

$$ED = 2AE$$

$$\left. \begin{matrix} \triangle BCF \\ \triangle AEF \end{matrix} \right\} \begin{matrix} \text{مساوی} \\ \text{مماسی} \end{matrix} \Rightarrow \frac{AE}{BC} = \frac{CF}{FA} = \frac{BF}{FE} = 2$$

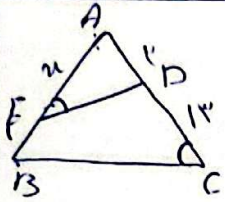
$$\frac{\sqrt{5}}{3}$$

(1)

$$k = \sqrt{9m^2 + 25} \Rightarrow k = 5\sqrt{1}$$

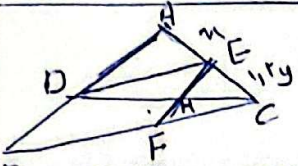
$$k = \sqrt{9m^2 + 25} = k = 5\sqrt{1}$$

$$\frac{EF}{AF} = \frac{t}{k} = \frac{k}{k} = \frac{\sqrt{10}}{3\sqrt{2}} = \frac{\sqrt{5}}{3}$$



$$AED \sim ACB \rightarrow \begin{cases} \hat{A} = \hat{A} \\ \hat{E} = \hat{C} \end{cases} \Rightarrow \frac{n}{10} = \frac{2}{1+n} \Rightarrow n(1+n) = 20 \Rightarrow n = 4$$

(2)



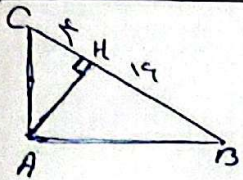
$$DE \parallel BC, 3y = 6n, BF = 3, FH = n, FH = y$$

$$y = 6n, \frac{n}{y} = \frac{3}{6}, \triangle DHE, \triangle FHC \text{ متشابه} \Rightarrow \frac{n}{y} = \frac{DE}{FC} = \frac{3}{6}$$

$$n = \frac{3}{2}y \Rightarrow DE \parallel BC \Rightarrow \frac{\frac{3}{2}y}{\frac{3}{2}y} = \frac{DE}{3+6} = \frac{1}{3} \Rightarrow \frac{3y}{2y} = \frac{1}{3} \Rightarrow 9n = 6n + 3 \Rightarrow 3n = 3 \Rightarrow n = 1$$

$$FC = 6 \times \frac{1}{3} \Rightarrow \frac{10}{3} + \frac{1}{3} = \frac{11}{3} = BC$$

(3)



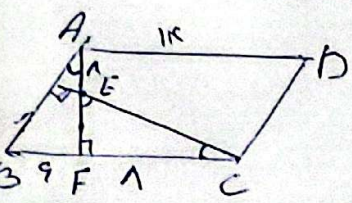
$$CB = 20$$

$$AB = 19 \times 20 \Rightarrow \sqrt{380}$$

$$AC = 16 \times 20 \Rightarrow \sqrt{320}$$

$$\frac{\sqrt{380}}{\sqrt{320}} = \frac{19\sqrt{10}}{16\sqrt{10}} = \frac{19}{16}$$

(4)

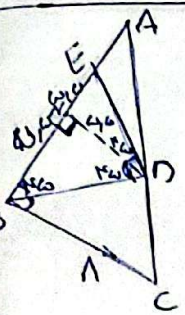


$$\triangle ABF \sim \triangle EFC \Rightarrow \frac{1}{1+EF} = \frac{AB}{AF} = \frac{EF}{9} \Rightarrow \frac{1}{1+n} = \frac{n}{9}$$

$$1 = 1n + n^2 \Rightarrow n^2 + 1n - 1 \Rightarrow (n+1)(n-1) \Rightarrow n = 1 \Rightarrow EF$$

$$AF = AE + EF = 1 + 1 = 2$$

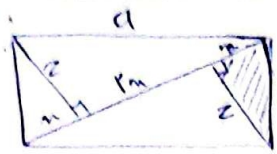
(5)



$$DN \parallel BC \rightarrow \frac{6,6+n}{1+n} = \frac{6,6}{1} \Rightarrow 6,6 + 1n = 6,6 + 6,6n$$

$$1,6n = 19,6 \Rightarrow n = \frac{19,6}{1,6} = 12,25$$

(6)

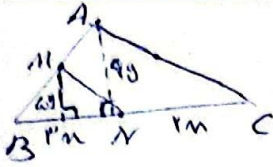


$$\left. \begin{aligned} a^2 &= qn^2 + z^2 \Rightarrow a^2 = qn^2 + r^2 n^2 \quad (1) \\ b^2 &= n^2 + z^2 \Rightarrow b^2 = n^2 + r^2 n^2 \quad (2) \end{aligned} \right\} S_{\triangle abc} = \frac{1}{2} ab \sin \angle c = \frac{1}{2} \sqrt{a^2 - z^2} \sqrt{b^2 - z^2} = \frac{1}{2} \sqrt{(qn^2 + z^2)(n^2 + z^2)}$$

$$19 n^2 = a^2 + b^2 \Rightarrow 19 n^2 = n^2 + z^2 + qn^2 + z^2 \Rightarrow qn^2 + 2z^2 = 18 n^2 \Rightarrow qn^2 = 18 n^2 - 2z^2$$

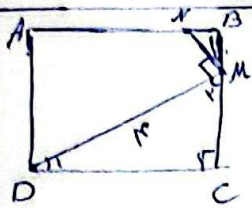
$$S_{\triangle abc} = \frac{1}{2} ab \sin \angle c = \frac{1}{2} \sqrt{a^2 - z^2} \sqrt{b^2 - z^2} = \frac{1}{2} \sqrt{(qn^2 + z^2)(n^2 + z^2)}$$

$$\frac{S_{\triangle abc}}{S_{\triangle abd}} = \frac{\frac{1}{2} ab \sin \angle c}{\frac{1}{2} ab \sin \angle d} = \frac{\sin \angle c}{\sin \angle d} = \frac{1}{2}$$



$$\frac{S_{\triangle ABC}}{S_{\triangle BMC}} = \frac{AM \sin \angle C}{BM \sin \angle C} = \frac{AM}{BM} = \frac{1}{2} \Rightarrow AM = \frac{1}{2} BM$$

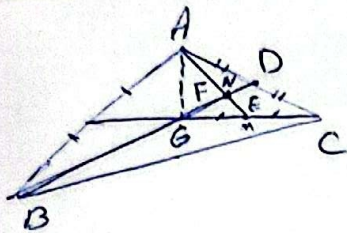
$$\frac{h}{H} = \frac{BM}{AB} = \frac{1}{2} \Rightarrow AB = 2BM = 2AM = \frac{2}{1} \Rightarrow \frac{BM}{AM} = \frac{1}{2}$$



$$\left. \begin{aligned} M_1 + M_2 &= 90^\circ \\ M_1 + D_1 &= 90^\circ \end{aligned} \right\} M_1 = D_1 \Rightarrow \triangle CMN \sim \triangle BMN \Rightarrow \frac{MN}{MD} = \frac{NB}{NC} = \frac{BM}{DC} = \frac{1}{2} \Rightarrow \frac{BM}{DC} = \frac{1}{2} \Rightarrow BM = \frac{1}{2} DC$$

$$MC = 2MN \Rightarrow 19 = 2MN + 9 \Rightarrow 19 = 2MN + 9 \Rightarrow 10 = 2MN \Rightarrow MN = 5 \Rightarrow M = \frac{10}{2} = 5$$

$$(19)^2 = \left(\frac{19}{2}\right)^2 = \frac{19 \times 19}{4} = \frac{361}{4}$$



$$\frac{BD}{FD} = ? \quad GE = EC$$

$$GD = \frac{1}{2} BD \quad \triangle AGC: \left. \begin{aligned} AD &= DC \\ GM &= MC \end{aligned} \right\} \rightarrow \text{Medians} \rightarrow FD = \frac{1}{2} GD$$

$$FD = \frac{1}{2} GD \Rightarrow \frac{1}{2} \left(\frac{1}{2} BD\right) = FD = \frac{1}{4} BD \Rightarrow \frac{BD}{FD} = \frac{1}{\frac{1}{4}} = 4$$

$$\frac{BD}{FD} = 4$$