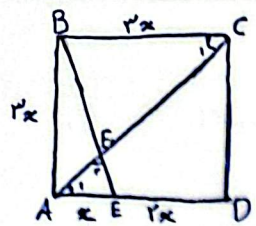


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$$\begin{cases} \hat{C}_1 = \hat{A}_1 = 45^\circ \\ \hat{F}_1 = \hat{E}_1 \end{cases} \Rightarrow \triangle BFC \sim \triangle AFE \Rightarrow K = 3$$

$$\frac{BC}{AE} = \frac{2x}{x} = 2$$

$$AC = \sqrt{(2x)^2 + (2x)^2} = 2\sqrt{2}x$$

$$AF = \frac{AC}{2} = \frac{2\sqrt{2}x}{2} = \sqrt{2}x$$

$$BE = \sqrt{(2x)^2 + x^2} = \sqrt{5}x \Rightarrow FE = \frac{\sqrt{5}}{2}x \Rightarrow \frac{EF}{AF} = \frac{\frac{\sqrt{5}}{2}x}{\sqrt{2}x} = \frac{\sqrt{5}}{2\sqrt{2}}$$

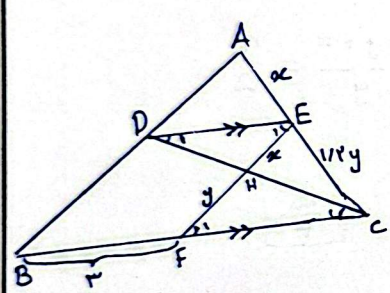
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$$\begin{cases} \hat{AED} = \hat{ACB} \\ \hat{A} = \hat{A} \end{cases} \Rightarrow \triangle AED \sim \triangle ABC \Rightarrow \frac{2}{x+1} = \frac{x}{1.5}$$

$$\frac{AD}{AB} = \frac{AE}{AC}$$

$$x^2 + x = 3 \Rightarrow x^2 + x - 3 = 0 \Rightarrow (x+6)(x-5) = 0 \Rightarrow \begin{cases} x_1 = 5 \\ x_2 = -6 \end{cases}$$

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$$DE \parallel BC \Rightarrow \frac{x}{12y+x} = \frac{DE}{BC} \Rightarrow \frac{DE}{BC} = \frac{x}{12x+x} = \frac{1}{13}$$

$$12y = \frac{1}{10} \times \frac{12}{x} \times x = 12$$

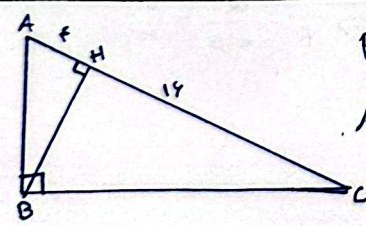
$$DE = 1 + FC$$

$$DE \parallel BC, EF \parallel \Rightarrow \hat{E}_1 = \hat{F}_1 \Rightarrow \triangle DHE \sim \triangle FHC \Rightarrow \frac{DE}{FC} = \frac{x}{y} = \frac{10}{12} = \frac{5}{6}$$

$$\Rightarrow DE = \frac{5}{6} FC$$

$$12 \times \frac{5}{6} FC = 1 + FC \Rightarrow FC = \frac{10}{5} = 2 \Rightarrow BC = 1 + FC = \frac{11}{5} + \frac{10}{5} = \frac{21}{5}$$

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$$BH^2 = AH \times CH \Rightarrow BH = \sqrt{4 \times 4} = 4$$

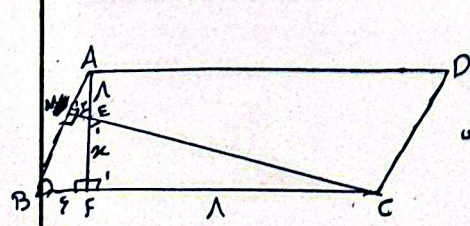
$$AB = \sqrt{12^2 + 1^2} = 13$$

$$BC = \sqrt{14^2 + 1^2} = 15$$

$$\frac{13}{15} = 2 \leq \frac{1}{2}$$

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$$\begin{cases} \hat{B} = \hat{D} \\ \hat{A}_1 = \hat{C}_1 = 90^\circ \end{cases} \Rightarrow \triangle ABF \sim \triangle CDE \Rightarrow \frac{x}{y} = \frac{1}{1+x}$$

$$\frac{EF}{BF} = \frac{FC}{AF}$$

$$12x + x^2 = 12$$

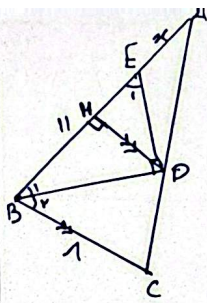
$$x^2 + 12x - 12 = 0$$

$$(x+12)(x-1) = 0 \Rightarrow \begin{cases} x_1 = 1 \\ x_2 = -12 \end{cases}$$

$$\Rightarrow AF = 1 + x = 1 + 1 = 2$$

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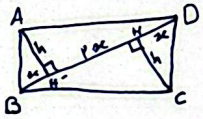
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$$DH \parallel BC, BH \perp \Rightarrow H=B \Rightarrow B=90^\circ \Rightarrow \theta_1 = \theta_2 = 45^\circ \Rightarrow E_1 = 45^\circ$$

$$\hat{B}_1 = \hat{E}_1 = 45^\circ \Rightarrow \text{ارتفاع وارد بر وتر همان} \Rightarrow \overline{EH} = \overline{BH} = \frac{11}{\sqrt{2}}$$

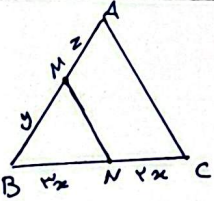
$$DH \parallel BC \Rightarrow \frac{x + \frac{11}{\sqrt{2}}}{x + 11} = \frac{\frac{11}{\sqrt{2}}}{11} \Rightarrow 14x + 11 = 11x + 11 \Rightarrow 3x = 0 \Rightarrow x = 0$$



$$\begin{cases} \overline{AD} = \overline{BC} \\ \hat{H} = \hat{H}' = 90^\circ \\ \overline{DH} = \overline{BH} = 3x \end{cases} \Rightarrow \hat{A}H'D \cong \hat{B}H'C \Rightarrow S_{\hat{A}H'D} = S_{\hat{B}H'C} = \alpha \Rightarrow \overline{CH} = \overline{AH} = h$$

$$\begin{cases} \overline{AB} = \overline{DC} \\ \hat{H} = \hat{H}' = 90^\circ \\ \overline{BH} = \overline{DH} = x \end{cases} \Rightarrow \hat{A}BH' \cong \hat{D}H'C \Rightarrow S_{\hat{A}BH'} = S_{\hat{D}H'C} = \beta$$

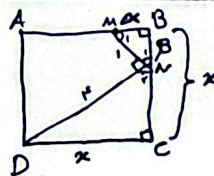
$$\frac{S_{\square}}{S_{\triangle ABC}} = \frac{2\alpha + 2\beta}{B} = \frac{2x \cdot \frac{h \cdot 3x}{x} + 2x \cdot \frac{h \cdot x}{x}}{\frac{h \cdot x}{x}} = \frac{4xh}{xh} = 4$$



$$2BN = 3NC \Rightarrow \begin{cases} BN = 3x \\ NC = 2x \end{cases}$$

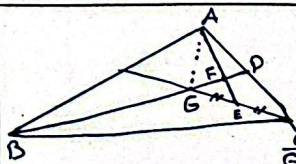
$$\frac{S_{\triangle ABC}}{S_{\triangle MBN}} = \frac{\frac{AB \times BC \times \sin B}{2}}{\frac{MB \times NB \times \sin B}{2}} = \frac{AB}{MB} \times \frac{BC}{NB} = 3 \Rightarrow \frac{y+z}{y} = \frac{4}{\omega}$$

$$\Rightarrow y = \omega \alpha \Rightarrow y + z = 4\alpha \Rightarrow z = 3\alpha \Rightarrow \frac{BM}{AM} = \frac{y}{z} = \frac{\omega \alpha}{3\alpha} = \frac{\omega}{3}$$



$$\begin{cases} \hat{N}_1 = 180^\circ - 90^\circ - N_1 \\ \hat{M}_1 = 180^\circ - 90^\circ - N_1 \end{cases} \Rightarrow \hat{M}_1 = \hat{N}_1 \Rightarrow \hat{B} = \hat{C} = 90^\circ \Rightarrow \hat{M}BN \sim \hat{D}CN \Rightarrow \frac{1}{f} = \frac{\alpha}{x-\beta} = \frac{\beta}{x}$$

$$\Rightarrow \beta = \frac{\alpha}{f} \Rightarrow NC = x - \beta = \frac{f-1}{f}x \Rightarrow x^2 + (\frac{f-1}{f}x)^2 = f^2 \Rightarrow x^2 + \frac{f^2-2f+1}{f^2}x^2 = f^2 \Rightarrow \frac{2f-1}{f^2}x^2 = f^2 \Rightarrow x^2 = \frac{f^4}{2f-1} \Rightarrow S_{\square} = x^2 = \frac{f^4}{2f-1}$$



$$\hat{ABC} \text{ مرکز ثقل } G \Rightarrow GD = \frac{1}{3}BD \Rightarrow BD = 3GD$$

$$\hat{AC} \text{ مرکز ثقل } F \Rightarrow AGC \text{ مرکز ثقل } F \Rightarrow FD = \frac{1}{3}GD$$

$$GE = EC$$

$$\frac{BD}{FD} = \frac{3GD}{\frac{1}{3}GD} = 9$$