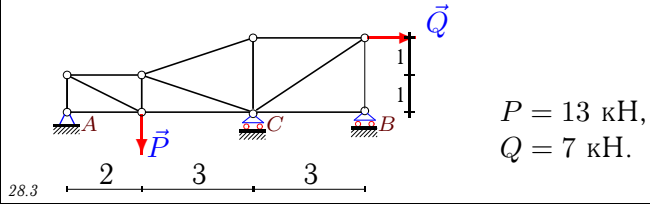
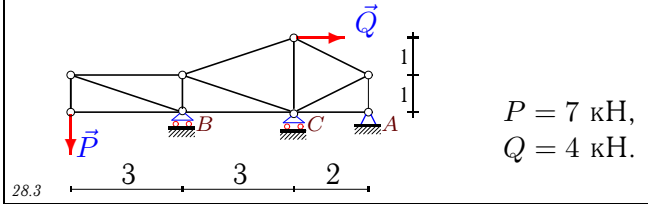


# Расчет статически неопределимой фермы

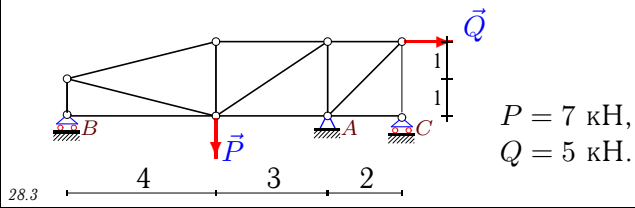
**Задача 28.1**



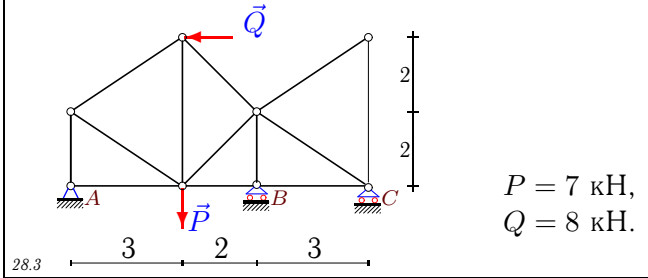
**Задача 28.2**



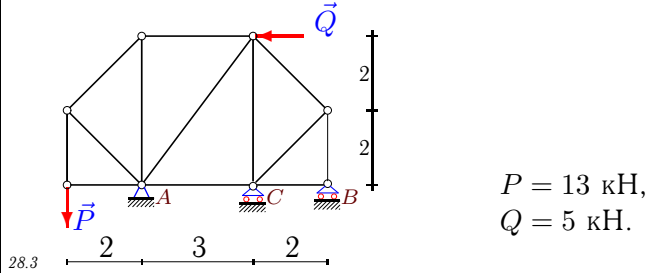
**Задача 28.3**



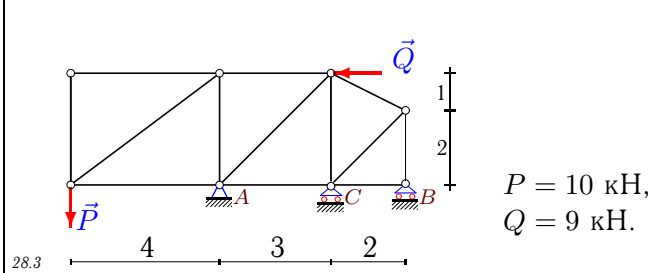
**Задача 28.4**



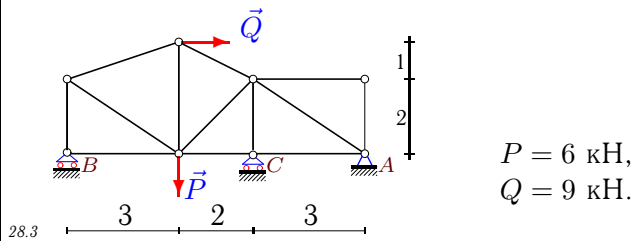
**Задача 28.5**



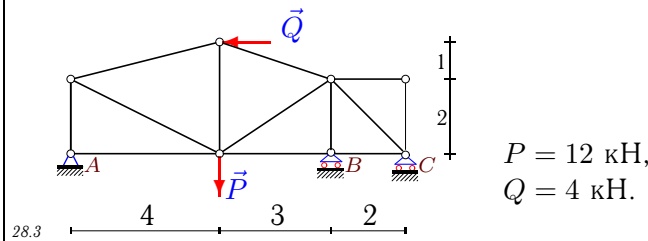
**Задача 28.6**



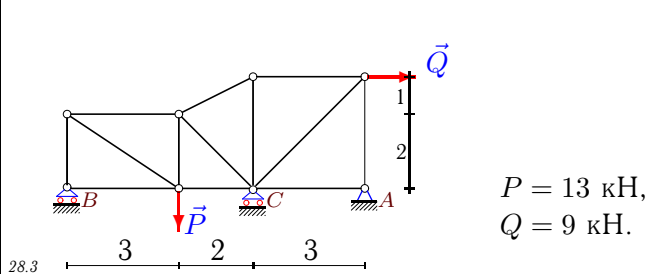
**Задача 28.7**



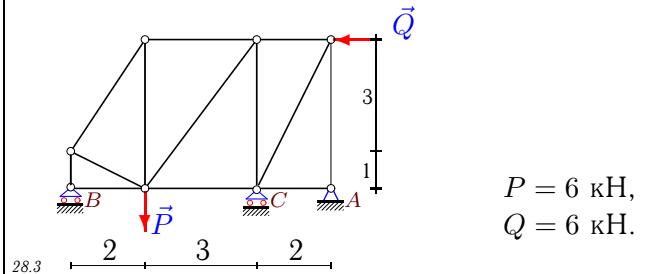
**Задача 28.8**



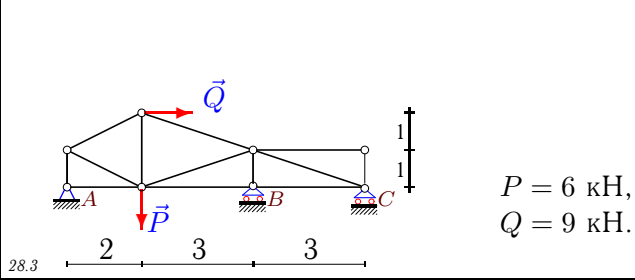
**Задача 28.9**



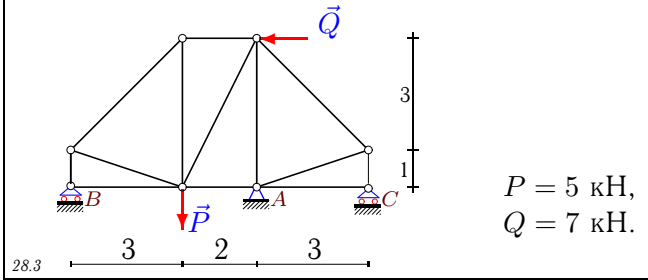
**Задача 28.10**



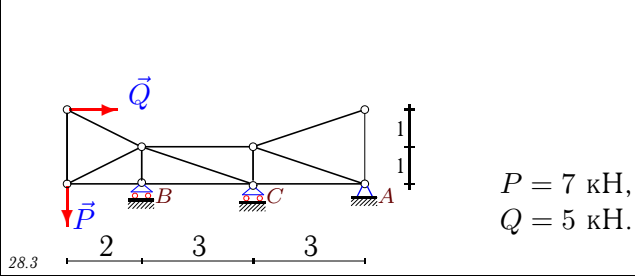
Задача 28.11



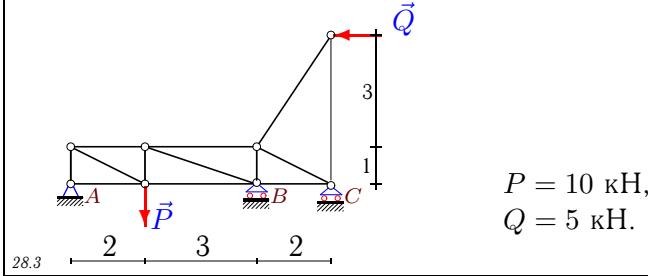
Задача 28.12



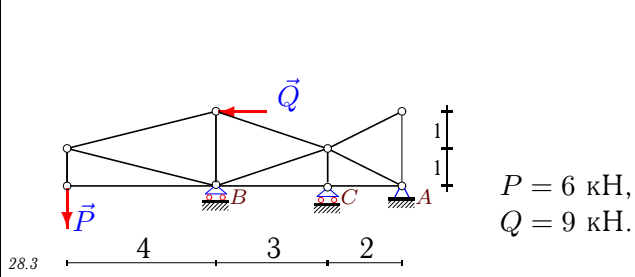
Задача 28.13



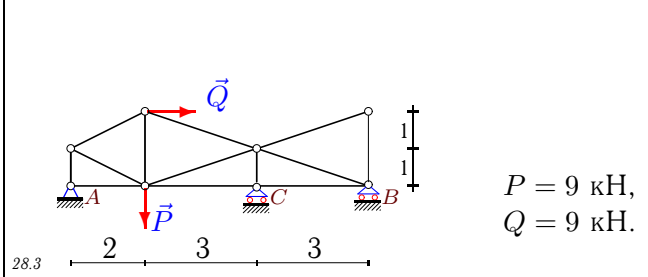
Задача 28.14



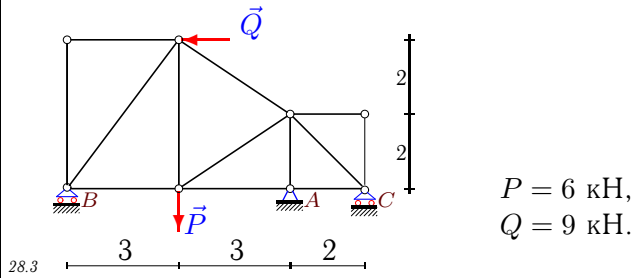
Задача 28.15



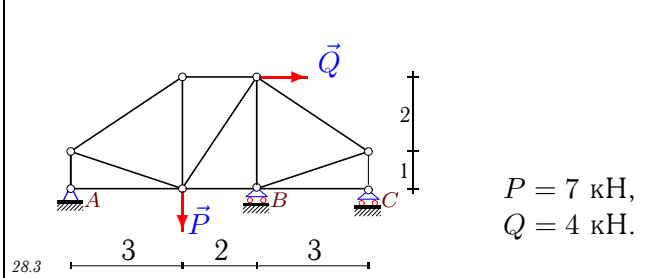
Задача 28.16



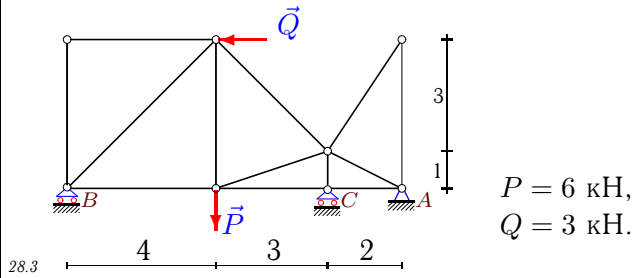
Задача 28.17



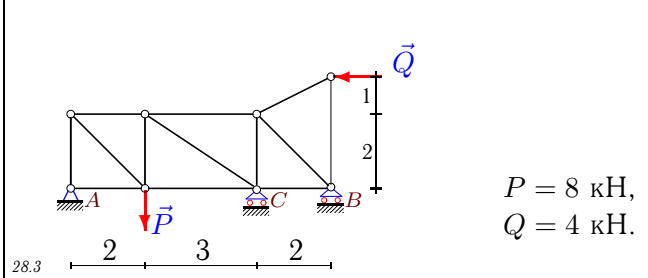
Задача 28.18



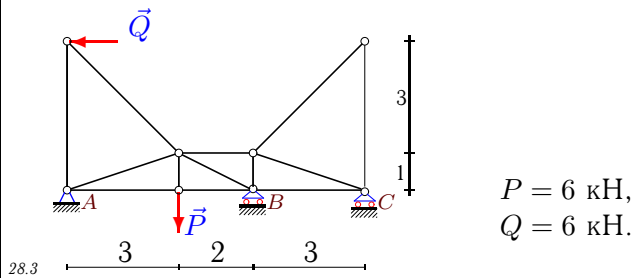
Задача 28.19



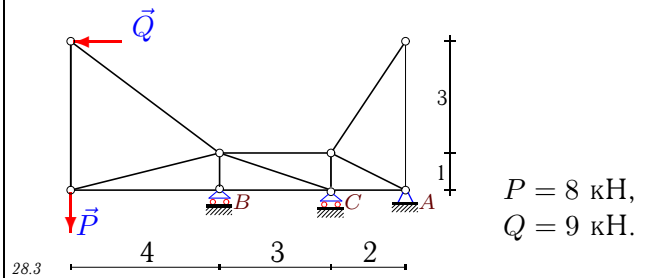
Задача 28.20



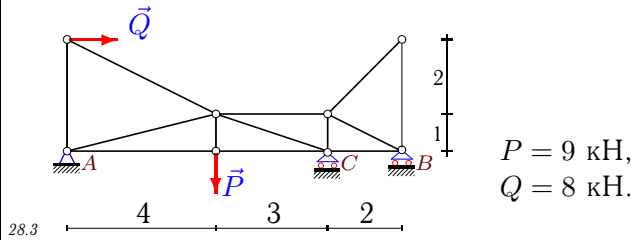
Задача 28.21



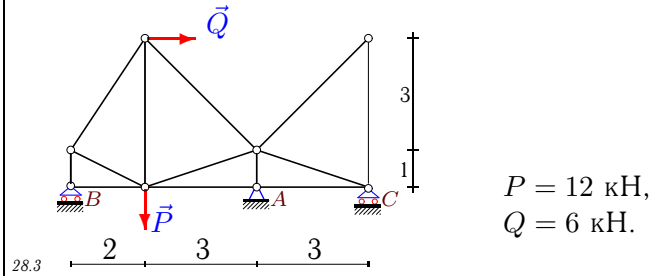
Задача 28.22



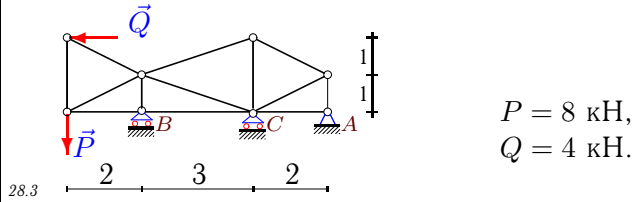
Задача 28.23



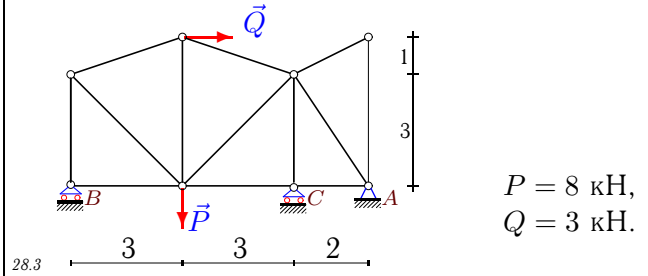
Задача 28.24



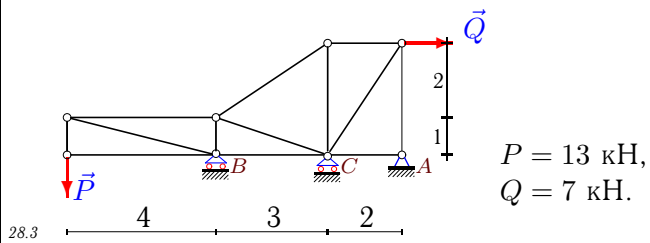
Задача 28.25



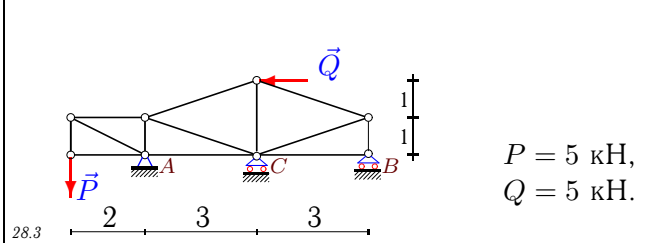
Задача 28.26



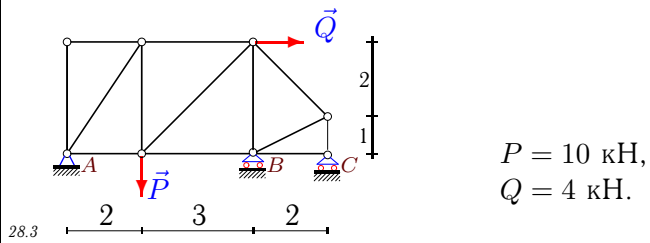
Задача 28.27



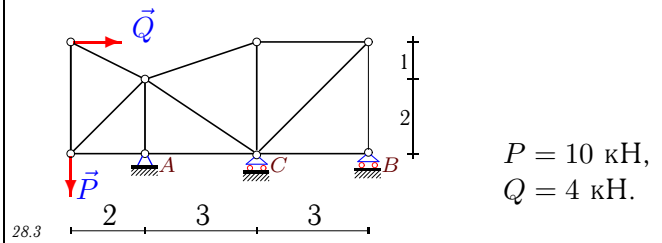
Задача 28.28



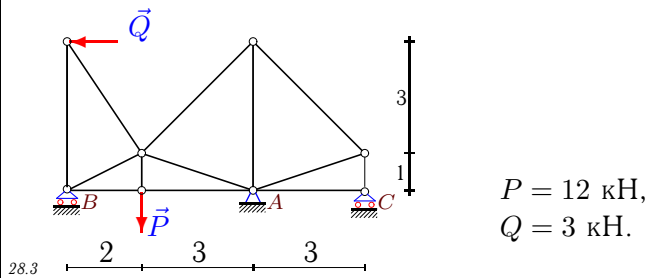
Задача 28.29



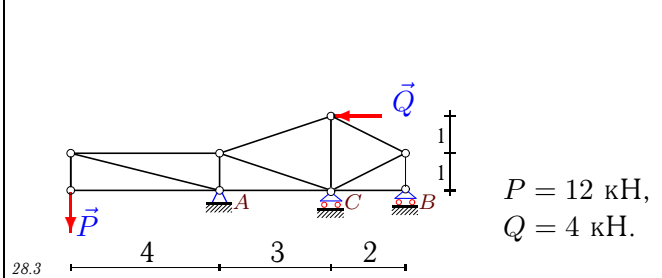
Задача 28.30



Задача 28.31



Задача 28.32



### Расчет статически неопределимой фермы

	$\delta_{11}$	$\Delta_{1P}$	$X_A$	$Y_A$	$Y_B$	$Y_C$
1	16.068	-146.231	-7.000	4.587	-0.688	9.101
2	5.562	-3.703	-4.000	-2.999	9.334	0.666
3	17.740	-24.481	-5.000	3.654	1.966	1.380
4	40.549	64.655	8.000	8.243	0.351	-1.594
5	5.218	-10.837	5.000	21.369	-10.446	2.077
6	4.990	-4.560	9.000	23.035	-13.948	0.914
7	14.956	-51.422	-9.000	3.476	-0.914	3.438
8	18.227	18.393	4.000	6.569	6.440	-1.009
9	10.858	-91.656	-9.000	2.974	1.584	8.442
10	7.118	-20.040	6.000	-3.725	6.910	2.815
11	112.559	-63.521	-9.000	0.339	5.097	0.564
12	22.182	83.988	7.000	3.458	5.328	-3.786
13	29.811	37.000	-5.000	-0.046	8.287	-1.241
14	42.549	380.574	5.000	6.422	12.522	-8.944
15	17.285	85.440	9.000	-5.434	16.377	-4.943
16	43.968	-273.942	-9.000	2.164	0.606	6.230
17	19.523	84.359	9.000	2.761	7.560	-4.321
18	23.110	-42.571	-4.000	1.505	3.653	1.842
19	28.074	-90.636	3.000	-1.178	3.949	3.228
20	8.611	-50.157	4.000	5.764	-3.589	5.825
21	109.232	9.218	6.000	7.149	-1.065	-0.084
22	16.805	60.324	9.000	-11.446	23.036	-3.590
23	30.021	-426.069	-8.000	-0.821	-4.372	14.192
24	118.477	-85.672	-6.000	8.443	2.834	0.723
25	5.562	-12.498	4.000	-6.148	11.901	2.247
26	8.804	-24.228	-3.000	2.436	2.812	2.752
27	5.044	8.655	-7.000	-5.170	19.886	-1.716
28	8.906	1.667	5.000	8.427	-3.240	-0.187
29	12.530	-25.049	-4.000	4.400	3.601	1.999
30	6.385	-6.056	-4.000	10.859	-1.808	0.948
31	33.459	106.796	3.000	7.507	7.685	-3.192
32	5.562	-23.029	4.000	21.544	-13.684	4.140

В первой строке — усилия от действия основной нагрузки, во второй — от единичной силы в опоре  $C$ .

	$U_1$	$U_2$	$U_3$	$V_1$	$V_2$	$V_3$	$V_4$	$O_1$	$O_2$	$O_3$	$D_1$	$D_2$	$D_3$	$X_A$	$Y_A$	$Y_B$
1	7.00	23.00	0.00	-8.00	5.00	0.17	-5.00	-16.00	-0.53	-0.50	17.89	-16.34	9.01	-7.00	8.00	5.00
	0.00	-0.75	0.00	0.38	0.38	-0.31	0.63	0.75	0.99	0.94	-0.84	-0.20	-1.13	0.00	-0.38	-0.63
2	0.00	-21.00	-4.00	7.00	-2.60	-3.50	2.60	21.00	6.96	2.91	-22.14	15.18	-2.91	-4.00	-2.60	9.60
	0.00	0.00	-0.00	0.00	0.40	-0.50	0.60	-0.00	0.63	0.67	0.00	-0.63	-0.67	0.00	-0.60	-0.40
3	0.00	-5.00	0.00	-1.57	0.79	-5.43	0.00	-3.24	-3.14	5.00	3.24	9.79	0.00	-5.00	5.43	1.57
	0.00	1.00	-0.00	-0.29	0.14	0.29	-1.00	-0.59	-0.57	-1.00	0.59	-0.52	1.41	0.00	-1.29	0.29
4	-8.00	0.00	0.00	-9.20	3.50	2.20	0.00	-8.29	1.56	0.00	8.29	-1.56	-0.00	8.00	9.20	-2.20
	0.00	1.50	1.50	-0.60	0.75	1.60	0.00	-0.54	-0.64	-0.00	0.54	-1.48	-1.80	0.00	0.60	-1.60
5	0.00	-4.60	0.00	13.00	-6.50	4.60	9.20	9.19	6.50	6.51	-9.19	-11.50	-6.51	5.00	22.20	-9.20
	0.00	-0.30	0.00	0.00	0.00	-0.70	0.60	0.00	0.00	0.42	0.00	0.50	-0.42	0.00	-0.40	-0.60
6	-13.33	-8.93	0.00	0.00	-10.00	8.93	13.40	0.00	13.33	9.99	16.67	-18.95	-12.63	9.00	23.40	-13.40
	0.00	-0.40	0.00	0.00	-0.00	-0.60	0.60	0.00	-0.00	0.45	-0.00	0.57	-0.57	0.00	-0.40	-0.60
7	0.00	-0.56	-0.56	-0.38	4.81	0.00	0.00	-0.40	-10.48	0.00	0.45	1.33	-10.14	-9.00	5.63	0.38
	0.00	-0.94	-0.94	0.38	-0.31	-1.00	0.00	0.40	0.42	0.00	-0.45	0.80	1.13	0.00	-0.63	-0.38
8	-4.00	-0.00	-0.00	-6.86	4.00	-5.14	0.00	-9.42	-5.42	0.00	10.22	6.18	0.00	4.00	6.86	5.14
	0.00	1.00	1.00	-0.29	0.22	1.29	0.00	-0.39	-0.40	0.00	0.43	-0.74	-1.41	0.00	0.29	-1.29
9	0.00	7.12	-9.00	-4.75	8.25	-0.37	-8.25	-7.12	0.84	0.75	8.56	-11.14	11.67	-9.00	8.25	4.75
	0.00	-0.56	0.00	0.37	0.37	-0.31	0.62	0.56	0.70	0.62	-0.68	-0.09	-0.88	0.00	-0.62	-0.37
10	0.00	5.14	6.00	-7.71	5.79	1.71	1.71	-6.95	-3.86	-5.14	4.31	-2.14	-1.92	6.00	-1.71	7.71
	0.00	-0.36	0.00	0.29	-0.21	-0.29	0.71	0.26	0.14	0.36	-0.16	0.36	-0.80	0.00	-0.71	-0.29
11	9.00	0.00	0.00	0.00	3.00	-6.00	0.00	-0.00	-9.49	-0.00	0.00	9.49	0.00	-9.00	0.00	6.00
	0.00	3.00	3.00	-0.60	0.50	1.60	0.00	-0.67	-0.63	0.00	0.67	-2.53	-3.16	0.00	0.60	-1.60
12	0.00	7.00	0.00	-7.60	5.70	2.60	0.00	-8.06	-5.70	0.00	6.01	-2.91	0.00	7.00	-2.60	7.60
	0.00	0.75	0.00	-0.60	0.45	1.35	-1.00	-0.64	-0.45	-1.06	0.47	-0.67	0.79	0.00	-1.60	0.60
13	-9.00	-9.00	-7.00	2.50	-7.67	-0.67	0.00	-5.59	2.00	0.00	10.06	2.11	2.11	-5.00	-0.67	7.67
	0.00	0.00	-1.50	0.00	0.50	-0.50	0.00	0.00	1.50	0.00	-0.00	-1.58	1.58	0.00	-0.50	-0.50
14	-5.00	15.00	15.00	-10.00	0.00	-0.00	7.50	-20.00	-20.00	-9.01	22.36	0.00	-16.77	5.00	10.00	-0.00
	-0.00	0.80	2.00	-0.40	-0.40	1.00	0.00	-0.80	-2.00	0.00	0.89	1.26	-2.24	0.00	0.40	-1.40
15	0.00	-7.80	-7.80	6.00	-10.00	0.00	0.00	12.37	22.14	0.00	-12.37	-4.43	18.78	9.00	-8.40	14.40
	0.00	-1.20	-1.20	0.00	0.00	-1.00	0.00	-0.00	-0.00	0.00	0.00	1.26	1.34	0.00	-0.60	-0.40
16	9.00	13.50	13.50	-4.50	6.75	0.00	-0.00	-5.03	-14.23	0.00	5.03	0.00	-14.23	-9.00	4.50	4.50
	0.00	-1.88	-1.88	0.38	-0.31	-1.00	0.00	0.42	0.40	0.00	-0.42	1.58	1.98	0.00	-0.38	-0.63
17	6.75	9.00	0.00	0.00	7.50	3.00	0.00	0.00	2.70	0.00	-11.25	-2.70	-0.00	9.00	-3.00	9.00
	0.25	1.00	1.00	0.00	0.50	1.33	0.00	0.00	-0.30	0.00	-0.42	-0.90	-1.41	0.00	-1.33	0.33
18	4.00	0.00	0.00	-0.40	0.27	-6.60	0.00	-0.48	-0.40	0.00	0.42	7.93	0.00	-4.00	0.40	6.60
	0.00	1.00	0.00	-0.60	0.40	1.27	-1.00	-0.72	-0.60	-1.20	0.63	-0.72	1.05	0.00	0.60	-1.60
19	4.67	5.67	5.67	0.00	6.33	0.00	0.00	0.00	-2.36	0.00	-6.60	-1.05	-2.98	3.00	1.33	4.67
	-0.22	-1.56	-1.56	-0.00	-0.44	-1.00	0.00	0.00	0.31	-0.00	0.31	1.41	1.74	-0.00	-0.78	-0.22
20	-4.00	3.43	2.57	-7.43	0.57	0.57	2.00	-7.43	-6.57	-4.47	10.51	-1.03	-3.64	4.00	7.43	0.57
	0.00	-0.29	-0.71	0.29	0.29	-0.71	0.00	0.29	0.71	-0.00	-0.40	-0.52	1.01	0.00	-0.29	-0.71
21	-2.40	-2.40	0.00	-6.00	6.00	-0.00	0.00	8.49	0.00	0.00	-3.79	2.68	0.00	6.00	7.20	-1.20
	1.80	1.80	3.00	0.00	0.00	1.00	0.00	0.00	-3.00	-0.00	-1.90	1.34	-3.16	0.00	0.60	-1.60
22	-59.00	-59.00	-18.20	-6.75	-21.60	-13.60	0.00	11.25	27.20	-0.00	60.82	43.01	30.41	9.00	-13.60	21.60
	0.00	0.00	-1.20	0.00	0.40	-0.60	0.00	0.00	1.20	0.00	-0.00	-1.26	1.34	-0.00	-0.60	-0.40
23	33.33	33.33	13.33	4.00	9.00	6.67	0.00	-8.94	-13.33	-0.00	-26.11	-21.08	-14.91	-8.00	2.33	6.67
	-0.89	-0.89	-1.56	0.00	0.00	-0.78	-0.00	0.00	1.56	-0.00	0.92	-0.70	1.74	0.00	-0.22	-0.78
24	0.00	-6.00	0.00	-2.40	9.00	-9.60	0.00	-2.16	-10.18	-0.00	1.34	7.59	0.00	-6.00	9.60	2.40
	0.00	3.00	3.00	-0.60	0.75	1.60	0.00	-0.54	-0.42	-0.00	0.34	-2.85	-3.16	-0.00	-1.60	0.60
25	-20.00	-20.00	4.00	-2.00	-12.80	-4.00	4.80	4.47	5.06	5.37	22.36	20.24	-5.37	4.00	-4.80	12.80
	-0.00	-0.00	-0.00	-0.00	0.40	-0.50	0.60	0.00	0.63	0.67	0.00	-0.63	-0.67	0.00	-0.60	-0.40
26	0.00	-0.00	-0.00	-3.50	2.75	0.00	0.00	-2.77	-5.93	0.00	3.71	3.71	-5.41	-3.00	4.50	3.50
	0.00	-0.50	-0.50	0.25	-0.13	-1.00	0.00	0.20	0.20	0.00	-0.27	0.44	0.90	0.00	-0.75	-0.25
27	0.00	-52.00	-7.00	13.00	-6.20	-7.42	6.20	52.00	13.38	11.13	-53.60	43.08	-7.45	-7.00	-6.20	19.20
	0.00	-0.00	-0.00	0.00	0.40	-0.27	0.60	0.00	0.48	0.40	-0.00	-0.42	-0.72	0.00	-0.60	-0.40
28	0.00	-15.00	0.00	5.00	-3.33	-1.67	3.33	10.00	-0.00	5.27	-11.18	10.54	-5.27	5.00	8.33	-3.33
	0.00	0.00	-0.00	0.00	0.50	-0.50	0.50	-0.00	0.79	0.79	0.00	-0.79	-0.79	0.00	-0.50	-0.50
29	6.40	0.00	0.00	-0.00	3.60	-6.40	0.00	0.00	-2.40	-0.00	-4.33	9.05	0.00	-4.00	3.60	6.40
	0.27	0.67	-0.00	-0.00	0.40	1.07	-1.00	0.00	-0.27	-0.94	-0.48	-0.57	0.75	0.00	0.40	-1.40
30	-8.00	-4.00	0.00	2.00	-11.33	-0.44	1.33	-4.47	1.41	1.33	11.31	3.20	-1.89	-4.00	11.33	-1.33
	-0.00	-0.00	-0.00	-0.00	0.50	-0.17	0.50	0.00	0.53	0.50	0.00	-0.60	-0.71	0.00	-0.50	-0.50
31	10.20	10.20	-0.00	-4.50	12.00	0.00	0.00	5.41	-0.00	-0.00	-11.40	-7.59	0.00	3.00	2.40	9.60
	1.20	1.20	0.00	0.00	0.00	1.50	-1.00	-0.00	-1.06	-1.06	-1.34	-0.47	0.79	-0.00	-1.60	0.60
32	0.00	-52.00	0.00	12.00	-11.20	-8.00	11.20	48.00	7.59	12.52	-49.48	43.01	-12.52	4.00	23.20	-11.20
	0.00	0.00	-0.00	0.00	0.40	-0.50	0.60	-0.00	0.63	0.67	0.00	-0.63	-0.67	0.00	-0.40	-0.60