

$$ED = AE \Rightarrow AD = AE + DE = 2AE$$

$$B \parallel HD \Rightarrow \begin{cases} \angle B_1 = \angle E_1 \\ \angle C_1 = \angle A_1 \\ \angle F_1 = \angle F_2 \end{cases} \Rightarrow \triangle BCF \sim \triangle AFE$$

$$\text{تناسب اولی مثلث} \Rightarrow \frac{DE}{AE} = \frac{CF}{AF} = \frac{BF}{EF} \Rightarrow \frac{2AE}{AE} = \frac{CF}{AF} = \frac{BF}{EF}$$

$$\rightarrow 2AF = CF \Rightarrow AC = AF + CF = 3AF$$

$$2EF = BF \Rightarrow BE = BF + FE = 3FE$$

$$\text{تناسب دوم} \Rightarrow \triangle ACD \sim \triangle BEF \Rightarrow AC = BE + AB$$

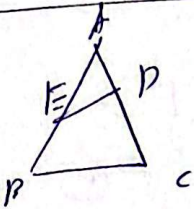
$$\Rightarrow 1/2 HF = a/2 + a$$

$$1/2 EF = a/2 + (a/2)$$

$$FAF = \sqrt{2}a$$

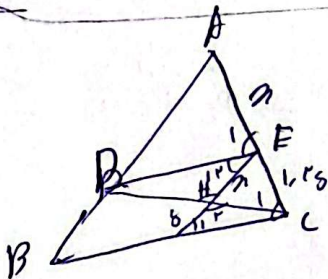
$$FEF = \frac{\sqrt{2}}{2}a$$

$$\Rightarrow \frac{EF}{AF} = \frac{\frac{\sqrt{2}}{2}a}{\sqrt{2}a} = \frac{1}{2} \checkmark$$



$$\begin{cases} \angle AED = \angle ACB \\ \angle A = \angle A \end{cases} \Rightarrow \triangle AED \sim \triangle ACB \Rightarrow \frac{AE}{AC} = \frac{AD}{AB} = \frac{ED}{BC} = \frac{a}{10} = \frac{2}{a+1}$$

$$\Rightarrow a^2 + a - 2 = 0 \Rightarrow (a+2)(a-1) = 0 \Rightarrow \begin{cases} a = -2 \text{ (رد)} \\ a = 1 \text{ (رد)} \end{cases} \checkmark$$



$$\begin{cases} DE \parallel BC \\ \angle A = \angle A \end{cases} \Rightarrow \triangle ADE \sim \triangle ABC$$

$$\text{تناسب اولی مثلث} \Rightarrow \frac{AE}{AC} = \frac{AD}{AB} = \frac{DE}{BC} \Rightarrow \frac{a}{a+1} = \frac{DE}{F_C + r}$$

$$\begin{cases} DE \parallel BC \\ \angle D = \angle H \\ \angle E = \angle F \end{cases} \Rightarrow \triangle DHE \sim \triangle HFE$$

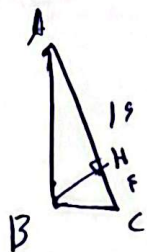
$$\text{تناسب دومی مثلث} \Rightarrow \frac{DE}{CF} = \frac{EH}{FH} = \frac{DH}{CH} \Rightarrow \frac{DE}{F_C} = \frac{a}{\delta} = \frac{r}{\delta} \Rightarrow DE = \frac{r}{\delta} F_C$$

$$\frac{\frac{r}{\delta} \delta}{\frac{r}{\delta} \delta + r} = \frac{\frac{r}{\delta} F_C}{F_C + r} \Rightarrow \frac{r}{\delta + r} = \frac{r F_C}{F_C + r} \Rightarrow r F_C = F_C + r \Rightarrow r F_C = r$$

$$F_C = r \times \frac{\delta}{\delta} = \frac{10}{\delta}$$

$$BC = F_C + BF = \frac{10}{\delta} + r$$

$$r + r = 10 \Rightarrow 2r = 10 \Rightarrow r = 5 \checkmark$$



برابر $BH^2 = AH \times CH = 1.9 \times 9.1 \Rightarrow BH = 1$

برابر

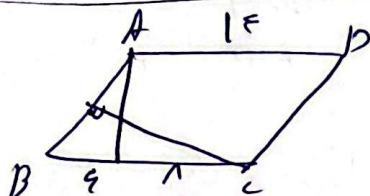
(2)

فقط $AB^2 = AH^2 + BH^2 = 1.9^2 + 1^2 = 3.61 + 1 = 4.61 \Rightarrow AB = 1.52$

$BC^2 = CH^2 + BH^2 = 9.1^2 + 1^2 = 82.81 + 1 = 83.81 \Rightarrow BC = 9.15$

$\frac{AD}{BC} = 2$ ✓

میدانی



$B \hat{D} \hat{C} \Rightarrow F \hat{E} \hat{C} \sim A \hat{F} \hat{B}$

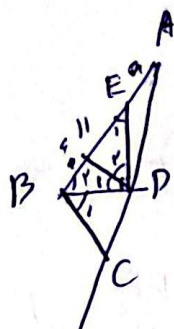
تساوی $\frac{FC}{AF} = \frac{EF}{BF} = \frac{1}{1+1} = \frac{1}{2}$

$FA = 1.2 + 1.2 \Rightarrow (1+1) (1.2 - F) \Rightarrow 1.2 - F = 0.6$

$AF = 1.2 + 1.2 = 2.4$ ✓ $m = 90^\circ$ ✓

میدانی

(2)



$DH \parallel BC \Rightarrow \hat{D}_1 = \hat{B}_1 \Rightarrow \hat{D}_1 = \hat{B}_1 \Rightarrow \hat{D}_1 = \hat{B}_1 = 90^\circ$

$\hat{D}_1 + \hat{D}_2 = 90^\circ \Rightarrow \hat{D}_2 = 90^\circ$
 $H_2 = 90^\circ \Rightarrow E_1 = 90^\circ$

$\frac{BE}{E} = EH = BH = 0.1 \Rightarrow HD = 0.1$

$HD \parallel BC \Rightarrow \frac{AH}{AB} = \frac{HD}{BC} = \frac{AD}{AC}$

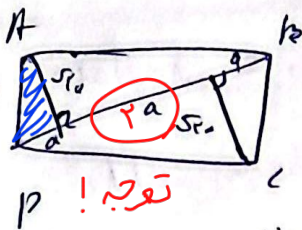
$\frac{0.1}{2+1} = \frac{0.1}{1} = \frac{1.2}{1.2}$

$0.1 = 1.2$

$m = \frac{1.2}{0} = 9.1$ ✓

میدانی

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توانی با این

$$AH^2 = PH \times BH = a \times \sqrt{a} - \sqrt{a}^2 \Rightarrow AH = \sqrt{a}$$

$$CH^2 = BH \times PH = a \times \sqrt{a} - \sqrt{a}^2 \Rightarrow CH = \sqrt{a}$$

(1)

$$CH^2 + BH^2 = DH^2 \Rightarrow \sqrt{a}^2 + a^2 = \sqrt{a}^2 \Rightarrow BC = \sqrt{a}$$

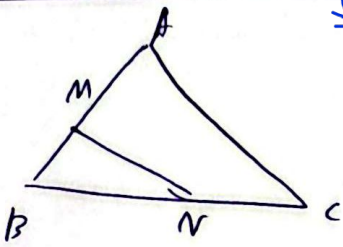
$$AH^2 + BH^2 = AB^2 \Rightarrow \sqrt{a}^2 + a^2 = \sqrt{a}^2 \Rightarrow AB = \sqrt{a}$$

در این حالت $\triangle BHC \sim \triangle AHP$

$$\Rightarrow \frac{BH}{AH} = \frac{BC}{AP} \Rightarrow \frac{\sqrt{a}}{\sqrt{a}} = \frac{\sqrt{a}}{a} \Rightarrow \sqrt{a} = \sqrt{a}$$

مساحت مثلث

$$\frac{S_{\triangle AHP}}{S_{\triangle BHC}} = \frac{\frac{1}{2} \times \sqrt{a} \times \sqrt{a}}{\frac{1}{2} \times \sqrt{a} \times \sqrt{a}} = 1$$

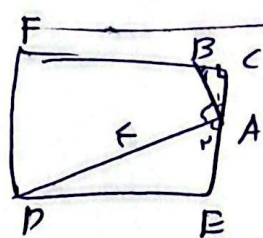


$$\frac{S_{\triangle ABC}}{S_{\triangle BMN}} = \frac{AB \times AC \times \sin B \times \frac{1}{2}}{BM \times BN \times \sin B \times \frac{1}{2}} = \frac{1}{1}$$

(2)

$$BN = NC \Rightarrow BC = BN + NC \quad \frac{AD \times D}{BM \times N} = \frac{1}{1}$$

$$\Rightarrow \frac{BM + AM}{BM} = \frac{9}{5} = 1 + \frac{AM}{BM} \Rightarrow \frac{AM}{BM} = \frac{4}{5} \Rightarrow \frac{BM}{AM} = \frac{5}{4} = \frac{5}{5-1} = \frac{5}{4}$$



$$\hat{C} = 90^\circ \Rightarrow \hat{B}_1 + \hat{A}_1 = 90^\circ \Rightarrow \hat{P}_1 = \hat{A}_1 \quad \hat{E} = 90^\circ \Rightarrow \hat{P}_1 + \hat{A}_1 = 90^\circ \Rightarrow \hat{A}_1 + \hat{A}_1 = 90^\circ \Rightarrow \hat{A}_1 = 45^\circ$$

$$\Rightarrow \hat{E} + \hat{C} = 90^\circ \Rightarrow \triangle BCA \sim \triangle EAD \Rightarrow \frac{BC}{AE} = \frac{AC}{DE} = \frac{BA}{DA} = \frac{1}{2}$$

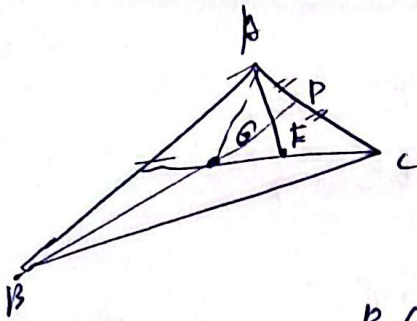
$$BC = 1 \Rightarrow AE = \frac{1}{2} \Rightarrow AE = \frac{1}{2}$$

$$\frac{DE}{OE} = \frac{1}{2} \Rightarrow OE = \frac{1}{2} \Rightarrow F = \frac{1}{2} \Rightarrow F = \frac{1}{2}$$

$$AE = \frac{1}{2} \Rightarrow \frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \Rightarrow \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$$

$$\frac{1}{4} \times \frac{1}{4} = \frac{1}{16} \Rightarrow \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$$

$$\frac{1}{4} \times \frac{1}{4} = \frac{1}{16} \Rightarrow \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$$



۱۰- ابتداءً A به B وصل می‌کنیم نقطه‌ی محل تلاقی میانه‌ی GD و AF در آنست

$$\frac{BG}{DG} = \frac{1}{2} \quad \text{است پس خواهیم داشت} \quad \Rightarrow DG = 2FD$$

$$\frac{BG}{BD} = \frac{1}{3} \quad \text{است پس خواهیم داشت} \quad \text{محققین نقطه‌ی محل تلاقی میانه‌ها در آنست} \quad (G)$$

$$H, I \Rightarrow \frac{2FD}{BD} = \frac{1}{3} \Rightarrow \frac{FD}{BD} = \frac{1}{6} \Rightarrow \frac{BD}{FD} = 6 \quad \checkmark$$

مسئله‌ی زی‌مان را