

به نام خدا

Subject:

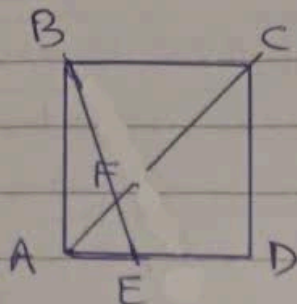
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بسم

روزاد حاجن بابا ئش - کلیل شماره ۲۱ - یازدهم () page: ()



$$\left. \begin{array}{l} \hat{A}FE = \hat{B}FC \quad \text{مقابل: (س)} \\ \hat{B}CF = \hat{CAD} \quad \text{منظره موازی} \end{array} \right\} \Rightarrow \Delta BFC \sim \Delta AFE$$

$$\Rightarrow \frac{AE}{BC} = \frac{FE}{BF} = \frac{AF}{FC} = \frac{1}{3} \Rightarrow \frac{AE}{BC} = \frac{AE}{AB} = \frac{1}{3}$$

$$ED = 2AE \rightarrow ED + AE = AD = 3AE \Rightarrow BC = 3AE \quad \left(\Rightarrow \frac{FE}{BE} = \frac{AF}{AC} = \frac{1}{5} \right)$$

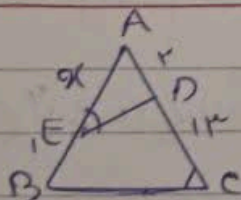
$$\Rightarrow \left\{ \begin{array}{l} AE = x \\ AB = 3x \end{array} \right. \Rightarrow \Delta ABE : AE^2 + AB^2 = BE^2 \Rightarrow x^2 + 9x^2 = 10x^2 = BE^2$$

$$\Rightarrow BE = \sqrt{10}x \Rightarrow FE = \frac{\sqrt{10}}{5}x$$

$$AB = 3x \Rightarrow \left\{ \begin{array}{l} CD = 3x \\ AD = 3x \end{array} \right. \Rightarrow \Delta ADC : AD^2 + CD^2 = AC^2 \Rightarrow 18x^2 = AC^2$$

$$\Rightarrow AC = 3\sqrt{2}x \Rightarrow AF = \frac{3\sqrt{2}}{5}x$$

$$\frac{EF}{AF} = \frac{\frac{\sqrt{10}}{5}x}{\frac{3\sqrt{2}}{5}x} = \frac{\sqrt{10}}{3\sqrt{2}} = \frac{\sqrt{5}}{3} \Rightarrow \frac{EF}{AF} = \frac{\sqrt{5}}{3}$$



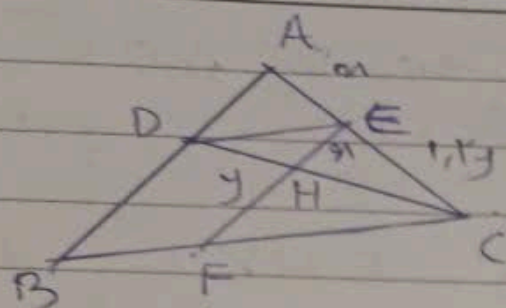
$$\left. \begin{array}{l} \hat{A} = \hat{A} \\ \hat{E} = \hat{C} \end{array} \right\} \Rightarrow \Delta ADE \sim \Delta ABC$$

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

$$\Rightarrow \frac{y}{3} = \frac{x}{5} \Rightarrow x(3+1) = 30 \Rightarrow x^2 + x - 30 = 0 \Rightarrow (x+6)(x-5) = 0$$

$$\Rightarrow \left\{ \begin{array}{l} x = -6 \quad \times \\ x = 5 \quad \checkmark \end{array} \right. \Rightarrow x = 5$$

$$xy = \delta a \rightarrow \frac{x}{\delta} y = a$$



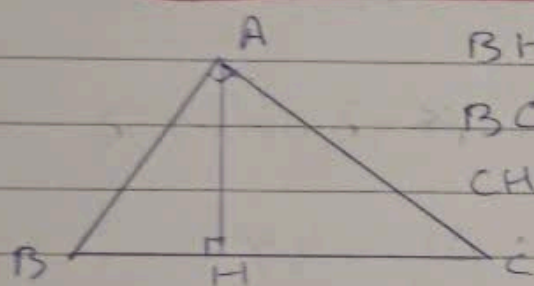
$$\begin{aligned} \hat{DHE} &= \hat{FHC} \quad \text{vertical angles} \\ \hat{DEF} &= \hat{EFC} \quad \text{alternate angles} \end{aligned} \Rightarrow \triangle DHE \sim \triangle FHC$$

$$\Rightarrow \frac{DE}{FC} = \frac{DH}{HC} = \frac{EH}{FH} = \frac{x}{y} = \frac{r}{a} = 0.4$$

$$DE \parallel BC \rightarrow \frac{AE}{AC} = \frac{DE}{BC} \Rightarrow \frac{a}{a+1.4y} = \frac{0.4y}{1.4y} = \frac{1}{3.5} \Rightarrow a = 0.4y$$

$$\frac{DE}{FC} \times \frac{BC}{DE} = \frac{r}{a} \times r \Rightarrow \frac{BC}{FC} = \frac{9}{a} \Rightarrow \frac{BC}{BC-r} = \frac{9}{a} \Rightarrow \triangle ABC = 9BC - rV$$

$$\Rightarrow rV = FBC \Rightarrow BC = \frac{rV}{F} = 4.14a$$



$$BH = r$$

$$BC = r_0$$

$$CH = 14$$

$$BH \cdot BC = AB^2 \Rightarrow r \cdot r_0 = E_0 = AB^2$$

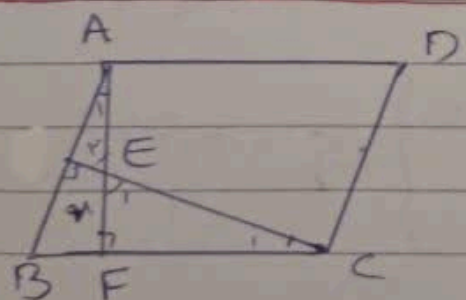
$$\Rightarrow AB = \sqrt{E_0} = r\sqrt{r_0}$$

$$AC^2 = CH \cdot BC \Rightarrow 14 \times r_0 = AC^2$$

$$\Rightarrow AC = \sqrt{r r_0} = 1\sqrt{a}$$

$$\text{نسبت طول اضلاع} = \frac{AB}{AC} = \frac{r\sqrt{r_0}}{1\sqrt{a}} = \frac{\sqrt{r}}{r}$$

ABC مثلث قائم الزاویه



$$AD = 1r$$

$$BF = y$$

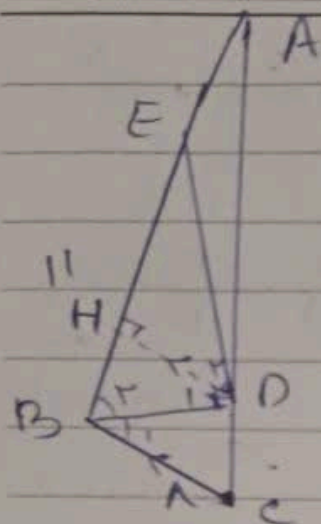
$$AE = 1$$

$$\begin{aligned} \hat{E}_1 + \hat{C}_1 &= 90^\circ \\ \hat{E}_r + \hat{A}_1 &= 90^\circ \\ \hat{E}_1 &= \hat{E}_r \end{aligned} \Rightarrow \hat{A}_1 = \hat{C}_1$$

$$\left. \begin{aligned} \hat{A}_1 &= \hat{C}_1 \\ \hat{E} &= 90^\circ \end{aligned} \right\} \Rightarrow \triangle EFC \sim \triangle ABF \Rightarrow \frac{EF}{BF} = \frac{FC}{AF} \Rightarrow \frac{a}{y} = \frac{1}{1+a} \Rightarrow Aa + a^2 = EA$$

$$\Rightarrow a^2 + 1a - EA = 0 \Rightarrow (a+1r)(a-r) = 0 \Rightarrow \begin{cases} a = r \quad \checkmark \\ a = -1r \quad \times \end{cases}$$

$$AF = AE + a = 1 + E - 1r \Rightarrow AF = 1r$$



پارو خط HD و BC موازی است و HD بر خط AB عمود است
 $\hat{B} = \hat{H} = 90^\circ \Rightarrow \hat{B}_1 = \hat{B}_2 = 45^\circ$ بنابراین :

$$\hat{H} = 90^\circ \rightarrow \hat{D}_1 = \hat{D}_2 = 45^\circ \Rightarrow \hat{E} = 45^\circ$$

$$\hat{B}_2 = 45^\circ$$

پس مثلث BDE قائم الزامیه متساوی الساقین است

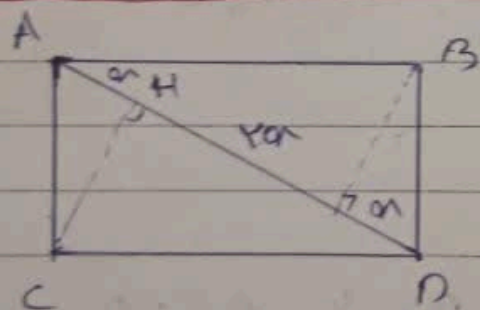
بنابراین : $BH = HE = 2,2$

از طرف : $DH^2 = BH \times HE \Rightarrow DH^2 = 2,2 \times 2,2 \Rightarrow DH = 2,2$

با فرض $AE = x$ و نوشتن رابطه تقسیم النسب داریم :

$$HD \parallel BC \Rightarrow \frac{x + 2,2}{x + 11} = \frac{2,2}{1} \Rightarrow 1x + 2,2 = 2,2x + 24,2$$

$$\Rightarrow 2,2x = 14,2 \Rightarrow x = \frac{14,2}{2,2} = 6,4 \Rightarrow AE = 6,4$$



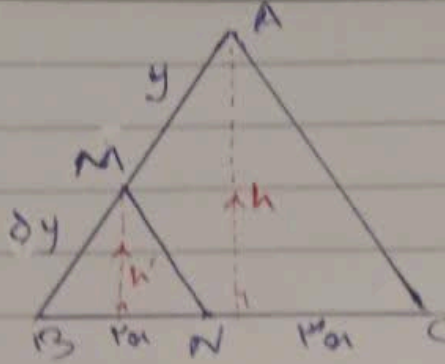
$$CH^2 = x \times 2x = 2x^2 \rightarrow CH = \sqrt{2}x$$

$$S_{\triangle AHC} = x \times \sqrt{2}x \times \frac{1}{2} = \frac{\sqrt{2}}{2}x^2$$

$$\left. \begin{aligned} CD^2 &= 2x \times 2x = 4x^2 \rightarrow CD = 2\sqrt{2}x \\ AC^2 &= x \times 2x = 2x^2 \rightarrow AC = \sqrt{2}x \end{aligned} \right\} \Rightarrow S_{ABCD} = 4\sqrt{2}x^2$$

$$\frac{S_{ABCD}}{S_{\triangle AHC}} = \frac{4\sqrt{2}}{\frac{\sqrt{2}}{2}} = \frac{1\sqrt{2}}{\sqrt{2}} = \frac{1\sqrt{4}}{2} = 2\sqrt{4}$$

مساحت مستطیل $2\sqrt{4}$ برابر مساحت کوچکترین مثلث ایجاد شده در آن است



$$S_{BMN} = S_{ABC} \Rightarrow \frac{1}{2} \times \rho_1 \times h' = \frac{1}{2} \times \rho_1 \times h$$

$$\Rightarrow 4h' = \delta h \Rightarrow h' = \frac{\delta}{4}h$$

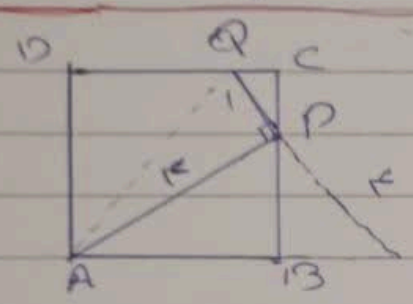
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(A)

$$h' \parallel h \rightarrow \frac{BM}{AB} = \frac{h'}{h} = \frac{\delta}{4} \Rightarrow \begin{cases} BM = \delta y \\ AB = 4y \rightarrow AM = y \end{cases}$$

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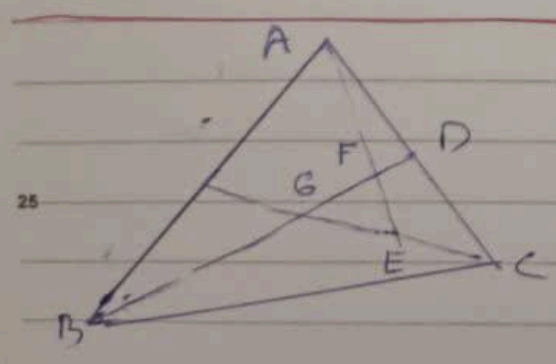
$$\Rightarrow \frac{BM}{AM} = \frac{\delta y}{y} = \delta$$



$$AQ^2 = AP^2 + PQ^2 = r^2 + i^2 \Rightarrow AQ = \sqrt{v}$$

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مركز ثقل مثلث یعنی محل برخورد میانهای آن

$$GE = EC \text{ زیرا } AE \text{ میان است}$$

$$BG = 2GD \quad AF = 2FE$$

$$BD = 3GD \quad AE = 3FE$$

$$GF = 2FD \Rightarrow GD = 3FD$$

مركز ثقل مثلث AGC است

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

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