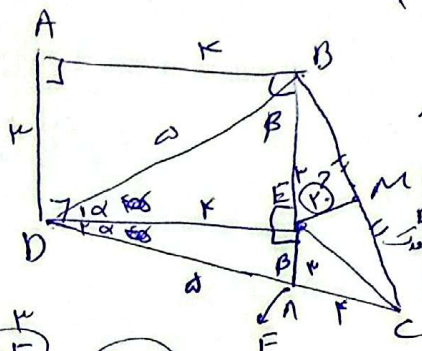
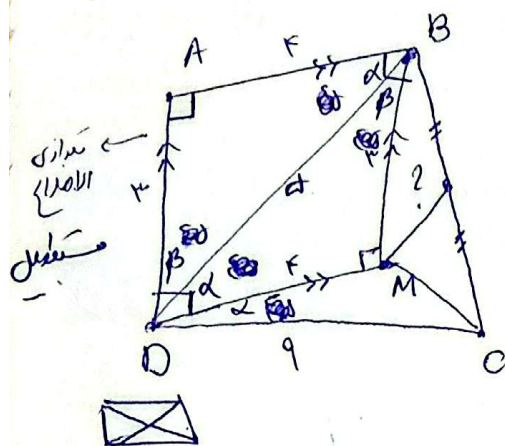


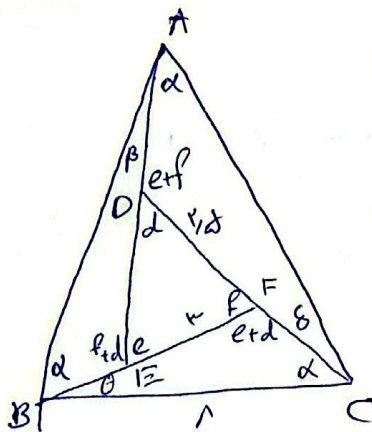
$$\frac{S_{\triangle BCE}}{S_{\triangle ODE}} = \frac{\frac{1}{2} BC \times h}{\frac{1}{2} \times DE \times h} = \frac{BC}{DE} = \frac{12}{4} = \frac{3}{1} = 3$$

$$DE \parallel BC \Rightarrow \frac{AD}{AB} = \frac{DE}{BC} = \frac{4}{12}$$



ABDE مثلث متساوی الساقین
 $\hat{D}_1 = \hat{E}_1 = \alpha$
 $\hat{D}_2 = \hat{E}_2 = \beta$
 $\hat{E} = \hat{E} = \alpha_0$
 $\triangle ABE \cong \triangle AFE$
 زیرا

$$\frac{BE}{BF} = \frac{EM}{FC} \Rightarrow FC \parallel EM$$



$$e + f + d = 180$$

$$p + f + d + s = 180$$

$$\Rightarrow d + s = d$$

$$\hat{C} = \hat{d}$$

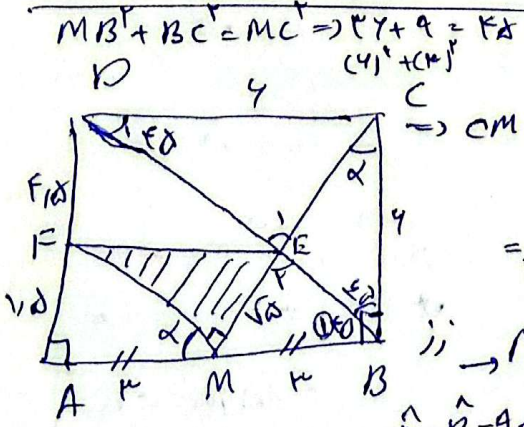
$$\hat{B} = \hat{f}$$

$$\hat{A} = \hat{e}$$

$$\Rightarrow \triangle ABC \sim \triangle DEF$$

$$\triangle ABC \sim \triangle DEF \Rightarrow \frac{AB}{EF} = \frac{BC}{FD}$$

$$\Rightarrow AB = \frac{EF}{FD} = \frac{9}{12} = \frac{3}{4}$$



$$MB^2 + BC^2 = MC^2 \Rightarrow 4^2 + 9 = FA^2$$

$$FA = 5$$

$$CM = \sqrt{FA} = \sqrt{5}$$

$$FM \perp ME \Rightarrow FM \times ME = \frac{1}{2} \sqrt{11} \times \sqrt{2} = \frac{\sqrt{22}}{2}$$

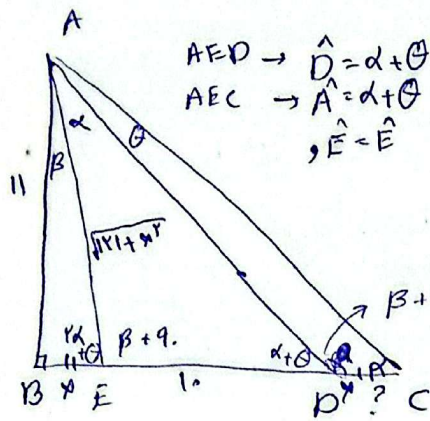
$$\triangle MBC \sim \triangle FAM \Rightarrow \frac{BC}{AM} = \frac{MB}{AF}$$

$$\Rightarrow \frac{CE}{EM} = 2$$

$$\Rightarrow CE = 2EM$$

$$\triangle AFM \Rightarrow AF^2 + FM^2 = MF^2 \Rightarrow (10)^2 + (x)^2 = 11 \times 2 \Rightarrow FM = \sqrt{11}$$

$$\Rightarrow AF = \frac{3 \times 2}{\sqrt{11}} = \frac{6}{\sqrt{11}}$$



$$\begin{aligned} \triangle AED &\rightarrow \hat{D} = \alpha + \gamma \\ \triangle AEC &\rightarrow \hat{A} = \alpha + \gamma \\ &\Rightarrow \hat{D} = \hat{A} \Rightarrow \triangle AED \sim \triangle AEC \end{aligned}$$

$$\begin{matrix} A & E & D \\ C & E & A \end{matrix}$$

$$\begin{aligned} \triangle AED &\rightarrow \hat{A} = \alpha \\ \triangle AEC &\rightarrow \hat{C} = \alpha \end{aligned}$$

$$\frac{AE}{CE} = \frac{ED}{EA} = \frac{AD}{CA}$$

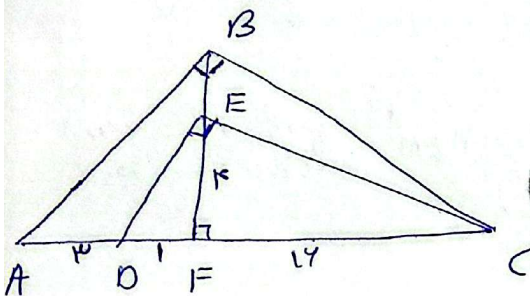
$$\Rightarrow 11 + x = 1 + 1 \cdot x$$

$$\Rightarrow x - 1 + x = 1$$

$$(x-1)(x-1) = 1$$

$$\begin{cases} x = 3 \\ x = 1 \end{cases}$$

9



$$BC = ?$$

$$\triangle EFC \sim \triangle DFC \Rightarrow EF^2 = DF \cdot FC$$

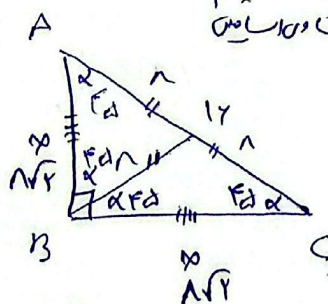
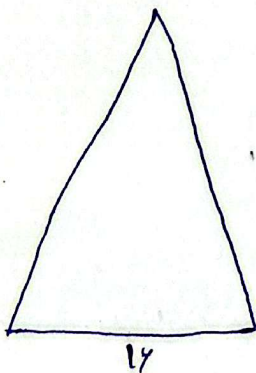
$$11^2 = 1 \cdot FC \Rightarrow FC = 121$$

$$\triangle BFC \sim \triangle CFC \Rightarrow BC^2 = CF \cdot AC$$

$$\Rightarrow BC = \sqrt{121 \cdot 121} = 121$$

$$= \sqrt{121 \cdot 121}$$

9



$$x^2 + y^2 = (11)^2$$

$$\Rightarrow x^2 + y^2 = 121 \Rightarrow x = \frac{11}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$= 11\sqrt{2}$$

$$AB^2 + BM^2 = AM^2$$

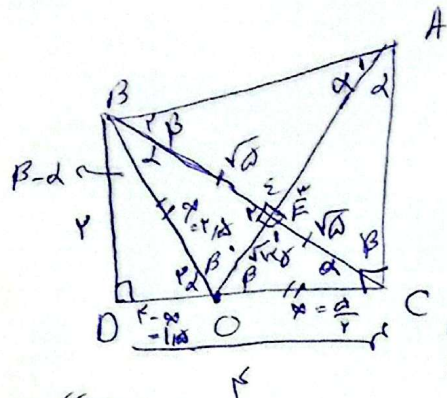
$$11^2 + 11^2 = 14^2$$

$$\Rightarrow AM = 11\sqrt{2}$$

9

المسألة ١٢

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$$S_{ABE} = \frac{1}{2} AE \cdot BE = \sqrt{a} \times \sqrt{a} \times \frac{1}{2} = \boxed{a}$$

$$B + d = 9$$

$$\triangle OBE \cong \triangle OEC \Rightarrow \begin{cases} \hat{E}_1 = \hat{E}_2 = 90^\circ \\ EO = EO \\ OC = OB \end{cases} \Rightarrow EB = EC$$

$$\triangle ABE \cong \triangle AEC \Rightarrow \begin{cases} \hat{A}_1 = d \\ \hat{B}_1 = B \end{cases}$$

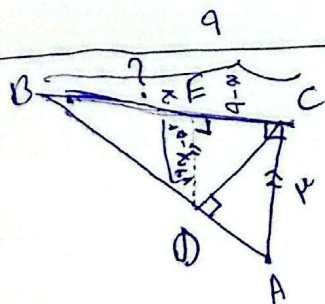
في المثلث BDC

$$DB^2 + DC^2 = BC^2 \Rightarrow \left(\frac{r}{2}\right)^2 + \left(\frac{r}{2}\right)^2 = BC^2 \Rightarrow BC = \sqrt{r} = \sqrt{a}$$

$$\text{في المثلث BDO} \Rightarrow BD^2 + DO^2 = BO^2 \Rightarrow r + 14 + 9x^2 - 14x = r^2 \Rightarrow 14x - 14 = 9x^2 - r^2 \Rightarrow x = \frac{d}{r}$$

$$\text{في المثلث OEC} \Rightarrow \left(\frac{a}{2}\right)^2 + (OE)^2 = OC^2 \Rightarrow OE = \sqrt{r \cdot d}$$

$$\begin{aligned} \hat{A}_1 = d, \hat{B}_1 = B &\Rightarrow \triangle ABE \sim \triangle COE \\ \Rightarrow \frac{AB}{CO} &= \frac{BE}{OE} = \frac{AE}{CE} \Rightarrow \frac{\sqrt{a}}{\sqrt{r \cdot d}} = \frac{AE}{\sqrt{a}} \Rightarrow AE = \frac{d}{\sqrt{r \cdot d}} = \sqrt{\frac{r \cdot d}{r \cdot d}} = \sqrt{r} \\ &= \sqrt{a} \end{aligned}$$



$$DE^2 = EC \cdot EB = (9 - x)(x) = 9x - x^2$$

$$\Rightarrow DE = \sqrt{9x - x^2}$$

$$DE \parallel AC \Rightarrow \frac{BE}{BC} = \frac{DE}{AC}$$

$$x = \sqrt{9x - x^2}$$

$$\xrightarrow{\text{تربيع الطرفين}} x^2 = 9(9x - x^2) \Rightarrow 11x - 9x^2 = 0$$

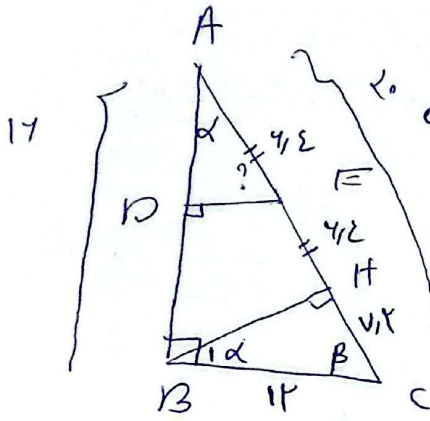
$$11x - 9x^2 = 0$$

$$x(11 - 9x) = 0$$

$$\Rightarrow 11x = 11 \Rightarrow \boxed{x = 11}$$

9 bis 10/12

10



Pythagoras: $AB^2 + BC^2 = AC^2$
 $(17)^2 + (12)^2 = AC^2 \Rightarrow AC = 21$

$\hat{C} = \hat{B}$
 $\hat{B}_1 = \alpha$
 $\hat{A} = \alpha$

$\triangle HBC \sim \triangle ABC$

$\frac{BC}{AC} = \frac{HC}{BC} \Rightarrow \frac{12}{21} = \frac{HC}{12}$

$\Rightarrow HC \times 21 = 144 \Rightarrow HC = \frac{144}{21} = \frac{48}{7}$

$AE = AC - HC = \frac{21 \times 7 - 48}{7} = \frac{147 - 48}{7} = \frac{99}{7} = 14\frac{1}{7}$

$\hat{B} = \hat{D} = 90^\circ \Rightarrow DE \parallel BC \Rightarrow \frac{DE}{BC} = \frac{AE}{AC} \Rightarrow \frac{DE}{12} = \frac{14\frac{1}{7}}{21} \Rightarrow \frac{DE}{12} = \frac{104}{147} \Rightarrow DE = \frac{12 \times 104}{147} = \frac{1248}{147} = \frac{416}{49} = 8\frac{24}{49}$