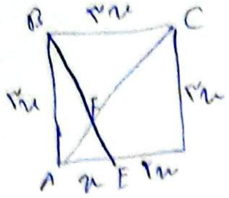
کاظران جاوشی نژاد   یازدهم ریاضی B

۱۴,۲۵

۱) ۰,۲۵



تشابه BCF, AFE ✓

$$\frac{BC}{AE}=\frac{CF}{AF}=\frac{BF}{FE}=3$$

۲) ۲

$$\left.\begin{aligned}\hat A&=\hat A\\ \hat E_1&=\hat C\end{aligned}\right\} \Rightarrow AED \simeq ABC \quad \frac{15}{x}=\frac{x+1}{2} \Rightarrow \boxed{x=5} ✓$$

۳) ۲

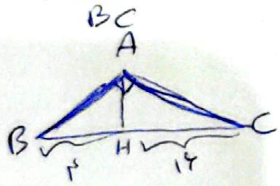
$1{,}2y=3x \quad DE \parallel BC \longrightarrow \frac{x}{\underset{x+2x \to 3x}{}}=\frac{DE}{BC}=\frac{1}{3}$ (1)

$$\left.\begin{aligned}\hat D&=\hat C\\ \hat E&=\hat F\\ \hat H_1&=\hat H_2\end{aligned}\right\} \to DEH \sim FHC \longrightarrow \frac{DE}{FC}=\frac{EH}{FH} \xrightarrow[y=\frac{5}{2}x]{} CF=\frac{5}{3}DE \text{ (2)}$$

$$(1),(2)+BC=BF+FC \longrightarrow 3\times DE=3+\frac{5}{3}DE \to \underbrace{3DE-\frac{5}{3}DE}_{\frac{4}{3}DE}=3 \Rightarrow DE=\frac{9}{4}$$

$$\to \frac{DE}{BC}=\frac{1}{3} \Rightarrow BC=3\times\frac{9}{4}=\boxed{\frac{27}{4}} ✓$$

۴) ۲

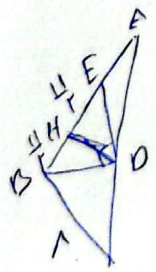


روابط طولی: $AB^2=BH\times BC$, $AC^2=CH\times BC \Rightarrow AB^2=4\times20 \to AB=4\sqrt5$, $AC^2=16\times20 \to AC=8\sqrt5$ $\boxed{\frac{AB}{AC}=\frac{1}{2}}$ ✓

۵) ۲

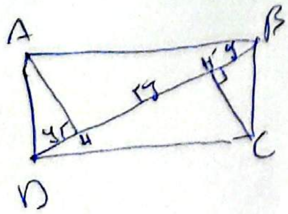
$$ECF \simeq AEG \simeq ABF \quad \frac{AF}{FC}=\frac{BF}{EF} \to \frac{x+8}{8}=\frac{6}{x} \to \boxed{x=4} ✓ \boxed{AF=12} ✓$$

۶) ۲



$$DH^2=\frac{11}{2}\times\frac{11}{2} \Rightarrow DH=\frac{11}{2} \quad \frac{AE+\frac{11}{2}}{11+AE}=\frac{\frac{11}{2}}{8} \Rightarrow \boxed{x=\frac{33}{5}} ✓$$

۷) ۲



$\triangle ABD, \hat A$

$(AH)^2=y\times3y=3y^2 \to AH=\sqrt3 y$

مساحت $ADH=\frac{hy}{2} \to \frac{\sqrt3 y^2}{2}$

مساحت $ABCD=S_{ABD}+S_{BCD}=2S_{ABD} \to \frac{2}{2}\times\sqrt3 y\times4y=4\sqrt3 y^2$

نسبت: $\frac{4\sqrt3 y^2}{\frac{\sqrt3}{2}y^2}=\boxed{8}$ ✓

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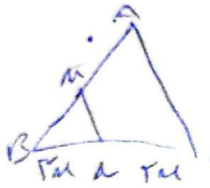
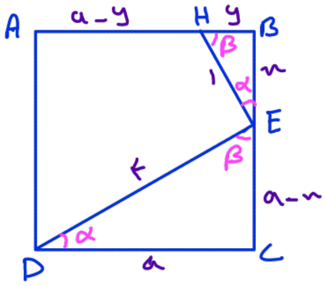
(۲)



$$S_{BMN} = \frac{AM \times 3AM \times \sin B}{2}$$
$$S_{ABC} = \frac{(AB) 5x \times \sin B}{2}$$
$$\rightarrow \frac{S_{ABC}}{S_{BMN}} \xrightarrow{\text{نتیجه}} 3AM = 5MB$$

$$\frac{BM}{AM} = \frac{5}{4}$$ ✓

۰ ۱۹)



$$\overset{\triangle}{EBH} \sim \overset{\triangle}{DCE} \rightarrow \frac{y}{a-x} = \frac{x}{a} = \frac{1}{4} \begin{cases} a = 4x \\ a - x = 4y \end{cases} \quad x = \frac{4}{3}y$$

$$\overset{\triangle}{DCE} \xrightarrow{\text{فیثاغورس}} (4)^2 = (a-x)^2 + (a)^2 \rightarrow \begin{cases} x = \frac{4}{5} \\ a = \frac{16}{5} \end{cases}$$

$$S_{\square} = a^2 = \boxed{\frac{256}{25}}$$

۰ ۱۰)

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:

$$GF = \frac{2}{3}x, \quad FD = \frac{1}{3}x \rightarrow \frac{BD}{FD} = \frac{3x}{\frac{1}{3}x} = \boxed{9}$$

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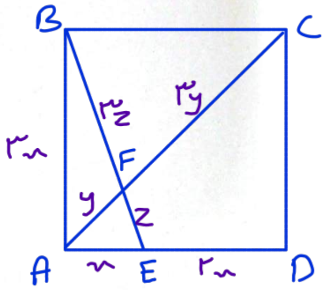

دو مثلث AEF و BFC با نسبت ۳ متشابه اند:

$$(BE)^2 = \underbrace{(\cancel{AE})^2}_{x^2} + \underbrace{(\cancel{AB})^2}_{(3x)^2} \rightarrow BE = \sqrt{10}\,x$$
$$4z = \sqrt{10}\,x \rightarrow z = \frac{\sqrt{10}}{4}x$$

$$(AC)^2 = \underbrace{(\cancel{AD})^2}_{(3x)^2} + \underbrace{(\cancel{CD})^2}_{(3x)^2} \rightarrow AC = 3\sqrt{2}\,x$$
$$4y = 3\sqrt{2}\,x \rightarrow y = \frac{3\sqrt{2}}{4}x$$

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

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