

$$\triangle ADC \Rightarrow \sqrt{r^2 + r^2} = r\sqrt{2} = AC \quad (1)$$

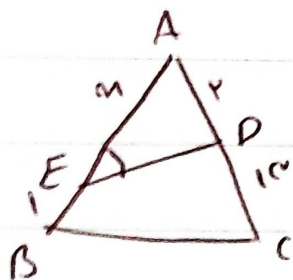
$$\triangle ABE \Rightarrow \sqrt{r^2 + m^2} = \sqrt{10} = BE$$

$$\triangle AFE \sim \triangle CFB \rightarrow \frac{AF}{CF} = \frac{FE}{FB} = \frac{AE}{BC} = \frac{m}{r} = \frac{1}{r}$$

$$AF = y \rightarrow y + ry = r\sqrt{2} \rightarrow y = \frac{r\sqrt{2}}{1+r}$$

$$EF = z \rightarrow rz + z = \sqrt{10} \rightarrow z = \frac{\sqrt{10}}{1+r}$$

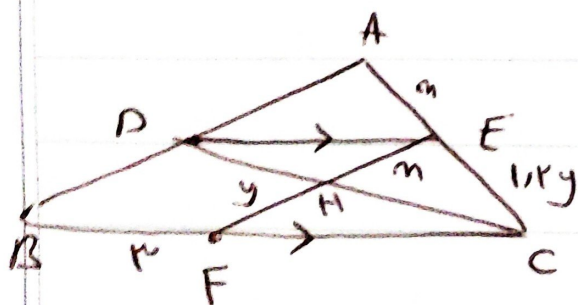
$$\Rightarrow \frac{EF}{AF} = \frac{\frac{\sqrt{10}}{1+r}}{\frac{r\sqrt{2}}{1+r}} = \frac{\sqrt{5}}{r}$$



$$\triangle AED \sim \triangle ACB \rightarrow \frac{AE}{AC} = \frac{ED}{CB} = \frac{AD}{AB} \rightarrow \frac{m}{10} = \frac{r}{m+1}$$

$$\rightarrow m^2 + m - 10r = 0 \quad (m+4) \quad (m-4) = 0$$

$$\text{S.O.E.} \quad \boxed{m=4}$$



$$\triangle ABC \rightarrow \frac{AE}{AC} = \frac{DE}{BC} \rightarrow$$

$$\frac{m}{m+1+r} = \frac{DE}{FC+r} \Rightarrow$$

$$rDE = r + FC \quad (1)$$

$$DE \parallel FC \Rightarrow \frac{DE}{FC} = \frac{EH}{HF} \rightarrow \frac{DE}{FC} = \frac{m}{y} = \frac{x}{\omega} \rightarrow$$

$$\triangle DEF \sim \triangle FCH \quad (1)$$

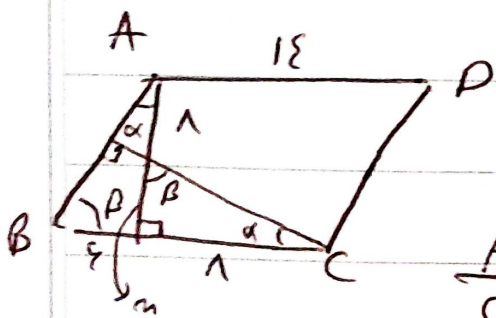
$$(1), (2) \rightarrow m + FC = m\left(\frac{\omega}{\omega}\right) FC \Rightarrow m + FC = \frac{9}{\omega} FC \rightarrow$$

$$\rightarrow \frac{x}{\omega} FC = m \rightarrow FC = m, \omega \quad BC = BF + FC = \underline{9, \omega}$$

$$m^2 = BH \cdot BC \rightarrow m = \sqrt{x \times \omega} = \sqrt{\omega x} \quad (3)$$

$$y^2 = CH \cdot BC \rightarrow y = \sqrt{19 \times \omega} = \sqrt{19\omega}$$

$$\frac{y}{m} = \frac{\sqrt{19\omega}}{\sqrt{\omega x}} = \boxed{F} = \boxed{\frac{1}{F}}$$



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

$$\hat{ABF} = \hat{FEC} \rightarrow \triangle ABF \sim \triangle CEF \quad (4)$$

$$\frac{AF}{CF} = \frac{BF}{EF} \rightarrow \frac{m+\lambda}{\lambda} = \frac{9}{m}$$

$$m^2 + \lambda m - 9\lambda = 0 \quad (m+19)(m-9) = 0 \rightarrow \underline{m=9}$$

$$AF = m + AE = 9 + \lambda = \underline{17}$$

④

اگر سینه ز BD زاویه B

EDB $\rightarrow 2\alpha = 90^\circ \rightarrow$ زاویه در زاویه α متقابل

ب $\alpha = F_1$ و $BC \parallel OP$ و BD و BC موازی

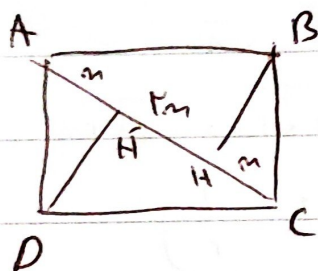
زاویه D نیز 2α

$$\text{جواب} \Rightarrow \frac{AO}{AB} = \frac{OP}{BC}$$

$$m^2 = 2.1 \times 0.1 \rightarrow m = 0.1 \quad \left\{ \begin{array}{l} \frac{y+0.1}{y+11} = \frac{11}{n} \rightarrow \end{array} \right.$$

$$14y + 11 = 11y + 121$$

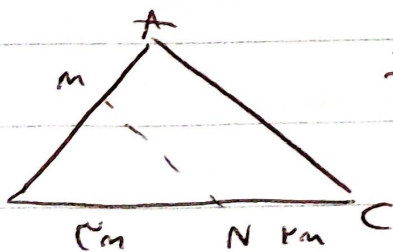
$$3y = 110 \quad \boxed{y = \frac{110}{3}}$$



$$S_{BHO} = \frac{m \times BH}{2} \quad S_{ABC} = \frac{BH \times em}{2} \quad (V)$$

$$S_{\square} = S_{ABC} + S_{ADC} \Rightarrow BH \times em$$

$$\frac{S_{\square}}{S_{BHO}} = \frac{BH \times em}{\frac{m \times BH}{2}} = 2 \quad (1)$$



$$\frac{S_{ABC}}{S_{DMN}} = \frac{\frac{1}{2} \times AB \times BC \times \sin B}{\frac{1}{2} \times BM \times BN \times \sin B} = 4 \quad (2)$$

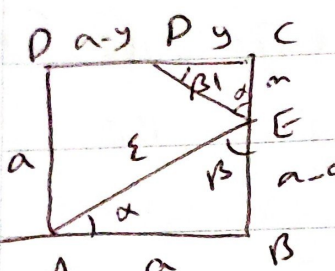
$$\frac{AB \times m}{BM \times n} = \frac{4}{1}$$

$$\frac{AB \times m}{BM \times n} = 4 \rightarrow \frac{AB}{BM} = \frac{4}{m}$$

$$\frac{AM}{BM} = \frac{4}{m} \rightarrow \boxed{\frac{BM}{AM} = \frac{m}{4}}$$

Subo

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$$DEC \sim EAB \rightarrow \frac{DC}{EB} = \frac{EC}{AB} = \frac{DE}{EA} \quad (9)$$

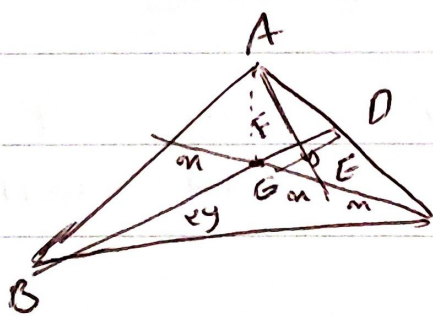
$$\Rightarrow \frac{y}{a-m} = \frac{m}{a} = \frac{1}{\epsilon} \rightarrow \begin{aligned} a &= \epsilon m \\ a-m &= \epsilon y \end{aligned}$$

$$\rightarrow \epsilon m = \epsilon y \quad \frac{m}{y} = \frac{\epsilon}{a}$$

فیثاغورث $ABE \rightarrow 14^2 = a^2 + (a-m)^2 \rightarrow 14^2 = 14m^2 + 9m^2$

$$a^2 = \frac{14}{20} \rightarrow m = \frac{\epsilon}{a} \quad a = \epsilon m \quad a = \frac{14}{a}$$

حاصل $a^2 = \frac{14 \times 14}{20 \times 20} = \frac{204}{20} = 10.2$



۱۹) G محل برخورد میانه‌های مثلث ABC است

و میانه‌ها یکدیگر را ۲:۱ نسبت به ۲ قطع می‌کنند

در مثلث AGC، AK، GP، میانه‌ها و هم‌را

به F قطع می‌کنند

$$GF = \frac{2}{3} y \quad FD = \frac{1}{3} y \quad \frac{GD}{FD} = \frac{2y}{\frac{1}{3} y} = 6$$