

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

$$B \parallel HD \left\{ \begin{array}{l} \angle B_1 = \angle E_1 \\ \angle C_1 = \angle A_1 \\ \angle F_1 = \angle F_2 \end{array} \right. \Rightarrow \triangle BCF \sim \triangle AFE$$

تناسب اضلاع

$$\Rightarrow \frac{BC}{AE} = \frac{CF}{AF} = \frac{BF}{EF} \Rightarrow \frac{AE}{AF} = \frac{CF}{BF} = \frac{BF}{EF}$$

$$\rightarrow \frac{AE}{AF} = \frac{CF}{BF} \Rightarrow AC = AF + CF = EAF$$

$$\frac{EF}{BF} = \frac{BF}{EF} \Rightarrow BE = BF + FE = FFE$$

نقشه

$$\triangle ACD = \triangle CDB + \triangle BDA$$

$$BE^2 = AB^2 + AE^2$$

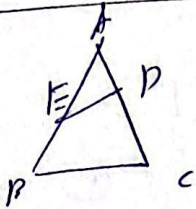
$$\Rightarrow \frac{1}{AE} = \frac{1}{AF} + \frac{1}{BF}$$

$$\frac{1}{EF} = \frac{1}{AF} + \frac{1}{BF}$$

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

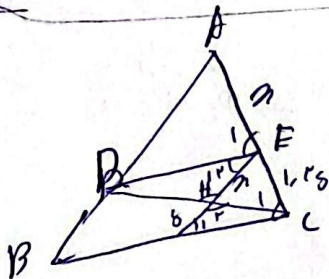
$$FEF = \frac{\sqrt{2}}{2}a$$

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



$$\frac{AE}{AC} = \frac{AD}{AB} = \frac{ED}{BC} = \frac{a}{a+b}$$

$$\Rightarrow a^2 + a - c = c \Rightarrow (a+1)(a-1) = c \Rightarrow \begin{cases} a = -1 \text{ (not possible)} \\ a = 1 \text{ (valid)} \end{cases}$$



$$DE \parallel BC \left\{ \begin{array}{l} \angle E_1 = \angle C_1 \\ \angle A_1 = \angle A \end{array} \right. \Rightarrow \triangle AED \sim \triangle ACB$$

$$\Rightarrow \frac{AE}{AC} = \frac{AD}{AB} = \frac{DE}{BC} = \frac{a}{a+b}$$

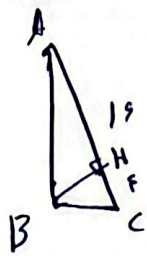
$$DE \parallel BC \left\{ \begin{array}{l} \angle E_1 = \angle C_1 \\ \angle H_1 = \angle H_2 \end{array} \right. \Rightarrow \triangle DHE \sim \triangle HCF$$

$$\Rightarrow \frac{DE}{CF} = \frac{EH}{FH} = \frac{DH}{CH} \Rightarrow \frac{DE}{FC} = \frac{a}{b} \Rightarrow DE = \frac{a}{b} FC$$

$$\frac{a}{b} = \frac{a}{b} \Rightarrow \frac{a}{b} = \frac{a}{b} \Rightarrow \frac{a}{b} = \frac{a}{b} \Rightarrow \frac{a}{b} = \frac{a}{b}$$

$$FC = \frac{a}{b} \Rightarrow BC = FC + BF = \frac{a}{b} + b$$

برای



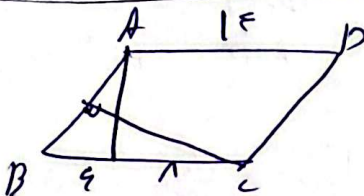
$$BH \cdot HC = AH^2 = 12^2 = 144 \Rightarrow BH = 1$$

$$AB^2 = AH^2 + BH^2 = 12^2 + 1^2 = 144 + 1 = 145 \Rightarrow AB = \sqrt{145}$$

$$BC^2 = CH^2 + BH^2 = 1^2 + 1^2 = 2 \Rightarrow BC = \sqrt{2}$$

$$\frac{AD}{BC} = 2$$

مسئله ۱۰



$$\left. \begin{array}{l} EF \parallel AC \\ EF = 12 \end{array} \right\} \Rightarrow EF \parallel AC \text{ و } AF \parallel BE$$

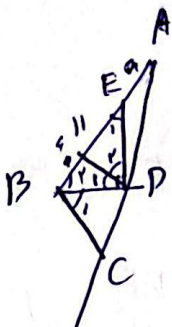
$$\text{تکوازی مثلثات} \rightarrow \frac{FC}{AF} = \frac{EF}{BF} = \frac{1}{1+1} = \frac{1}{2}$$

$$FA = 12 + 12 \Rightarrow (12+12) (2-F) \Rightarrow 24(2-F) = 24 \Rightarrow F = 1$$

$$AF = 12 + 1 = 13$$

$$m = 120^\circ$$

مسئله ۱۱



$$\left. \begin{array}{l} DE \parallel BC \\ DE = EF \end{array} \right\} \Rightarrow \hat{D}_1 = \hat{E}_1 \Rightarrow \hat{D}_1 = \hat{E}_1 \Rightarrow \hat{D}_1 = \hat{E}_1 = 90^\circ$$

$$\hat{D}_1 + \hat{E}_1 = 90^\circ \Rightarrow \hat{D}_1 = 90^\circ$$

$$HE = 90^\circ \Rightarrow E_1 = 90^\circ$$

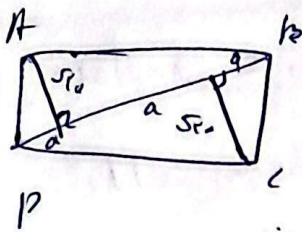
$$\frac{BE}{E} = EH = BH = 12 \Rightarrow HD = 12$$

$$HD \parallel BC \xrightarrow{\text{تکوازی}} \frac{AH}{AB} = \frac{HD}{BC} = \frac{12}{12} = 1$$

$$\frac{12}{12+12} = \frac{12}{24} = \frac{1}{2} = \frac{12}{24} = \frac{1}{2}$$

$$m = 120^\circ$$

$$m = \frac{120}{2} = 60^\circ$$



طبقه اول

$$AH^2 = BH \times BH = q \times r_a = r_a^2 \Rightarrow AH = \sqrt{r_a}$$

$$CH^2 = BH \times BH = q \times r_c = r_c^2 \Rightarrow CH = \sqrt{r_c}$$

طبقه اولی مثلثات $CH^2 + BH^2 = DC^2 \Rightarrow r_a^2 + q^2 = r_a^2 \Rightarrow BC = \sqrt{r_a}$

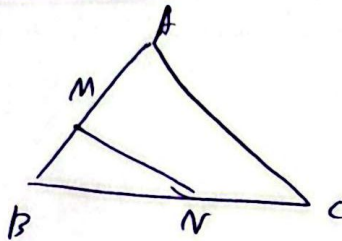
$$AH^2 + BH^2 = AB^2 \Rightarrow r_a^2 + q^2 = r_a^2 \Rightarrow AB = \sqrt{r_a}$$

طبقه اولی مثلثات $BH^2 \leq AH^2$

$$\Rightarrow BH^2 \leq AH^2 \Rightarrow \frac{\sqrt{r_a} \times q}{2} \leq \frac{\sqrt{r_a}}{2} \times q^2 \Rightarrow \sqrt{r_a} \times q \leq \sqrt{r_a} \times q^2$$

سید علی جوان

$$\frac{BH^2}{SAH^2} \leq \frac{\sqrt{r_a} \times q}{\sqrt{r_a} \times q^2} \leq 1$$



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

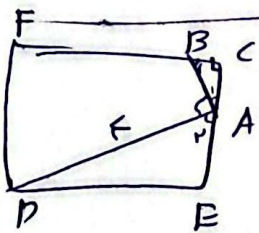
$$BN = NC \Rightarrow BC = BN + NC$$

$$NC = \frac{1}{2} BN \quad BC = \frac{3}{2} BN$$

$$\frac{AB \times AC}{BM \times BN} = \frac{1}{1}$$

$$\Rightarrow \frac{BM + AM}{BM} = \frac{q}{a} = 1 + \frac{AM}{BM}$$

$$\frac{AM}{BM} = \frac{f}{a} \Rightarrow \frac{BM}{AM} = \frac{a}{f} = \frac{q}{a}$$



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

$$A_1 + \hat{A}_1 = 90^\circ \Rightarrow A_1 = D_1$$

$$\Rightarrow \hat{E} + \hat{C} = 90^\circ$$

$$\Rightarrow B_1 A \sim E A D$$

$$\Rightarrow \frac{BE}{AE} = \frac{AC}{DE} = \frac{BA}{DA} = \frac{1}{f}$$

$$BC = a$$

$$AC = b \Rightarrow AE = \frac{a}{f} \Rightarrow AE = fa$$

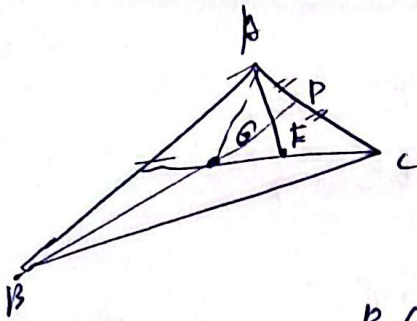
$$\frac{a}{OE} = \frac{1}{f} \Rightarrow OE = fa \Rightarrow FD = CE = PE = CF$$

$$a + fa = fb \Rightarrow fa = fb$$

$$AE = fa = fb \Rightarrow \text{طبقه اولی مثلثات} \quad AE^2 + DE^2 = AD^2 \Rightarrow (fa)^2 + (fb)^2 = b^2$$

$$f \times \frac{a}{b} = fb \Rightarrow f \times \frac{a}{b} = fb \Rightarrow a = b \Rightarrow DE = fb \times \frac{a}{b} = \frac{1}{2} a$$

$$f \times \frac{a}{b} = \frac{1}{2} a \times \frac{1}{b} = \frac{1}{2} \times \frac{a}{b}$$



۱۰- ابقدار ا ب ب و دلی کیم نقطه ج اعل تانی میانی G و D و E و D

$$\frac{BG}{GD} = \frac{1}{2} \Rightarrow BG = 2GD$$

صحتین خطی اعل تانی میانما و نمک ARE است یی خواص ا ب ب (G)

$$\frac{BG}{GD} = \frac{1}{2} \Rightarrow \frac{BG}{GD} = \frac{1}{2} \Rightarrow \frac{BG}{GD} = \frac{1}{2} \Rightarrow \frac{BG}{GD} = \frac{1}{2}$$

صحتین خطی اعل تانی میانما و نمک ARE است یی خواص ا ب ب (G)