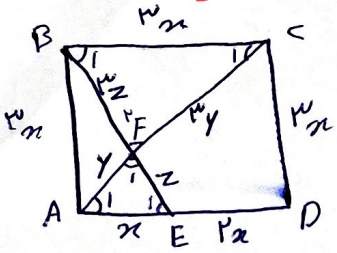
(۲)



$\hat{F}_1 = \hat{F}_2$, $\hat{E}_1 = \hat{A}_1$, $\hat{B}_1 = \hat{E}_1$ $\Rightarrow$ (ززز) $\Delta AFE \sim \Delta BCF$

$(BE)^2 = (3x)^2 + x^2 = 10x^2$

$BE = x\sqrt{10}$

$EF = \frac{x\sqrt{10}}{4}$

$(AC)^2 = (3x)^2 + (3x)^2$

$(AC)^2 = 18x^2$ $AC = x\sqrt{18}$

$AF = \frac{x\sqrt{18}}{4}$

$\frac{EF}{AF} = \frac{\frac{x\sqrt{10}}{4}}{\frac{x\sqrt{18}}{4}} = \frac{\sqrt{10}}{\sqrt{18}} = \sqrt{\frac{10}{18}} = \sqrt{\frac{5}{9}} = \frac{\sqrt{5}}{3}$ ✓

(۲)

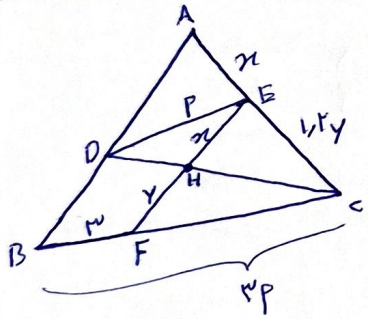
$\frac{4}{x+1} = \frac{x}{15}$ $4x = x^2 + x$ $x^2 + x - 4x = 0$

$(x+3)(x-5) = 0$

$x = 5$ ✓

$x = -3$ ✗

(۲)



$3y = 5x$

$y = \frac{5}{3}x$

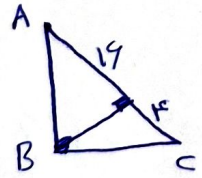
$\frac{5}{3} \times \frac{5}{3} = 2x$

$\frac{x}{3x} = \frac{1}{3}$ $\frac{p}{3p} = \frac{1}{3} = \frac{DE}{BC}$

$\frac{y}{x} = \frac{\frac{5}{3}x}{x} = \frac{5}{3} = \frac{FC}{p} = \frac{\frac{5}{3}p}{p}$ $FC = \frac{5}{3}p$

$3p - \frac{5}{3}p = 3$ $\frac{4}{3}p = 3$ $p = \frac{9}{4}$ $3p = \frac{9}{4} \times 3 = \boxed{\frac{27}{4}}$ ✓

(۲)



$(BC)^2 = 4 \times 20$

$BC = \sqrt{80}$

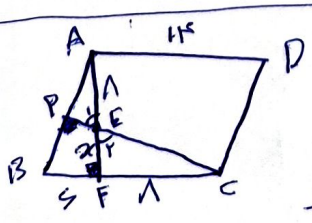
$(AB)^2 = 15 \times 20$

$AB = \sqrt{300}$

$\frac{\sqrt{320}}{\sqrt{80}} = \sqrt{4} = 2$ ✓

$\frac{\sqrt{80}}{\sqrt{320}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$ ✓

(۲)



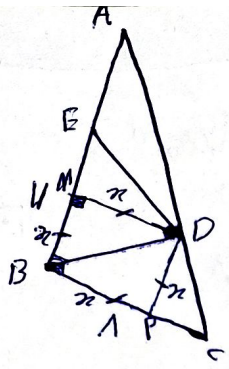
$\hat{E}_1 = \hat{E}_2$, $\hat{F} = \hat{P}$ $\Rightarrow \hat{A} = \hat{C}$

$\hat{A} = \hat{C}$, $\hat{F}_1 = \hat{F}_2$ $\Rightarrow$ (زز) $\Delta FCE \simeq ABF$

$\frac{x}{6} = \frac{8}{8+x}$ $64 = x^2 + 8x$ $x^2 + 8x - 64 = 0$

$(x+12)(x-4) = 0$ $x = -12$ ✗ $x = 4$ ✓

$AF = 8 + 4 = \boxed{12}$ ✓



$x^2 = (11-x)x$

$x^2 = -x^2 + 11x$

$2x^2 = 11x$

$2x = 11$

$x = \frac{11}{2}$

$\frac{8-x}{8} = \frac{x}{AB}$

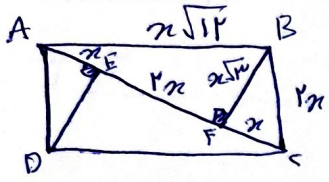
$\frac{5}{15} = \frac{\frac{11}{2}}{AB}$

$88 = 5AB$

$AB = \frac{88}{5}$

$AE = \frac{88}{5} - 11 = \frac{33}{5} = 9,9$ ✓

(۲) (۹)



$(BC)^2 = x \cdot 4x$

$BC = 2x$

$(BF)^2 = x \cdot 3x$

$BF = x\sqrt{3}$

$S_{ABCD} = 2x \cdot x\sqrt{11}$

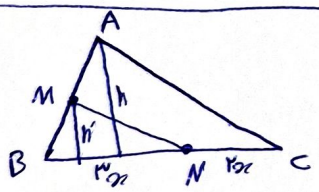
$(AB)^2 = 3x \cdot 4x$

$AB = x\sqrt{12}$

$S_{BCF} = \frac{x \cdot x\sqrt{3}}{2}$

$\frac{2x^2\sqrt{11}}{\frac{x^2\sqrt{3}}{2}} = 8$ ✓

(۲) (۷)



$2S_{ABC} = 5xh$

$2S_{BMN} = 3xh'$

$9xh' = 5xh$

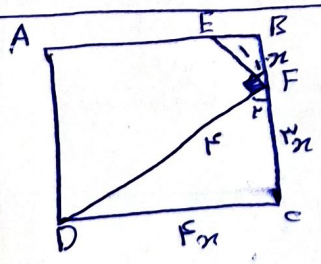
$\frac{9}{5}h' = h$

$\frac{h'}{h} = \frac{BM}{AB} = \frac{h'}{\frac{9}{5}h'} = \frac{5}{9}$

$\frac{BM}{BM+AM} = \frac{5}{9}$

$\frac{BM}{AM} = \frac{5}{4}$ ✓

(۲) (۸)



$\hat{E}_2 + \hat{F}_1 = 90$

$\hat{F}_1 + \hat{F}_2 = 90$

$\Big\} E = F_2$

$\hat{C} = \hat{B}$

$\hat{E} = \hat{F}_2$

$\Big\} \overset{j.j}{\Rightarrow} CDF \sim EBF$

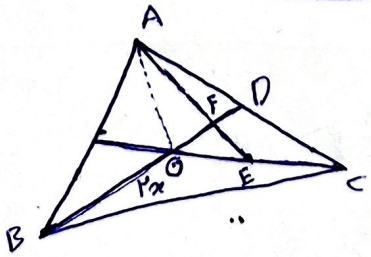
$k = 4$

$(4x)^2 + (3x)^2 = 25x^2 = 16$

$x^2 = \frac{16}{25}$

$S_{ABCD} = 4x \cdot 4x = 16x^2 = 16 \times \frac{16}{25} = \frac{256}{25} = 10\frac{6}{25}$ ✓

(۲) (۹)



محل برخورد میانه‌ها = مرکز ثقل

$BD = 3x \begin{cases} BG = 2x \\ DG = x \end{cases}$

$GD = x \begin{cases} FG = \frac{2}{3}x \\ DF = \frac{1}{3}x \end{cases}$

$AD = CD$

$CE = GE$

$\Big\} F =$ برخورد میانه

$\frac{BD}{FD} = \frac{3x}{\frac{1}{3}x} = \frac{9x}{x} = 9$ ✓

(۲) (۱۰)