

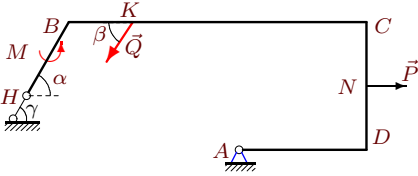
Определение реакций опор рамы

Тяжелая однородная рама расположена в вертикальной плоскости и опирается на неподвижный шарнир A и наклонный невесомый стержень H . К раме приложены горизонтальная сила P , наклонная сила Q и момент M . Учитывая погонный вес рамы ρ , найти реакции опор.

Курсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. — 384 с. (с.31.)

Задача S4.1.

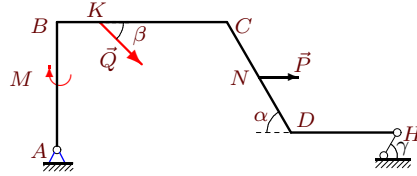
8



$\rho = 3$ кН/м, $P = 9$ кН, $Q = 11$ кН,
 $M = 70$ кНм, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 60^\circ$,
 $HB = 4$ м, $BC = 14$ м, $CD = 6$ м,
 $DA = 6$ м, $BK = 3$ м, $CN = 3$ м.

Задача S4.2.

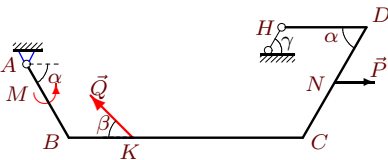
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$\rho = 2$ кН/м, $P = 7$ кН, $Q = 35$ кН,
 $M = 20$ кНм, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 45^\circ$,
 $AB = 6$ м, $BC = 8$ м, $CD = 6$ м,
 $DH = 5$ м, $BK = 2$ м, $CN = 3$ м.

Задача S4.3.

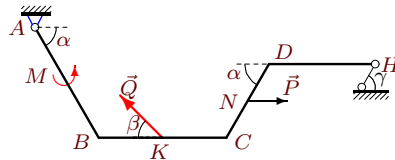
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$\rho = 1$ кН/м, $P = 6$ кН, $Q = 17$ кН,
 $M = 30$ кНм, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 30^\circ$,
 $AB = 4$ м, $BC = 11$ м, $CD = 6$ м,
 $DH = 4$ м, $BK = 3$ м, $CN = 3$ м.

Задача S4.4.

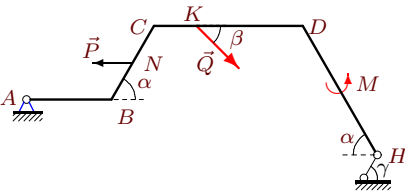
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$\rho = 2$ кН/м, $P = 7$ кН, $Q = 19$ кН,
 $M = 50$ кНм, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 45^\circ$,
 $AB = 6$ м, $BC = 6$ м, $CD = 4$ м,
 $DH = 5$ м, $BK = 3$ м, $CN = 2$ м.

Задача S4.5.

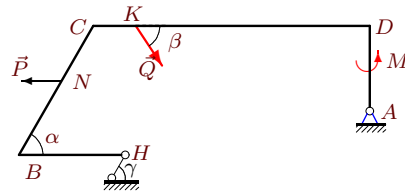
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$\rho = 1$ кН/м, $P = 6$ кН, $Q = 19$ кН,
 $M = 30$ кНм, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 30^\circ$,
 $AB = 4$ м, $BC = 4$ м, $CD = 7$ м,
 $DH = 7$ м, $CK = 2$ м, $CN = 2$ м.

Задача S4.6.

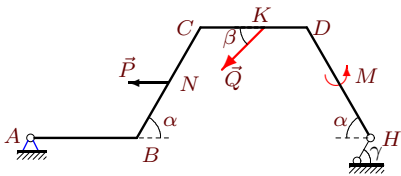
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$\rho = 3$ кН/м, $P = 9$ кН, $Q = 14$ кН,
 $M = 70$ кНм, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 60^\circ$,
 $HB = 5$ м, $BC = 7$ м, $CD = 13$ м,
 $DA = 4$ м, $CK = 2$ м, $CN = 3$ м.

Задача S4.7.

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$\rho = 2 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 16 \text{ кН}$,
 $M = 50 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 45^\circ$,
 $AB = 5 \text{ м}$, $BC = 6 \text{ м}$, $CD = 5 \text{ м}$,
 $DH = 6 \text{ м}$, $CK = 3 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.8.

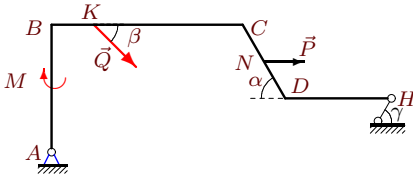
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$\rho = 2 \text{ кН/м}$, $P = 6 \text{ кН}$, $Q = 28 \text{ кН}$,
 $M = 20 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 45^\circ$,
 $AB = 4 \text{ м}$, $BC = 14 \text{ м}$, $CD = 4 \text{ м}$,
 $DH = 5 \text{ м}$, $BK = 3 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.9.

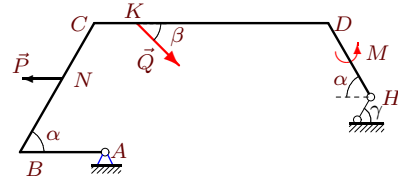
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$\rho = 1 \text{ кН/м}$, $P = 5 \text{ кН}$, $Q = 31 \text{ кН}$,
 $M = 15 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 30^\circ$,
 $AB = 6 \text{ м}$, $BC = 9 \text{ м}$, $CD = 4 \text{ м}$,
 $DH = 5 \text{ м}$, $BK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.10.

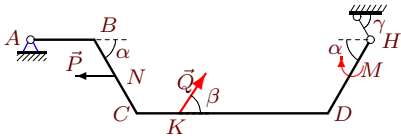
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$\rho = 1 \text{ кН/м}$, $P = 6 \text{ кН}$, $Q = 20 \text{ кН}$,
 $M = 30 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 30^\circ$,
 $AB = 4 \text{ м}$, $BC = 7 \text{ м}$, $CD = 11 \text{ м}$,
 $DH = 4 \text{ м}$, $CK = 2 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.11.

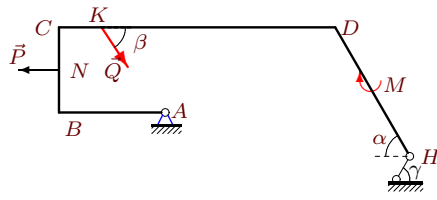
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$\rho = 1 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 22 \text{ кН}$,
 $M = 15 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 30^\circ$,
 $AB = 3 \text{ м}$, $BC = 4 \text{ м}$, $CD = 9 \text{ м}$,
 $DH = 4 \text{ м}$, $CK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.12.

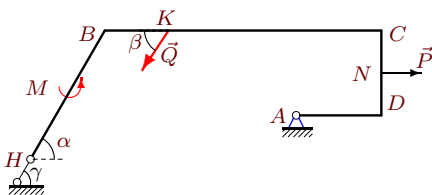
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$\rho = 1 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 28 \text{ кН}$,
 $M = 15 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 30^\circ$,
 $AB = 5 \text{ м}$, $BC = 4 \text{ м}$, $CD = 13 \text{ м}$,
 $DH = 7 \text{ м}$, $CK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.13.

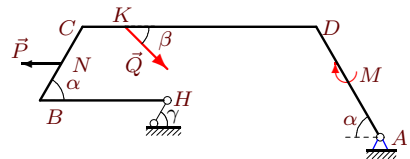
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$\rho = 3 \text{ кН/м}$, $P = 9 \text{ кН}$, $Q = 15 \text{ кН}$,
 $M = 70 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 60^\circ$,
 $HB = 7 \text{ м}$, $BC = 13 \text{ м}$, $CD = 4 \text{ м}$,
 $DA = 4 \text{ м}$, $BK = 3 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.14.

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$\rho = 3 \text{ кН/м}$, $P = 8 \text{ кН}$, $Q = 26 \text{ кН}$,
 $M = 25 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 60^\circ$,
 $HB = 6 \text{ м}$, $BC = 4 \text{ м}$, $CD = 11 \text{ м}$,
 $DA = 6 \text{ м}$, $CK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.15.

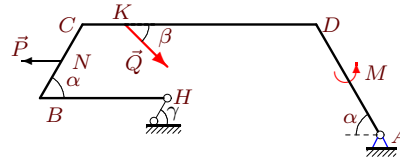
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$\rho = 2 \text{ кН/м}$, $P = 6 \text{ кН}$, $Q = 31 \text{ кН}$,
 $M = 20 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 45^\circ$,
 $AB = 4 \text{ м}$, $BC = 13 \text{ м}$, $CD = 7 \text{ м}$,
 $DH = 4 \text{ м}$, $BK = 3 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.16.

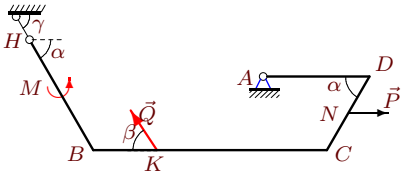
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$\rho = 3 \text{ кН/м}$, $P = 8 \text{ кН}$, $Q = 20 \text{ кН}$,
 $M = 70 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 60^\circ$,
 $HB = 6 \text{ м}$, $BC = 4 \text{ м}$, $CD = 11 \text{ м}$,
 $DA = 6 \text{ м}$, $CK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.17.

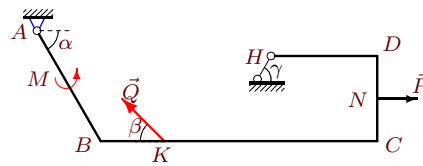
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$\rho = 3 \text{ кН/м}$, $P = 9 \text{ кН}$, $Q = 16 \text{ кН}$,
 $M = 70 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 60^\circ$,
 $HB = 6 \text{ м}$, $BC = 11 \text{ м}$, $CD = 4 \text{ м}$,
 $DA = 5 \text{ м}$, $BK = 3 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.18.

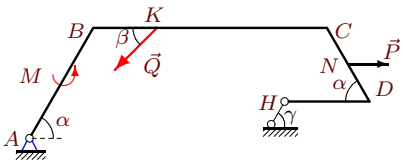
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$\rho = 1 \text{ кН/м}$, $P = 6 \text{ кН}$, $Q = 11 \text{ кН}$,
 $M = 30 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 30^\circ$,
 $AB = 6 \text{ м}$, $BC = 13 \text{ м}$, $CD = 4 \text{ м}$,
 $DH = 5 \text{ м}$, $BK = 3 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.19.

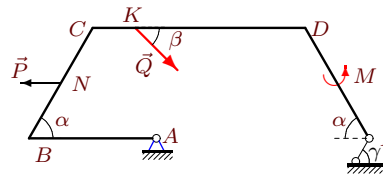
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$\rho = 2 \text{ кН/м}$, $P = 6 \text{ кН}$, $Q = 17 \text{ кН}$,
 $M = 50 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 45^\circ$,
 $AB = 6 \text{ м}$, $BC = 11 \text{ м}$, $CD = 4 \text{ м}$,
 $DH = 4 \text{ м}$, $BK = 3 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.20.

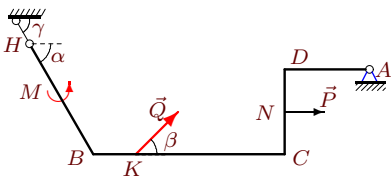
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$\rho = 2 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 17 \text{ кН}$,
 $M = 50 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 45^\circ$,
 $AB = 6 \text{ м}$, $BC = 6 \text{ м}$, $CD = 10 \text{ м}$,
 $DH = 6 \text{ м}$, $CK = 2 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.21.

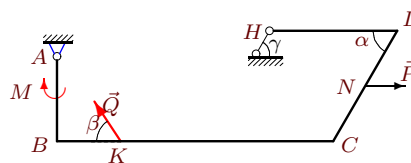
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$\rho = 3 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 14 \text{ кН}$,
 $M = 70 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 60^\circ$,
 $HB = 6 \text{ м}$, $BC = 9 \text{ м}$, $CD = 4 \text{ м}$,
 $DA = 4 \text{ м}$, $BK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.22.

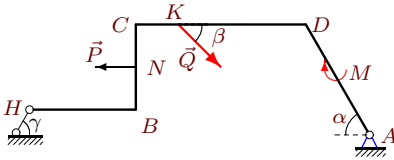
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$\rho = 1 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 35 \text{ кН}$,
 $M = 15 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 30^\circ$,
 $AB = 4 \text{ м}$, $BC = 13 \text{ м}$, $CD = 6 \text{ м}$,
 $DH = 6 \text{ м}$, $BK = 3 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.23.

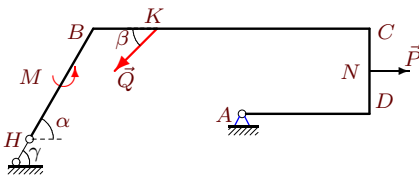
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$\rho = 3 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 30 \text{ кН}$,
 $M = 25 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 60^\circ$,
 $HB = 5 \text{ м}$, $BC = 4 \text{ м}$, $CD = 8 \text{ м}$,
 $DA = 6 \text{ м}$, $CK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.25.

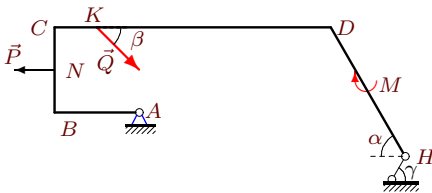
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$\rho = 3 \text{ кН/м}$, $P = 8 \text{ кН}$, $Q = 15 \text{ кН}$,
 $M = 70 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 60^\circ$,
 $HB = 6 \text{ м}$, $BC = 13 \text{ м}$, $CD = 4 \text{ м}$,
 $DA = 6 \text{ м}$, $BK = 3 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.27.

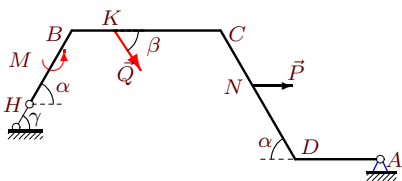
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$\rho = 2 \text{ кН/м}$, $P = 6 \text{ кН}$, $Q = 32 \text{ кН}$,
 $M = 20 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 45^\circ$,
 $AB = 4 \text{ м}$, $BC = 4 \text{ м}$, $CD = 13 \text{ м}$,
 $DH = 7 \text{ м}$, $CK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.29.

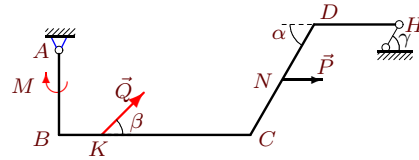
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$\rho = 3 \text{ кН/м}$, $P = 9 \text{ кН}$, $Q = 20 \text{ кН}$,
 $M = 70 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 60^\circ$,
 $HB = 4 \text{ м}$, $BC = 7 \text{ м}$, $CD = 7 \text{ м}$,
 $DA = 4 \text{ м}$, $BK = 2 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.24.

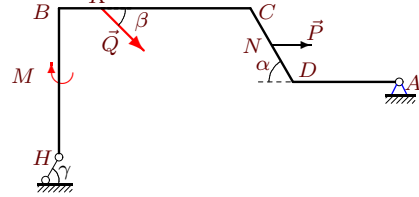
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$\rho = 1 \text{ кН/м}$, $P = 5 \text{ кН}$, $Q = 32 \text{ кН}$,
 $M = 15 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 30^\circ$,
 $AB = 4 \text{ м}$, $BC = 9 \text{ м}$, $CD = 6 \text{ м}$,
 $DH = 4 \text{ м}$, $BK = 2 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.26.

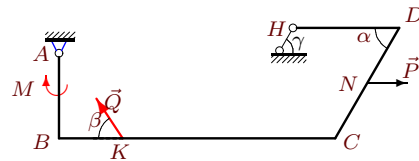
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$\rho = 3 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 32 \text{ кН}$,
 $M = 25 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 60^\circ$,
 $HB = 7 \text{ м}$, $BC = 9 \text{ м}$, $CD = 4 \text{ м}$,
 $DA = 5 \text{ м}$, $BK = 2 \text{ м}$, $CN = 2 \text{ м}$.

Задача S4.28.

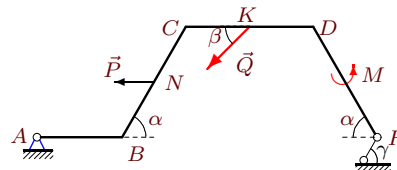
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$\rho = 1 \text{ кН/м}$, $P = 7 \text{ кН}$, $Q = 32 \text{ кН}$,
 $M = 15 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 60^\circ$, $\gamma = 30^\circ$,
 $AB = 4 \text{ м}$, $BC = 13 \text{ м}$, $CD = 6 \text{ м}$,
 $DH = 5 \text{ м}$, $BK = 3 \text{ м}$, $CN = 3 \text{ м}$.

Задача S4.30.

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$\rho = 2 \text{ кН/м}$, $P = 6 \text{ кН}$, $Q = 18 \text{ кН}$,
 $M = 50 \text{ кНм}$, $\alpha = 60^\circ$, $\beta = 30^\circ$, $\gamma = 45^\circ$,
 $AB = 4 \text{ м}$, $BC = 6 \text{ м}$, $CD = 6 \text{ м}$,
 $DH = 6 \text{ м}$, $CK = 3 \text{ м}$, $CN = 3 \text{ м}$.

S4 Ответы.
Определение реакций опор рамы

04.03.2012

	$M_A(Q)$	$M_A(P)$	$\Sigma_k M_A(G_k)$	h	X_A	Y_A	R_H
1	80.631	-27.000	-12.0	-9.928	-9.122	89.789	11.244
2	-197.990	-23.813	-313.0	10.745	-68.258	38.239	51.632
3	18.463	5.196	-229.5	4.500	-27.820	-6.559	39.076
4	10.800	24.249	-305.0	12.538	-5.969	16.161	17.542
5	-154.021	10.392	-197.8	10.500	-33.117	20.607	29.655
6	105.368	12.617	773.3	-8.928	-51.831	5.886	107.663
7	-65.663	18.187	-382.0	11.314	-5.404	31.596	33.541
8	-54.995	13.608	-451.0	8.157	-26.168	-4.417	62.815
9	-192.081	-21.340	-148.0	5.804	-88.015	7.071	64.857
10	-106.945	20.785	-77.3	4.000	-37.026	23.466	33.353
11	171.473	-12.124	-166.0	8.000	-1.656	-0.406	2.706
12	16.746	14.000	-55.3	7.536	-11.540	50.628	5.242
13	107.942	-18.000	251.3	-9.794	-22.492	60.632	41.983
14	125.087	27.713	721.5	-9.526	-54.961	22.176	89.153
15	60.887	-8.412	-491.5	10.297	-10.675	39.978	44.578
16	96.221	27.713	721.5	-9.526	-54.190	11.921	96.096
17	-96.995	15.588	168.0	-8.660	8.041	48.484	18.082
18	6.252	19.177	-264.0	6.536	-25.858	4.266	31.912
19	25.500	-20.785	-437.0	7.261	-28.508	21.269	52.652
20	-50.441	18.187	-52.0	7.071	-8.446	64.595	4.844
21	-28.503	14.000	562.5	-13.258	4.182	21.633	46.612
22	20.933	9.813	-249.5	3.964	-40.568	-30.795	58.968
23	-0.000	22.373	529.5	-14.454	-37.206	52.433	36.450
24	142.851	7.010	-159.5	6.964	-35.777	5.231	3.538
25	84.853	-16.000	46.5	-8.062	-8.889	77.696	22.990
26	128.000	-12.124	756.0	-12.088	-69.741	30.329	70.057
27	-78.851	12.000	-167.5	10.297	-39.179	54.533	24.701
28	19.138	9.813	-239.0	4.464	-34.659	-24.919	50.413
29	155.885	-31.177	561.8	-15.588	-43.263	41.295	48.527
30	-9.000	15.588	-376.0	11.314	1.625	33.037	28.232

S4 файл о4s8B