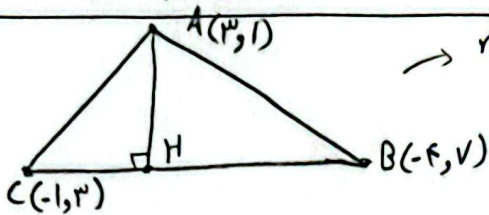


$$m_{AB} = \frac{1+6}{2-4} = \frac{14}{-2} = -7$$

$$y = \frac{1}{7}x + \frac{4}{7}$$

$$\Rightarrow m_{CH} = \frac{1}{7} \rightarrow \text{چون عمود است} \rightarrow y = \frac{1}{7}x + b \xrightarrow{(3,1)} 1 = \frac{3}{7} + b \Rightarrow b = \frac{4}{7}$$

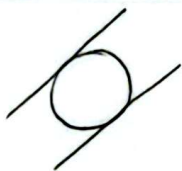


$$\rightarrow m_{BC} = \frac{7-1}{-4+1} = \frac{6}{-3} = -2 \rightarrow y_{BC} = -2x + d$$

$$\hookrightarrow d_{AH} = \frac{|1+d-\frac{d}{2}|}{\sqrt{1+\frac{1}{4}}} = \frac{\frac{13}{2}}{\frac{5}{2}} = \frac{13}{5}$$

$$d_{BC} = \sqrt{(-4+1)^2 + (7-3)^2} = \sqrt{9+16} = 5$$

$$BC - AH = 5 - \frac{13}{5} = \frac{25-13}{5} = \frac{12}{5}$$



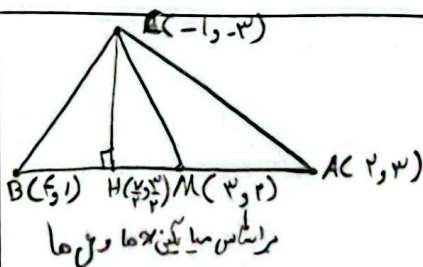
چون شیب آن هم $\frac{1}{2}$ است پس $\frac{a}{b} = \frac{1}{2} \Rightarrow a = \frac{b}{2}$

$$\begin{cases} y = ax + 2 \\ y = x + 1 \end{cases} \rightarrow \begin{cases} y = \frac{a}{2}x + 2 \\ y = x + 1 \end{cases} \rightarrow d = \frac{|1-1|}{\sqrt{4+1}} = \frac{0}{\sqrt{5}}$$

$$\hookrightarrow m = \frac{1}{2}$$

$$\left(\frac{3}{\sqrt{5}}\right) = \text{مساحت}$$

$$S_{\text{دایره}} = \pi r^2 = \left(\frac{3}{\sqrt{5}}\right)^2 \pi = \frac{9}{5} \pi$$



$$m_{AB} = \frac{1-3}{1+1} = \frac{-2}{2} = -1 \rightarrow m_{CH} = 1$$

$$\hookrightarrow y_{AB} = -x + d \quad \hookrightarrow y_{CH} = x - 2$$

$$H = \text{نقطه برخورد} \rightarrow -x + d = x - 2$$

$$2x = d \Rightarrow x = \frac{d}{2} \rightarrow y = \frac{d}{2} - 2$$

$$\rightarrow d_{MH} = \sqrt{\left(-1 - \frac{d}{2}\right)^2 + \left(3 - \left(\frac{d}{2} - 2\right)\right)^2} = \sqrt{\left(-\frac{d}{2}\right)^2 + \left(\frac{d}{2}\right)^2} = \sqrt{\frac{d^2}{2}} = \frac{\sqrt{2}}{2}d$$

$$\begin{cases} y = \frac{-(2m-2)x+1}{d-m} \rightarrow m = \frac{-(2m-2)}{d-m} = \frac{2m-2}{m-d} \\ y = \frac{(m+1)x-1}{2m-4} \rightarrow m = \frac{m+1}{2m-4} \end{cases}$$

$$\frac{-(2m-2)}{d-m} \times \frac{m+1}{2m-4} = -1 \rightarrow (2m-2)(m+1) = (d-m)(2m-4)$$

$$2m^2 + 2m - 2 = 2m^2 - 2d - 2m + 4 \Rightarrow 4m - 2d = 2 \Rightarrow 2m - d = 1$$

$$2m^2 - 13m + 11 = 0 \rightarrow \Delta < 0 \rightarrow m \text{ معین نمی‌شود}$$

$A(1,1)$
 $y = 2x - 1$
 $y = -x + 3$
 $B(2, -1)$
 $C(\frac{1}{2}, \frac{3}{2})$
 $M(\frac{3}{2}, \frac{1}{2})$
 $H(\frac{3}{2}, \frac{1}{2})$
 $m_{BC} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - \frac{3}{2}}{2 - \frac{1}{2}} = \frac{-\frac{5}{2}}{\frac{3}{2}} = -\frac{5}{3}$
 $y_{BC} = -\frac{5}{3}x + \frac{13}{3}$
 $d_{AH} = \frac{|1 + 1 - 6|}{\sqrt{10}} = \frac{4}{\sqrt{10}} = \frac{2\sqrt{10}}{5}$
 $\frac{AM}{AH} = \frac{\frac{2\sqrt{10}}{5}}{\frac{2\sqrt{10}}{5}} = 1$

$A(a, 0), B(0, b) \rightarrow m = -\frac{b}{a}$
 $\frac{b}{a} = \frac{1}{r} \rightarrow a = rb \rightarrow b = \frac{a}{r}$
 $\frac{y}{b} + \frac{x}{a} = 1 \rightarrow \frac{ay + bx}{ab} = 1 \rightarrow ab - ay - bx = 0$
 $\frac{a^2}{\sqrt{a^2 + b^2}} = \frac{a^2}{\sqrt{a^2 + \frac{a^2}{r^2}}} = \frac{a^2}{\frac{a\sqrt{r^2 + 1}}{r}} = \frac{ar}{\sqrt{r^2 + 1}} = \frac{a}{\sqrt{1 + r^2}} \rightarrow a = 10, b = d$

$\textcircled{1} \text{ خط: } y = \frac{5}{m}x + 2$
 $\textcircled{2} \text{ خط: } y = (1-m)x + 2$
 $0 = \frac{5}{m}x + 2 \rightarrow x_A = -\frac{2m}{5} \rightarrow A(-\frac{2m}{5}, 0)$
 $0 = (1-m)x + 2 \rightarrow x_B = \frac{2}{m-1} \rightarrow B(\frac{2}{m-1}, 0)$
 $\frac{2}{m-1} + \frac{m}{5} = \frac{1}{5} \rightarrow \frac{2}{m-1} + m = \frac{1}{5} \rightarrow (m-1)^2 = 0 \rightarrow m = 1$
 $\frac{2}{m-1} + m = -\frac{1}{5} \rightarrow m^2 + 5m - 1 = 0 \rightarrow m = \frac{-5 \pm \sqrt{25 + 4}}{2} = \frac{-5 \pm \sqrt{29}}{2}$

$M(\frac{1}{2}, -\frac{1}{2})$
 $H(\frac{1}{2}, -\frac{1}{2})$
 $y_{MH} = -\frac{1}{2}x - 1$
 $-\frac{1}{2}x - 1 = 2x - 3 \rightarrow \frac{5}{2}x = 2 \rightarrow x = \frac{4}{5} \rightarrow y = -\frac{9}{5}$
 $\frac{4}{5} + \frac{x}{2} = 2 \rightarrow \frac{4}{5} + x = 4 \rightarrow x = \frac{16}{5} \rightarrow y = 2x - 3 = \frac{32}{5} - 3 = \frac{17}{5}$
 $-\frac{9}{5} + \frac{x}{2} = -2 \rightarrow -\frac{9}{5} + x = -4 \rightarrow x = -\frac{11}{5} \rightarrow y = -\frac{17}{5}$

$A(1, 2)$
 $B(-1, 4)$
 $A'(-3, 4)$
 $y = x + 4 \rightarrow y_{AB} = -x + 3$
 $2x - 3 = x + 4 \rightarrow x = 7 \rightarrow y = 11$
 $2b - a = 11 + 3 = 14$