

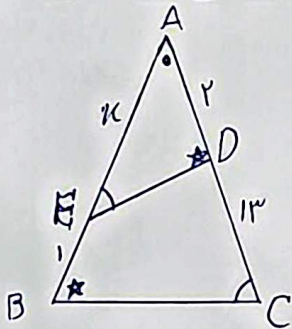
$$ED = 2AE$$

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

$$\triangle FBC \sim \triangle FAE \Rightarrow \frac{AF}{FC} = \frac{EF}{FB} = k$$

$$\begin{aligned} AC^2 &= AD^2 + CD^2 \sim AC = 3\sqrt{2}k \\ BE^2 &= AB^2 + AE^2 \sim BE = \sqrt{10}k \end{aligned} \Rightarrow \begin{cases} \frac{z}{y} + \frac{yz}{y^2} = 3\sqrt{2}k \\ \frac{y}{z} + \frac{yz}{z^2} = \sqrt{10}k \end{cases} \Rightarrow \begin{cases} z(1+k) = 3\sqrt{2}k \\ y(1+k) = \sqrt{10}k \end{cases}$$

$$\frac{y}{z} = \frac{EF}{AF} = \frac{\sqrt{5}}{3} \quad \leftarrow \quad \frac{z}{y} = \frac{3\sqrt{2}}{\sqrt{10}}$$

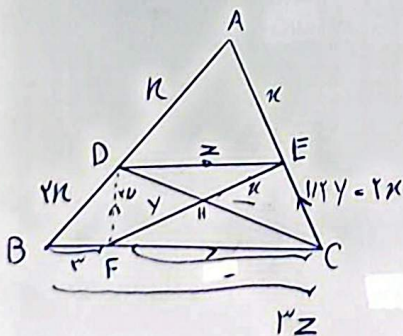


$$k = ? \quad \triangle AED \sim \triangle ACB \Rightarrow \triangle ACB \sim \triangle AED$$

$$\frac{AE}{AC} = \frac{AD}{AB} \Rightarrow \frac{k}{1} = \frac{2}{k+1} \rightarrow k^2 + k = 2$$

$$k = 1$$

$$k^2 + k - 2 = 0 \rightarrow (k+2)(k-1) = 0 \rightarrow \begin{cases} k = 1 \checkmark \\ k = -2 \text{ (مردود)} \end{cases}$$



$$\begin{aligned} DE &\parallel BC \\ 3y &= 5k \\ BF &= 3 \\ BC &= ? \end{aligned}$$

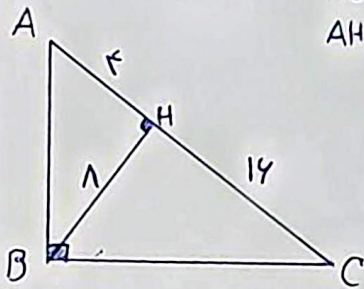
$$DE = BC$$

$$\triangle DEH \sim \triangle FCH \rightarrow \frac{EH}{FH} = \frac{DE}{FC}$$

$$\sim \frac{3}{5} = \frac{DE}{3DE - 3}$$

$$9DE - 9 = 5DE$$

$$4DE = 9 \rightarrow DE = \frac{9}{4} \xrightarrow{I} BC = \frac{9\sqrt{5}}{4} \checkmark$$



$$AC = 20 \quad AB = ?$$

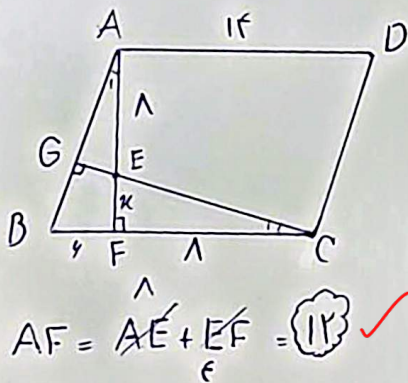
$$AH = \epsilon \quad BC = ?$$

$$\Rightarrow \frac{BC}{AB} = \sqrt{\frac{20}{10}} = \sqrt{2} = \underline{\underline{2}} \quad (2) \quad (4)$$

$$BH^2 = AH \times CH \rightarrow BH = 4$$

$$AB^2 = AH^2 + BH^2 \rightarrow 14 + 4\epsilon = AB^2 \sim \boxed{AB = \sqrt{18}} \quad (2)$$

$$BC^2 = BH^2 + CH^2 \rightarrow 4\epsilon + 20\epsilon = BC^2 \sim \boxed{BC = \sqrt{240}} \quad (2)$$



$$AF = ?$$

$$\triangle AFB \sim \triangle CGE \Rightarrow \hat{A}_1 = \hat{C}_1$$

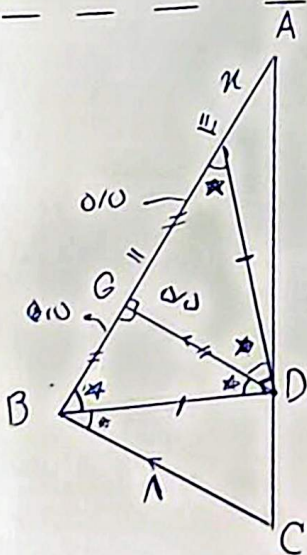
$$\triangle AFB \sim \triangle CGE \Rightarrow \frac{EF}{BF} = \frac{FC}{AF} \rightarrow \frac{\kappa}{\epsilon} = \frac{\lambda}{\lambda + \kappa}$$

$$\kappa + \lambda\kappa - \epsilon\lambda = 0$$

$$(\kappa - \epsilon)(\kappa + 12) = 0$$

$$\kappa \begin{cases} \boxed{\epsilon} \\ -1200\epsilon \end{cases}$$

$$AF = AE + EF = \underline{\underline{12}} \quad (2) \quad (4)$$



$$AE = ?$$

$$\begin{cases} \hat{A} + \hat{O} = 90^\circ \\ \hat{A} = 50^\circ \end{cases} \rightarrow \hat{O} = 40^\circ$$

$$\hat{B} = 90^\circ$$

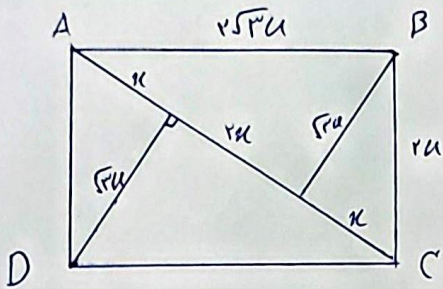
$$\frac{AG}{AB} = \frac{GD}{BC} \Rightarrow \frac{\kappa + \omega/\omega}{12 + \kappa} = \frac{\omega/\omega}{14}$$

$$14\kappa + 44 = 40\omega + \omega/\omega\kappa$$

$$14/\omega = 4/\omega\kappa$$

$$\boxed{\kappa = 4/9} \quad (2) \quad (4)$$

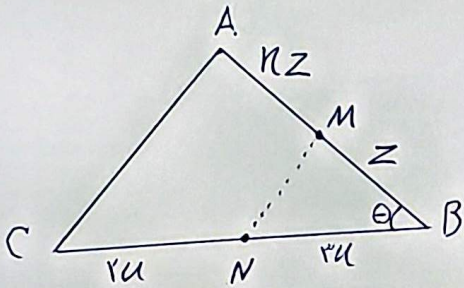
$$\frac{S_{\square}}{S_{\triangle ABC}} \Rightarrow \frac{\frac{1}{2} \times \sqrt{3} \times \sqrt{3}}{\frac{1}{2} \times \sqrt{3} \times \sqrt{3}} = \frac{1}{1} \quad (1)$$



$$BC = DC = \sqrt{k \times 3u} = \sqrt{3}u$$

$$AB^2 = CD^2 = 3u^2 + 9u^2 = 12u^2$$

$$BC^2 = AD^2 = 3u^2 + u^2 = 4u^2$$

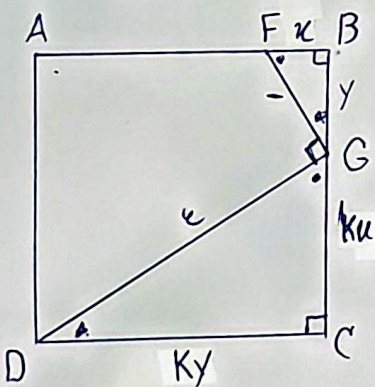


$$S_{\triangle ABC} = 3 S_{\triangle MNC}$$

$$\frac{BM}{AM} \cdot \frac{1}{k} = \frac{\frac{\Delta}{F}}{F} \quad (2)$$

$$3 = \frac{\frac{1}{2} \sin \theta \times z \times (1+k) \times \Delta u}{\frac{1}{2} \sin \theta \times 3u \times z} \Rightarrow \frac{9}{8} = k+1$$

$$k = \frac{1}{8}$$



$$AB \cdot CD = \text{ج} \Rightarrow S_{\square}$$

$$BFG \sim CGD$$

$$\begin{cases} k^2 + y^2 = 1 \\ k^2(k^2 + y^2) = 14 \end{cases} \Rightarrow k = \frac{1}{2}$$

$$ky = ku + y$$

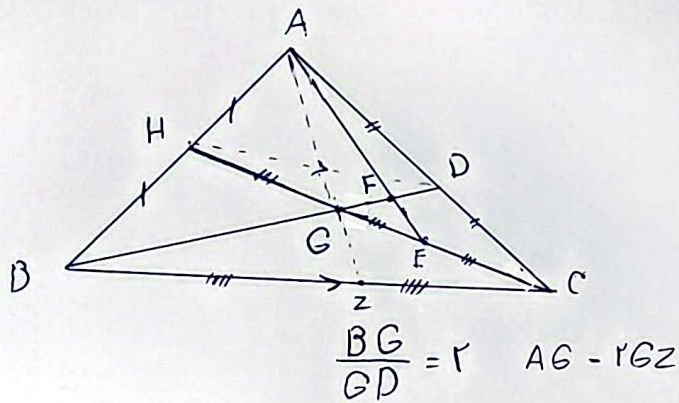
$$fy - y = fu \Rightarrow 3y = fu$$

$$y = \frac{f}{3}u \Rightarrow k^2 + \frac{14}{9}u^2 = 1 \Rightarrow k^2 \left(\frac{9}{9} \right) = 1$$

$$S = \left(\frac{f}{3}u + ku \right)^2$$

$$\left(\frac{f}{3} + \frac{14}{9} \right)^2 = \frac{106}{9} \quad (3)$$

$$k = \frac{1}{2}$$



$$CE = EG = GH$$

$$BD = \underset{2FD}{BG} + \underset{2FD}{GD} = \underset{4FD}{9FD}$$

$$\Rightarrow \frac{BD}{FD} = \frac{9FD}{FD} = 9 \quad \checkmark$$

G = مرکز ثقل = محل برخورد میانه‌ها در مثلث
(حاده $\triangle ABC$)

(۱۰)

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

(۲)

F = میانه مثلث حاده
($\triangle AGC$)

$$GF = 2FD$$

$$GD = GF + FD$$

$$GD = 3FD$$