

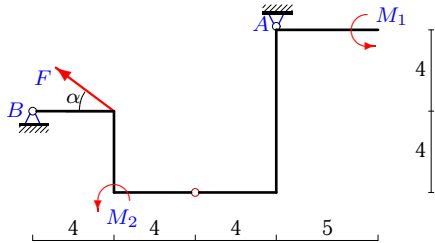
Тяжелая составная рама из двух частей

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

Задача S-36.1.

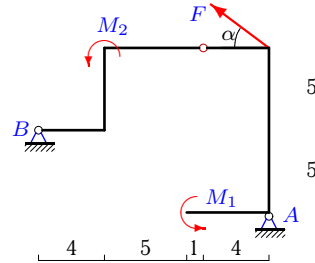
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$F = 5 \text{ кН}$, $M_1 = 137.5 \text{ кНм}$, $M_2 = 540 \text{ кНм}$,
 $\rho = 3 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.2.

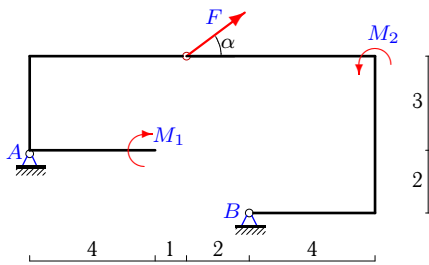
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$F = 5 \text{ кН}$, $M_1 = 339 \text{ кНм}$, $M_2 = 350 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.3.

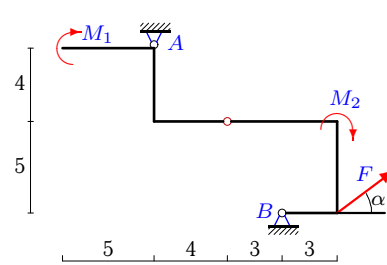
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$F = 5 \text{ кН}$, $M_1 = 101.5 \text{ кНм}$, $M_2 = 67 \text{ кНм}$,
 $\rho = 1 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.4.

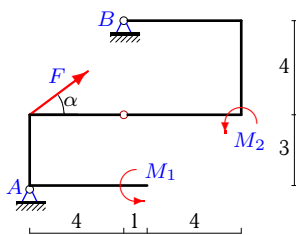
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$F = 5 \text{ кН}$, $M_1 = 72.5 \text{ кНм}$, $M_2 = 20.5 \text{ кНм}$,
 $\rho = 1 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.5.

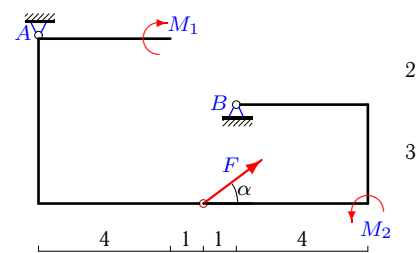
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$F = 5 \text{ кН}$, $M_1 = 16.5 \text{ кНм}$, $M_2 = 13 \text{ кНм}$,
 $\rho = 1 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.6.

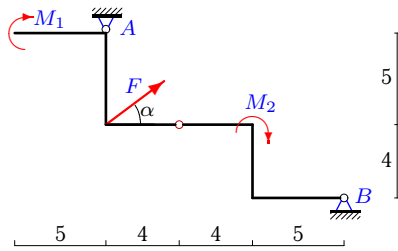
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$F = 15 \text{ кН}$, $M_1 = 79 \text{ кНм}$, $M_2 = 0 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.7.

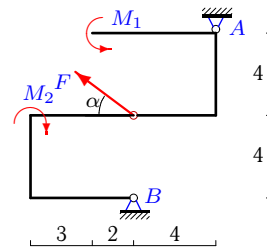
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$F = 10 \text{ кН}$, $M_1 = 128.5 \text{ кНм}$, $M_2 = 473.5 \text{ кНм}$,
 $\rho = 3 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.8.

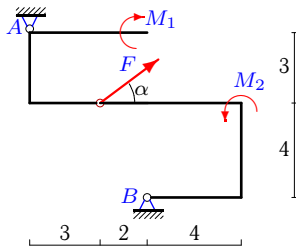
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$F = 5 \text{ кН}$, $M_1 = 92 \text{ кНм}$, $M_2 = 122 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.9.

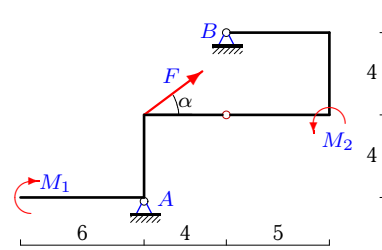
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$F = 10 \text{ кН}$, $M_1 = 44 \text{ кНм}$, $M_2 = 66 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.10.

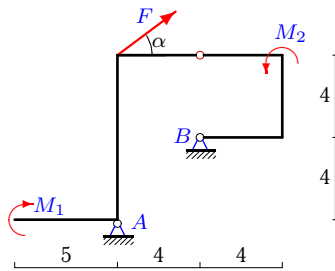
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$F = 15 \text{ кН}$, $M_1 = 80 \text{ кНм}$, $M_2 = 42 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.11.

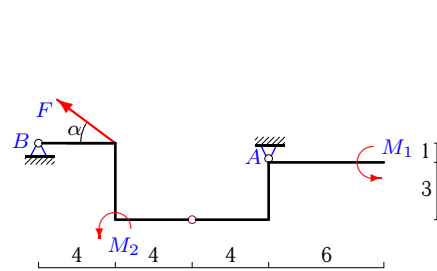
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$F = 10 \text{ кН}$, $M_1 = 64.5 \text{ кНм}$, $M_2 = 64 \text{ кНм}$,
 $\rho = 1 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.12.

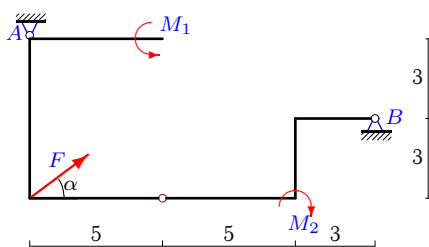
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$F = 10 \text{ кН}$, $M_1 = 84 \text{ кНм}$, $M_2 = 280 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.13.

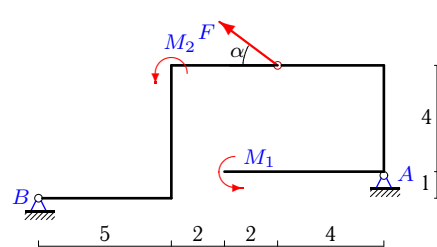
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$F = 15 \text{ кН}$, $M_1 = 61 \text{ кНм}$, $M_2 = 365 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.14.

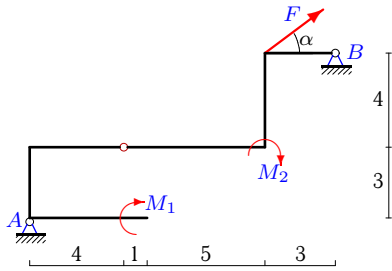
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$F = 5 \text{ кН}$, $M_1 = 116 \text{ кНм}$, $M_2 = 336 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.15.

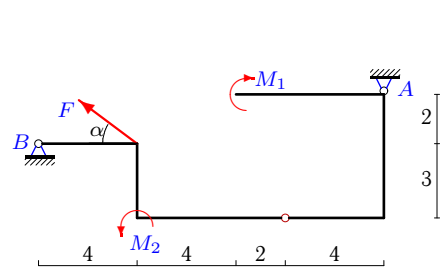
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$F = 15 \text{ кН}, M_1 = 77 \text{ кНм}, M_2 = 283 \text{ кНм},$
 $\rho = 2 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.16.

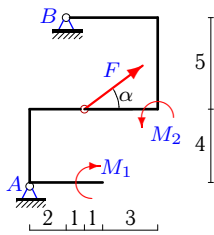
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$F = 10 \text{ кН}, M_1 = 22 \text{ кНм}, M_2 = 674 \text{ кНм},$
 $\rho = 3 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.17.

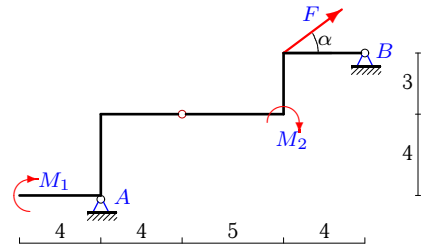
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$F = 5 \text{ кН}, M_1 = 1,5 \text{ кНм}, M_2 = 37,5 \text{ кНм},$
 $\rho = 1 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.18.

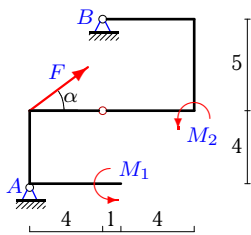
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$F = 15 \text{ кН}, M_1 = 144 \text{ кНм}, M_2 = 261 \text{ кНм},$
 $\rho = 2 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.19.

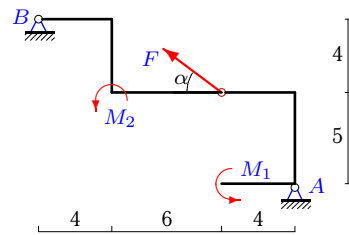
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$F = 15 \text{ кН}, M_1 = 13 \text{ кНм}, M_2 = 20 \text{ кНм},$
 $\rho = 2 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.20.

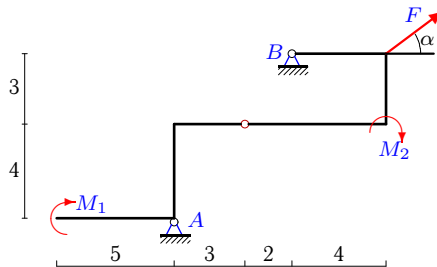
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$F = 5 \text{ кН}, M_1 = 140 \text{ кНм}, M_2 = 344 \text{ кНм},$
 $\rho = 2 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.21.

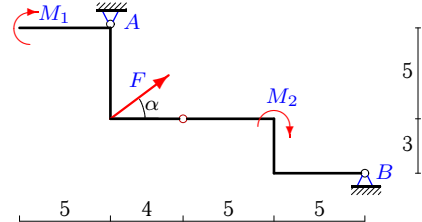
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$F = 5 \text{ кН}, M_1 = 130 \text{ кНм}, M_2 = 7 \text{ кНм},$
 $\rho = 3 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.22.

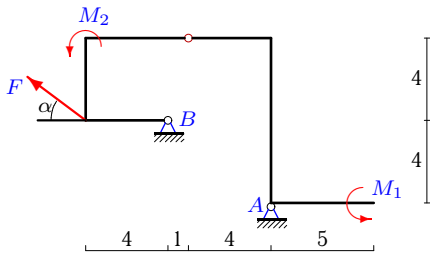
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$F = 10 \text{ кН}, M_1 = 119,5 \text{ кНм}, M_2 = 531 \text{ кНм},$
 $\rho = 3 \text{ кН/м}, \cos \alpha = 0,8.$

Задача S-36.23.

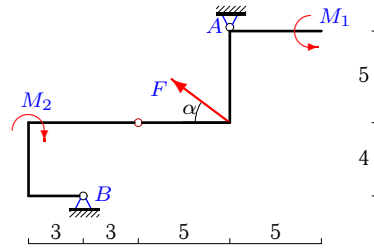
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$F = 15 \text{ кН}$, $M_1 = 169 \text{ кНм}$, $M_2 = 7 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.24.

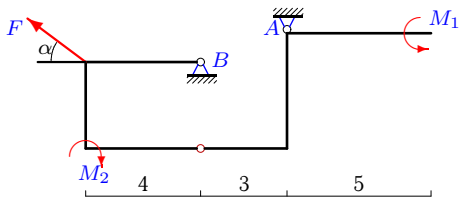
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$F = 15 \text{ кН}$, $M_1 = 115 \text{ кНм}$, $M_2 = 23 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.25.

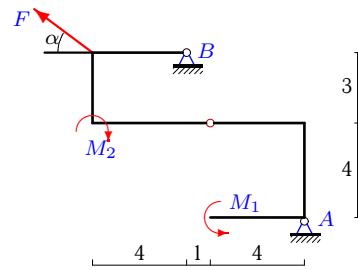
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$F = 10 \text{ кН}$, $M_1 = 35 \text{ кНм}$, $M_2 = 4 \text{ кНм}$,
 $\rho = 1 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.26.

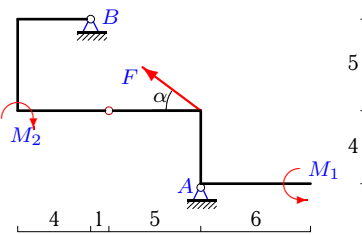
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$F = 10 \text{ кН}$, $M_1 = 56 \text{ кНм}$, $M_2 = 7 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.27.

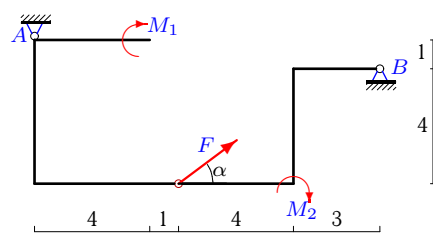
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$F = 10 \text{ кН}$, $M_1 = 190,5 \text{ кНм}$, $M_2 = 27,5 \text{ кНм}$,
 $\rho = 3 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.28.

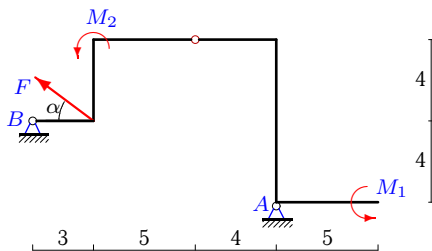
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$F = 10 \text{ кН}$, $M_1 = 44 \text{ кНм}$, $M_2 = 259 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.29.

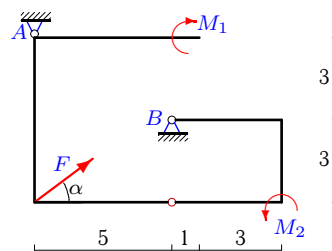
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$F = 5 \text{ кН}$, $M_1 = 305 \text{ кНм}$, $M_2 = 271 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.30.

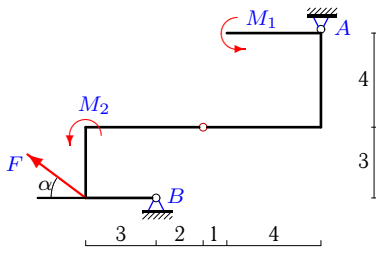
11



$F = 5 \text{ кН}$, $M_1 = 79 \text{ кНм}$, $M_2 = 44 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.31.

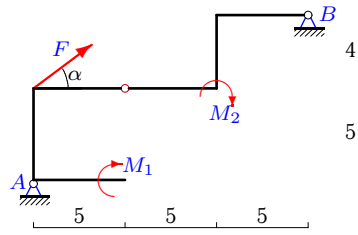
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$F = 10 \text{ кН}$, $M_1 = 51.5 \text{ кНм}$, $M_2 = 28 \text{ кНм}$,
 $\rho = 1 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.32.

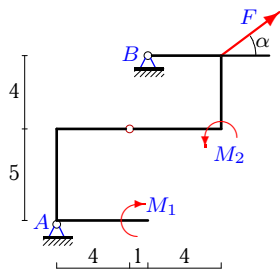
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$F = 15 \text{ кН}$, $M_1 = 85 \text{ кНм}$, $M_2 = 398 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.33.

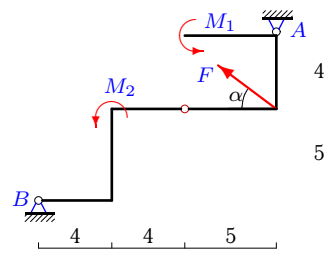
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$F = 5 \text{ кН}$, $M_1 = 49 \text{ кНм}$, $M_2 = 12 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.34.

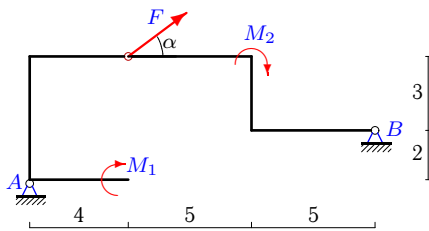
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$F = 5 \text{ кН}$, $M_1 = 113 \text{ кНм}$, $M_2 = 448 \text{ кНм}$,
 $\rho = 3 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.35.

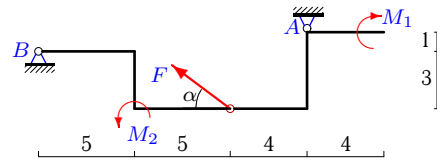
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$F = 5 \text{ кН}$, $M_1 = 196 \text{ кНм}$, $M_2 = 286 \text{ кНм}$,
 $\rho = 2 \text{ кН/м}$, $\cos \alpha = 0,8$.

Задача S-36.36.

11



$F = 5 \text{ кН}$, $M_1 = 56 \text{ кНм}$, $M_2 = 219 \text{ кНм}$,
 $\rho = 1 \text{ кН/м}$, $\cos \alpha = 0,8$.

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	-8	4	12	80	$-8X_A + 4Y_A - 80 = 0,$	$-4X_A + 12Y_A - 80 = 0$
2	-24	0	28	65	$10X_A + 4Y_A + 240 = 0,$	$5X_A + 14Y_A + 120 = 0$
3	9	-7	-13	31	$3X_A - 5Y_A - 62 = 0,$	$-2X_A - 7Y_A - 31 = 0$
4	10	-14	-14	38	$-4X_A - 4Y_A - 16 = 0,$	$-9X_A - 7Y_A - 8 = 0$
5	4	11	-8	12	$3X_A - 4Y_A + 32 = 0,$	$7X_A - 4Y_A + 16 = 0$
6	1	3	-13	40	$-5X_A - 5Y_A + 20 = 0,$	$-2X_A - 6Y_A + 20 = 0$
7	9	-4	-17	79	$-5X_A - 4Y_A + 29 = 0,$	$-9X_A - 13Y_A + 29 = 0$
8	-4	-12	8	65	$-4X_A + 4Y_A + 32 = 0,$	$-8X_A + 4Y_A + 16 = 0$
9	7	-11	-15	55	$-3X_A - 3Y_A - 12 = 0,$	$-7X_A - 5Y_A - 6 = 0$
10	0	4	-12	43	$4X_A - 4Y_A + 16 = 0,$	$8X_A - 4Y_A + 16 = 0$
11	0	-4	-8	27	$8X_A - 4Y_A - 16 = 0,$	$4X_A - 4Y_A - 16 = 0$
12	-8	4	16	40	$-3X_A + 4Y_A - 40 = 0,$	$X_A + 12Y_A - 40 = 0$
13	21	0	-33	45	$-6X_A - 5Y_A + 126 = 0,$	$-3X_A - 13Y_A + 63 = 0$
14	-9	-5	13	58	$4X_A + 4Y_A + 56 = 0,$	$X_A + 13Y_A + 56 = 0$
15	22	11	-34	30	$3X_A - 4Y_A - 22 = 0,$	$7X_A - 13Y_A - 11 = 0$
16	-24	1	32	77	$-5X_A + 4Y_A - 124 = 0,$	$-2X_A + 14Y_A - 62 = 0$
17	-1	5	-3	17	$4X_A - 3Y_A + 19 = 0,$	$9X_A - 2Y_A + 19 = 0$
18	22	10	-34	29	$4X_A - 4Y_A - 48 = 0,$	$7X_A - 13Y_A - 24 = 0$
19	4	14	-16	33	$4X_A - 4Y_A + 40 = 0,$	$9X_A - 4Y_A + 20 = 0$
20	-24	13	28	38	$5X_A + 4Y_A + 68 = 0,$	$9X_A + 14Y_A + 34 = 0$
21	7	10	-11	62	$4X_A - 3Y_A + 2 = 0,$	$7X_A - 5Y_A + = 0$
22	10	-3	-18	78	$-5X_A - 4Y_A + 38 = 0,$	$-8X_A - 14Y_A + 38 = 0$
23	-1	-4	13	55	$8X_A + 4Y_A + 24 = 0,$	$4X_A + 5Y_A + 24 = 0$
24	-11	-13	23	60	$-5X_A + 5Y_A + 10 = 0,$	$-9X_A + 8Y_A + 5 = 0$
25	0	3	8	14	$-4X_A + 3Y_A - 9 = 0,$	$X_A + 3Y_A - 9 = 0$
26	-1	3	9	39	$4X_A + 4Y_A - 8 = 0,$	$7X_A + 5Y_A - 8 = 0$
27	-1	5	9	76	$4X_A + 5Y_A - 21 = 0,$	$9X_A + 6Y_A - 21 = 0$
28	7	4	-15	40	$-5X_A - 5Y_A + 55 = 0,$	$X_A - 12Y_A + 55 = 0$
29	-20	0	24	55	$8X_A + 4Y_A + 160 = 0,$	$4X_A + 12Y_A + 80 = 0$
30	0	3	-4	50	$-6X_A - 5Y_A + 15 = 0,$	$-3X_A - 5Y_A + 15 = 0$
31	-2	-3	10	21	$-4X_A + 5Y_A + 7 = 0,$	$-7X_A + 7Y_A + 7 = 0$
32	10	4	-22	45	$5X_A - 5Y_A - 30 = 0,$	$9X_A - 15Y_A - 30 = 0$
33	6	13	-10	38	$5X_A - 4Y_A + 22 = 0,$	$9X_A - 5Y_A + 11 = 0$
34	-8	-5	12	83	$-4X_A + 5Y_A - 7 = 0,$	$-9X_A + 13Y_A - 7 = 0$
35	24	-1	-28	50	$5X_A - 4Y_A - 124 = 0,$	$2X_A - 14Y_A - 62 = 0$
36	-24	2	28	20	$-4X_A + 4Y_A - 104 = 0,$	$X_A + 14Y_A - 52 = 0$