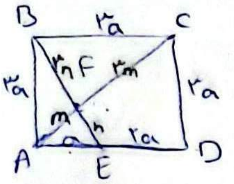
نام و نام خانوادگی: امین عظیمی　　کصف : ۲۱　　کلاس: نقشه یازدهم تجربی



$$\frac{EF}{AF} = ?$$

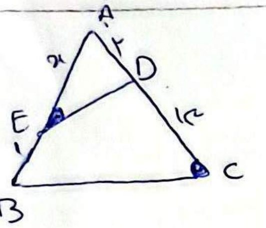
$\hat{C}_1 = \hat{A}_1$, $\hat{B}_1 = \hat{E}_1$ } زز → $\overset{\triangle}{BC} \sim \overset{\triangle}{AE} \rightarrow \frac{3m}{m} = \frac{BF}{FE} = 3$

$\overset{\triangle}{ACD}$ درست → فیثاغورس : $AC = 3\sqrt{2}\,a = 4m \rightarrow m = \frac{3\sqrt{2}}{4}a$

$\overset{\triangle}{ABE}$ درست → فیثاغورس : $BE = \sqrt{10}\,a = 4n \rightarrow n = \frac{\sqrt{10}}{4}a$

$$\frac{EF}{AF} = \frac{n}{m} = \frac{\frac{\sqrt{10}}{4}}{\frac{3\sqrt{2}}{4}} = \frac{\sqrt{10}}{3\sqrt{2}} = \boxed{\frac{\sqrt{5}}{3}}$$

۱



$\hat{E}_1 = \hat{C}$, $\hat{A} = \hat{A}$ } زز → $\overset{\triangle}{AED} \sim \overset{\triangle}{ABC}$ → نسبت تشابه : $\frac{AD}{AB} = \frac{ED}{BC} = \frac{AE}{AC}$

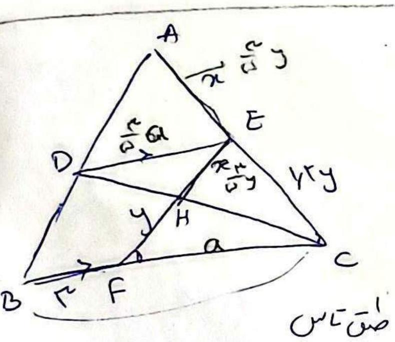
$$\rightarrow \frac{2}{x+1} = \frac{x}{15}$$

$$x^2 + x = 30$$

$$x^2 + x - 30 = 0$$

$$\boxed{x = 5} \leftarrow (x+6)(x-5) = 0$$

۲



$3y = 5x \rightarrow x = \frac{3}{5}y$

$DE = \frac{3}{5}a$

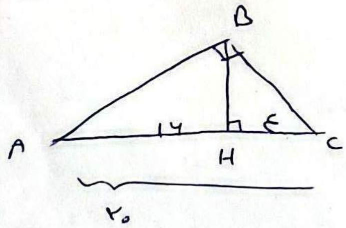
$\rightarrow \hat{F}_1 = \hat{E}_1$, $\hat{C}_1 = \hat{D}_1$ (DE ∥ BC) } زز → $\overset{\triangle}{DHE} \sim \overset{\triangle}{FHC} \rightarrow \frac{HE}{FH} = \frac{3}{5} = \frac{DE}{FC} \rightarrow DE = \frac{3}{5}FC$

طبق تالس BE ∥ BC → $\frac{AE}{AC} = \frac{DE}{BC} \rightarrow \frac{\frac{3}{5}y}{\cancel{\frac{3}{5}y + \frac{6}{5}y}\ \frac{9}{5}} = \frac{\frac{3}{5}a}{3+a} = \frac{1}{3} \rightarrow 3 + a = \frac{9}{5}a$

$\frac{4}{5}a = 3$

$BC = 3 + \frac{15}{4} = \boxed{\frac{27}{4}} \leftarrow FC = \frac{15}{4} \leftarrow a = 3 \times \frac{5}{4}$

۳



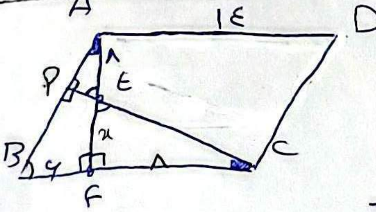
$$\frac{AB}{BC} = ?$$

$AB^2 = 16 \times 20$

$BC^2 = 4 \times 20$

$\rightarrow \left(\frac{AB}{BC}\right)^2 = 4 \rightarrow \frac{AB}{BC} = ②$

۴



$\hat{E}_1 = \hat{E}_2$, $\hat{P} = \hat{F} = 90$ } زز → $\overset{\triangle}{APE} \sim \overset{\triangle}{CFE} \rightarrow \hat{A}_1 = \hat{C}_1$

$\rightarrow \hat{F}_1 = \hat{F}_2 = 90$, $\hat{A}_1 = \hat{C}_1$ } زز → $\overset{\triangle}{ABF} \sim \overset{\triangle}{CFE} \rightarrow \frac{BF}{EF} = \frac{AB}{EC} = \frac{AF}{FC}$

$\leftarrow \frac{6}{x} = \frac{x+8}{8}$

$x^2 + 8x = 48$

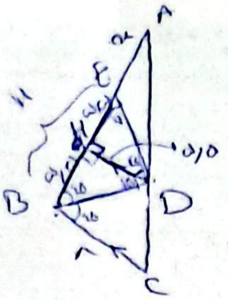
$x^2 + 8x - 48 = 0$

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

$x = 4$

$AF = 8 + 4 = (12)$

۵



$HD \parallel BC \rightarrow$
$HD \perp BD \rightarrow$ ارتفاع } $\hat{H} = \hat{B} = ۹۰ \rightarrow \hat{B}_1 = \hat{D}_1 , \hat{D}_2 = \hat{E}_1 = ۴۵ \rightarrow \overset{\triangle}{BHD} , \overset{\triangle}{HED}$ } متساوی الساقین

$\downarrow$

$a = BH = HD = HE$ ۶

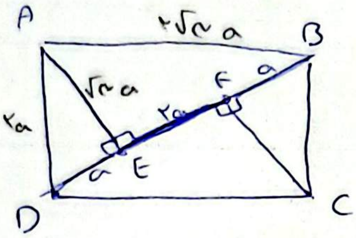
$\xrightarrow{\text{تالس}} \frac{AH}{AB} = \frac{HD}{BC} \rightarrow \frac{x+۵/۵}{۱۱+x} = \frac{۵/۵}{۸} = \frac{۱۱}{۱۶}$ $\rightarrow ۲a = ۱۱$, $a = ۵/۵$

$\rightarrow ۱۶x + ۸۸ = ۱۲۱ + ۱۱x \rightarrow ۵x = ۳۳ \rightarrow x = \frac{۳۳}{۵} = \boxed{۶/۶}$

$\overset{\triangle}{ABD}$ درمثلث $\longrightarrow AE^2 = DE \cdot EB = a(۳a)$

$AE^2 = ۳a^2$

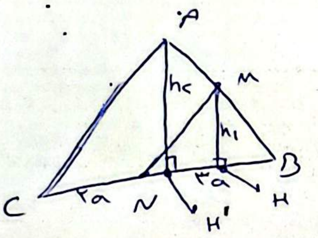
$AE = \sqrt{۳}a$ ۷



فیثاغورس : $AD = \sqrt{AE^2 + ED^2} = ۲a$

$AB = \sqrt{AE^2 + EB^2} = ۲\sqrt{۳}a$

$\frac{S_{\text{مستطیل}}}{S_{\text{کوچکترین مثلث}}} = \frac{۲a \times ۲\sqrt{۳}a}{\frac{۱}{۲} \times \sqrt{۳}a \times a} = \frac{۴\sqrt{۳}}{\frac{\sqrt{۳}}{۲}} = \frac{۸\sqrt{۳}}{\sqrt{۳}} =$ ⑧ برابر

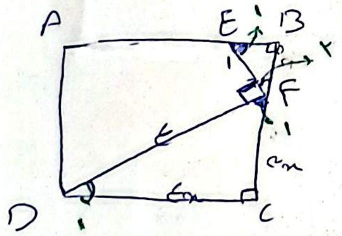


$\frac{BN}{NC} = \frac{۳}{۲} \rightarrow \frac{S_{BMN}}{S_{ABC}} = \frac{۱}{۳} = \frac{h_1 \times (\text{قاعده ۱}) \rightarrow ۳a}{h_2 \times (\text{قاعده ۲}) \rightarrow ۵a}$

$\rightarrow \frac{h_1}{h_2} = \frac{۵}{۹}$ ۸

$\overset{\triangle}{ABH'}$ درمثلث تالس : $\frac{MH}{AH'} = \frac{MB}{AB} = \frac{۵}{۹} \xrightarrow[\text{مخرج}]{\text{تفاضل از}} \boxed{\frac{MB}{AM} = \frac{۵}{۴}}$

(۲ ارتفاع h_2, h_1 موازی هستند چون هردو بر خط BC عمودند)



$\left.\begin{array}{l}\hat{F}_2 + \hat{E}_1 = ۹۰ \\ \hat{F}_2 + \hat{F}_1 = ۹۰\end{array}\right\} \hat{E}_1 = \hat{F}_1$ پس $\hat{D}_1 = \hat{F}_2$

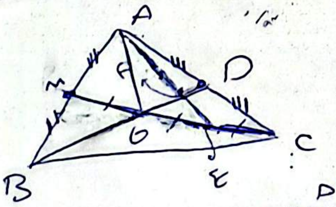
$\rightarrow$ درمثلث $\overset{\triangle}{EBF}$ و $\overset{\triangle}{DFC}$ متشابه اند $\rightarrow \frac{FC}{EB} = \frac{\text{ضلع}}{BF} = ۴ \rightarrow BF = x$ ۹

ضلع $= ۴x$

$FC = ۳x$

$\overset{\triangle}{FDC}$ درمثلث $\rightarrow$ فیثاغورس : $DF^2 = FC^2 + DC^2$: $۱۶ = ۹x^2 + ۱۶x^2$

$۲۵x^2 = ۱۶ \rightarrow x^2 = \frac{۱۶}{۲۵} \rightarrow$ مساحت مربع $: ۱۶x^2 = ۱۶ \times \frac{۱۶}{۲۵} = \boxed{\frac{۲۵۶}{۲۵}}$



$\frac{BD}{FD} = ?$

G مرکز ثقل $\rightarrow BD$ و CM : میانه

$\overset{\triangle}{AGC}$ از طرفی درمثلث $\rightarrow GD$ و AE هم میانه اند

$\} \rightarrow$ نقطه محل برخورد میانه ها آنها را به نسبت ۲ به ۱ تقسیم می‌کند ۱۰

$\rightarrow \frac{BG}{GD} = ۲$ همچنین $\frac{GF}{FD} = ۲ \rightarrow \left.\begin{array}{l}FD = x \\ FG = ۲x\end{array}\right\} GD = ۳x \rightarrow BG = ۶x \rightarrow \frac{BD}{FD} = \frac{۹x}{x} =$ ⑨