به نام خدا

فاطمه متقی - ۲۱

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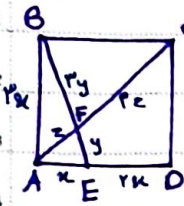


$BE = \sqrt{10}\,x$, $AC = 3\sqrt{2}\,x$

$4z = 3\sqrt{2}\,x \rightarrow z = \frac{3\sqrt{2}}{4}x$

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

(۲

فقط $\hat{A} = \hat{A}$, $\hat{E} = \hat{C}$, $\hat{D} = \hat{B}$ $\rightarrow A\hat{E}D \sim A\hat{B}C$ $\xrightarrow[\text{اضلاع}]{\text{نسبت}}$ $\frac{2}{x+1} = \frac{x}{15} = \frac{ED}{BC} \Rightarrow x^2 + x = 30$

$\hookrightarrow (x-5)(x+6) = 0$ $\rightarrow x = 5$ ✓

$\rightarrow x = -6$ غ ق ق

(۳

$BF = 3$

$FC \rightarrow z$

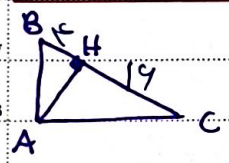
$3y = 5x$

$\Rightarrow \frac{x}{y} = \frac{4}{5} \rightarrow \frac{DE}{z} = \frac{3}{5}$

$\frac{DE}{BC} = \frac{AE}{AC} \Rightarrow \frac{\frac{3}{5}z}{3+z} = \frac{x}{x+1.2y} \Rightarrow \frac{3z}{15+5z} = \frac{1}{3}$

$\hookrightarrow z = 3.75 \Rightarrow DC = 3 + 3.75 = 6.75$

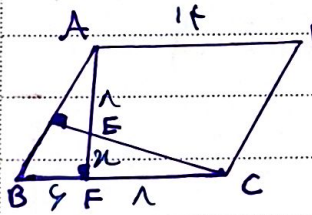
(۴



روابط طولی در مثلث قائم الزاویه $\Rightarrow AH^2 = BH \times CH = 4 \times 16 \Rightarrow AH = 8$

$A\hat{B}H \sim A\hat{B}C$ $\xrightarrow[\text{اضلاع}]{\text{نسبت}}$ $\frac{AC}{AB} = \frac{AH}{BH} = \frac{8}{4} = 2$

(۵



$B\hat{A}F \sim E\hat{C}F \rightarrow \frac{BF}{EF} = \frac{AF}{CF}$

$\hookrightarrow \frac{6}{x} = \frac{8+x}{8} \Rightarrow 48 = 8x + x^2 \Rightarrow (x-4)(x+12) = 0$

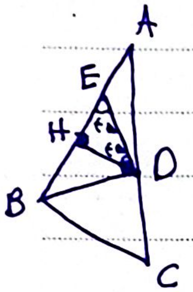
$\rightarrow x = 4$ ✓

$\rightarrow x = -12$ غ ق ق $\Rightarrow AF = 8 + x = 12$

Arman

«به نام خدا»

(۶

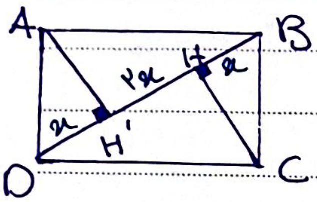


$EH = DH = HB = 5.5$

$\overset{\triangle}{AHD} \sim \overset{\triangle}{ABC} \Rightarrow \frac{AH}{AB} = \frac{HD}{BC} = \frac{5.5}{8} = \frac{5.5 + AE}{11 + AE}$

$\hookrightarrow 5.5AE + 60.5 = 44 + 8AE \rightarrow AE = 6.6$

(۷



$AH'^2 = x \times 3x \Rightarrow AH' = x\sqrt{3}$

$S_{\square} = \frac{2 \times x\sqrt{3} \times 4x}{2} = 4\sqrt{3}x^2$

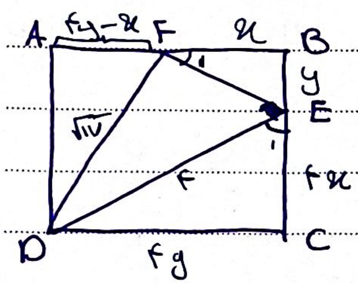
$\hookrightarrow S_{\triangle} = \frac{x^2\sqrt{3}}{2} \rightarrow \frac{S_{\square}}{S_{\triangle}} = \frac{4\sqrt{3}x^2}{\frac{\sqrt{3}x^2}{2}} = 8$

(۸

$\frac{S_{BMN}}{S_{ABC}} = \frac{BM \times BN}{BA \times BC} = \frac{BM}{AB} \times \frac{3}{5} = \frac{1}{3} \Rightarrow \frac{BM}{AB} = \frac{5}{9}$

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

(۹



$90 + F_1 = 90 + E_1 \rightarrow \left.\begin{matrix} \hat{E}_1 = \hat{F}_1 \\ \hat{B} = \hat{C} \end{matrix}\right\} \rightarrow \overset{\triangle}{FBE} \sim \overset{\triangle}{DCE}$

$\frac{FE}{DE} = \frac{FB}{EC} = \frac{BE}{DC} = \frac{1}{4}$ / $4x + y = 4y \rightarrow x = \frac{3}{4}y$

$\hookrightarrow 4y - x = \frac{13}{4}y \Rightarrow (\sqrt{17})^2 = (\frac{13}{4}y)^2 + 4y^2 \Rightarrow y = \frac{8}{10}$

$DC = 4 \times \frac{8}{10} = \frac{16}{5} \rightarrow S_{\square} = \frac{16}{5} \times \frac{16}{5} = 10.24$

(۱۰

$CM = DM = x \rightarrow AD = 2x$ / $EM \parallel GD \rightarrow \frac{EC}{EG} = \frac{CM}{DM} = 1$

$FD \parallel EM \rightarrow \frac{AD}{AM} = \frac{FD}{EM} = \frac{FD}{EM} = \frac{2x}{3x} \rightarrow EM = \frac{3}{2}FD$

$EM \parallel DG \rightarrow \frac{CM}{CD} = \frac{EM}{GD} = \frac{x}{2x} = \frac{EM}{GD} \rightarrow GD = 2EM \rightarrow GD = 3FD$

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

Arman