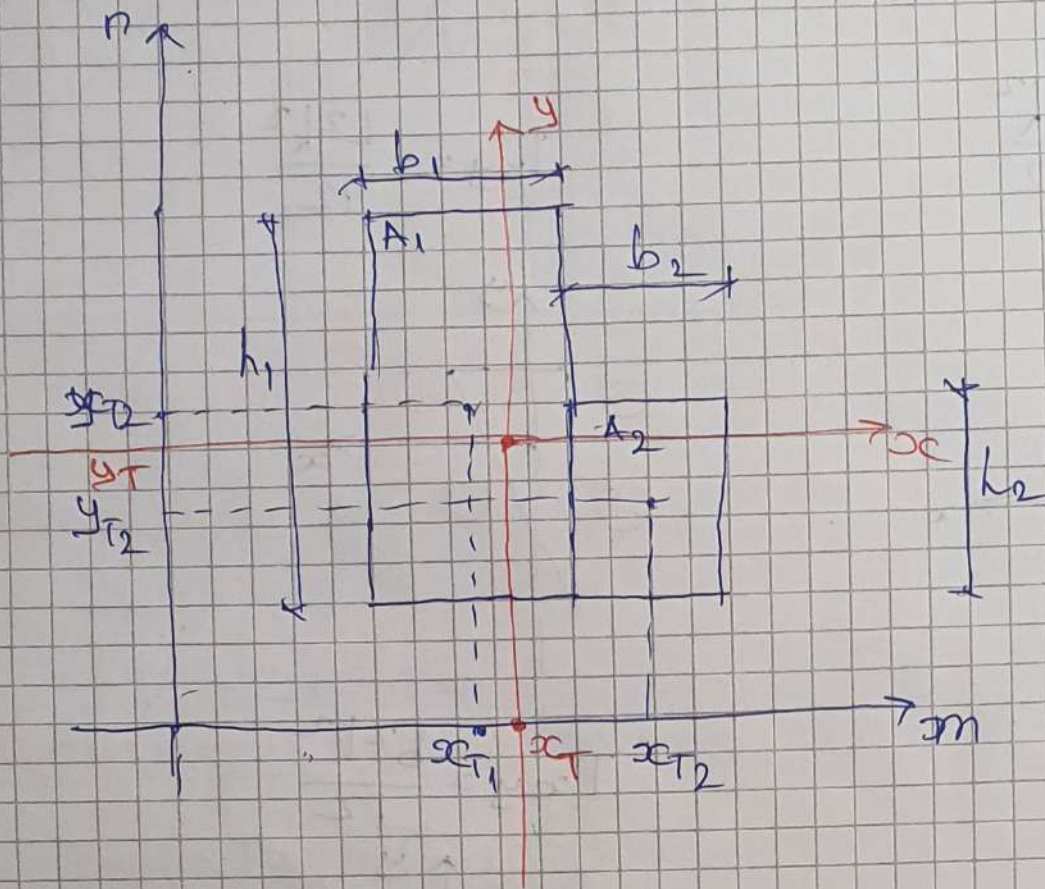


IV Теорема

* Момент инерции y относительно осей симметрии тела



* Теорема тела:

* Площади

$$A_1 = b_1 \cdot h_1$$

$$A_2 = b_2 \cdot h_2$$

$$A = A_1 + A_2$$

* Статический момент отдельных тел

$$S_{m1} = y_{T1} \cdot A_1$$

$$S_{n1} = x_{T1} \cdot A_1$$

$$S_{m2} = y_{T2} \cdot A_2$$

$$S_{n2} = x_{T2} \cdot A_2$$

* Статический момент всего тела

$$S_m = y_T \cdot A$$

$$S_n = x_T \cdot A$$

$$S_m = S_{m1} + S_{m2}$$

$$S_n = S_{n1} + S_{n2}$$

* ТЕНЗИОНЕ ТЕНА

$$y_T = \frac{S_m}{A} = \frac{S_{m1} + S_{m2}}{A_1 + A_2} = \frac{y_{T1} A_1 + y_{T2} A_2}{A_1 + A_2}$$

$$x_T = \frac{S_n}{A} = \frac{S_{n1} + S_{n2}}{A_1 + A_2} = \frac{x_{T1} A_1 + x_{T2} A_2}{A_1 + A_2}$$

* МОМЕНТ УТЕРЏУЌЕ

* АКСИДАЛНИ МОМЕНТИ УТЕРЏУЌЕ У ОДНОСУ
НА x И y ОСИ

$$I_x = I_{x1} + I_{x2}$$

$$I_y = I_{y1} + I_{y2}$$

* ЦЕНТРУФАЛНИ МОМЕНТИ УТЕРЏУЌЕ У ОДНОСУ
НА x И y ОСИ

$$I_{xy} = I_{xy1} + I_{xy2}$$

$$I_{x1} = I_{x1}^S + I_{x1}^P = \frac{b_1 h_1^3}{12} + A_1 (y_{T1} - y_T)^2$$

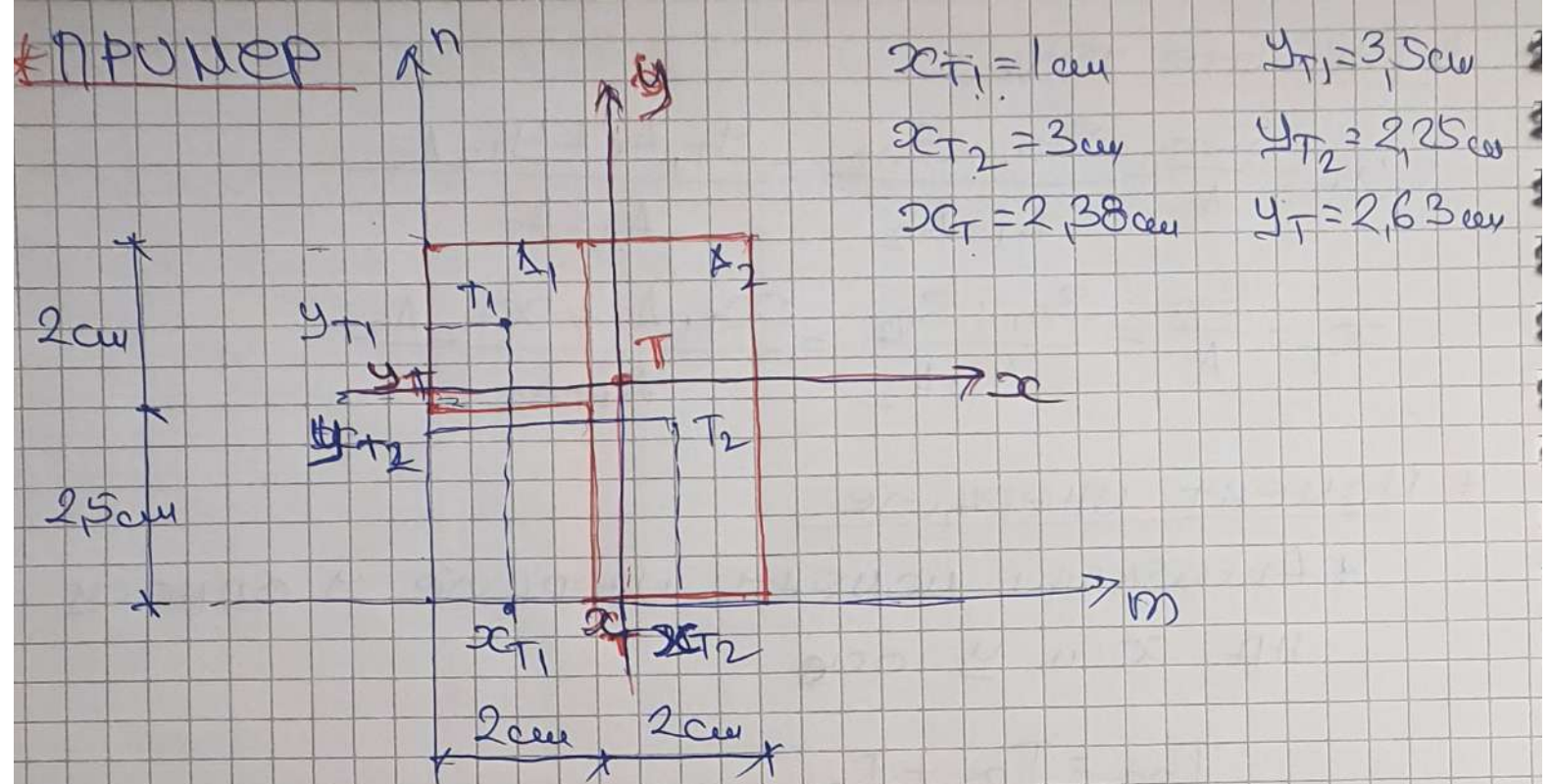
$$I_{y1} = I_{y1}^S + I_{y1}^P = \frac{b_1^3 h}{12} + A_1 (x_{T1} - x_T)^2$$

$$I_{xy1} = I_{xy1}^S + I_{xy1}^P = 0 + A_1 (y_{T1} - y_T)(x_{T1} - x_T)$$

$$I_{x2} = I_{x2}^S + I_{x2}^P = \frac{b_2 h_2^3}{12} + A_2 (y_{T2} - y_T)^2$$

$$I_{y2} = I_{y2}^S + I_{y2}^P = \frac{b_2^3 h_2}{12} + A_2 (x_{T2} - x_T)^2$$

$$I_{xy2} = I_{xy2}^S + I_{xy2}^P = 0 + A_2 (y_{T2} - y_T)(x_{T2} - x_T)$$



* ПОБРОУКЕ

$$A_1 = 2 \cdot 2 = 4 \text{ cm}^2$$

$$A_2 = 2 \cdot 2,5 = 5 \text{ cm}^2$$

$$A = A_1 + A_2 = 9 \text{ cm}^2$$

* СТАТУЧКУ МОМЕНТУ ПОСРЕДНАЧЕНИХ ТЕЛА

$$S_{m1} = A_1 y_{T1} = 4 \cdot 3,5 = 14 \text{ cm}^3$$

$$S_{n1} = A_1 x_{T1} = 4 \cdot 1 = 4 \text{ cm}^3$$

$$S_{m2} = A_2 y_{T2} = 5 \cdot 2,25 = 11,25 \text{ cm}^3$$

$$S_{n2} = A_2 x_{T2} = 5 \cdot 3 = 15 \text{ cm}^3$$

* СТАТУЧКУ МОМЕНТ ЦЕНТРА ТЕЛА

$$S_m = y_T \cdot A \Rightarrow y_T = \frac{S_m}{A}$$

$$S_n = x_T \cdot A \Rightarrow x_T = \frac{S_n}{A}$$

$$y_T = \frac{S_m}{A} = \frac{S_{m1} + S_{m2}}{A} = \frac{14 + 11,25}{9} = 2,6346 \text{ cm}$$

$$x_T = \frac{S_n}{A} = \frac{S_{n1} + S_{n2}}{A} = \frac{4 + 15}{9} = 2,3846 \text{ cm}$$

* Момент инерции

$$I_x = I_{x_1} + I_{x_2}$$

$$I_y = I_{y_1} + I_{y_2}$$

$$I_{xy} = I_{xy_1} + I_{xy_2}$$

$$I_{x_1} = I_{x_1}^S + I_{x_1}^P = \frac{b_1 h_1^3}{12} + \overbrace{b_1 h_1}^A (y_{T1} - y_T)^2 =$$
$$= \frac{2 \cdot 2^3}{12} + 2 \cdot 2 \cdot (3,5 - 2,63)^2 = 4,3809 \text{ см}^4$$

$$I_{y_1} = I_{y_1}^S + I_{y_1}^P = \frac{b_1^3 h_1}{12} + b_1 h_1 (x_{T1} - x_T)^2 =$$
$$= \frac{2^3 \cdot 2}{12} + 2 \cdot 2 \cdot (1 - 2,38)^2 = 8,9509 \text{ см}^4$$

$$I_{xy_1} = I_{xy_1}^S + I_{xy_1}^P = 0 + b_1 h_1 (y_{T1} - y_T) (x_{T1} - x_T) =$$
$$= -4,8024 \text{ см}^2$$

$$I_{x_2} = I_{x_2}^S + I_{x_2}^P = \frac{b_2 h_2^3}{12} + b_2 h_2 (y_{T2} - y_T)^2 =$$
$$= \frac{2 \cdot 4,5^3}{12} + 2 \cdot 4,5 \cdot (2,25 - 2,63)^2 = 16,4871 \text{ см}^4$$

$$I_{y_2} = I_{y_2}^S + I_{y_2}^P = \frac{b_2^3 h_2}{12} + b_2 h_2 (x_{T2} - x_T)^2 =$$
$$= \frac{2^3 \cdot 4,5}{12} + 2 \cdot 4,5 \cdot (3 - 2,38)^2 = 6,4596 \text{ см}^4$$

$$I_{xy_2} = I_{xy_2}^S + I_{xy_2}^P = 0 + b_2 h_2 (y_{T2} - y_T) (x_{T2} - x_T)$$
$$= -2,1204 \text{ см}^4$$