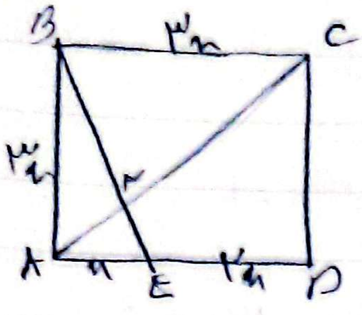
Date: Sub: به نام خدا [illegible]

۱-



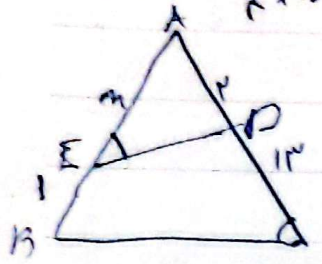
$AC = ۳\sqrt{۲}x$

$BE = \sqrt{۱۰}x$

$\overset{\triangle}{BCF} \sim \overset{\triangle}{AFE} \longrightarrow AF = \frac{۱}{۴}AC \quad EF = \frac{۱}{۴}BE$

$$\frac{EF}{AF} = \frac{\frac{۱}{۴}\times\sqrt{۱۰}x}{\frac{۱}{۴}\times۳\sqrt{۲}x} = \boxed{\frac{\sqrt{۵}}{۳}}$$

۲-

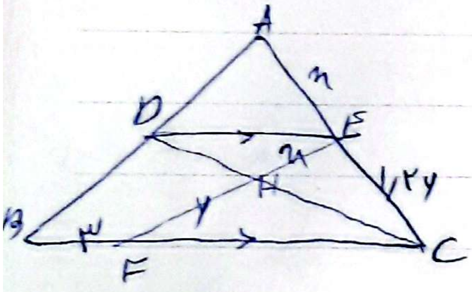


$$A\overset{\triangle}{E}D \sim A\overset{\triangle}{C}B \longrightarrow \frac{\overset{x}{AE}}{\underset{۱۵}{\cancel{AC}}} = \frac{\overset{۲}{AD}}{\underset{x+۱}{\cancel{AB}}}$$

$x^۲ + x = ۳۰ \to x^۲ + x - ۳۰ = ۰ \quad (x+۶)(x-۵) = ۰$

$\boxed{x = ۵}$

۳-

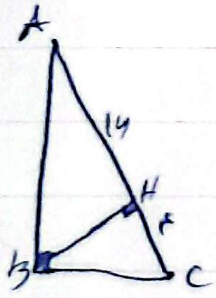


$$\frac{DE}{FC} = \frac{x}{y} = \frac{۳}{۵} \longleftarrow H\overset{\triangle}{D}E \sim H\overset{\triangle}{C}F$$

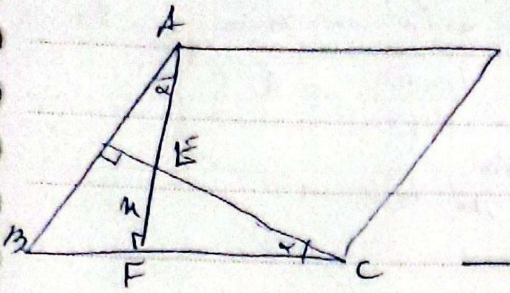
$$DE \parallel BC \longrightarrow \frac{DE}{\underset{FC+۳}{BC}} = \frac{x}{۱/۲y} = \frac{۱}{۳}$$

$$\frac{FC+۳}{DE} = ۳ \to \underset{\frac{۵}{۳}}{\frac{FC}{DE}} + \frac{۳}{DE} = ۳ \longrightarrow DE = \frac{۹}{۴} \Rightarrow BC = ۳\times\frac{۹}{۴} = \boxed{۶/۷۵}$$

۴-



$$\left.\begin{array}{l} BC^۲ = \overset{۴}{\cancel{CH}} \times \overset{۲۰}{\cancel{AC}} \longrightarrow BC = ۴\sqrt{۵} \\ AB^۲ = \underset{۱۶}{AH} \times \underset{۲۰}{\cancel{AC}} \longrightarrow AB = ۸\sqrt{۵} \end{array}\right\} \begin{array}{l} \frac{AB}{BC} = \boxed{۲} \\ \frac{BC}{AB} = \boxed{\frac{۱}{۲}} \end{array}$$

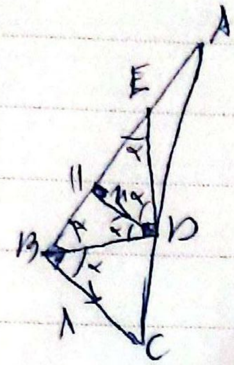


۵-

$A\overset{\triangle}{B}F \sim C\hat{E}F \longrightarrow \frac{AF}{CF} = \frac{BF}{EF} \Rightarrow \frac{x+۸}{۸} = \frac{۶}{x}$

$\longrightarrow x^۲+۸x-۴۸=۰ \quad (x+۱۲)(x-۴)=۰ \longrightarrow \boxed{x=۴}$

$AF = x+AE = ۴+۸ = \boxed{۱۲}$



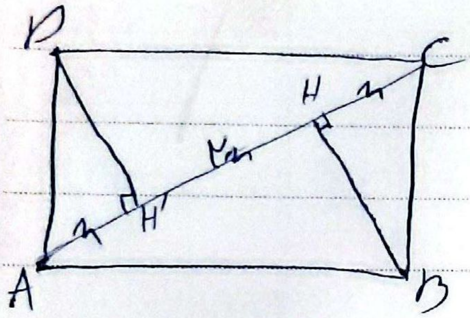
۶-

$۲\alpha = ۹۰ \longrightarrow \alpha = ۴۵$

$BC \parallel OD, \ BD/ \longrightarrow \hat{D} = ۲\alpha \Rightarrow E\hat{D}B$ متساوی الساقین

$x^۲ = ۵,۵ \times ۵,۵ \longrightarrow x = ۵,۵$

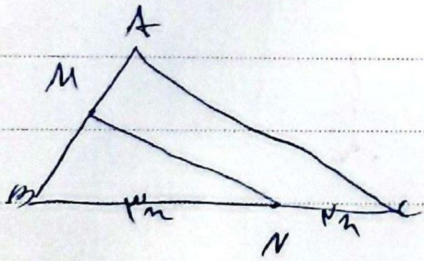
$\frac{AD}{AB} = \frac{OD}{BC} \longrightarrow \frac{y+۵,۵}{y+۱۱} = \frac{۵,۵}{۸} \longrightarrow y = \frac{۳۳}{۵} = \boxed{۶,۶}$



۷-

$S_{B\hat{H}C} = \frac{HB \times x}{۲} \quad S_{AB\overset{\square}{C}D} = ۲S_{A\overset{\triangle}{B}C} = ۲ \times \frac{BH \times ۴x}{۲}$

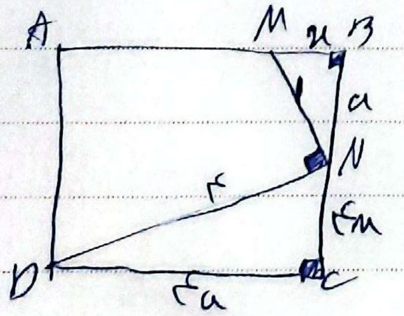
$\frac{S_{AB\overset{\square}{C}D}}{S_{B\overset{\triangle}{H}C}} = \boxed{۸}$



۸-

$\frac{S_{A\overset{\triangle}{B}C}}{S_{B\overset{\triangle}{M}N}} = ۳ = \frac{\cancel{\frac{۱}{۲}} \times AB \times \overset{۵x}{\cancel{BC}} \times \cancel{\sin B}}{\cancel{\frac{۱}{۲}} \times BM \times \underset{۳x}{\cancel{BN}} \times \cancel{\sin B}}$

$\longrightarrow \frac{AB}{BM} = \frac{۹}{۵} \quad \frac{\overset{AM}{AB-BM}}{BM} = \frac{۴}{۵} \longrightarrow \boxed{\frac{BM}{MA} = \frac{۵}{۴}}$

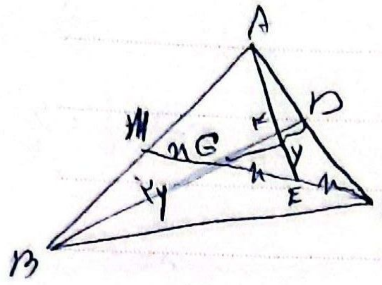


۹-

$M\overset{\triangle}{B}N \sim N\overset{\triangle}{C}D \longrightarrow \frac{MN}{DN} = \frac{MB}{NC} = \frac{BN}{DC} = \frac{۱}{۴}$

[illegible] $\longrightarrow ۴x + \cancel{a} = \underset{۳a}{\cancel{۴}a} \longrightarrow a = \frac{۴}{۳}x$

$\left(\frac{۴}{۳}x\right)^۲ + x^۲ = ۱ \longrightarrow x = \frac{۳}{۵} \quad S = \left(\frac{۳}{۵} \times \frac{۴}{\cancel{۳}} \times ۴\right)^۲ = \boxed{۱۰,۲۴}$



۱۰ـ میانه‌ها به نسبت ۱ به ۲ ← میانه GD و $AF \leftarrow A\hat{G}C$

$GF = \frac{2}{3}y$ $FD = \frac{1}{3}y$ $\frac{BD}{FD} = \boxed{9}$

G مرکز ثقل ← BD و CM میانه مثلث $A\hat{B}C$