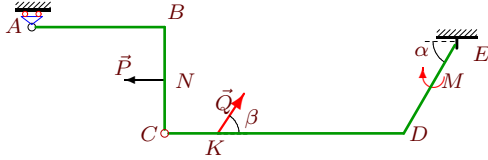


## Составная конструкция

Определить реакции опор конструкции (в кН), состоящей из двух тел. Конструкция расположена в вертикальной плоскости. Дан погонный вес  $\rho$ .

### Задача S7.1.

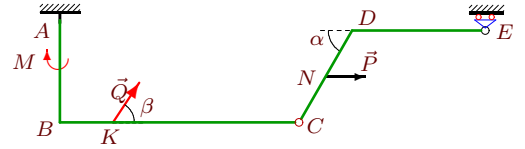
10



$P = 9$  кН,  $Q = 8$  кН,  $M = 9$  кНм,  
 $\rho = 3$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 75^\circ$ ,  
 $AB = 5$  м,  $BC = 4$  м,  $CD = 9$  м,  
 $DE = 4$  м,  $CN = 2$  м,  $CK = 2$  м.

### Задача S7.2.

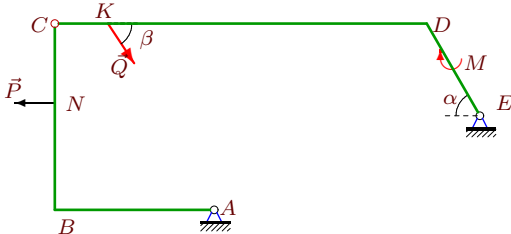
10



$P = 8$  кН,  $Q = 7$  кН,  $M = 9$  кНм,  
 $\rho = 3$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 60^\circ$ ,  
 $AB = 4$  м,  $BC = 9$  м,  $CD = 4$  м,  
 $DE = 5$  м,  $CN = 2$  м,  $BK = 2$  м.

### Задача S7.3.

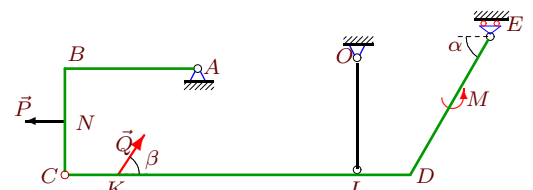
10



$P = 6$  кН,  $Q = 6$  кН,  $M = 3$  кНм,  
 $\rho = 1$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 60^\circ$ ,  
 $AB = 6$  м,  $BC = 7$  м,  $CD = 14$  м,  
 $DE = 4$  м,  $CN = 3$  м,  $CK = 2$  м.

### Задача S7.4.

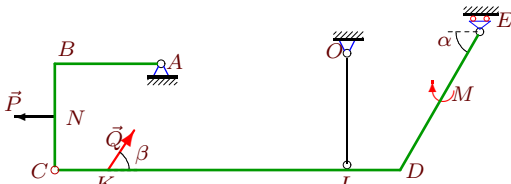
10



$P = 7$  кН,  $Q = 7$  кН,  $M = 7$  кНм,  
 $\rho = 2$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 60^\circ$ ,  
 $AB = 5$  м,  $BC = 4$  м,  $CD = 13$  м,  
 $DE = 6$  м,  $CN = 2$  м,  $CK = 2$  м,  $LD = 2$  м.

### Задача S7.5.

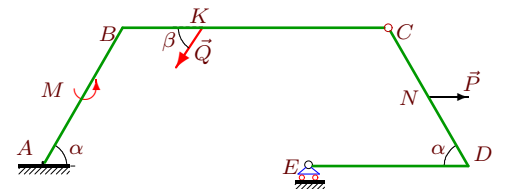
10



$P = 8$  кН,  $Q = 9$  кН,  $M = 6$  кНм,  
 $\rho = 2$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 75^\circ$ ,  
 $AB = 4$  м,  $BC = 4$  м,  $CD = 13$  м,  
 $DE = 6$  м,  $CN = 2$  м,  $CK = 2$  м,  $LD = 2$  м.

### Задача S7.6.

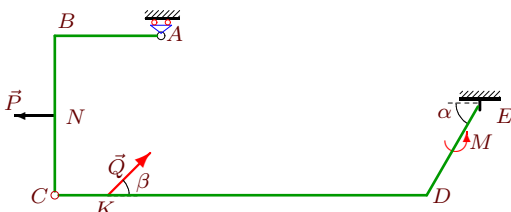
10



$P = 9$  кН,  $Q = 3$  кН,  $M = 9$  кНм,  
 $\rho = 3$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 75^\circ$ ,  
 $AB = 6$  м,  $BC = 10$  м,  $CD = 6$  м,  
 $DE = 6$  м,  $CN = 3$  м,  $BK = 3$  м.

### Задача S7.7.

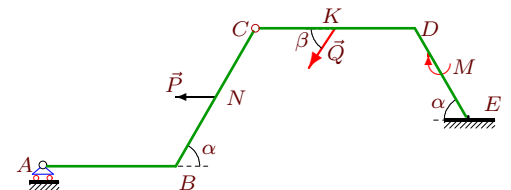
10



$P = 7$  кН,  $Q = 9$  кН,  $M = 5$  кНм,  
 $\rho = 3$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 45^\circ$ ,  
 $AB = 4$  м,  $BC = 6$  м,  $CD = 14$  м,  
 $DE = 4$  м,  $CN = 3$  м,  $CK = 2$  м.

### Задача S7.8.

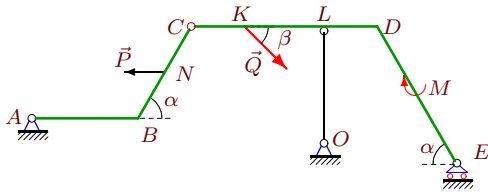
10



$P = 9$  кН,  $Q = 4$  кН,  $M = 9$  кНм,  
 $\rho = 3$  кН/м,  $\alpha = 60^\circ$ ,  $\beta = 75^\circ$ ,  
 $AB = 5$  м,  $BC = 6$  м,  $CD = 6$  м,  
 $DE = 4$  м,  $CN = 3$  м,  $CK = 3$  м.

**Задача S7.9.**

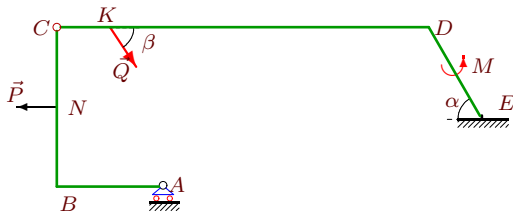
10



$P = 6 \text{ кН}$ ,  $Q = 6 \text{ кН}$ ,  $M = 6 \text{ кНм}$ ,  
 $\rho = 2 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 45^\circ$ ,  
 $AB = 4 \text{ м}$ ,  $BC = 4 \text{ м}$ ,  $CD = 7 \text{ м}$ ,  
 $DE = 6 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $CK = 2 \text{ м}$ ,  $LD = 2 \text{ м}$

**Задача S7.11.**

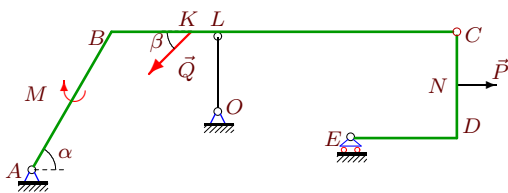
10



$P = 8 \text{ кН}$ ,  $Q = 9 \text{ кН}$ ,  $M = 7 \text{ кНм}$ ,  
 $\rho = 3 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 60^\circ$ ,  
 $AB = 4 \text{ м}$ ,  $BC = 6 \text{ м}$ ,  $CD = 14 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 3 \text{ м}$ ,  $CK = 2 \text{ м}$ .

**Задача S7.13.**

10



$P = 5 \text{ кН}$ ,  $Q = 2 \text{ кН}$ ,  $M = 6 \text{ кНм}$ ,  
 $\rho = 2 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 30^\circ$ ,  
 $AB = 6 \text{ м}$ ,  $BC = 13 \text{ м}$ ,  $CD = 4 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $BK = 3 \text{ м}$ ,  $LC = 9 \text{ м}$ .

**Задача S7.15.**

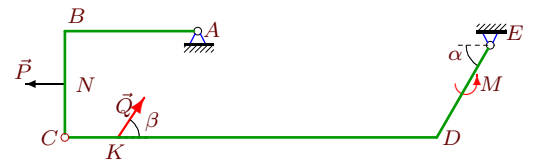
10



$P = 5 \text{ кН}$ ,  $Q = 6 \text{ кН}$ ,  $M = 5 \text{ кНм}$ ,  
 $\rho = 1 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 45^\circ$ ,  
 $AB = 5 \text{ м}$ ,  $BC = 4 \text{ м}$ ,  $CD = 12 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $CK = 2 \text{ м}$ .

**Задача S7.10.**

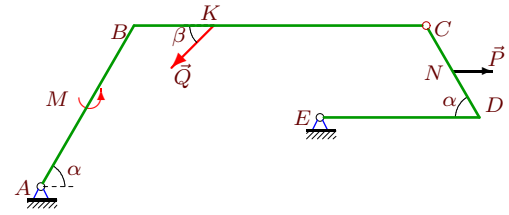
10



$P = 6 \text{ кН}$ ,  $Q = 7 \text{ кН}$ ,  $M = 7 \text{ кНм}$ ,  
 $\rho = 1 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 60^\circ$ ,  
 $AB = 5 \text{ м}$ ,  $BC = 4 \text{ м}$ ,  $CD = 14 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $CK = 2 \text{ м}$ .

**Задача S7.12.**

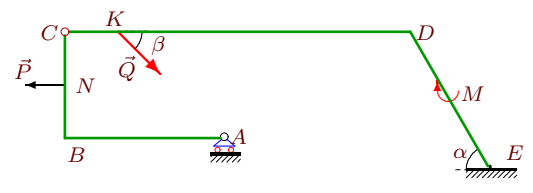
10



$P = 5 \text{ кН}$ ,  $Q = 3 \text{ кН}$ ,  $M = 5 \text{ кНм}$ ,  
 $\rho = 1 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 45^\circ$ ,  
 $AB = 7 \text{ м}$ ,  $BC = 11 \text{ м}$ ,  $CD = 4 \text{ м}$ ,  
 $DE = 6 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $BK = 3 \text{ м}$ .

**Задача S7.14.**

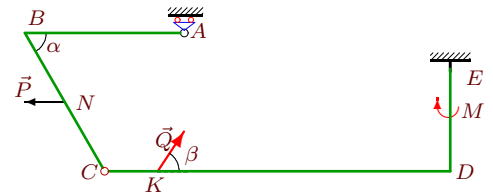
10



$P = 7 \text{ кН}$ ,  $Q = 7 \text{ кН}$ ,  $M = 9 \text{ кНм}$ ,  
 $\rho = 3 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 45^\circ$ ,  
 $AB = 6 \text{ м}$ ,  $BC = 4 \text{ м}$ ,  $CD = 13 \text{ м}$ ,  
 $DE = 6 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $CK = 2 \text{ м}$ .

**Задача S7.16.**

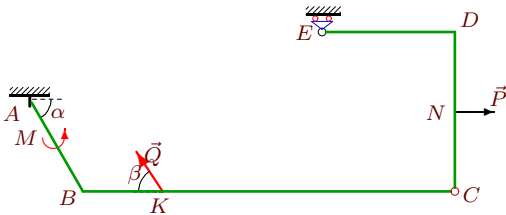
10



$P = 9 \text{ кН}$ ,  $Q = 2 \text{ кН}$ ,  $M = 9 \text{ кНм}$ ,  
 $\rho = 3 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 75^\circ$ ,  
 $AB = 6 \text{ м}$ ,  $BC = 6 \text{ м}$ ,  $CD = 13 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 3 \text{ м}$ ,  $CK = 2 \text{ м}$ .

**Задача S7.17.**

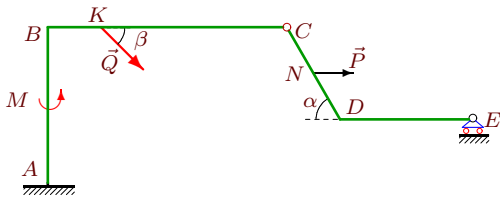
10



$P = 9 \text{ кН}$ ,  $Q = 1 \text{ кН}$ ,  $M = 9 \text{ кНм}$ ,  
 $\rho = 3 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 75^\circ$ ,  
 $AB = 4 \text{ м}$ ,  $BC = 14 \text{ м}$ ,  $CD = 6 \text{ м}$ ,  
 $DE = 5 \text{ м}$ ,  $CN = 3 \text{ м}$ ,  $BK = 3 \text{ м}$ .

**Задача S7.19.**

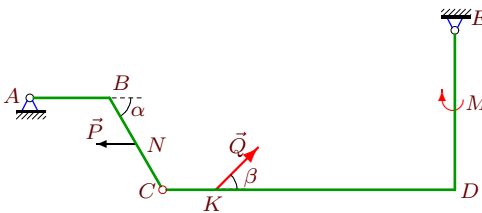
10



$P = 6 \text{ кН}$ ,  $Q = 7 \text{ кН}$ ,  $M = 3 \text{ кНм}$ ,  
 $\rho = 3 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 30^\circ$ ,  
 $AB = 6 \text{ м}$ ,  $BC = 9 \text{ м}$ ,  $CD = 4 \text{ м}$ ,  
 $DE = 5 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $BK = 2 \text{ м}$ .

**Задача S7.21.**

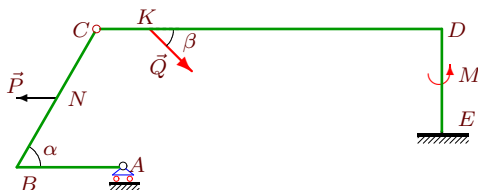
10



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

**Задача S7.23.**

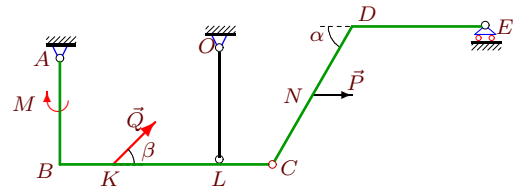
10



$P = 7 \text{ кН}$ ,  $Q = 1 \text{ кН}$ ,  $M = 5 \text{ кНм}$ ,  
 $\rho = 3 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 45^\circ$ ,  
 $AB = 4 \text{ м}$ ,  $BC = 6 \text{ м}$ ,  $CD = 13 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 3 \text{ м}$ ,  $CK = 2 \text{ м}$ .

**Задача S7.18.**

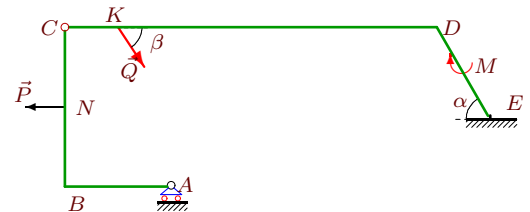
10



$P = 5 \text{ кН}$ ,  $Q = 6 \text{ кН}$ ,  $M = 6 \text{ кНм}$ ,  
 $\rho = 2 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 30^\circ$ ,  
 $AB = 4 \text{ м}$ ,  $BC = 8 \text{ м}$ ,  $CD = 6 \text{ м}$ ,  
 $DE = 5 \text{ м}$ ,  $CN = 3 \text{ м}$ ,  $BK = 2 \text{ м}$ .  $LC = 2 \text{ м}$ .

**Задача S7.20.**

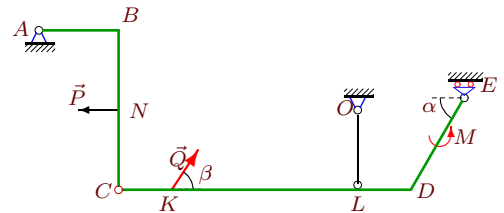
10



$P = 9 \text{ кН}$ ,  $Q = 8 \text{ кН}$ ,  $M = 9 \text{ кНм}$ ,  
 $\rho = 3 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 75^\circ$ ,  
 $AB = 4 \text{ м}$ ,  $BC = 6 \text{ м}$ ,  $CD = 14 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 3 \text{ м}$ ,  $CK = 2 \text{ м}$ .

**Задача S7.22.**

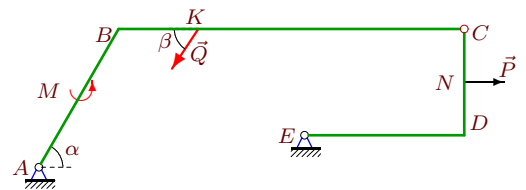
10



$P = 7 \text{ кН}$ ,  $Q = 9 \text{ кН}$ ,  $M = 7 \text{ кНм}$ ,  
 $\rho = 2 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 60^\circ$ ,  
 $AB = 3 \text{ м}$ ,  $BC = 6 \text{ м}$ ,  $CD = 11 \text{ м}$ ,  
 $DE = 4 \text{ м}$ ,  $CN = 3 \text{ м}$ ,  $CK = 2 \text{ м}$ .  $LD = 2 \text{ м}$ .

**Задача S7.24.**

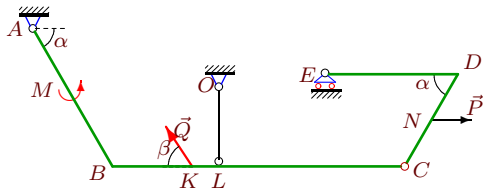
10



$P = 6 \text{ кН}$ ,  $Q = 1 \text{ кН}$ ,  $M = 7 \text{ кНм}$ ,  
 $\rho = 1 \text{ кН/м}$ ,  $\alpha = 60^\circ$ ,  $\beta = 60^\circ$ ,  
 $AB = 6 \text{ м}$ ,  $BC = 13 \text{ м}$ ,  $CD = 4 \text{ м}$ ,  
 $DE = 6 \text{ м}$ ,  $CN = 2 \text{ м}$ ,  $BK = 3 \text{ м}$ .

**Задача S7.25.**

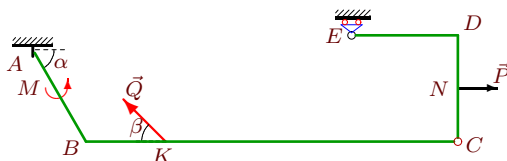
10



$P = 7 \text{ кН}, Q = 3 \text{ кН}, M = 7 \text{ кНм},$   
 $\rho = 2 \text{ кН/м}, \alpha = 60^\circ, \beta = 60^\circ,$   
 $AB = 6 \text{ м}, BC = 11 \text{ м}, CD = 4 \text{ м},$   
 $DE = 5 \text{ м}, CN = 2 \text{ м}, BK = 3 \text{ м}. LC = 7 \text{ м}.$

**Задача S7.27.**

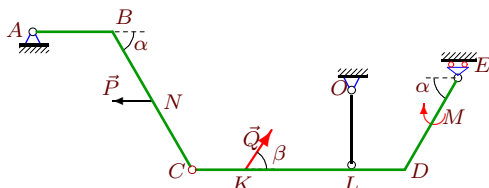
10



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

**Задача S7.29.**

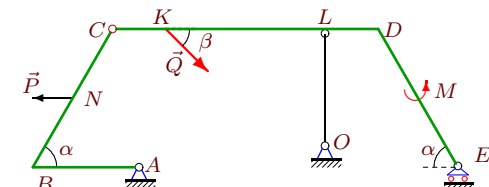
10



$P = 8 \text{ кН}, Q = 4 \text{ кН}, M = 6 \text{ кНм},$   
 $\rho = 2 \text{ кН/м}, \alpha = 60^\circ, \beta = 75^\circ,$   
 $AB = 3 \text{ м}, BC = 6 \text{ м}, CD = 8 \text{ м},$   
 $DE = 4 \text{ м}, CN = 3 \text{ м}, CK = 2 \text{ м}. LD = 2 \text{ м}$

**Задача S7.31.**

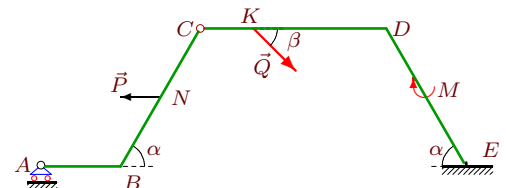
10



$P = 5 \text{ кН}, Q = 3 \text{ кН}, M = 3 \text{ кНм},$   
 $\rho = 2 \text{ кН/м}, \alpha = 60^\circ, \beta = 30^\circ,$   
 $AB = 4 \text{ м}, BC = 6 \text{ м}, CD = 10 \text{ м},$   
 $DE = 6 \text{ м}, CN = 3 \text{ м}, CK = 2 \text{ м}. LD = 2 \text{ м}$

**Задача S7.26.**

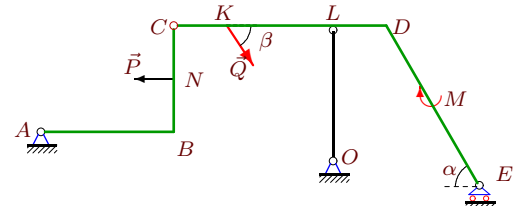
10



$P = 7 \text{ кН}, Q = 3 \text{ кН}, M = 9 \text{ кНм},$   
 $\rho = 3 \text{ кН/м}, \alpha = 60^\circ, \beta = 45^\circ,$   
 $AB = 3 \text{ м}, BC = 6 \text{ м}, CD = 7 \text{ м},$   
 $DE = 6 \text{ м}, CN = 3 \text{ м}, CK = 2 \text{ м}.$

**Задача S7.28.**

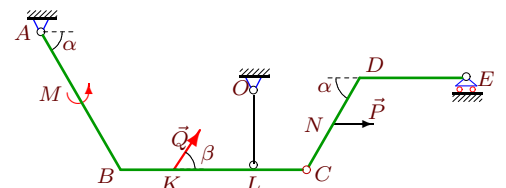
10



$P = 7 \text{ кН}, Q = 9 \text{ кН}, M = 6 \text{ кНм},$   
 $\rho = 2 \text{ кН/м}, \alpha = 60^\circ, \beta = 60^\circ,$   
 $AB = 5 \text{ м}, BC = 4 \text{ м}, CD = 8 \text{ м},$   
 $DE = 7 \text{ м}, CN = 2 \text{ м}, CK = 2 \text{ м}. LD = 2 \text{ м}$

**Задача S7.30.**

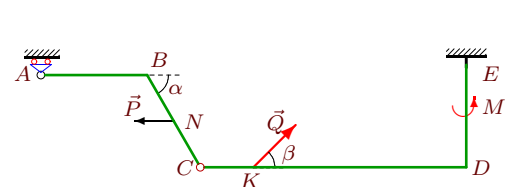
10



$P = 7 \text{ кН}, Q = 3 \text{ кН}, M = 7 \text{ кНм},$   
 $\rho = 2 \text{ кН/м}, \alpha = 60^\circ, \beta = 60^\circ,$   
 $AB = 6 \text{ м}, BC = 7 \text{ м}, CD = 4 \text{ м},$   
 $DE = 4 \text{ м}, CN = 2 \text{ м}, BK = 2 \text{ м}. LC = 2 \text{ м}.$

**Задача S7.32.**

10



$P = 6 \text{ кН}, Q = 1 \text{ кН}, M = 3 \text{ кНм},$   
 $\rho = 3 \text{ кН/м}, \alpha = 60^\circ, \beta = 30^\circ,$   
 $AB = 4 \text{ м}, BC = 4 \text{ м}, CD = 10 \text{ м},$   
 $DE = 4 \text{ м}, CN = 2 \text{ м}, CK = 2 \text{ м}.$

**S7 Ответы.**  
**Составная конструкция**

04.03.2012

	$X_A$	$Y_A$	$X_E$	$Y_E$	$S_{OL}$	$M$
1	—	11.100	6.929	47.173	—	-259.849
2	-11.500	46.601	—	13.337	—	195.346
3	-21.190	30.721	24.190	5.475	—	
4	3.500	5.000	—	-34.088	79.026	
5	5.671	5.671	—	-20.877	60.513	
6	-8.224	88.104	—	-1.206	—	801.792
7	—	0.750	0.636	76.886	—	-771.701
8	—	10.765	10.035	56.099	—	-324.964
9	1.757	5.949	—	-7.196	47.490	
10	19.909	16.027	-17.409	4.911	—	
11	—	12.000	3.500	79.794	—	-806.244
12	-40.421	-5.057	37.543	35.178	—	
13	-3.268	-15.212	—	6.500	63.712	
14	—	11.333	2.050	80.616	—	-767.117
15	17.705	17.057	-16.947	3.701	—	
16	—	-16.794	8.482	101.862	—	-875.645
17	-8.741	83.934	—	2.100	—	840.290
18	-10.196	13.380	—	10.749	18.871	
19	-12.062	65.627	—	9.873	—	352.020
20	—	12.750	6.929	78.977	—	-789.188
21	-4.703	7.544	7.837	15.956	—	
22	2.500	5.000	—	-30.610	65.816	
23	—	-20.813	6.293	102.521	—	-952.025
24	-49.239	-4.293	43.739	34.159	—	
25	-5.500	-13.616	—	-5.041	68.059	
26	—	8.219	4.879	59.902	—	-384.632
27	-4.268	74.000	—	3.000	—	703.215
28	2.500	4.200	—	-15.905	67.499	
29	6.965	4.932	—	-16.238	49.441	
30	-8.500	15.968	—	8.687	14.746	
31	2.402	-25.490	—	-78.785	157.775	
32	—	11.732	5.134	53.768	—	-251.144

S7 файл o7s10B

1	$Y_A = 55.5/(5); M_E = -437.45 + Y_A(16)$
2	$-7 \cdot Y_E = -13.86 - 79.5; M_A = 408.73 - 16 \cdot Y_E;$
3	$7 \cdot X_A + 6 \cdot Y_A - 36 = 0; 3.54 \cdot X_A - 10 \cdot Y_A + 382.14 = 0.$
4	$11 \cdot Y_E + 6 \cdot S - 99.19 = 0; 16 \cdot Y_E + 11 \cdot S - 323.88 = 0.$
5	$12 \cdot Y_E + 7 \cdot S - 173.07 = 0; 16 \cdot Y_E + 11 \cdot S - 331.61 = 0.$
6	$3 \cdot Y_E = 23.38 - 27; M_A = 789.73 - 10 \cdot Y_E;$
7	$Y_A = -3/(-4); M_E = -780.7 + Y_A(12)$
8	$Y_A = 86.12/(8); M_E = -497.2 + Y_A(16)$
9	$16 \cdot Y_E + 11 \cdot S - 407.25 = 0; 10 \cdot Y_E + 5 \cdot S - 165.49 = 0.$
10	$-4 \cdot X_A + 5 \cdot Y_A - 0.5 = 0; -0.54 \cdot X_A - 11 \cdot Y_A + 186.97 = 0.$
11	$Y_A = -48/(-4); M_E = -950.24 + Y_A(12)$
12	$3.46 \cdot X_E - 4 \cdot Y_E + 10.66 = 0; -2.6 \cdot X_E + 10.5 \cdot Y_E - 271.83 = 0.$
13	$4 \cdot Y_E = 10 + 16; 7 \cdot Y_A = 5 \cdot Y_E + 5.2 - 523.98;$
14	$Y_A = -68/(-6); M_E = -880.45 + Y_A(10)$
15	$-3.46 \cdot X_A + 3 \cdot Y_A + 10.16 = 0; 0 \cdot X_A - 11 \cdot Y_A + 187.62 = 0.$
16	$Y_A = 50.38/(-3); M_E = -707.7 + Y_A(10)$
17	$5 \cdot Y_E = -27 + 37.5; M_A = 863.39 - 11 \cdot Y_E;$
18	$-8 \cdot Y_E = -13 - 73; 6 \cdot Y_A = 10 \cdot Y_E - 4 - 326;$
19	$-7 \cdot Y_E = 10.4 - 79.5; M_A = 509.98 - 16 \cdot Y_E;$
20	$Y_A = -51/(-4); M_E = -942.19 + Y_A(12)$
21	$-3.46 \cdot X_A - 5 \cdot Y_A + 21.43 = 0; 2.54 \cdot X_A - 16 \cdot Y_A + 132.62 = 0.$
22	$16 \cdot Y_E + 12 \cdot S - 300.03 = 0; 13 \cdot Y_E + 9 \cdot S - 194.41 = 0.$
23	$Y_A = 20.81/(-1); M_E = -702.26 + Y_A(12)$
24	$4 \cdot X_E - 6 \cdot Y_E + 30 = 0; -1.2 \cdot X_E + 10 \cdot Y_E - 289.27 = 0.$
25	$3 \cdot Y_E = -12.12 - 3; 7 \cdot Y_A = 4 \cdot Y_E - 5.2 - 449.54;$
26	$Y_A = 49.31/(6); M_E = -516.13 + Y_A(16)$
27	$4 \cdot Y_E = -12 + 24; M_A = 739.22 - 12 \cdot Y_E;$
28	$16.5 \cdot Y_E + 11 \cdot S - 480.06 = 0; 11.5 \cdot Y_E + 6 \cdot S - 222.09 = 0.$
29	$16 \cdot Y_E + 12 \cdot S - 333.5 = 0; 10 \cdot Y_E + 6 \cdot S - 134.27 = 0.$
30	$-6 \cdot Y_E = -12.12 - 40; 8 \cdot Y_A = 8 \cdot Y_E - 5.2 - 301.13;$
31	$12 \cdot Y_E + 7 \cdot S - 159 = 0; 13 \cdot Y_E + 8 \cdot S - 238 = 0.$
32	$Y_A = 70.4/(6); M_E = -438.86 + Y_A(16)$