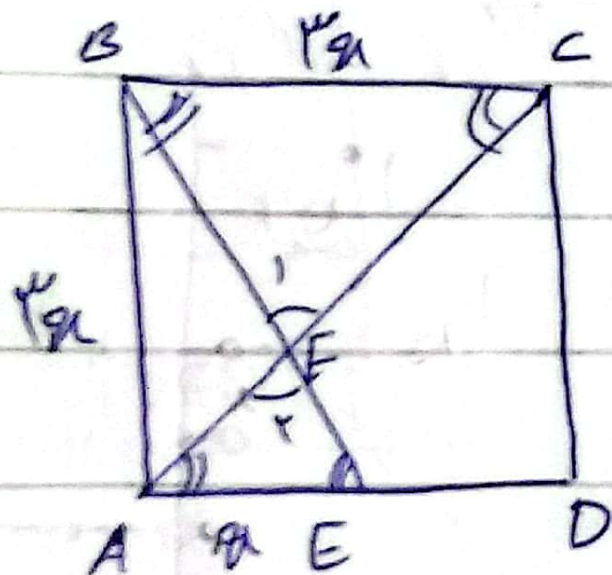


باز هم فرض

کلیف ۲۱

فایده سواد قلمی



$$ED = 2AE \rightarrow ED + AE = BC = 3AE \quad (1)$$

$$\begin{aligned} AE &\parallel BC \\ \hat{F}_1 &= \hat{F}_2 \\ \hat{B} &= \hat{E} \\ \hat{A} &= \hat{C} \end{aligned}$$

$$\triangle AEF \sim \triangle FBC \rightarrow$$

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

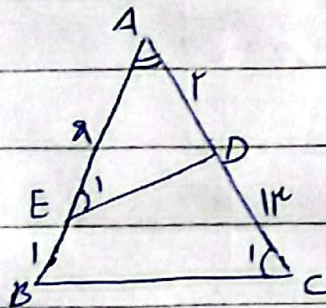
$$AC^2 = AB^2 + BC^2 \rightarrow AC = 3\sqrt{2}x$$

$$\frac{FC}{AF} = 3 \rightarrow \frac{AF + FC}{AF} = \frac{AC}{AF} = 3 \rightarrow AF = \frac{3\sqrt{2}}{4}x$$

$$BE^2 = AE^2 + AB^2 \rightarrow BE = \sqrt{10}x$$

$$\frac{BF}{FE} = 3 \rightarrow \frac{BF + FE}{FE} = \frac{BE}{FE} = 3 \rightarrow FE = \frac{\sqrt{10}}{4}x$$

$$\frac{EF}{AF} = \frac{\frac{\sqrt{10}}{F} \cdot 9}{\frac{F\sqrt{F}}{F} \cdot n} = \frac{\sqrt{10}}{F}$$



$$\left. \begin{array}{l} \hat{E}_1 = \hat{C}_1 \\ \hat{A} = \hat{A} \end{array} \right\} \rightarrow \triangle AED \sim \triangle ACB \Rightarrow$$

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

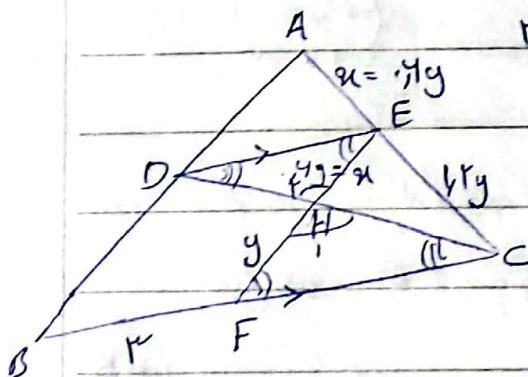
$$\frac{F}{n+1} = \frac{9}{10} = \frac{ED}{BC}$$

$$n(n+1) = 9 \rightarrow n^2 + n - 9 = 0$$

$$(n+9)(n-1) = 0$$

$$n = -9 \quad \text{or} \quad n = 1$$

$$n = 1$$



$$F_y = \Delta n \rightarrow n = \frac{F_y}{\Delta}$$

$$\frac{DE}{BC} = \frac{AE}{AC} = \frac{1}{F} \rightarrow BC = F \cdot DE$$

$$\left. \begin{array}{l} \hat{H}_1 = \hat{H}_2 \\ \hat{E} = \hat{F} \\ \hat{D} = \hat{C} \end{array} \right\} \rightarrow \triangle HDE \sim \triangle HCF$$

$$\frac{EH}{HF} = \frac{DE}{FC} = \frac{DH}{HC} = \frac{F}{\Delta} = \frac{F_y}{y}$$

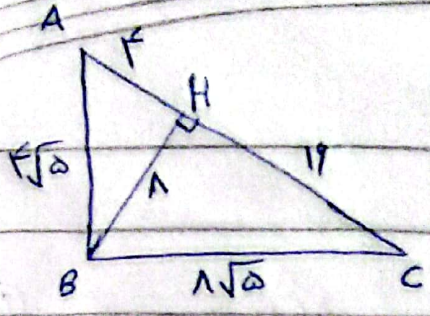
$$\frac{DE}{FC} = \frac{F_y}{\Delta n} \rightarrow \frac{DE}{FC + BF} = \frac{F_y}{\Delta n + F} = \frac{1}{F}$$

$$\frac{DE}{BC} = \frac{1}{F}$$

$$9n = \Delta n + F$$

$$F_n = F \rightarrow n = \frac{F}{F}$$

$$BC = \Delta n + F = \frac{F}{F} \times \Delta + F = \frac{F \Delta}{F} + F$$



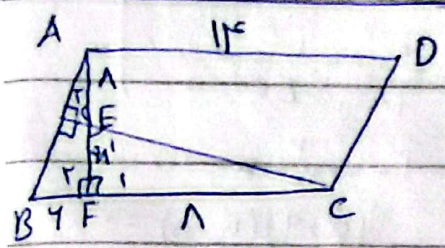
$$BC^2 = CH \times AC$$

$$BC^2 = 14 \times 20 = 280$$

$$BC = \sqrt{280}$$

$$AB^2 = AH \times AC = 9 \times 20 = 180$$

$$AB = \sqrt{180} = 13.416$$



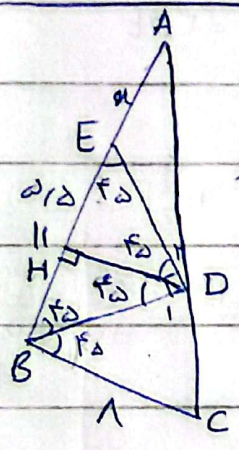
$$\begin{matrix} \angle A = \angle C \\ \angle F_1 = \angle E_1 \end{matrix} \} \rightarrow \triangle AFB \sim \triangle CFE$$

$$\frac{BF}{EF} = \frac{AF}{FC} \rightarrow \frac{4}{x} = \frac{12+x}{14}$$

$$14x + 14x = 4(14+x) \rightarrow 28x = 56 + 4x$$

$$24x = 56 \rightarrow x = \frac{56}{24} = \frac{7}{3}$$

$$AF = AE + EF = 9 + 3 = 12$$



مسئله ۴: در مثل ABC، دو خط BD و CE از رئوس B و C به اضلاع AC و AB رسم شده است. اگر BD و CE در نقطه H قطع کنند و BH=4، HD=8، CH=6، CE=14 باشد، طول BD را بیابید.

$$\begin{matrix} HD = HD \\ \angle D_1 = \angle E_1 \\ \angle D_2 = \angle E_2 \end{matrix} \} \rightarrow \triangle BHD \cong \triangle EHD$$

$$BH = HE = 4$$

$$2x = 11 \rightarrow x = 5.5$$

$$HD = EH = BH = 5.5$$

$$HD \parallel BC \rightarrow \frac{AH}{HB} = \frac{HD}{BC - HD}$$

$$\frac{5.5 + x}{5.5} = \frac{5.5}{14 - 5.5}$$

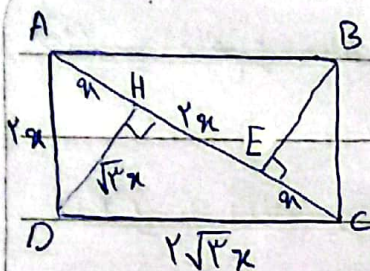
$$\frac{5.5 + x}{5.5} = \frac{5.5}{8.5}$$

$$8.5(5.5 + x) = 5.5 \times 5.5$$

$$46.75 + 8.5x = 30.25$$

$$8.5x = -16.5 \rightarrow x = -1.94$$

$$x = AE = 1.94$$



$$DH^2 = AH \times HC$$

$$DH^2 = \frac{1}{2} \times \frac{1}{2} \rightarrow DH = \frac{1}{2}$$

$$AD^2 = AH^2 + DH^2 \rightarrow AD^2 = \frac{1}{2} \rightarrow AD = \frac{1}{\sqrt{2}}$$

$$DC^2 = DH^2 + HC^2 \rightarrow DC^2 = \frac{1}{2} \rightarrow DC = \frac{1}{\sqrt{2}}$$

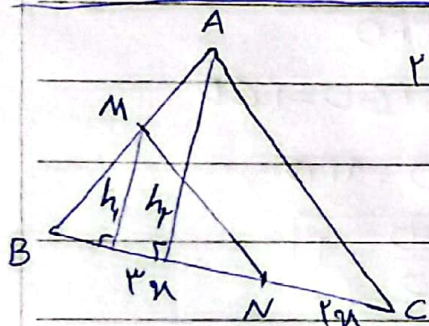
$$DC = \frac{1}{\sqrt{2}}$$

کو چھوڑیں۔ اس کے بجائے $\triangle AHD$ اور $\triangle BEC$ میں۔

$$S_{ABCD} = AD \times DC = \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}$$

$$S_{\triangle ADH} = \frac{AH \times HD}{2} = \frac{\frac{1}{2} \times \frac{1}{2}}{2} = \frac{1}{8}$$

$$\frac{S_{ABCD}}{S_{\triangle ADH}} = \frac{\frac{1}{2}}{\frac{1}{8}} = 4$$



$$BN = NC$$

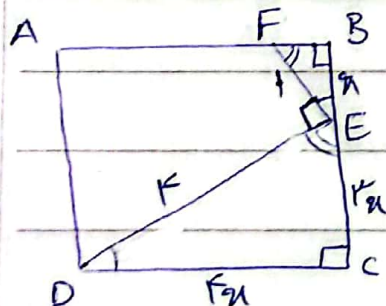
① ارتفاع h_1 کی نسبت $\triangle BMN$

و ارتفاع h_2 کی نسبت $\triangle ABC$ میں۔

$$\frac{S_{\triangle ABC}}{S_{\triangle BMN}} = \frac{\frac{1}{2} \times BC \times h_2}{\frac{1}{2} \times BN \times h_1} = 4$$

$$\frac{1}{2} \times \frac{h_2}{h_1} = 4 \rightarrow \frac{h_2}{h_1} = 8$$

$$h_1 \parallel h_2 \rightarrow \frac{BM}{AB} = \frac{h_1}{h_2} = \frac{1}{8} \rightarrow \frac{BM}{BM+MA} = \frac{1}{8} \rightarrow \frac{BM}{MA} = \frac{1}{7} \rightarrow \frac{BM}{MA} = \frac{1}{7}$$



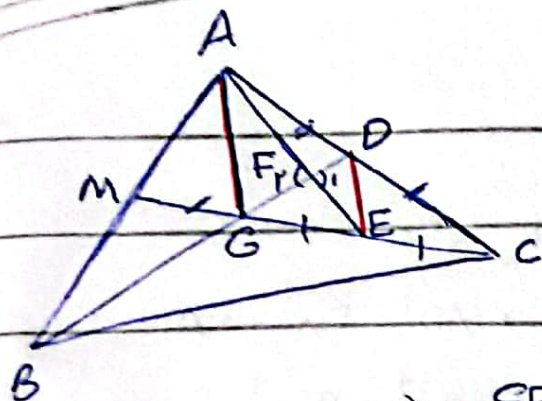
$$\frac{DE}{EF} = \frac{EC}{FB} = \frac{DC}{BE} = 1$$

$$BE = 1 \rightarrow DC = 1$$

$$DC = BC \rightarrow DC = 1 \rightarrow EC = 1$$

$$DE^2 = DC^2 + EC^2 \rightarrow 1^2 = 1^2 + 1^2 \rightarrow 1 = 2 \rightarrow DC = 1$$

$$S_{ABCD} = 1 \times 1 = 1$$



⑩ میان‌ها هم از نسبت ۲ به ۱ قطع می‌کنند پس

$$GE = EC = MG$$

BD یک میانه است پس $AD = DG$

$$\frac{CE}{GE} = \frac{CD}{DA} = 1$$

طبق قضیه عکس تالس

بنابراین خط DE موازی AG است

$$\left. \begin{array}{l} \hat{F}_1 = \hat{F}_2 \\ \hat{E} = \hat{A} \\ \hat{D} = \hat{C} \end{array} \right\} \rightarrow \triangle FDE \sim \triangle FGA \rightarrow \frac{DE}{AG} = \frac{EF}{AF} = \frac{FD}{FG} = \frac{1}{3}$$

$$\frac{CE}{GE} = 1 \rightarrow \frac{CE}{GE+CE} = \frac{CE}{CG} = \frac{1}{3} \Rightarrow \frac{CE}{CG} = \frac{DE}{AG} = \frac{1}{3}$$

$$FG = 2FD \rightarrow GD = FG + FD = 3FD$$

$$BG = 2GD \rightarrow BD = BG + GD = 3GD$$

$$\left. \begin{array}{l} BD = 3GD \\ GD = 3FD \end{array} \right\} \rightarrow BD = 9FD$$

$$\boxed{\frac{BD}{FD} = 9}$$

