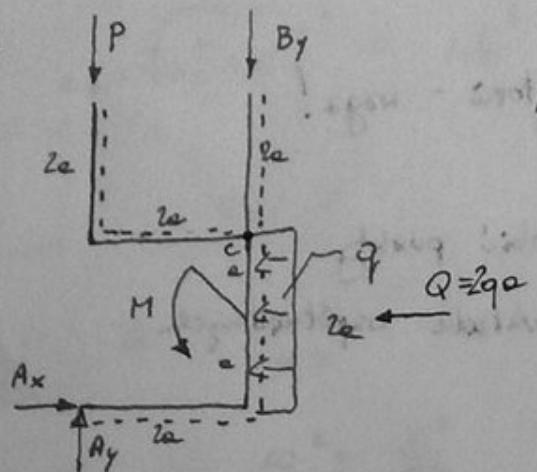


Zad. 1



$P = 4qa$

$M = 2qa^2$

Gr. B

$A_y - P - B_y = 0$

$A_y = B_y + P = 6qa$

$A_x = 2qa$

$\sum M^A = B_y 2a - M - Qa = 0$

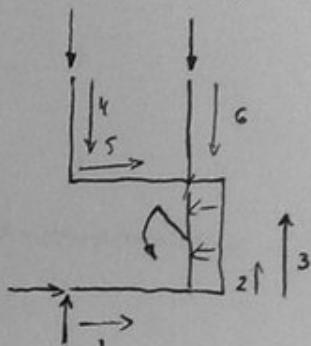
$B_y 2a = 2qa^2 + 2qa^2$

$2B_y = 4qa$

$B_y = 2qa$

$\sum M^C = 2a A_y - 2a A_x - M - 2a P + Qa = 0$

$12qa^2 - 4qa^2 - 2qa^2 - 8qa^2 + 2qa^2 = 0$



$Mg^I = A_y x_1 \quad Mg^I(2a) = 12qa^2$

$Mg^{II} = 12qa^2 - A_x x_2 + \frac{q x_1^2}{2} \quad Mg^{II}(a) = 12qa^2 - 2qa^2 + \frac{qa^2}{2} = 10,5qa^2$

$Mg^{III} = 12qa^2 - A_x x_3 + \frac{q x_2^2}{2} - M \quad Mg^{III}(2a) = 12qa^2 - 4qa^2 + 2qa^2 - 2qa^2 = 8qa^2$

$Mg^{IV} = 12qa^2 - A_x x_3 + q a (x_3 - \frac{a}{2}) + q \frac{(x_1 - a)^2}{2} - M$

$Mg^{IV}(2a) = 12qa^2 - 4qa^2 + \frac{3}{2}qa^2 + \frac{qa^2}{2} - 2qa^2 = 8qa^2$

$Mg^{V} = 0$

$Mg^{VI} = 0 + P x_5 \quad Mg^{VI}(2a) = 4qa \cdot 2a = 8qa^2$

$Mg^{VII} = 0$

8 W 8

$T^I = A_y$

$T^{II} = -A_x + qx_1$

$T^{III} = -A_x + qx_3$

$T^{IV} = 0$

$T^V = P$

$T^{VI} = 0$

Zad. 2 wglidem osi y^*

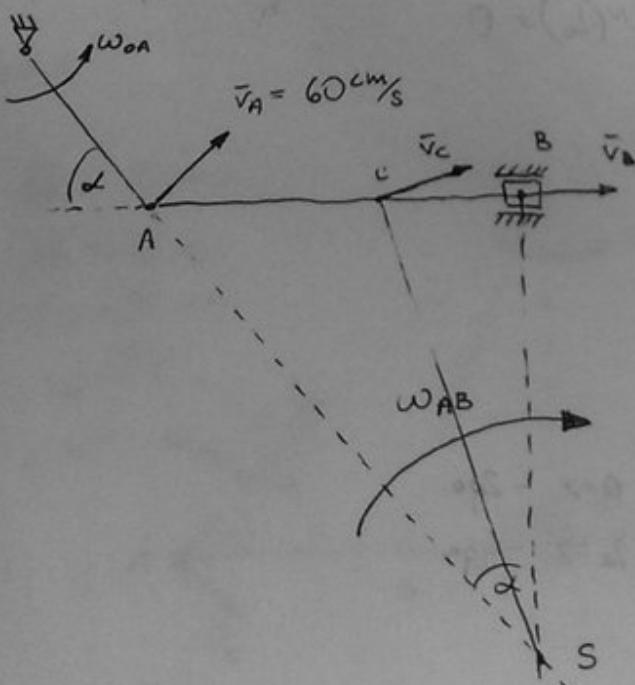
$x_1 = 2$ $y_1 = \frac{5}{3}$ $A_1 = 15$
 $x_2 = 1 + \frac{5}{3}$ $y_2 = 1 + \frac{5}{3}$ $A_2 = 2$
 $x_3 = \frac{3}{2}$ $y_3 = \frac{1}{2}$ $A_3 = 1$

$x_c = \frac{2 \cdot 15 - \frac{5}{3} \cdot 2 - \frac{3}{2} \cdot 1}{15 - 2 - 1} = \frac{25 \frac{1}{6}}{12} = 2 \frac{7}{12} = 2,097$

$y_c = \frac{\frac{5}{3} \cdot 15 - \frac{5}{3} \cdot 2 - \frac{1}{2} \cdot 1}{15 - 2 - 1} = \frac{21 \frac{1}{6}}{12} = 1 \frac{55}{72} = 1,764$

$\bar{y}^1 \Rightarrow 2$ $I_{y^*}^1 = I_{\bar{y}^1} + A_1 r_1^2 = \frac{5 \cdot 6^3}{36} + 15 \cdot (2 \frac{7}{12} - 2)^2$
 $\bar{y}^2 \Rightarrow \frac{5}{3}$ $= 30 + 0,142 = 30,142$
 $\bar{y}^3 = \frac{3}{2}$ $I_{y^*}^2 = I_{\bar{y}^2} + A_2 r_2^2 = \frac{2 \cdot 2^3}{36} + 2 \cdot \left(\frac{5}{3} - 2\right)^2 = \frac{4}{9} + \frac{2}{9} = \frac{6}{9} = \frac{2}{3}$
 $\bar{y}^* = 2 \frac{7}{12}$ $I_{y^*}^3 = I_{\bar{y}^3} + A_3 r_3^2 = \frac{1 \cdot 1^3}{12} + 1 \cdot \left(\frac{3}{2} - 2 \frac{7}{12}\right)^2 = \frac{1}{12} + 0,357 = 0,44$
 $I_{y^*}^c = 30,142 - 0,44 = 29,035 \text{ m}^4$

Zad. 3



$$OA = 20 \text{ cm}$$

$$AB = 50 \text{ cm}$$

$$AC = 30 \text{ cm}$$

$$\omega_{0A} = 3 \text{ s}^{-1}$$

$$\alpha = 45^\circ$$

$$AB = BS = 50$$

$$CS = \sqrt{BS^2 + CB^2} = \sqrt{2500 + 400} = 53,85$$

$$v_B = \omega_{AB} \cdot BS = \frac{3\sqrt{2}}{5} \cdot 50 = 30\sqrt{2}$$

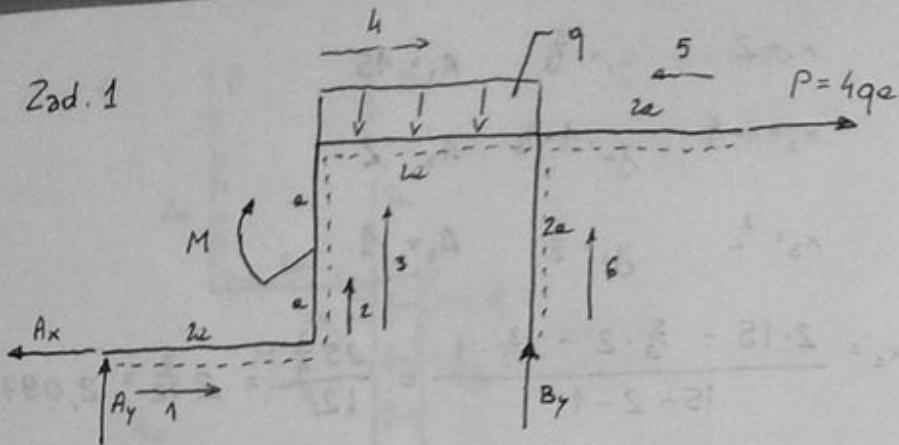
$$v_A = \omega_{0A} \cdot \bar{OA} = \omega_{AB} \cdot \bar{AS}$$

$$\omega_{AB} = \frac{\omega_{0A} \cdot \bar{OA}}{\bar{AS}} = \frac{60 \cdot \sqrt{2}}{50\sqrt{2}} \cdot \frac{\sqrt{2}}{12} = \frac{60\sqrt{2}}{100}$$

$$\omega_{AB} = \frac{3\sqrt{2}}{5} \text{ s}^{-1}$$

$$v_C = 45,693 \text{ m/s}$$

Zad. 1



$$M = 2qa^2$$

$$P = 4qa$$

$$A_y + B_y - 2qa = 0$$

$$A_y = 2qa - B_y = 2qa - 4qa = -2qa$$

$$A_x = 4qa$$

$$\sum M^A = M + 2qa \cdot 3a - 4a B_y + 8qa^2 = 0$$

$$2qa^2 + 6qa^2 + 8qa^2 = 4a B_y$$

$$16qa^2 = 4a B_y \quad B_y = 4qa$$

$$Mg^I = A_y x_1, \quad Mg^I(2a) = -2qa \cdot 2a = -4qa^2$$

$$Mg^{II} = -4qa^2 + A_x x_2, \quad Mg^{II}(a) = -4qa^2 + 4qa^2 = 0$$

$$Mg^{III} = -4qa^2 + A_x x_3 + M, \quad Mg^{III}(2a) = -4qa^2 + 8qa^2 + 2qa^2 = 6qa^2$$

$$Mg^{IV} = 6qa^2 + A_y x_4 - q \frac{x_4^2}{2}, \quad Mg^{IV}(2a) = 6qa^2 + A_y 2a - 2qa^2 = 6qa^2 - 4qa^2 - 2qa^2$$

$$Mg^V = 0$$

$$Mg^{IV}(l_a) = 0$$

$$Mg^{VI} = 0$$

$$T^I = A_y$$

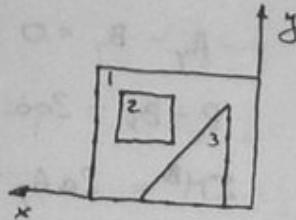
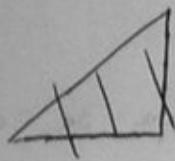
$$T^{II} = A_x$$

$$T^{III} = A_x$$

$$T^{IV} = A_y - qx = -2qa - qx \quad 0 \Rightarrow -2qa$$

$$2a \Rightarrow -4qa$$

Zad. 2



$$\begin{array}{lll} x_1 = 3 & y_1 = 2,5 & A_1 = 30 \\ x_2 = 5,4 & y_2 = 3 & A_2 = 4 \\ x_3 = 2 & y_3 = \frac{4}{3} & A_3 = 6 \end{array}$$

$$x_c = \frac{3 \cdot 30 - 5,4 \cdot 2,6}{30 - 4 - 6} = 3,4$$

$$y_c = \frac{2,5 \cdot 30 - 3 \cdot 4 - \frac{4}{3} \cdot 6}{20} = 2,75$$

~~Diagram~~

$$x^* = 2,75$$

$$x_1 = 2,5$$

$$x_2 = 3$$

$$x_3 = \frac{4}{3}$$

$$I_{x^*}^1 = I_{x_1}^1 + A_1 r_1^2 = \frac{6 \cdot 5^3}{12} + 30 \cdot (2,75 - 2,5)^2 = 64,375$$

$$I_{x^*}^2 = I_{x_2}^2 + A_2 r_2^2 = \frac{2 \cdot 2^3}{12} + 4 \cdot (2,75 - 3)^2 = 1,583$$

$$I_{x^*}^3 = I_{x_3}^3 + A_3 r_3^2 = \frac{3 \cdot 4^3}{36} + 6 \cdot (2,75 - \frac{4}{3})^2 = 17,375$$

$$I_{x_c}^* = 45,417 \text{ m}^4$$

Zad. 3

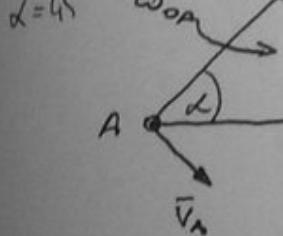
$$\overline{OA} = 10 \text{ cm}$$

$$\overline{AB} = 40 \text{ cm}$$

$$\overline{AC} = 25 \text{ cm}$$

$$\omega_{OA} = 2 \text{ s}^{-1}$$

$$\alpha = 45^\circ$$



$$v_{Ax} = 20 \frac{\pi}{2} = 10\sqrt{2}$$

S

$$\omega_{AB}$$

$$v_A = \omega_{OA} \cdot \overline{OA} = 20 \text{ cm/s}$$

$$\overline{AB} = \overline{BS} = 40 \text{ cm}$$

$$AS = 40\sqrt{2} \text{ cm}$$

$$v_A = \overline{AS} \cdot \omega_{AB}$$

$$\omega_{AB} = \frac{\omega_{OA} \cdot \overline{OA}}{\overline{AS}} = \frac{20\sqrt{2}}{40\sqrt{2}} = \frac{20\sqrt{2}}{80}$$

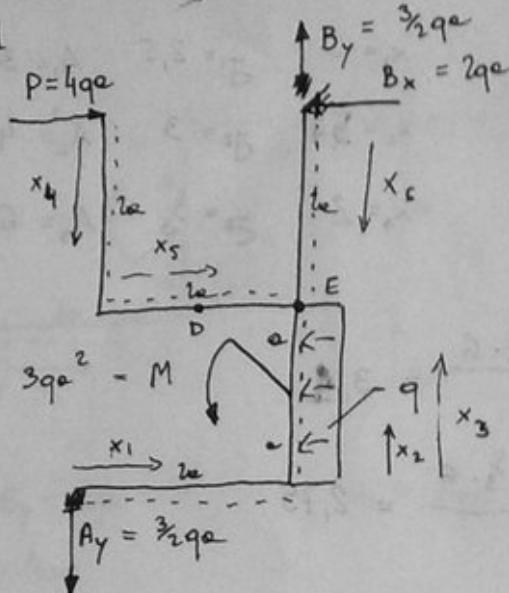
$$\omega_{AB} = \frac{\sqrt{2}}{4} \text{ s}^{-1}$$

$$v_B = 40 \cdot \frac{\sqrt{2}}{4} = 10\sqrt{2} \text{ cm/s} = 14,14 \text{ cm/s}$$

$$CS = \sqrt{40^2 + 15^2} = 42,72 \text{ cm}$$

$$v_C = 15,10 \text{ cm/s}$$

Zad. 1



$$A_y - B_y = 0$$

$$P - B_x - 2qa = 0$$

$$\sum M_B = 2a A_y - M + 2qa \cdot 3a = 0$$

$$2a A_y = M - 6qa^2$$

$$A_y = -\frac{3}{2}qa$$

$$B_y = A_y = -\frac{3}{2}qa$$

$$B_x = P - 2qa = 2qa$$

$$\sum M_D = 2a P - a B_y - 2a B_x - M + \frac{2qa^2}{4} = \frac{3}{2}qa^2$$

$$8qa^2 - \frac{3}{2}qa^2 - 4qa^2 - 3qa^2 + 2qa^2 = \frac{3}{2}qa^2$$

$$Mg^I = -A_y x_1, \quad Mg^I(2a) = -3qa^2$$

$$Mg^{II} = -3qa^2 + \frac{qx_1^2}{2}, \quad Mg^{II}(a) = -3qa^2 + \frac{qa^2}{2} = -2,5qa^2$$

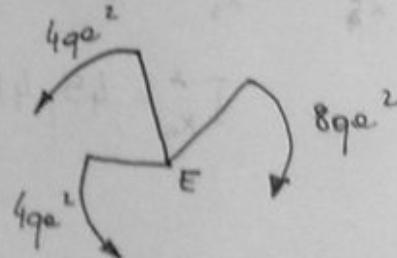
$$Mg^{III} = -3qa^2 + \frac{qx_1^2}{2} - M, \quad Mg^{III}(a) = -3qa^2 + \frac{qa^2}{2} - 3qa^2 = -5,5qa^2$$

$$Mg^{IV}(2a) = -3qa^2 + 2qa^2 - 3qa^2 = -4qa^2$$

$$Mg^{V} = -Px_4, \quad Mg^{IV}(2a) = -8qa^2$$

$$Mg^{VI} = -8qa^2$$

$$Mg^{VII} = B_x x_6, \quad Mg^{VII}(2a) = 4qa^2$$



$$T^I = -A_y$$

$$T^{II} = qx$$

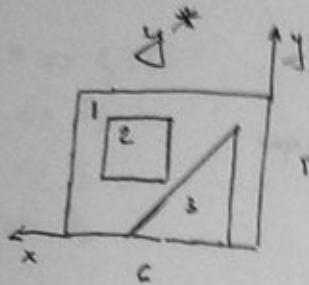
$$T^{III} = qx$$

$$T^{IV} = P$$

$$T^V = 0$$

$$T^{VI} = -B_x$$

Zad. 2



$x_1 = 3$

$d_1 = 2,5$

$A_1 = 30$

$x_2 = 4$

$d_2 = 3$

$A_2 = 4$

$x_3 = 2$

$d_3 = \frac{4}{3}$

$A_3 = 6$

$$x_c = \frac{3 \cdot 30 - 4 \cdot 4 - 2 \cdot 6}{30 - 4 - 6} = 3,1$$

$$y_c = \frac{2,5 \cdot 30 - 3 \cdot 4 - \frac{4}{3} \cdot 6}{20} = 2,75$$

$y^* \Rightarrow 3,1$

~~$y_1 \Rightarrow 2,83$~~

$y_2 \Rightarrow 4$

$y_3 \Rightarrow 2$

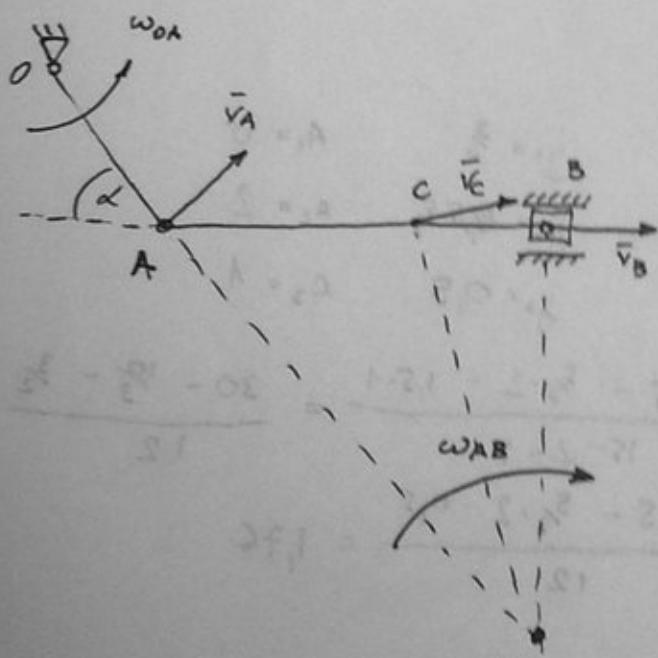
$$\bar{I}_{y^*} = \frac{5 \cdot 6^3}{12} + 30 \cdot (3,1 - 3)^2 = 90 + 30 \cdot 0,01 = 90,3 \text{ m}^4$$

$$\bar{I}_{y^*} = \frac{4 \cdot 3^3}{36} + 6 \cdot (3,1 - 2)^2 = 3 + 6 \cdot 1,21 = 10,26 \text{ m}^4$$

$$\bar{I}_{y^*} = \frac{2^4}{12} + 4 \cdot (3,1 - 4)^2 = \frac{4}{3} + 4 \cdot 0,81 = 4,57 \text{ m}^4$$

$$\bar{I}_{y^*} = 90,3 - 10,26 - 4,57 = 75,47 \text{ m}^4$$

Zad. 3



$\omega_{0A} = \frac{3}{4} \text{ s}^{-1}$

$\overline{OA} = 20 \text{ cm}$

$\overline{AB} = 50 \text{ cm}$

$\overline{AC} = 30 \text{ cm}$

$\alpha = 45^\circ$

$v_A = \omega_{0A} \cdot \overline{OA} = 15 \text{ cm/s}$

$AB = BS = 50 \text{ cm}$

$AS = 50\sqrt{2} \text{ cm}$

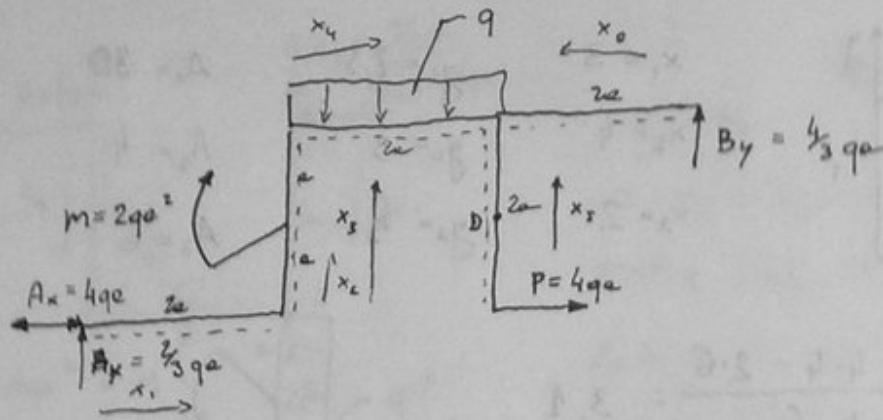
$CS = 53,85 \text{ cm}$

$\omega_{AB} = \frac{\omega_{0A} \cdot \overline{OA}}{AS} = \frac{15}{50\sqrt{2}} = 0,21 \frac{1}{5}$

$v_B = 10,61 \text{ cm/s}$

$v_C = 11,42 \text{ cm/s}$

Zad. 1



$$A_y + B_y - 2qa = 0 \quad A_y = 2qa - B_y = \frac{2}{3}qa$$

$$A_x + P = 0 \quad A_x = -P = -4qa$$

$$\sum M_A = M + 2qa \cdot 3a - 6a B_y = 0$$

$$6a B_y = 2qa^2 + 6qa^2$$

$$B_y = \frac{4}{3}qa$$

$$\sum M_D = 4a A_y + a A_x + M - 2qa^2 - aP - 2a B_y = 0$$

$$\frac{8}{3}qa^2 + 4qa^2 + 2qa^2 - 2qa^2 - 4qa^2 - \frac{8}{3}qa^2 = 0$$

$$Mg^I = A_y x_1 \quad Mg^I(2a) = \frac{4}{3}qa^2$$

$$Mg^{II} = \frac{4}{3}qa^2 + A_x x_2 \quad Mg^{II}(a) = \frac{4}{3}qa^2 + 4qa^2 = 5\frac{1}{3}qa^2$$

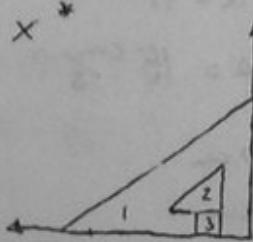
$$Mg^{III} = \frac{4}{3}qa^2 + A_x x_3 + M \quad Mg^{III}(a) = 7\frac{1}{3}qa^2 \quad Mg^{III}(2a) = \frac{4}{3}qa^2 + 8qa^2 + 2qa^2 = 11\frac{1}{3}qa^2$$

$$Mg^{IV} = A_y x_4 + 11\frac{1}{3}qa^2 - \frac{9x_4^2}{2} \quad Mg^{IV}(2a) = \frac{4}{3}qa^2 + 11\frac{1}{3}qa^2 - 2qa^2 = 10\frac{2}{3}qa^2$$

$$Mg^V = P x_5 \quad Mg^V(2a) = 8qa^2$$

$$Mg^{VI} = B_y x_6 \quad Mg^{VI}(2a) = \frac{8}{3}qa^2$$

Zad. 2:



$$x_1 = 2 \quad y_1 = \frac{5}{3} \quad A_1 = 15$$

$$x_2 = \frac{11}{3} \frac{5}{3} \quad y_2 = \frac{10}{3} \frac{5}{3} \quad A_2 = 2$$

$$x_3 = 1,5 \quad y_3 = 0,5 \quad A_3 = 1$$

$$x_c = \frac{2 \cdot 15 - \frac{5}{3} \cdot 2 - 1,5 \cdot 1}{15 - 2 - 1} = \frac{30 - \frac{10}{3} - \frac{3}{2}}{12} = 2,097$$

$$y_c = \frac{\frac{5}{3} \cdot 15 - \frac{5}{3} \cdot 2 - 0,5}{12} = 1,76$$

$$x^* \Rightarrow 1,76$$

$$x_1 \Rightarrow \frac{5}{3}$$

$$x_2 \Rightarrow \frac{5}{3}$$

$$x_3 \Rightarrow \frac{1}{2}$$

$$\bar{I}_{x^*}^1 = \frac{6 \cdot 5^3}{36} + 15 \cdot (1,76 - \frac{5}{3})^2 = 20,96$$

$$\bar{I}_{x^*}^2 = \frac{24}{36} + 2 \cdot (1,76 - \frac{5}{3})^2 = 0,46$$

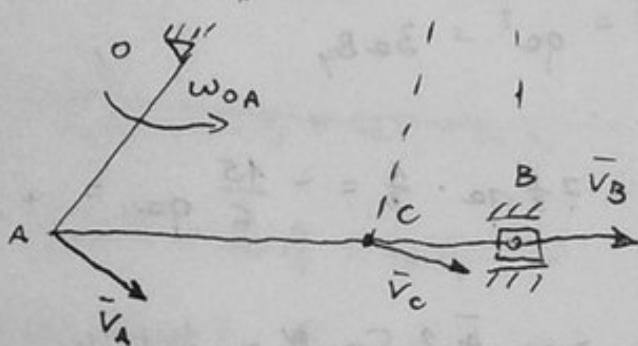
$$\bar{I}_{x^*}^3 = \frac{1}{12} + 1 \cdot (1,76 - 0,5)^2 = 1,67$$

$$\bar{I}_{xx}^c = \bar{I}_{x^*}^1 - \bar{I}_{x^*}^2 - \bar{I}_{x^*}^3 = 18,83 \text{ m}^4$$

$\curvearrowright S$

$\curvearrowright \omega_{AB}$

Zad. 3



$$\overline{OA} = 10 \text{ cm}$$

$$\overline{AB} = 40 \text{ cm}$$

$$\overline{AC} = 25 \text{ cm}$$

$$\omega_{0A} = \frac{2\pi}{3} \text{ s}^{-1}$$

$$\alpha = 45^\circ$$

$$\overline{AB} = \overline{BS} = 40 \text{ cm}$$

$$\overline{AS} = 40\sqrt{2} \text{ cm}$$

$$v_A = \frac{20}{3} \text{ cm/s} = 6,66 \text{ cm/s}$$

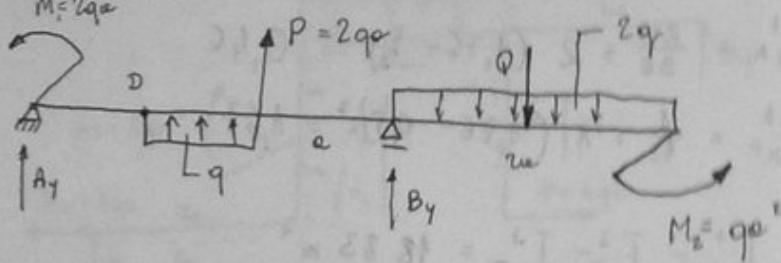
$$\omega_{AB} = \frac{\frac{20}{3}}{40\sqrt{2}} = \frac{1}{3} \cdot \frac{1}{40\sqrt{2}} = \frac{\sqrt{2}}{12}$$

$$v_B = 40 \cdot \frac{\sqrt{2}}{12} = \frac{10\sqrt{2}}{3} = 4,71 \text{ cm/s}$$

$$CS = 42,72 \text{ cm}$$

$$v_C = 5,03 \text{ cm/s}$$

2nd. 1



$$A_y + B_y + q_a + P = -4q_a \approx 0$$

$$\sum M^A = -M_1 - \frac{3}{2}q_a^2 - 2q_a P - 3q_a B_y + 4q_a \cdot 4q_a - M_2 = 0$$

$$-2q_a^2 - \frac{3}{2}q_a^2 - 4q_a^2 + 16q_a^2 - q_a^2 = 3q_a B_y$$

$$-8,5q_a^2 + 16q_a^2 = 3q_a B_y$$

$$+7,5q_a^2 = 3q_a B_y \quad B_y = -7,5q_a \cdot \frac{1}{3} = -\frac{15}{6}q_a = +2,5q_a$$

$$A_y = 4q_a - P - q_a - B_y = 4q_a - 2q_a - q_a - 2,5q_a = 2,5q_a - 1,5q_a$$

$$\sum M^D = -M_1 + A_y x_1 - \frac{q_a^2}{2} - P x_1 - 2q_a B_y + 3Q x_1 - M_2$$

~~$$-2q_a^2 + 3,5q_a^2 - 0,5q_a^2 - 2q_a^2 + 5q_a^2 + 12q_a^2 - q_a^2 = 0$$~~

~~$$-2q_a^2 - \frac{3}{2}q_a^2 - \frac{q_a^2}{2} - 2q_a^2 - 5q_a^2 + 12q_a^2 - q_a^2 = 0$$~~

$$M_g^I = -M + A_y x_1, \quad M_g^I(0) = -2q_a^2 \quad M_g^I(a) = -2q_a^2 + 1,5q_a^2 = -3,5q_a^2$$

$$T^I = A_y = -1,5q_a$$

$$M_g^{II} = -M + A_y x_2 + \frac{q(x_2 - a)^2}{2} \quad M_g^{II}(a) = -2q_a^2 - 3q_a^2 + \frac{q_a^2}{2} = -4,5q_a^2$$

$$T^{II} = A_y + q(x_2 - a) \quad T^{II}(a) = -1,5q_a$$

$$T^{II}(2a) = -1,5q_a + q_a = -0,5q_a$$

$$M_g^{III} = -M + A_y x_3 + q_a(x_3 - 1,5a) + P$$

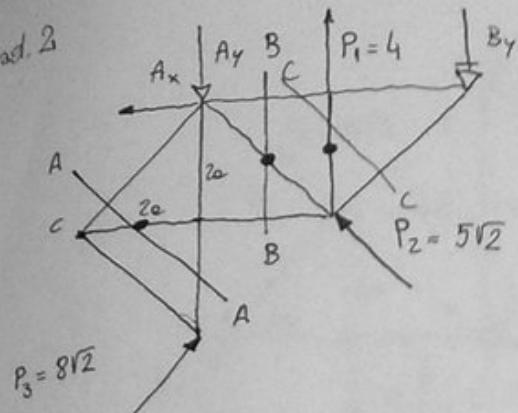
$$M_g^{III}(3a) = -2q_a^2 - 4,5q_a^2 + 1,5q_a^2 + 2q_a^2$$

$$T^{III} = 1,5q_a^2$$

$$M_g^{NP} = M_2 - \frac{2q_a x^2}{2} = M_2 - q_a x^2 \quad M^{NP}(0) = q_a^2$$

$$T^{NP} = 2q_a x \quad T^N(0) = 0 \quad T^N(2a) = M^{NP}(2a) = q_a^2 - 4q_a^2 = -3q_a^2$$

zad. 2



$$-A_y - B_y + 8\sqrt{2} \cdot \frac{\sqrt{2}}{2} + 5\sqrt{2} \cdot \frac{\sqrt{2}}{2} + 4 = 0$$

$$-A_x + 8\sqrt{2} \cdot \frac{\sqrt{2}}{2} - 5\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 0$$

$$\sum M^A: -P_3 \cdot \alpha\sqrt{2} - P_4 \cdot z_2 + 4\alpha B_y = 0$$

$$4\alpha B_y = P_3 \sqrt{2} + P_4 \cdot z_2$$

$$4B_y = P_3 \sqrt{2} + 2P_4$$

$$4B_y = 16 + 8$$

$$B_y = 6$$

$$\text{II: } A_y = 4 + 5 + 8 - 6 = 11$$

$$A_x = 3$$

~~$$\sum M^C: 2\alpha A_y - 2\alpha A_x - 2\sqrt{2}\alpha P_3 - 4\alpha P_4 + 6\alpha B_y$$~~

$$\sum M^A: -P_3 \cdot 2\sqrt{2} - 2\alpha P_4 + 4\alpha B_y = 0 \quad 4B_y = 2P_4 + 2\sqrt{2}P_3 = 8 + 32 = 40 \quad B_y = 10$$

$$A_y = 4 + 5 + 8 - 10 = 7$$

$$A_x = 3$$

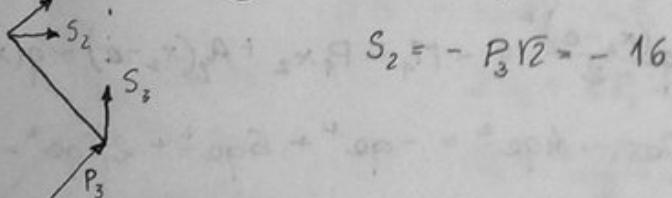
$$\sum M^C: 2\alpha A_y - 2\alpha A_x - 2\sqrt{2}\alpha P_3 - 4\alpha P_4 + 6\alpha B_y - 2\sqrt{2}\alpha P_2$$

$$14 - 6 - 32 - 16 + 60 - 20 = 74 - 74 = 0$$

$$P_{3k} = 8\sqrt{2} \cdot \frac{\sqrt{2}}{2} =$$

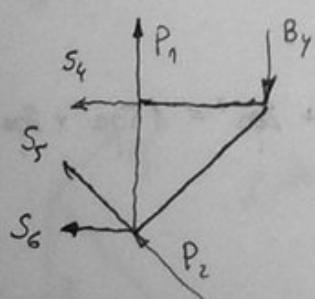
A-A : I

$$(S_2) \quad \sum M^I: -2\alpha S_2 - 2\sqrt{2}\alpha P_3 = 0$$



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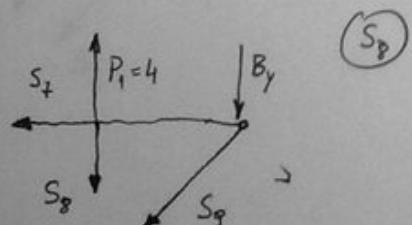
B-B



$$(S_5) \quad \sum F_y: S_5 \frac{\sqrt{2}}{2} + P_1 - B_y + P_2 \frac{\sqrt{2}}{2} = 0$$

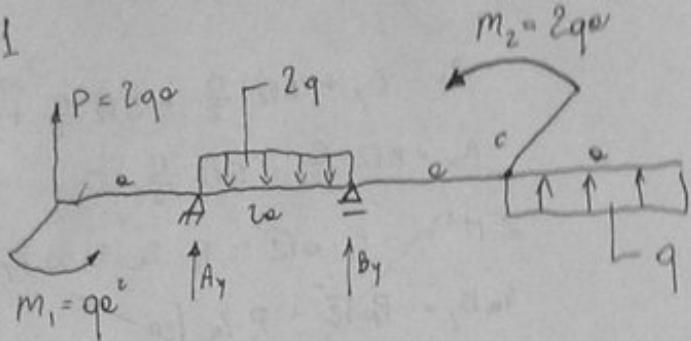
$$S_5 \frac{\sqrt{2}}{2} = 10 - 4 - 5$$

$$S_5 = \frac{2\sqrt{2}}{\sqrt{2}\sqrt{2}} = \sqrt{2}$$



$$(S_8) \quad S_8 = 4$$

Zad. 1



$$A_y + B_y - 4qe + P + qe = 0$$

$$\sum M_A = -M_1 + Pa + 4qe \cdot a - 2B_y \cdot a - M_2 - qe \cdot 3,5a \\ -qe^2 + 2qe^2 + 4qe^2 - 2qe^2 - 3,5qe^2 - 2qe^2 = 0$$

$$-\frac{1}{2}qe^2 = 2aB_y$$

$$B_y = -\frac{qe^2}{4}$$

$$A_y = 4qe - P - qe + \frac{qe}{4} = 4qe - 3qe + \frac{qe}{4} = \frac{5}{4}qe$$

$$\sum M_C = -M_1 + P \cdot 4a + A_y \cdot 3a - 4qe \cdot 2a + B_y \cdot e - M_2 - \frac{7a^2}{2} = 0$$

$$-qe^2 + 8qe^2 + \frac{15}{4}qe^2 - 8qe^2 - \frac{qe^2}{4} - 2qe^2 - \frac{qe^2}{2} = 0$$

$$-qe^2 + \frac{14}{4}qe^2 - 2qe^2 - \frac{qe^2}{2} = 0$$

$$-3,5qe^2 + 3,5qe^2 = 0$$

$$Mg^I = -M_1 + P_1 x_1 \quad Mg^I(0) = -qe^2 \quad Mg^I(a) = -qe^2 + 2qe^2 = qe^2$$

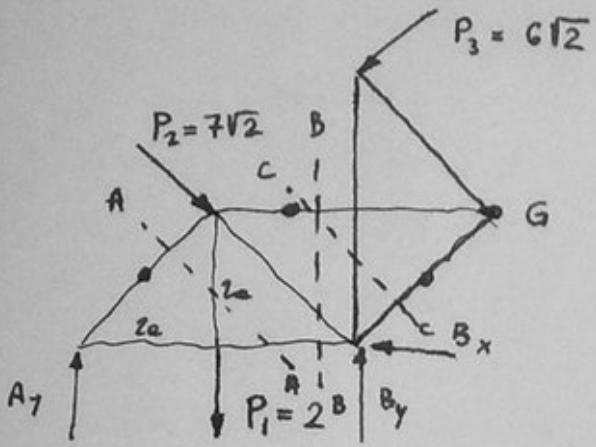
$$Mg^{II} = -M_1 + P_1 x_2 + A_y(x_2 - a) - 2q \frac{(x_2 - a)}{2} = -M_1 + P_1 x_2 + A_y(x_2 - a) - q(x_2 - a)$$

$$Mg^{II}(3a) = -qe^2 + 2qe \cdot 3a + \frac{5}{4}qe \cdot 2a - 4qe^2 = -qe^2 + 6qe^2 + 2,5qe^2 - 4qe^2$$

$$Mg^{II}(3a) = 3,5qe^2$$

$$Mg^{III P} = \frac{qx_3^2}{2} \quad Mg^{III P}(0) = 0 \quad Mg^{III P}(a) = \frac{qe^2}{2}$$

$$Mg^{IV P} = qe(x_2 - \frac{a}{2}) + M_2 \quad Mg^{IV P}(2a) = qe \cdot 1,5a + 2qe^2 = 1,5qe^2 + 2qe^2 = 3,5qe^2$$



$$A_y + B_y - P_1 - P_2 \frac{\sqrt{2}}{2} - P_3 \frac{\sqrt{2}}{2} = 0$$

$$P_2 \frac{\sqrt{2}}{2} - P_3 \frac{\sqrt{2}}{2} - B_x = 0$$

$$\sum M^B = A_y \cdot 4a - P_1 \cdot 2a - P_3 \cdot 2\sqrt{2}a = 0$$

$$4A_y = 2P_1 + 2\sqrt{2}P_3 = 4 + 24$$

$$4A_y = 28 \quad A_y = 7$$

$$B_y = 6 + 7 + 2 - 7 = 8$$

$$B_x = 1$$

$$\begin{aligned}\sum M^A &= 6aA_y - 4aP_1 + 2aB_y + 2aB_x - 2\sqrt{2}aP_2 - 2\sqrt{2}aP_3 = 0 \\ 42 - 8 + 16 + 2 - 28 - 24 &= 0\end{aligned}$$

A-A

$$\sum M^D < S_1 \cdot a\sqrt{2} + A_y \cdot 2a = 0 \quad S_1 \frac{\sqrt{2}}{2} \cdot 2a + 2aA_y = 0$$

$$S_1 = -\frac{14\sqrt{2}}{12\sqrt{2}} = -7\sqrt{2}$$

B-B

$$\sum M^H = 4aA_y - 2aP_1 + 2aS_4 = 0$$

$$2S_4 = 2P_1 - 4A_y$$

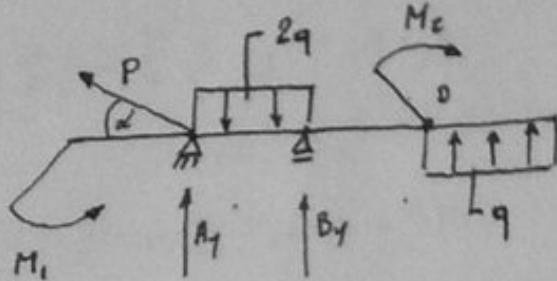
$$S_4 = \frac{4 - 28}{2} = -12$$

C-C

$$\sum M^K = -P_3 \cdot 2\sqrt{2}a + S_g \cdot 2\sqrt{2}a = 0$$

$$S_g = P_3 = 6\sqrt{2}$$

2.d.1



$$\begin{aligned}M_1 &= 2qa^2 \\M_2 &= qa^2 \\P &= 2qa \\ \alpha &= 30^\circ\end{aligned}$$

$$A_y + B_y - 2qa + P_y + qa = 0$$

$$\sum M^A = -M_1 + 2qa \cdot \frac{a}{2} - B_y a + M_2 - qa \cdot 2,5a = 0$$

$$B_y a = -2qa^2 + qa^2 + qa^2 - 2,5qa^2 \quad B_y = -2,5qa \quad A_y = 2,5qa$$

$$A_y = 2qa - qa - P_y - B_y = qa - qa - B_y = 2,5qa$$

$$\sum M^D = -M_1 + P_y \cdot 2a + A_y \cdot 2a - 2qa \cdot 1,5a + B_y a + M_2 - qa \cdot \frac{a}{2} = 0$$

$$-2qa^2 + 2qa^2 + 5qa^2 - 3qa^2 - 2,5qa^2 + qa^2 - 0,5qa^2 = 0$$

$$M_g^I = -M_1 = -2qa^2$$

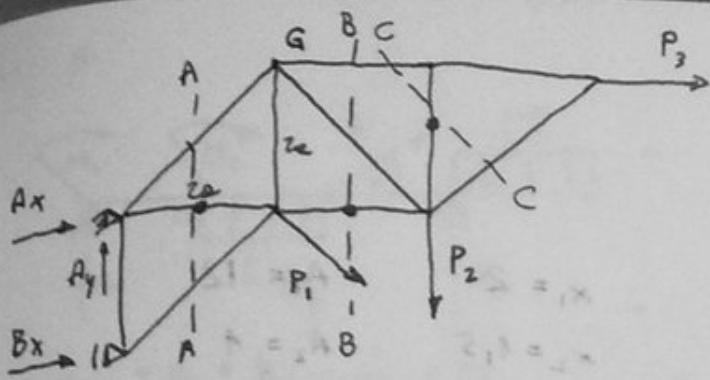
$$M_g^{II} = -M_1 + P_y(x_2 - a) + A_y(x_2 - a) - 3q \frac{(x_2 - a)^2}{2}$$

$$M_g^{II}(2a) = -2qa^2 + qa^2 + 2,5qa^2 - qa^2 = 0,5qa^2$$

$$M_g^{III P} = \frac{qx_3^2}{2} \quad M_g^{III}(a) = \frac{qa^2}{2}$$

$$M_g^{IV P} = qa(x_4 - \frac{a}{2}) - M_2 \quad M_g^{IV P}(a) = \frac{qa^2}{2} - qa^2 = -\frac{qa^2}{2}$$

$$M_g^{IV P}(2a) = 1,5qa^2 - qa^2 = 0,5qa^2$$



$$P_1 = 3\sqrt{2}$$

$$P_2 = 7$$

$$P_3 = 5$$

$$A_x + B_x + P_1 \frac{\sqrt{2}}{2} + P_3 = 0$$

$$A_x + B_x + 3\sqrt{2} + 5 = 0$$

$$A_x = -30\sqrt{2} - 30$$

$$A_y - P_1 \frac{\sqrt{2}}{2} - P_2 = 0$$

$$A_y = 3 + 7 = 10$$

$$\sum M^A = -B_x \cdot 2a + P_1 \cdot a\sqrt{2} + 4aP_2 + 2aP_3 = 0$$

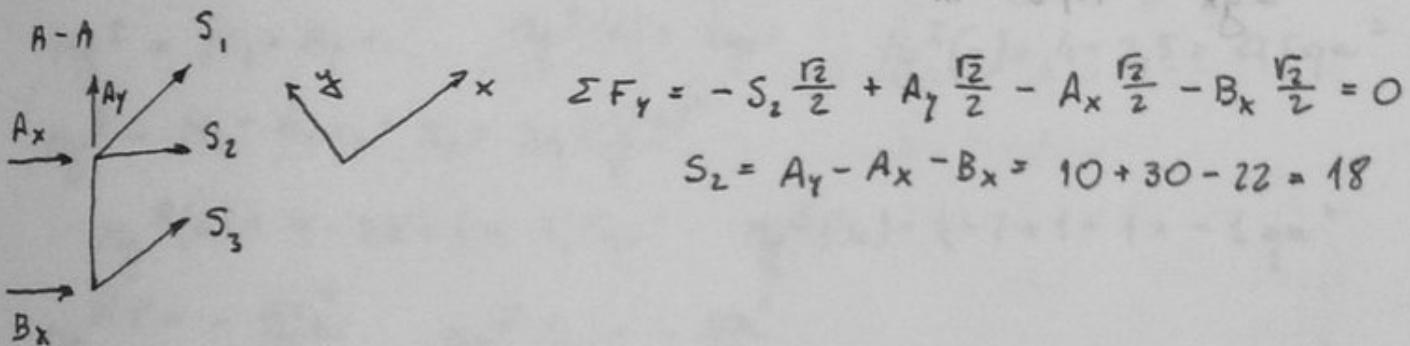
$$2B_x = 5 + 28 + 10$$

$$B_x = 22$$

$$\sum M^A = -A_x \cdot 2a + A_y \cdot 2a - B_x \cdot 4a - P_1 \sqrt{2}a + P_2 \cdot 2a = 0$$

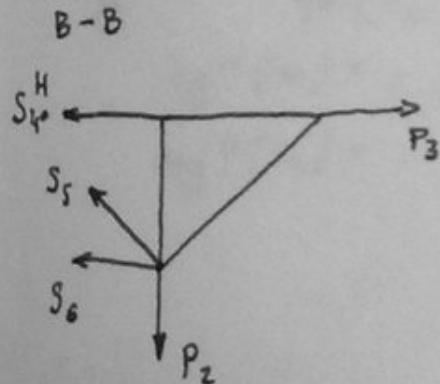
$$+15\sqrt{2} + 20\sqrt{2} - 82a$$

$$60 + 20 - 88 - 6 + 14 = 0$$

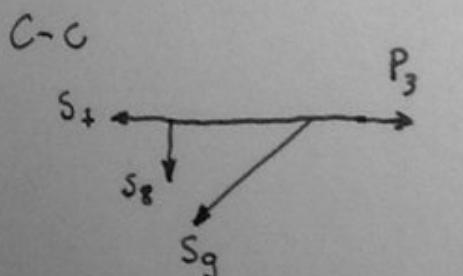


$$\sum M^H = S_6 \cdot 2a + P_2 \cdot 2a = 0$$

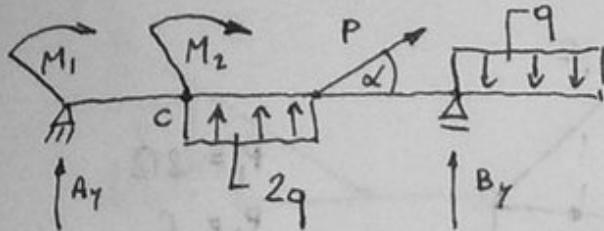
$$S_6 = -P_2 = -7$$



$$S_9 = 0$$



22.1 B



$$\begin{aligned}M_1 &= 4qa^2 \\M_2 &= qa^2 \\P &= 4qa \\alpha &= 30^\circ\end{aligned}$$

$$A_y + 2qa + P_y + B_y - qa = 0 \quad A_x = -B_x \quad A_y + 2qa + 2qa + B_y - qa = 0$$

$$\sum M^A = M_1 + M_2 - 2qa \cdot 1,5a - P_y \cdot 2a - 3aB_y + qa \cdot 3,5a = 0$$

$$4qa^2 + qa^2 - 3qa^2 - 4qa^2 + 3,5qa^2 = 3aB_y \quad B_y = \frac{1}{2}qa$$

$$B_y = \frac{1}{2}qa \quad A_y = \cancel{\frac{1}{2}qa} - \cancel{\frac{1}{2}qa} \quad A_y = -3,5qa$$

~~$$\sum M^C = A_y a + M_1 + M_2 = qa^2 - P_y a - 2aB_y + qa \cdot 2,5a = 0$$~~

~~$$\cancel{-\frac{7}{6}qa^2} + 5qa^2 - qa^2 - \frac{14}{6}qa^2 + 2,5qa^2 = 0$$~~

~~$$\sum M^C = -3,5qa^2 + 5qa^2 - qa^2 - 2qa^2 - qa^2 + 2,5qa^2$$~~

$$Mg^I = M_1 + A_y x_1 \quad Mg^I(0) = 4qa^2 \quad Mg^I(a) = 4 - 3,5 = 0,5qa^2$$

$$Mg^{II} = M_1 + A_y x_2 + M_2 + 2q \frac{(x_2 - a)^2}{8}$$

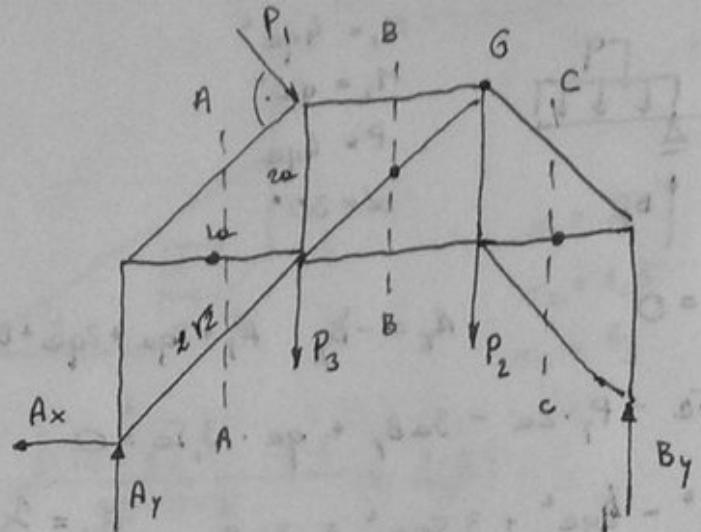
$$Mg^{II}(a) = 4 - 3,5 + 1 = 1,5qa^2 \quad Mg^{II}(2a) = 4 - 7 + 1 + 1 = -1qa^2$$

$$Mg^{III} P = -\frac{q x_3^2}{2} \quad Mg^{III}(a) = -\frac{qa^2}{2}$$

$$Mg^{IVP} = -qa(x_4 - \frac{1}{2}a) + B_y(x_4 - a)$$

$$Mg^{IV}(a) = -\frac{qa^2}{2}$$

$$Mg^{IV}(2a) = -1,5qa^2 + \frac{1}{2}qa^2 = -qa^2$$



$$P_1 = 2\sqrt{2}$$

$$P_2 = 6$$

$$P_3 = 4$$

$$-A_x + P_1 \frac{\sqrt{2}}{2} = 0 \quad A_x = 2$$

$$P_1 \frac{\sqrt{2}}{2} \cdot 4a + P_1 \frac{\sqrt{2}}{2} \cdot 2a$$

$$A_y + B_y - P_3 - P_2 - P_1 \frac{\sqrt{2}}{2} = 0$$

$$\sum M_A = P_1 3\sqrt{2}a + P_3 \cdot 2a + P_2 \cdot 4a - 6a B_y = 0$$

$$6B_y = 12 + 8 + 24 \quad B_y = 7 \frac{1}{3} = \frac{22}{3}$$

$$A_y = 2 + 6 + 4 - 2\frac{2}{3} = -15\frac{1}{3} = 16\frac{2}{3} \quad A_y = 4\frac{2}{3}$$

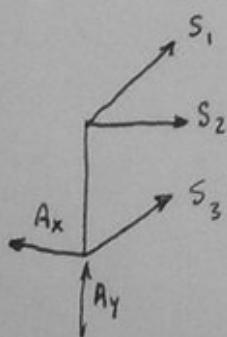
$$\sum M_G = 4a A_y + 4a A_x - P_3 \cdot 2a - P_1 \sqrt{2}a - 2a B_y = 0$$

$$-64\frac{1}{3} + 8 - 8 - 4$$

$$-18\frac{2}{3} + 8 - 8 - 4 = 14\frac{2}{3} = 0$$

$$0 = 0$$

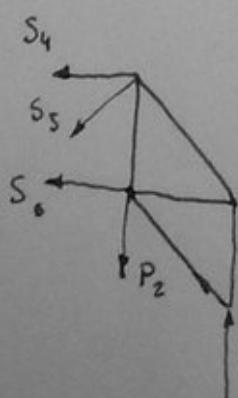
A-A



$$\sum F_y = -S_2 \frac{\sqrt{2}}{2} + A_x \frac{\sqrt{2}}{2} + A_y \frac{\sqrt{2}}{2} = 0$$

$$S_2 = A_x + A_y = 6\frac{2}{3}$$

B-B

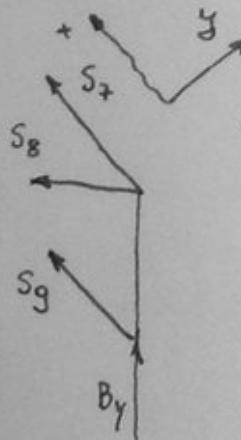


$$-S_5 \frac{\sqrt{2}}{2} - P_2 + B_y = 0$$

$$S_5 \frac{\sqrt{2}}{2} = B_y - P_2 = 7\frac{1}{3} - 6$$

$$S_5 = \frac{4}{3} \cdot \frac{2}{\sqrt{2}} = \frac{4\sqrt{2}}{3}$$

C-C



$$\sum F_y = -S_9 \frac{\sqrt{2}}{2} + B_y \frac{\sqrt{2}}{2} = 0$$

$$S_9 = B_y = 7\frac{1}{3}$$