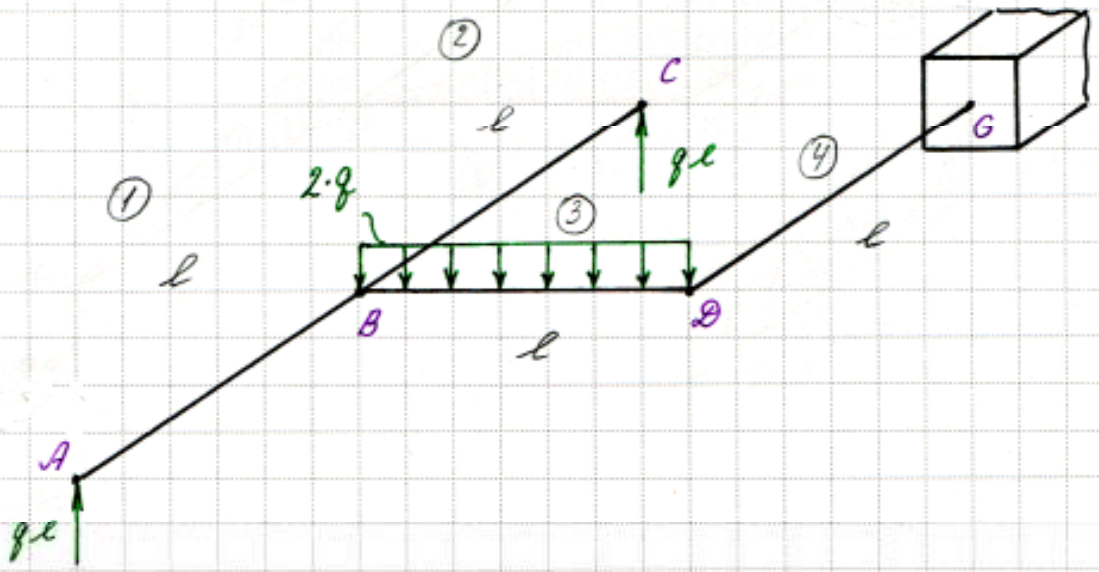
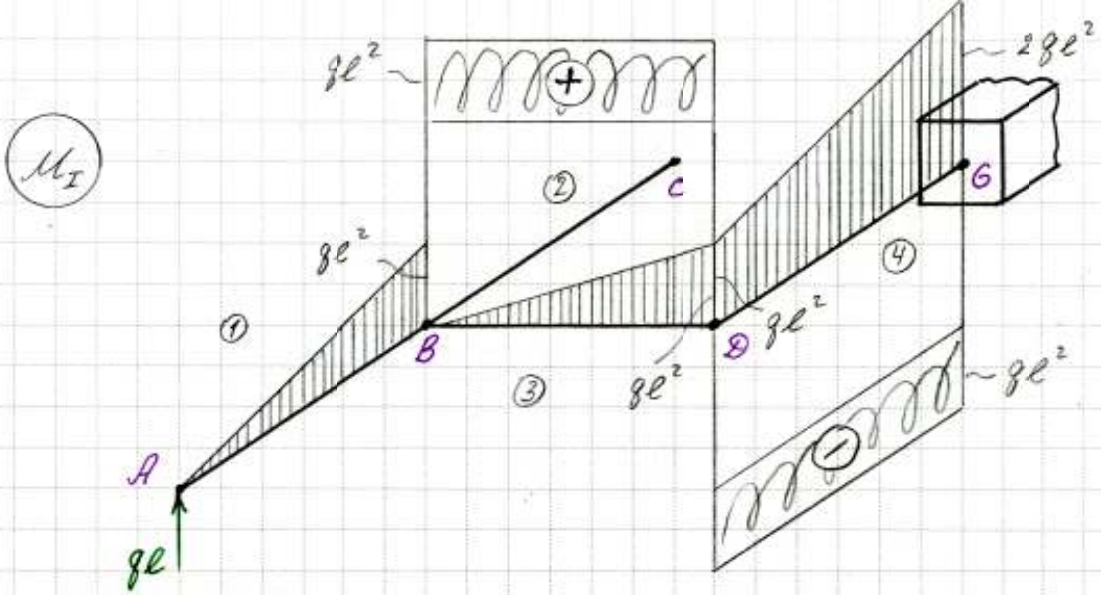
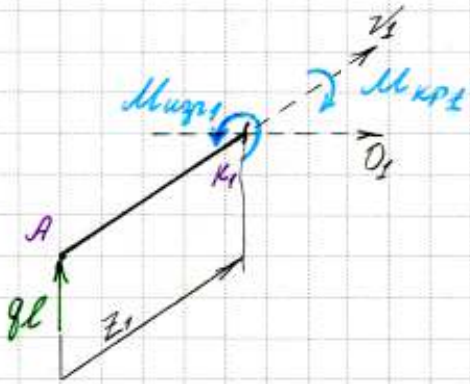


Построить эпюру моментов изгибающих и крутящих.

Решение

Строим эпюри от каждой из сил поотдельности, потом эпюри складываем:



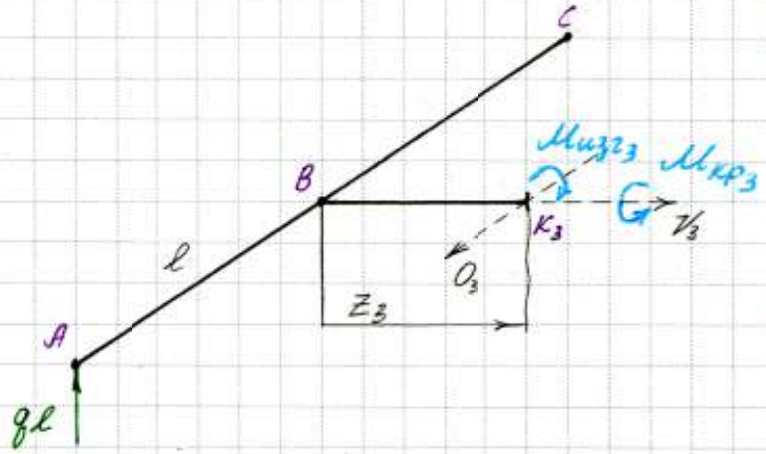


$$\sum M_{O_1} = 0 = -ql z_1 + M_{изг_1} \Rightarrow M_{изг_1} = ql z_1$$

$z_1 = 0: \; M_{изг_1} = 0$

$z_1 = l: \; M_{изг_1} = ql^2$

$$\sum M_{V_1} = 0 = M_{кр1}$$



$$\sum M_{O_3} = 0 = -ql z_3 - M_{изг_3} \Rightarrow M_{изг_3} = -ql z_3$$

$z_3 = 0: \; M_{изг_3} = 0$

$z_3 = l: \; M_{изг_3} = -ql^2$

$$\sum M_{V_3} = 0 = -ql \cdot l + M_{кр3} \Rightarrow M_{кр3} = ql^2$$

$$\sum M_{O_4} = 0 = -ql(l + z_4) + M_{изг_4}$$

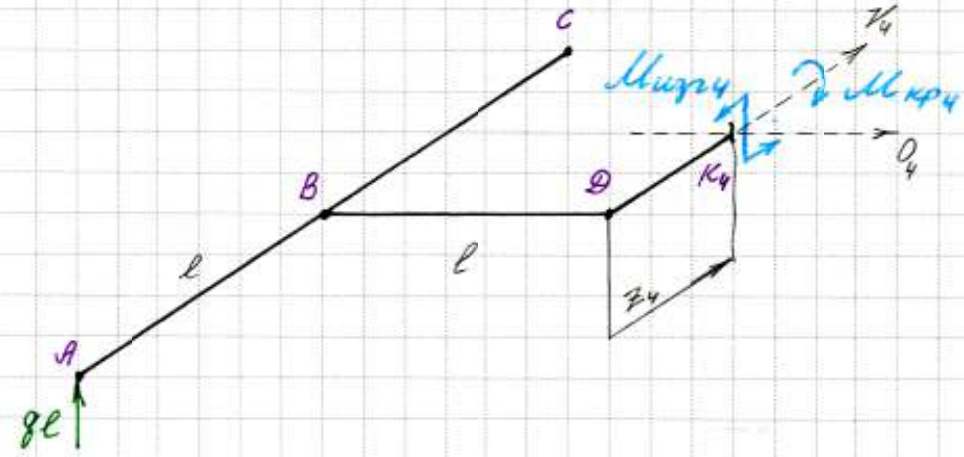
$$M_{изг_4} = ql(l + z_4)$$

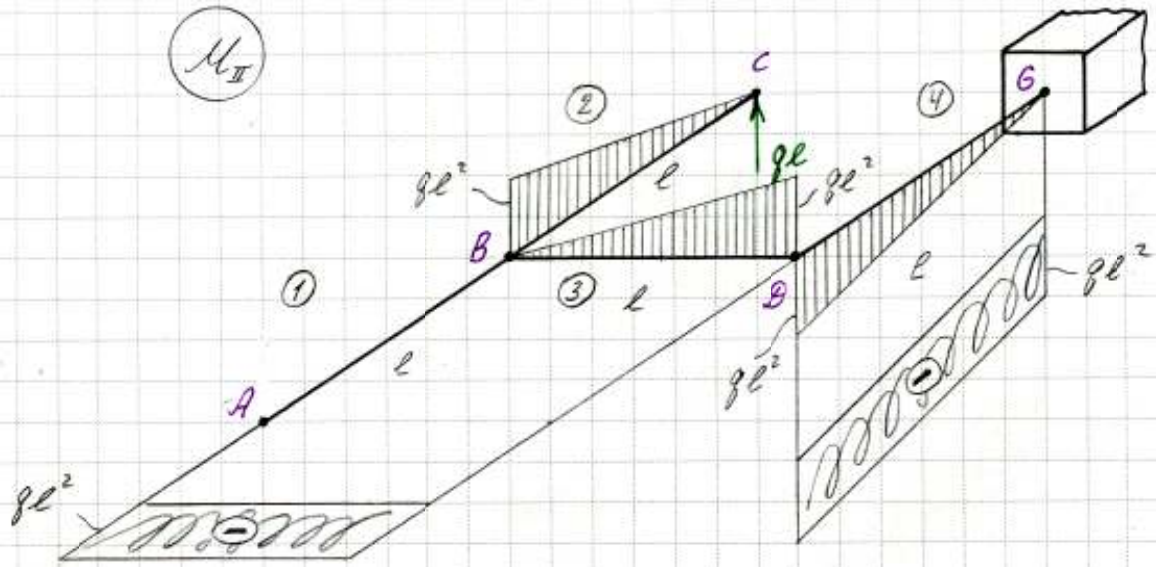
$z_4 = 0: \; M_{изг_4} = ql^2$

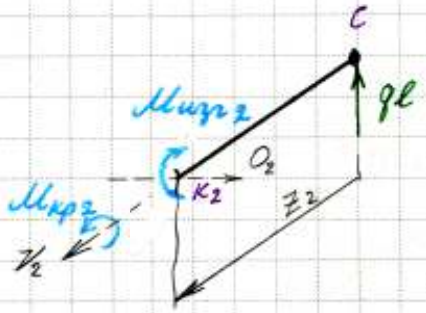
$z_4 = l: \; M_{изг_4} = 2ql^2$

$$\sum M_{V_4} = 0 = ql \cdot l + M_{кр4}$$

$$M_{кр4} = -ql^2$$





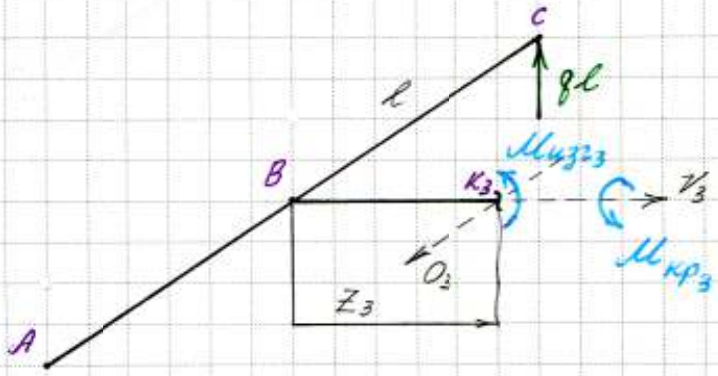


$$\sum M_{O_2} = 0 = -M_{изг_2} + ql z_2 \Rightarrow M_{изг_2} = ql z_2$$

$z_2 = 0 : M_{изг_2} = 0$

$z_2 = l : M_{изг_2} = ql^2$

$$\sum M_{\gamma_2} = 0 = M_{кр_2}$$

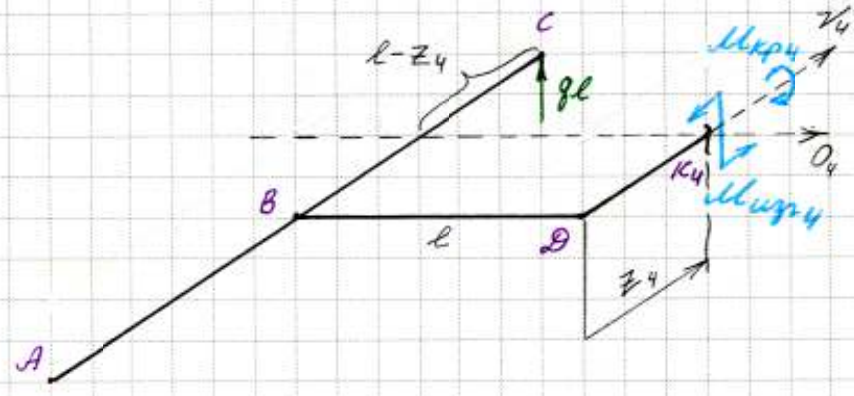


$$\sum M_{O_3} = 0 = -ql z_3 + M_{изг_3} \Rightarrow M_{изг_3} = ql z_3$$

$z_3 = 0 : M_{изг_3} = 0$

$z_3 = l : M_{изг_3} = ql^2$

$$\sum M_{\gamma_3} = 0 = ql \cdot l + M_{кр_3} \Rightarrow M_{кр_3} = -ql^2$$



$$\sum M_{O_4} = 0 = ql(l - z_4) + M_{изг_4}$$

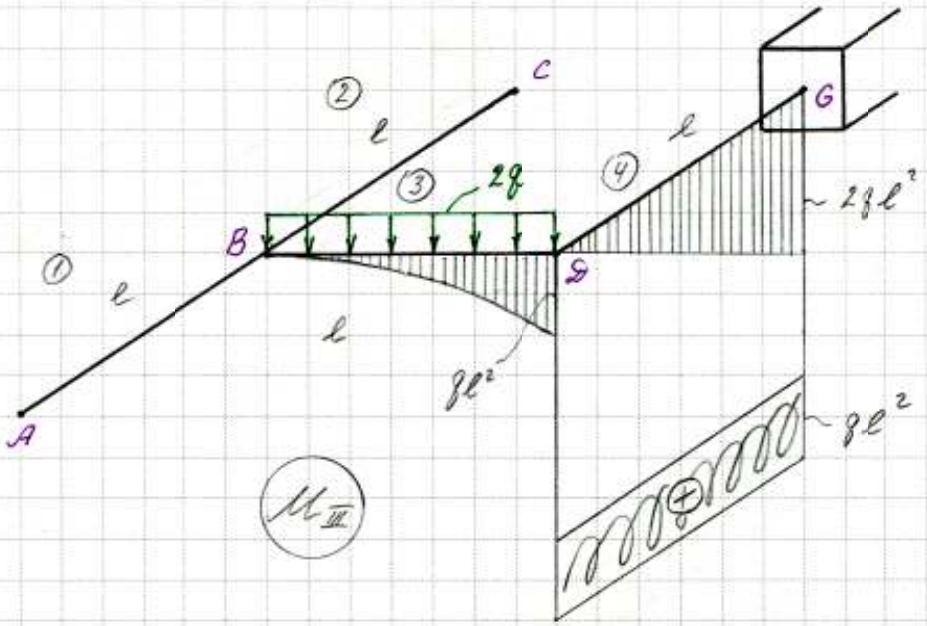
$M_{изг_4} = -ql(l - z_4)$

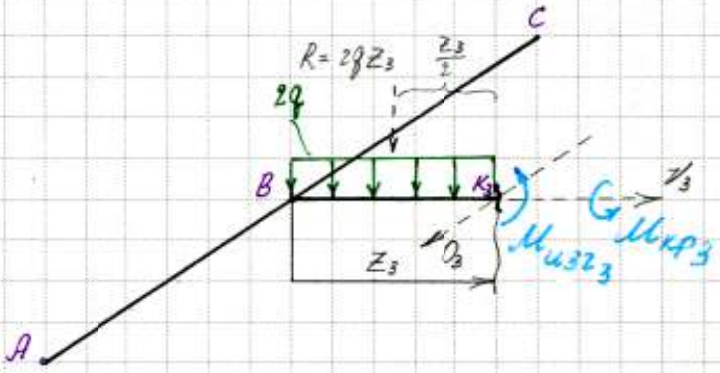
$z_4 = 0 : M_{изг_4} = -ql^2$

$z_4 = l : M_{изг_4} = 0$

$$\sum M_{\gamma_4} = 0 = ql \cdot l + M_{кр_4}$$

$M_{кр_4} = -ql^2$





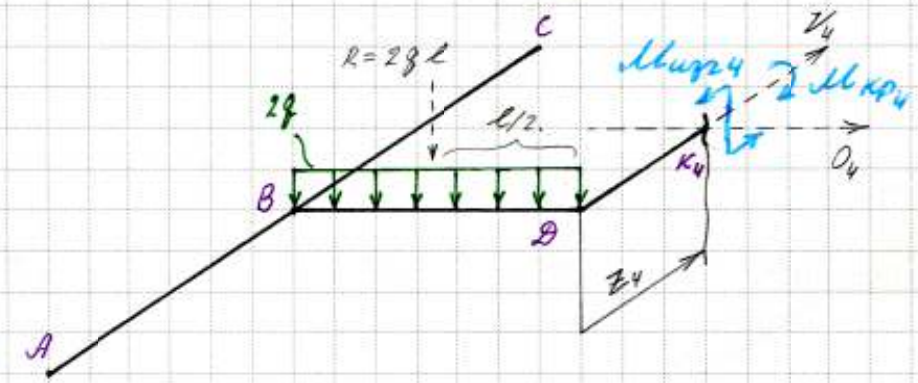
$$\sum M_{O_3} = 0 = 2qz_3 \cdot \frac{z_3}{2} + M_{кр3}$$

$$M_{кр3} = -qz_3^2$$

$z_3 = 0 : M_{кр3} = 0$

$z_3 = l : M_{кр3} = -ql^2$

$$\sum M_{Z_3} = 0 = M_{кр3}$$



$$\sum M_{O_4} = 0 = 2qlz_4 + M_{кр4}$$

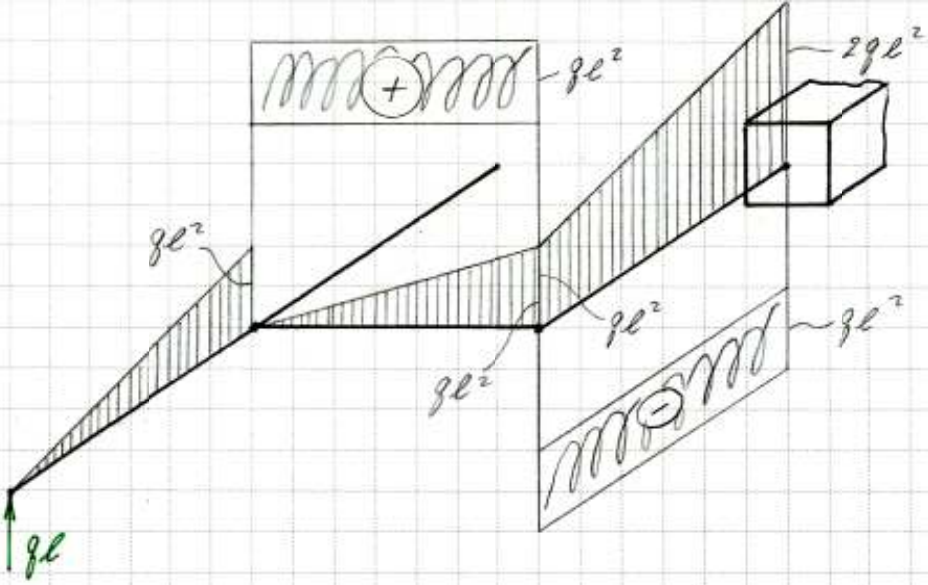
$$M_{кр4} = -2qlz_4$$

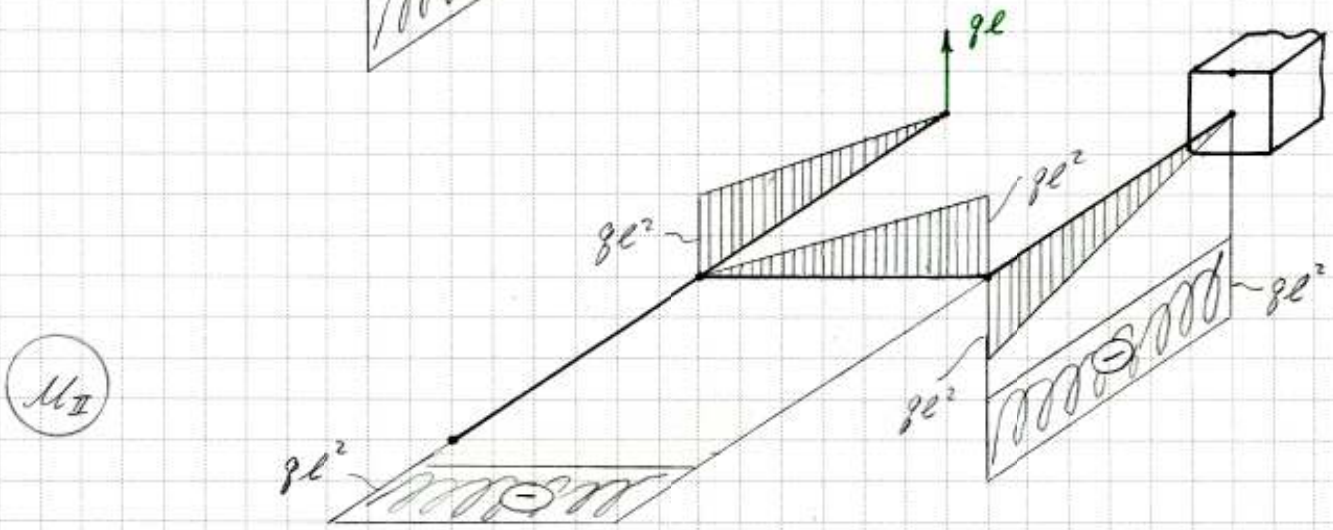
$z_4 = 0 : M_{кр4} = 0$

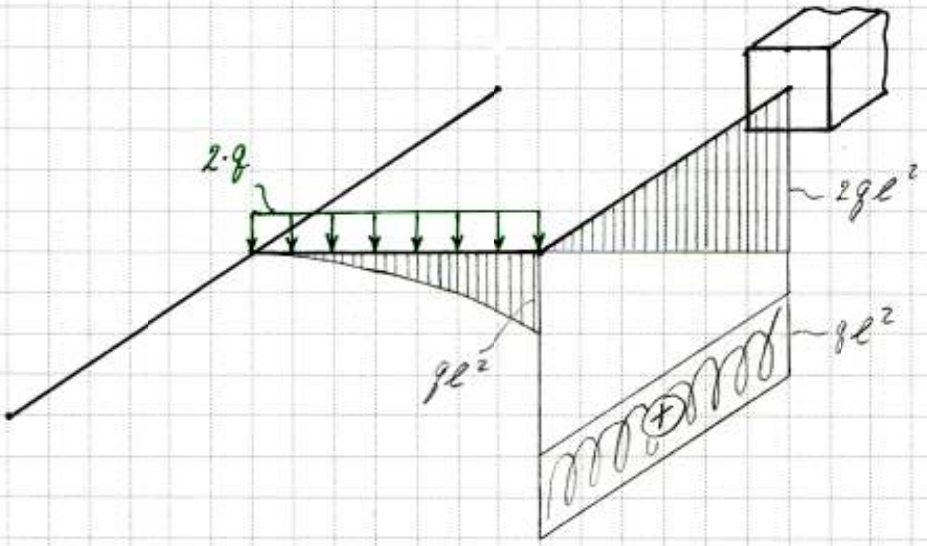
$z_4 = l : M_{кр4} = -2ql^2$

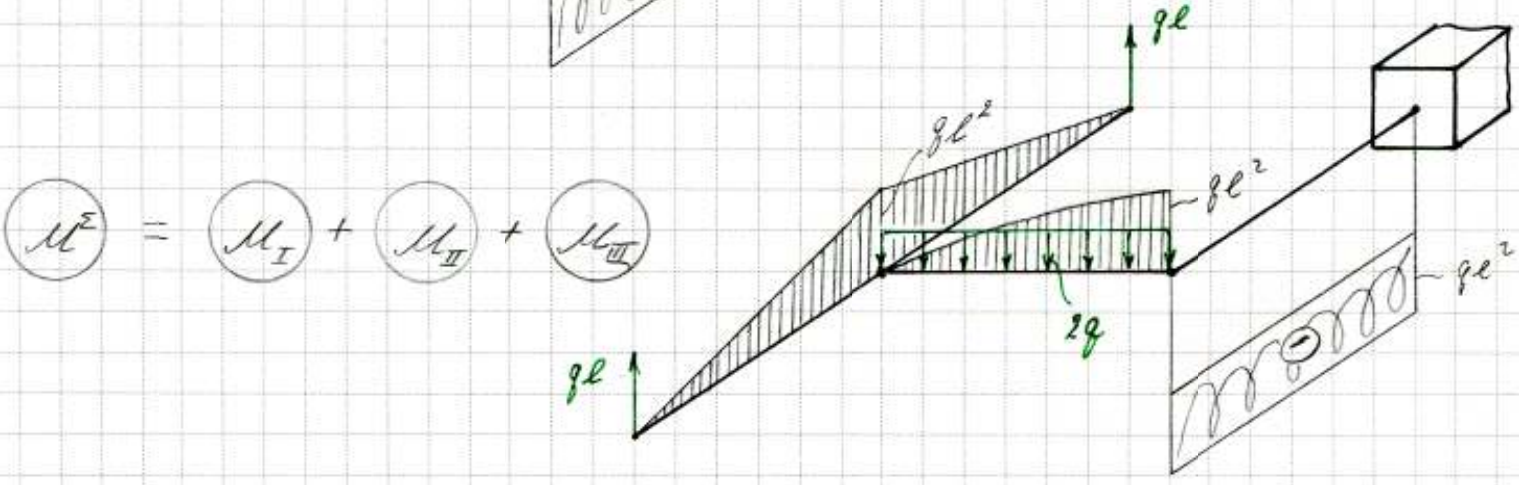
$$\sum M_{Z_4} = 0 = -2ql\frac{l}{2} + M_{кр4}$$

$$M_{кр4} = +ql^2$$


ql^2
$2ql^2$
ql^2
ql^2
ql^2
ql^2
ql
M_I


ql
ql^2
ql^2
ql^2
ql^2
ql^2
M_{II}


$2 \cdot q$
$2ql^2$
ql^2
ql^2
M_{III}


$M^{\Sigma} = M_I + M_{II} + M_{III}$
ql
ql^2
ql^2
$2q$
ql
ql^2