

نقطات M : $M \left \begin{array}{l} \frac{x+1}{1} = \frac{y}{1} = 1' \rightarrow M(1,1) \\ \frac{x-4}{1} = \frac{y}{1} = 1 \end{array} \right.$ شیب خط AB : $m_{AB} = \frac{1-(-4)}{1-4} = \frac{5}{-3} = -\frac{5}{3} \rightarrow m = \frac{1}{5} \Rightarrow y = \frac{1}{5}x + b$ $1 = \frac{1}{5}x + b \rightarrow b = \frac{4}{5} \rightarrow$ معادله خط : $y = \frac{1}{5}x + \frac{4}{5}$	۱
$BC = \sqrt{(-5-1)^2 + (0-1)^2} = \sqrt{16+1} = \sqrt{17} = \sqrt{17} = 4$ معادله خط BC : $m_{BC} = \frac{0-1}{-5-1} = \frac{1}{-6} = -\frac{1}{6} \Rightarrow y = -\frac{1}{6}x + b \rightarrow 1 = -\frac{1}{6}x + b \rightarrow b = \frac{7}{6}$ $\rightarrow y = -\frac{1}{6}x + \frac{7}{6}$ $AH = \frac{ 1+5-\frac{7}{6} }{\sqrt{1+\frac{1}{36}}} = \frac{\frac{10}{6}}{\sqrt{\frac{37}{36}}} = \frac{10}{\sqrt{37}} = \frac{10}{\sqrt{37}} = 2 \rightarrow 4-2 = 2$ واحد $\Rightarrow y + \frac{1}{6}x - \frac{7}{6} = 0$	۲
فاصله موازی = معادله موازی $\begin{cases} \epsilon y = ax + r \\ 1y = x + 4 \rightarrow \epsilon y = 1x + 4 \end{cases} \Rightarrow a = 1$ فاصله موازی = $\frac{ 1c - c' }{\sqrt{a^2 + b^2}} = \frac{ 1-2-(-4) }{\sqrt{1+1}} = \frac{3}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$ $\rightarrow \epsilon y - 1x - 4 = 0$ $\rightarrow \frac{4}{\sqrt{2}} = 2\sqrt{2} \Rightarrow r = \frac{1}{\sqrt{2}} \rightarrow S = r\pi = \frac{1}{2}\pi$	۳
نقطات M : $M \left \begin{array}{l} \frac{x+1}{1} = \frac{y}{1} = 1' \\ \frac{x-4}{1} = \frac{y}{1} = 1 \end{array} \right.$ شیب خط AB : $m_{AB} = \frac{1-1}{1-4} = \frac{0}{-3} = 0$ $\Rightarrow$ شیب خط CH : $m_{CH} = 1 \rightarrow y = x + b \rightarrow -1 = -1 + b \rightarrow b = 0$ $\Rightarrow y = x$ معادله خط CH فاصله موازی : $y = -x + b' \rightarrow 1 = -(-4) + b' \rightarrow b' = -3 \rightarrow y = -x - 3$ فاصله موازی : $y = -x + b' \rightarrow 1 = -(-4) + b' \rightarrow b' = -3 \rightarrow y = -x - 3$ $MH = \sqrt{(1-\frac{1}{2})^2 + (1-\frac{1}{2})^2} = \sqrt{(\frac{1}{2})^2 + (\frac{1}{2})^2} = \sqrt{2(\frac{1}{4})} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$	۴
شیب خط L : $\frac{-(m+1)}{-(2m-4)} = \frac{m+1}{2m-4}$ شیب خط L : $\frac{-(2m-4)}{(5-m)} = \frac{2-4m}{5-m}$ $\frac{m+1}{2m-4} = -\left(\frac{5-m}{2-4m}\right) = \frac{m-5}{2-4m} \Rightarrow (m+1)(2-4m) = (m-5)(2m-4)$ $\Rightarrow -4m^2 + 2m + 2 - 4m = 2m^2 - 4m - 10m + 20 \rightarrow -4m^2 - m + 2 = 2m^2 - 14m + 20$ $\rightarrow 4m^2 - 13m + 18 = 0 \rightarrow \Delta = (13)^2 - 4(4)(18) = 169 - 340 = -171 < 0$ جواب ندارد برای هیچ مقدار m	۵

$$A \begin{cases} x+2y=1 \\ y=2x-1 \end{cases} \rightarrow 2y=2x-1 \Rightarrow x=1-2x+1 \Rightarrow 3x=0 \rightarrow x=0, y=1 \rightarrow A(0,1)$$

$$B \begin{cases} x+2y=1 \\ x+y=1 \end{cases} \rightarrow y=-1 \Rightarrow x=2 \Rightarrow B(2,-1) \quad C \begin{cases} y=2x-1 \\ x+y=1 \end{cases} \rightarrow -x=2x-1-1 \Rightarrow 3x=0 \rightarrow x=0, y=1 \Rightarrow C(0,1)$$

$$M \text{ وسط } AC : M \left(\frac{0+0}{2}, \frac{1+1}{2} \right) = \left(\frac{0}{2}, \frac{2}{2} \right) = (0,1) \rightarrow AM = \sqrt{\left(\frac{0}{2}-0\right)^2 + \left(\frac{2}{2}-1\right)^2} = \sqrt{\left(\frac{0}{2}\right)^2 + \left(\frac{1}{2}\right)^2} = \frac{\sqrt{1}}{2} = \frac{1}{2}$$

$$BC \text{ معادله: } 2x+y-1=0 \quad AH = \frac{|2(0)+1-1|}{\sqrt{2}} = \frac{0}{\sqrt{2}} = 0 \quad \frac{|AM|}{|AH|} = \frac{\frac{1}{2}}{0} = \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2\sqrt{2}} = \frac{\sqrt{2} \cdot \sqrt{2}}{2 \cdot \sqrt{2} \cdot \sqrt{2}} = \frac{2}{4} = \frac{1}{2}$$

$$y = -\frac{1}{2}x + b \rightarrow OH = \frac{|-b|}{\sqrt{1+\frac{1}{4}}} = \sqrt{2} = \sqrt{2} \Rightarrow b = \pm (\sqrt{2} \cdot \sqrt{5}) = \pm \sqrt{10} \quad (دری نسبت برقی غنی هندسه دارد) \quad \Rightarrow y + \frac{1}{2}x - b = 0$$

$$\rightarrow (b = \sqrt{10} \text{ مثبت}) \Rightarrow y = -\frac{1}{2}x + \sqrt{10} \quad \begin{cases} y=0 \Rightarrow \frac{1}{2}x = \sqrt{10} \rightarrow x = 2\sqrt{10} \rightarrow A(2\sqrt{10}, 0) \\ x=0 \Rightarrow y = \sqrt{10} \rightarrow B(0, \sqrt{10}) \end{cases}$$

$$AB = \sqrt{10^2 + 10^2} = \sqrt{200} = 10\sqrt{2}$$

مقدار m هر چه باشد، خط داده شده به خط AB موازی می باشد (بر نقطه A مماس)

$$(m=1) \rightarrow y+x = x+2 = y=2 \rightarrow x=0, y=2 \rightarrow (0,2) \quad \text{نقطه مشترک: } (0,2) \quad y-2x=2 \rightarrow y=2x+2$$

پس ارتفاع مثلث ABC است. (از A عمود بر BC می کشیم و نقطه H را پیدا می کنیم. H از BC می گذرد و BC موازی AB است)

$$S = \frac{a}{v} = \frac{2x \cdot \frac{1}{2}}{v} = \frac{x}{v} \Rightarrow \text{مساحت} = \frac{1}{2} \cdot \frac{a}{v} \quad \ell = \left| \frac{r}{m-1} - \left(-\frac{m}{r} \right) \right| = \left| \frac{r}{m-1} + \frac{m}{r} \right| = \left| \frac{r^2 + m^2 - m}{r(m-1)} \right| = \frac{a}{r}$$

$$\begin{cases} y=0 \rightarrow x = \frac{rm}{-r} = -\frac{m}{r} \\ y=0 \rightarrow (m-1)x = 2 \rightarrow x = \frac{2}{m-1} \end{cases} \rightarrow \frac{r^2 + m^2 - m}{r(m-1)} = \frac{a}{r} \Rightarrow r^2 + m^2 - m = a(m-1) \rightarrow m = 2$$

$$\begin{cases} r = \frac{1+x}{2} \Rightarrow \epsilon = 1+x \rightarrow x=3 \\ -r = \frac{-1+y}{2} \Rightarrow -\epsilon = -1+y \rightarrow y=2 \end{cases}$$

$$y = 2x + b \rightarrow -2 = 4 + b \rightarrow b = -6$$

$$y = 2x - 6$$

مربع: خط به خط AB از نقطه $(3, -3)$ می گذرد.

$$A(1,2) \quad H \text{ نقطه تقاطع } AB \text{ و } BC \Rightarrow y = -x + b \rightarrow 2 = -1 + b \rightarrow b = 3 \rightarrow y = -x + 3$$

$$\begin{cases} y = x + 3 \\ y = -x + 3 \end{cases} \Rightarrow x + 3 = -x + 3 \rightarrow 2x = 0 \rightarrow x = 0, y = 3 \rightarrow H(0,3)$$

$$\rightarrow \begin{cases} -1 = \frac{x_{A'} + 1}{2} \Rightarrow x_{A'} + 1 = -2 \rightarrow x_{A'} = -3 \\ 2 = \frac{y_{A'} + 2}{2} \Rightarrow y_{A'} + 2 = 4 \rightarrow y_{A'} = 2 \end{cases} \rightarrow 2b - a = 2(4) - (-3) = 11 \Rightarrow 11$$