+3z = 3\sqrt{2}x \qquad z = \frac{3\sqrt{2}}{4}x$

2

$\left.\begin{matrix}\hat{AED} = \hat{ACB} \\ \hat{A} = \hat{A}\end{matrix}\right\} \to \overset{\triangle}{AED} \sim \overset{\triangle}{ACB} \to \frac{AE}{AC} = \frac{ED}{BC} = \frac{AD}{AB}$ $\qquad \frac{x}{15} = \frac{2}{x+1} \to x^2+x = 30 \to x^2+x-30 = 0$

$(x+6)(x-5) = 0$

-6 غ ق ق $\qquad 5$ ق ق

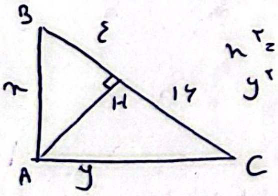
3

$\overset{\triangle}{ABC}: DE \parallel BC \to \frac{AE}{AC} = \frac{DE}{BC} \to \frac{x}{x+1/2y} = \frac{DE}{FC+3} \to DE \parallel FC \to \frac{DE}{FC} = \frac{EH}{HF} \to \frac{DE}{FC} = \frac{x}{y} = \frac{3}{5} \to DE = \frac{3}{5}FC$ $\boxed{2}$

$\frac{x}{x+1/2(\frac{5}{3}x)} = \frac{DE}{3+FC} = \frac{x}{x+2x} = \frac{DE}{3+FC} \to 3DE = 3+FC$ $\boxed{1}$ $\qquad \boxed{1} \cap \boxed{2} \to 3+FC = 3(\frac{3}{5})FC \to$

$3+FC = \frac{9}{5}FC \to FC = \frac{15}{4} = 3/75 \qquad BC = BF+FC \to 3+3/75 = 6/75$

4



$x^2 = 4\times 20 \to x = \sqrt{80}$

$y^2 = 16\times 20 \to y = \sqrt{320}$ $\qquad \frac{y}{x} = \frac{\sqrt{320}}{\sqrt{80}} = \sqrt{4} = \boxed{2}$

5

$\left.\begin{matrix}\hat{F} = \hat{F} = 90^\circ \\ A\hat{B}F = F\hat{E}C\end{matrix}\right\} \to \overset{\triangle}{ABF} \sim \overset{\triangle}{CEF}$ (زز) $\to \frac{AF}{CF} = \frac{BF}{EF} \to \frac{x+8}{8} = \frac{6}{x} \to x^2+8x = 48 \to (x+12)(x-4) = 0$

-12 غ ق ق $\qquad 4$ ق ق

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

6

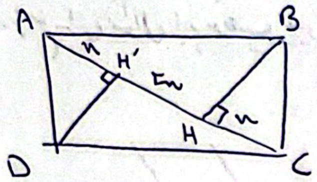
$BC \parallel OD,\ BD \perp \to D = 2\alpha$

$2\alpha = 90 \to \alpha = 45 \to \overset{\triangle}{EDB} \to$ متساوی‌الساقین

$x^2 = \underbrace{5/5 * 5/5}_{(5/5)^2} \to x = 5/5$ $\qquad \frac{AO}{AB} = \frac{OD}{BC} \to \frac{y+5/5}{y+11} = \frac{\frac{11}{2}}{8} \to 16y+88 = 11y+121$

$5y = 33 \to y = \frac{33}{5} = \frac{66}{10}$

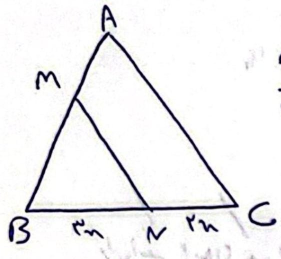
۷



$S_{\overset{\triangle}{BHC}} = \frac{x \times BH}{2}$ $\quad S_{\overset{\triangle}{ABC}} = \frac{BH \times 4x}{2}$

$S_{\square} = S_{\overset{\triangle}{ABC}} + S_{ADC} \rightarrow BH \times 4x$ $\quad \frac{S_{\text{مستطیل}}}{S_{\overset{\triangle}{BHC}}} = \frac{BH \times 4x}{\frac{x \times BH}{2}} \rightarrow \frac{8x}{x} = 8$

۸

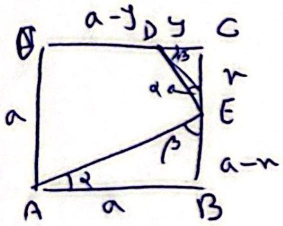


$\frac{S_{\overset{\triangle}{ABC}}}{S_{\overset{\triangle}{BMN}}} = \frac{AB \times BC \times \sin B \times \frac{1}{2}}{BM \times BN \times \sin B \times \frac{1}{2}} = 3 \rightarrow \frac{AB \times 5x}{BM \times 3x} = 3$

$\frac{AB}{BM} = \frac{9}{5} \rightarrow \frac{AB - BM}{BM} = \frac{9}{5} - \frac{5}{5} = \frac{4}{5} \rightarrow \frac{AM}{BM} = \frac{4}{5} \rightarrow \frac{BM}{AM} = \frac{5}{4} = \frac{125}{100}$

۹

$\overset{\triangle}{DEC} \sim \overset{\triangle}{EBA} \rightarrow \frac{DE}{EB} = \frac{EC}{AB} = \frac{DE}{EA}$ $\quad \frac{y}{a-x} = \frac{x}{a} = \frac{1}{4} \rightarrow \left.\begin{array}{l} a = 4x \\ a - x = 4y \end{array}\right\} 4x - x = 4y \rightarrow 3x = 4y$



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

$ABE \rightarrow 16 = a^2 + (a-x)^2 \rightarrow 16 = 16x^2 + 9x^2$

$x^2 = \frac{16}{25} \rightarrow x = \frac{4}{5} \rightarrow a = 4x \rightarrow a = \frac{16}{5}$ $\quad S_{\square} = a^2 \rightarrow \left(\frac{16}{5}\right)^2 = \frac{256}{25} = 10/24$

۱۰ G محل برخورد میانه‌های مثلث ABC ← میانه‌ها یکدیگر را به نسبت $\frac{1}{2}$ قطع می‌کنند

$\overset{\triangle}{AGC} \rightarrow AE , GE \rightarrow$ میانه $\rightarrow$ در F قطع میشن

$GF = \frac{2}{3}y$ $\quad FD = \frac{1}{3}y$ $\quad \frac{BD}{FD} = \frac{3y}{\frac{1}{3}y} = \frac{3}{\frac{1}{3}} = 9$