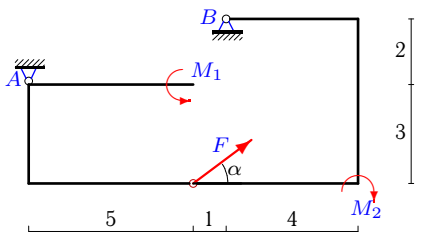
Тяжелая составная рама из двух частей

Плоская рама, состоящая из двух шарнирно соединенных частей, расположена в вертикальной плоскости. Задан погонный вес ρ стержней рамы. Определить реакции опор рамы (в кН).

Кирсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. — 384 с. (с.54.)

Задача S-36.1.

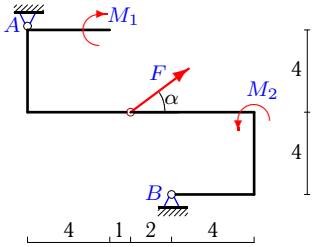
12



$F = 15$ кН, $M_1 = 16$ кНм, $M_2 = 56.5$ кНм, $\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.2.

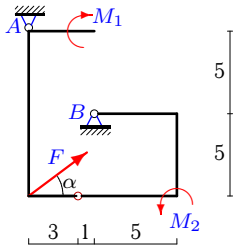
12



$F = 15$ кН, $M_1 = 68.5$ кНм, $M_2 = 82$ кНм, $\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.3.

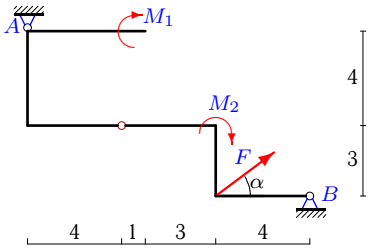
12



$F = 10$ кН, $M_1 = 9$ кНм, $M_2 = 6$ кНм, $\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.4.

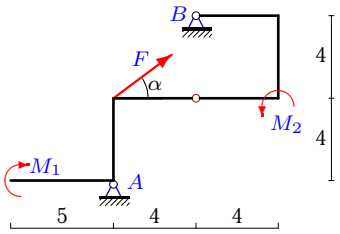
12



$F = 15$ кН, $M_1 = 11.5$ кНм, $M_2 = 112$ кНм, $\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.5.

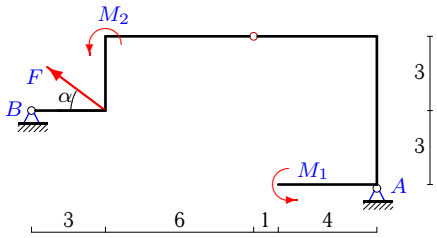
12



$F = 15$ кН, $M_1 = 61$ кНм, $M_2 = 16$ кНм, $\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.6.

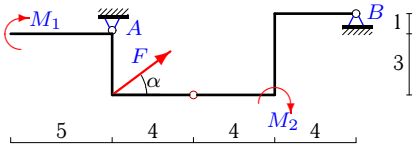
12



$F = 5$ кН, $M_1 = 192.5$ кНм, $M_2 = 106.5$ кНм, $\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.7.

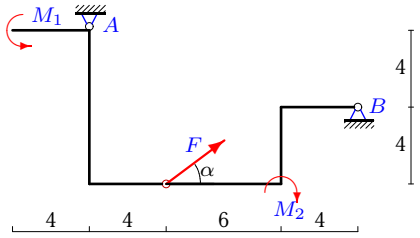
12



$F = 15$ кН, $M_1 = 29$ кНм, $M_2 = 264$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.8.

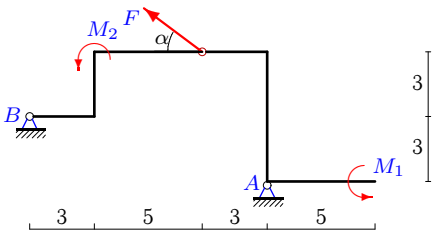
12



$F = 10$ кН, $M_1 = 64$ кНм, $M_2 = 520$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.9.

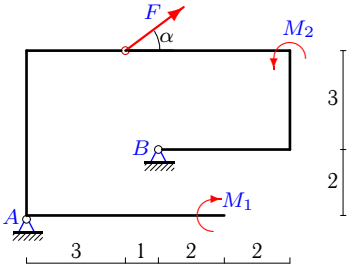
12



$F = 10$ кН, $M_1 = 164$ кНм, $M_2 = 24$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.10.

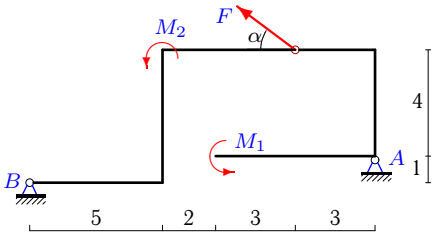
12



$F = 5$ кН, $M_1 = 86.5$ кНм, $M_2 = 69.5$ кНм,
$\rho = 3$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.11.

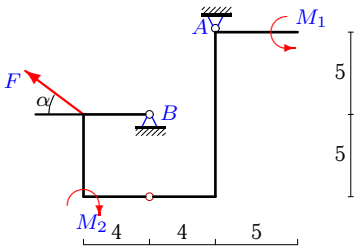
12



$F = 5$ кН, $M_1 = 88$ кНм, $M_2 = 360$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.12.

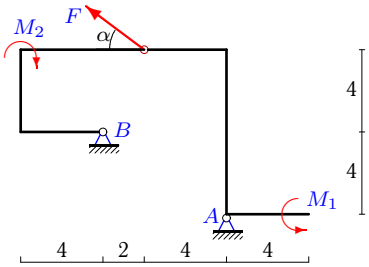
12



$F = 5$ кН, $M_1 = 221.5$ кНм, $M_2 = 96$ кНм,
$\rho = 3$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.13.

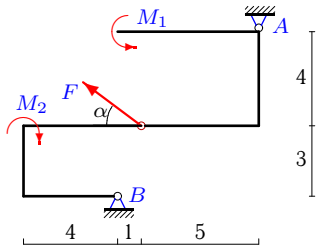
12



$F = 15$ кН, $M_1 = 128$ кНм, $M_2 = 96$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.14.

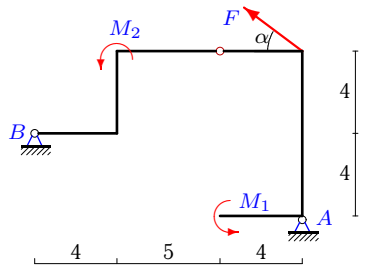
12



$F = 10$ кН, $M_1 = 111$ кНм, $M_2 = 66$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.15.

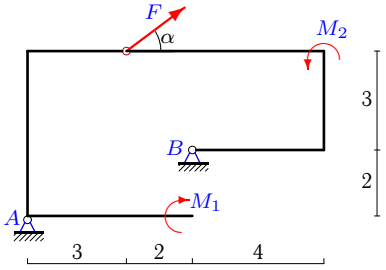
12



$F = 10$ кН, $M_1 = 112$ кНм, $M_2 = 114.5$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.16.

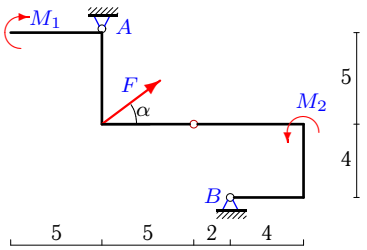
12



$F = 10$ кН, $M_1 = 104$ кНм, $M_2 = 55$ кНм,
$\rho = 3$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.17.

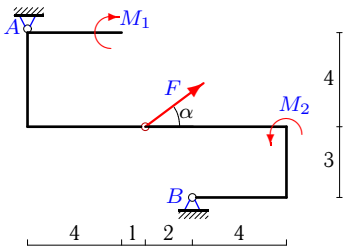
12



$F = 10$ кН, $M_1 = 215$ кНм, $M_2 = 54$ кНм,
$\rho = 3$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.18.

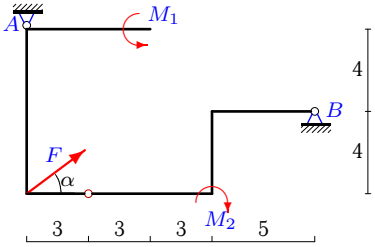
12



$F = 10$ кН, $M_1 = 103$ кНм, $M_2 = 43$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.19.

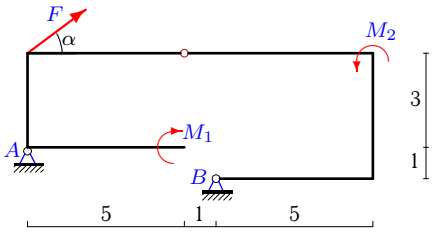
12



$F = 10$ кН, $M_1 = 132.5$ кНм, $M_2 = 868.5$ кНм,
$\rho = 3$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.20.

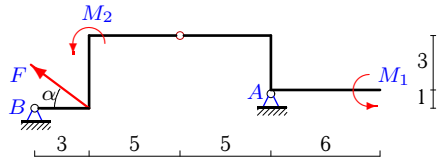
12



$F = 5$ кН, $M_1 = 71$ кНм, $M_2 = 73.5$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.21.

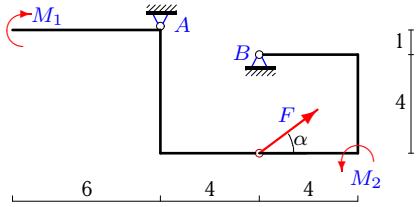
12



$F = 5$ кН, $M_1 = 239$ кНм, $M_2 = 259$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.22.

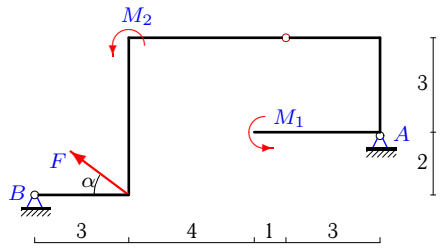
12



$F = 15$ кН, $M_1 = 194$ кНм, $M_2 = 48$ кНм,
$\rho = 3$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.23.

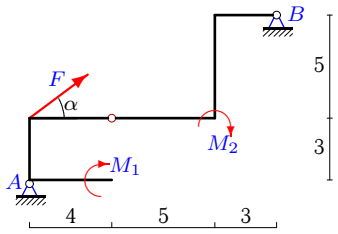
12



$F = 15$ кН, $M_1 = 95.5$ кНм, $M_2 = 61$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.24.

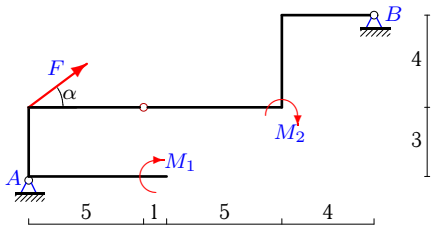
12



$F = 10$ кН, $M_1 = 8$ кНм, $M_2 = 127$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.25.

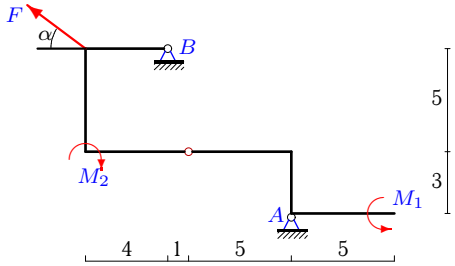
12



$F = 15$ кН, $M_1 = 54$ кНм, $M_2 = 360$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.26.

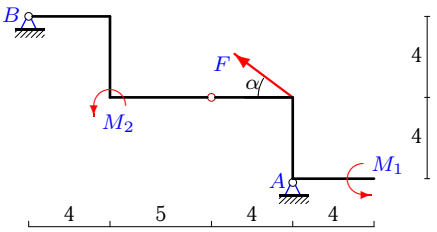
12



$F = 15$ кН, $M_1 = 108$ кНм, $M_2 = 9$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.27.

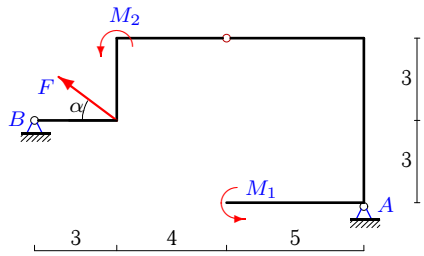
12



$F = 10$ кН, $M_1 = 64$ кНм, $M_2 = 122.5$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.28.

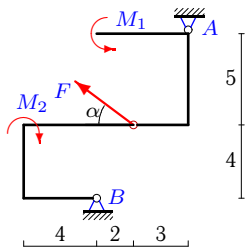
12



$F = 15$ кН, $M_1 = 167$ кНм, $M_2 = 264$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.29.

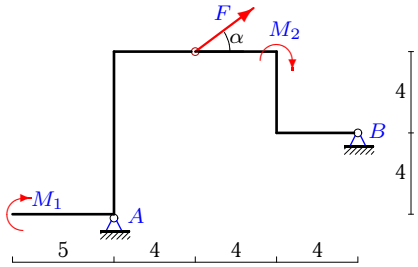
12



$F = 5$ кН, $M_1 = 48$ кНм, $M_2 = 32$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.30.

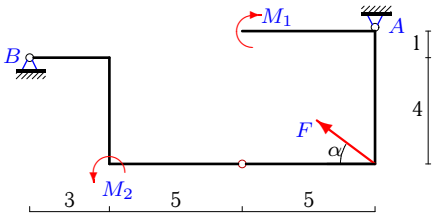
12



$F = 15$ кН, $M_1 = 225$ кНм, $M_2 = 248$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.31.

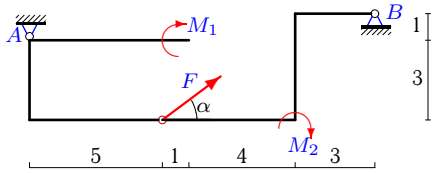
12



$F = 15$ кН, $M_1 = 5$ кНм, $M_2 = 304$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.32.

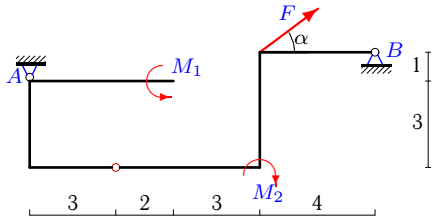
12



$F = 10$ кН, $M_1 = 35$ кНм, $M_2 = 296$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.33.

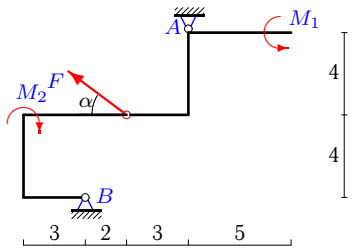
12



$F = 5$ кН, $M_1 = 7$ кНм, $M_2 = 299$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.34.

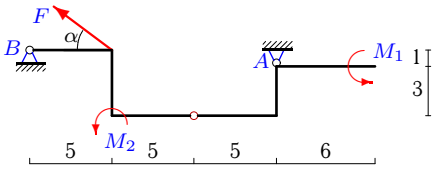
12



$F = 5$ кН, $M_1 = 52$ кНм, $M_2 = 21$ кНм,
$\rho = 1$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.35.

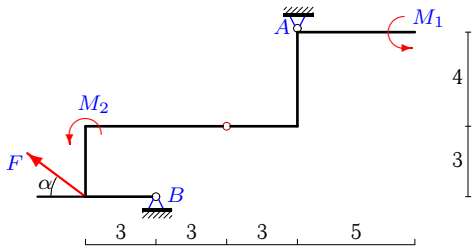
12



$F = 5$ кН, $M_1 = 101$ кНм, $M_2 = 405$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

Задача S-36.36.

12



$F = 10$ кН, $M_1 = 82$ кНм, $M_2 = 66$ кНм,
$\rho = 2$ кН/м, $\cos\alpha = 0{,}8$.

S-36 **Ответы.**

Тяжелая составная рама из двух частей

07.10.2013

№	X_A	Y_A	X_B	Y_B	$\sum M_C = 0$	$\sum M_B = 0$
1	7	7	−19	11	$-3X_A - 5Y_A + 56 = 0,$	$2X_A - 6Y_A + 28 = 0$
2	9	−12	−21	30	$-4X_A - 5Y_A - 24 = 0,$	$-8X_A - 7Y_A - 12 = 0$
3	5	0	−13	60	$-10X_A - 3Y_A + 50 = 0,$	$-5X_A - 4Y_A + 25 = 0$
4	8	−3	−20	18	$-4X_A - 4Y_A + 20 = 0,$	$-7X_A - 12Y_A + 20 = 0$
5	0	4	−12	37	$4X_A - 4Y_A + 16 = 0,$	$8X_A - 4Y_A + 16 = 0$
6	−23	0	27	24	$6X_A + 5Y_A + 138 = 0,$	$3X_A + 14Y_A + 69 = 0$
7	8	4	−20	35	$-3X_A - 4Y_A + 40 = 0,$	$X_A - 12Y_A + 40 = 0$
8	24	0	−32	54	$-8X_A - 4Y_A + 192 = 0,$	$-4X_A - 14Y_A + 96 = 0$
9	−19	0	27	19	$6X_A + 3Y_A + 114 = 0,$	$3X_A + 11Y_A + 57 = 0$
10	5	−1	−9	76	$5X_A - 3Y_A - 28 = 0,$	$2X_A - 4Y_A - 14 = 0$
11	−10	−5	14	58	$4X_A + 3Y_A + 55 = 0,$	$X_A + 13Y_A + 55 = 0$
12	0	5	4	88	$-10X_A + 4Y_A - 20 = 0,$	$-5X_A + 4Y_A - 20 = 0$
13	−8	0	20	21	$8X_A + 4Y_A + 64 = 0,$	$4X_A + 6Y_A + 32 = 0$
14	−7	−10	15	58	$-4X_A + 5Y_A + 22 = 0,$	$-7X_A + 6Y_A + 11 = 0$
15	−9	−4	17	27	$8X_A + 4Y_A + 88 = 0,$	$4X_A + 13Y_A + 88 = 0$
16	7	−1	−15	73	$5X_A - 3Y_A - 38 = 0,$	$2X_A - 5Y_A - 19 = 0$
17	9	−13	−17	94	$-5X_A - 5Y_A - 20 = 0,$	$-9X_A - 7Y_A - 10 = 0$
18	9	−10	−17	56	$-4X_A - 5Y_A - 14 = 0,$	$-7X_A - 7Y_A - 7 = 0$
19	25	0	−33	90	$-8X_A - 3Y_A + 200 = 0,$	$-4X_A - 14Y_A + 100 = 0$
20	7	−5	−11	30	$3X_A - 5Y_A - 46 = 0,$	$X_A - 6Y_A - 23 = 0$
21	−21	−5	25	54	$3X_A + 5Y_A + 88 = 0,$	$X_A + 13Y_A + 44 = 0$
22	0	4	−12	68	$-5X_A - 4Y_A + 16 = 0,$	$X_A - 4Y_A + 16 = 0$
23	−19	−7	31	21	$3X_A + 3Y_A + 78 = 0,$	$-2X_A + 11Y_A + 39 = 0$
24	8	5	−16	13	$3X_A - 4Y_A - 4 = 0,$	$8X_A - 12Y_A - 4 = 0$
25	25	11	−37	36	$3X_A - 5Y_A - 20 = 0,$	$7X_A - 15Y_A - 10 = 0$
26	−1	5	13	40	$3X_A + 5Y_A - 22 = 0,$	$8X_A + 6Y_A - 22 = 0$
27	−22	12	30	7	$4X_A + 4Y_A + 40 = 0,$	$8X_A + 13Y_A + 20 = 0$
28	−7	−3	19	46	$6X_A + 5Y_A + 57 = 0,$	$3X_A + 12Y_A + 57 = 0$
29	−7	−13	11	64	$-5X_A + 3Y_A + 4 = 0,$	$-9X_A + 5Y_A + 2 = 0$
30	8	−4	−20	53	$8X_A - 4Y_A - 80 = 0,$	$4X_A - 12Y_A - 80 = 0$
31	−8	4	20	41	$-5X_A + 5Y_A - 60 = 0,$	$X_A + 13Y_A - 60 = 0$
32	8	4	−16	42	$-3X_A - 5Y_A + 44 = 0,$	$X_A - 13Y_A + 44 = 0$
33	9	4	−13	41	$-3X_A - 3Y_A + 39 = 0,$	$X_A - 12Y_A + 39 = 0$
34	−7	−12	11	33	$-4X_A + 3Y_A + 8 = 0,$	$-8X_A + 5Y_A + 4 = 0$
35	−10	4	14	49	$-3X_A + 5Y_A - 50 = 0,$	$X_A + 15Y_A - 50 = 0$
36	−9	−10	17	52	$-4X_A + 3Y_A - 6 = 0,$	$-7X_A + 6Y_A - 3 = 0$

S-36 файл o36s12A