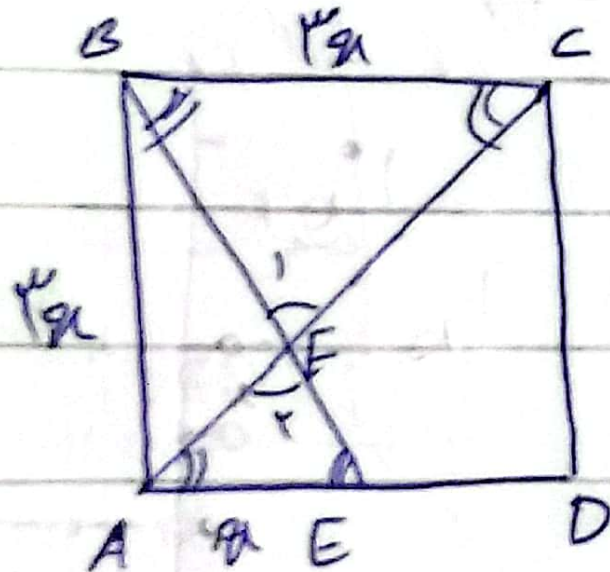


باز هم فرض

فرضیات سوال قدری ۱۹, ۷۵ ۲۱ ۱۹, ۷۵



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

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

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

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

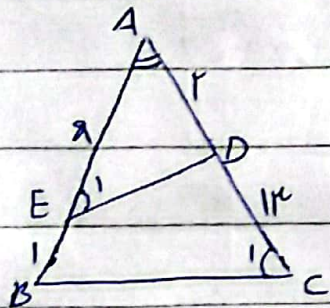
$$AC^2 = AB^2 + BC^2 \rightarrow AC = 3\sqrt{2}x$$

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

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

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

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



$$\begin{aligned} \hat{E}_1 &= \hat{C}_1 \\ \hat{A} &= \hat{A} \end{aligned} \Rightarrow \triangle AED \sim \triangle ACB \Rightarrow$$

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

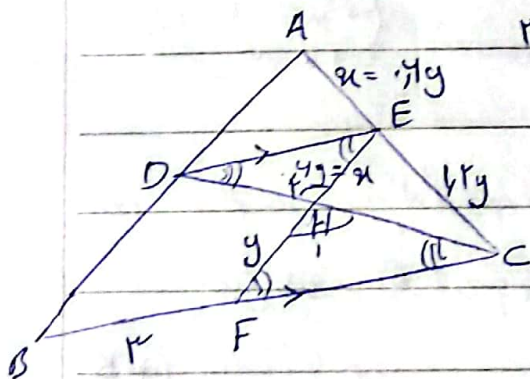
$$\frac{r}{n+1} = \frac{9}{10} = \frac{ED}{BC}$$

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

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

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

$$n = 1$$



$$r_y = 2n \Rightarrow n = \frac{r_y}{2}$$

$$\frac{DE}{BC} = \frac{AE}{AC} = \frac{1}{r} \Rightarrow BC = r \cdot DE$$

$$\begin{aligned} \hat{H}_1 &= \hat{H}_r \\ \hat{E} &= \hat{F} \\ \hat{D} &= \hat{C} \end{aligned} \Rightarrow \triangle HDE \sim \triangle HCF$$

$$\frac{EH}{HF} = \frac{DE}{FC} = \frac{DH}{HC} = \frac{r}{n} = \frac{r_y}{y}$$

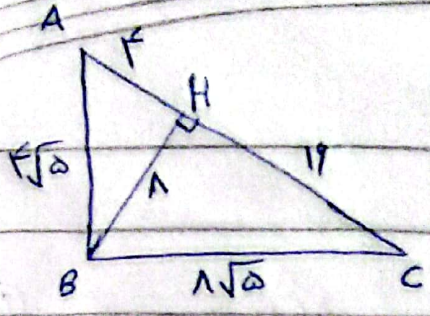
$$\frac{DE}{FC} = \frac{r_y}{2n} \Rightarrow \frac{DE}{FC+BF} = \frac{r_y}{2n+r} = \frac{1}{r}$$

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

$$9n = 2n + r$$

$$7n = r \Rightarrow n = \frac{r}{7}$$

$$BC = 2n + r = \frac{r}{7} \times 2 + r = \frac{9r}{7}$$



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

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

$$BC = \sqrt{280}$$

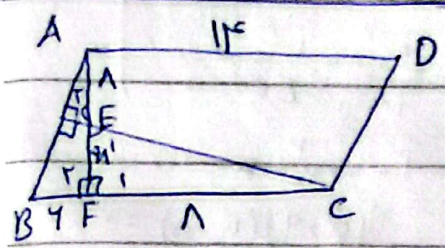
$$AB^2 = AH \times AC = 9 \times 20 = 180$$

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

②

1, 1, 0

$$\frac{17\sqrt{5}}{17\sqrt{2}} = 1 \quad \perp \quad \frac{1}{1}$$



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

③

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

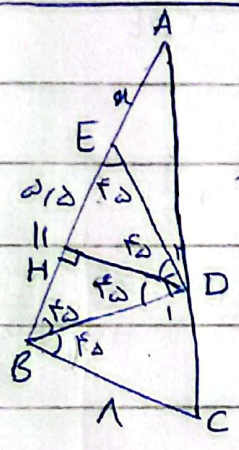
$$12^2 + 12x = 12 \rightarrow 12x + 12m - 12 = 0$$

5

$$(12+x)(12-x) = 0$$

$$x = -12 \quad \text{و} \quad x = 12$$

$$AF = AE + EF = 4 + 8 = 12$$



④ سوال غیر مستقیم اشاره می کند مثلث ABC در زاویه B قائمه است. ارتفاع وارد بر BE را رسم می کنیم. از آنجا که BD میسازد $\angle B = 90^\circ$ است. باریم:

$$\left. \begin{matrix} HD = HD \\ \angle D_1 = \angle E_1 \\ \angle D_2 = \angle E_2 \end{matrix} \right\}$$

$$\triangle BHD \cong \triangle EHD \Rightarrow$$

$$BH = HE = 11$$

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

5

$$HD = EH = BH = 5.5$$

$HD \parallel BC$

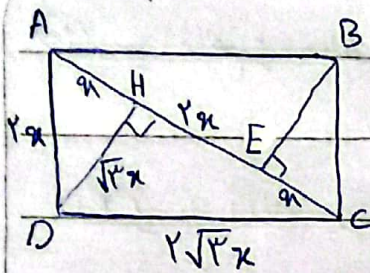
$$\frac{AH}{HB} = \frac{HD}{BC - HD} \Rightarrow \frac{5.5 + x}{5.5} = \frac{5.5}{11 - 5.5}$$

$$\frac{5.5 + x}{5.5} = \frac{5.5}{5.5} = 1$$

$$40.5 = 5.5x + 27.5$$

$$5.5x = 13 \rightarrow x = 2.36$$

$$x = AE = 2.36$$



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

$$DH^2 = x^2 \rightarrow DH = \sqrt{x}$$

$$AD^2 = AH^2 + DH^2 \rightarrow AD^2 = x^2 \rightarrow AD = x$$

$$DC^2 = DH^2 + HC^2 \rightarrow DC^2 = 12x^2$$

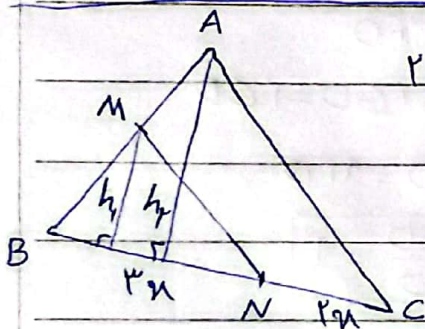
$$DC = 2\sqrt{3}x$$

کوئی چیز سے ایک بار سہو ΔAHD و ΔBEC اور

$$S_{ABCD} = AD \times DC = 2\sqrt{3}x^2$$

$$S_{\Delta ADH} = \frac{AH \times HD}{2} = \frac{\sqrt{x} \times x}{2}$$

$$\frac{S_{ABCD}}{S_{\Delta ADH}} = \frac{2\sqrt{3}x^2}{\frac{\sqrt{x} \times x}{2}} = 4$$



$$x_{BN} = x_{NC}$$

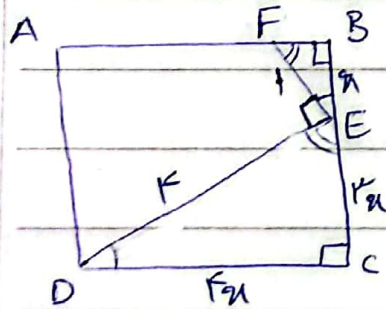
ارتفاع h_1 سے ΔBMN

و ارتفاع h_2 سے ΔABC میں

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

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

$$h_1 \parallel h_2 \rightarrow \frac{BM}{AB} = \frac{h_2}{h_1} = \frac{2}{x} \rightarrow \frac{BM}{BM+MA} = \frac{2}{x} \rightarrow \frac{BM}{MA} = \frac{2}{x-2} = \frac{2}{1}$$



$$\frac{AE}{AF} = \frac{ED}{FE} \rightarrow \frac{EB}{FB} = \frac{DC}{CE}$$

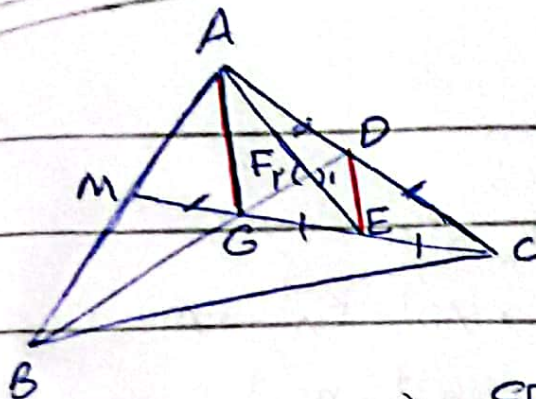
$$\frac{DE}{EF} = \frac{EC}{FB} = \frac{DC}{BE} = x$$

$$BE = x \rightarrow DC = 2x$$

$$DC = BC \rightarrow DC = x \rightarrow EC = x \rightarrow BE = x$$

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

$$S_{ABCD} = 2 \times 2 = 4$$



⑩ میانه‌ها هم از یک نقطه می‌گذرند و

$$GE = EC = MG$$

BD یک میانه است پس $AD = DC$

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

طبق قضیه عکس تالس

بنابراین خط DE موازی AG است

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

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

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

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

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

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

