

Расчет статически неопределимой фермы (2)

Найти реакции опор фермы и усилие S в дополнительном раскосе, выделенном утолщенной линией.

Задача M24.1. 3

$P = 7 \text{ кН},$
 $Q = 9 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.2. 3

$P = 11 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.3. 3

$P = 8 \text{ кН},$
 $Q = 9 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.4. 3

$P = 5 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.5. 3

$P = 10 \text{ кН},$
 $Q = 9 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.6. 3

$P = 7 \text{ кН},$
 $Q = 8 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.7. 3

$P = 6 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.8. 3

$P = 10 \text{ кН},$
 $Q = 5 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.9. 3

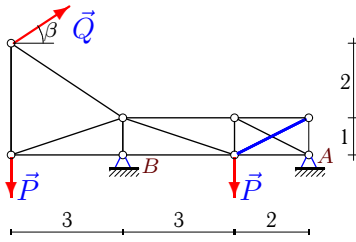
$P = 10 \text{ кН},$
 $Q = 4 \text{ кН},$
 $\beta = 45^\circ.$

Задача M24.10. 3

$P = 6 \text{ кН},$
 $Q = 8 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.11.

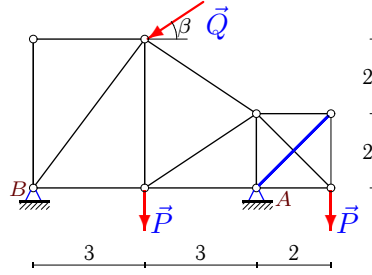
3



$P = 6 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.12.

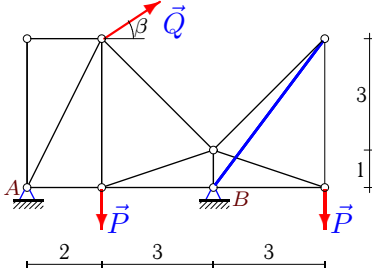
3



$P = 12 \text{ кН},$
 $Q = 4 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.13.

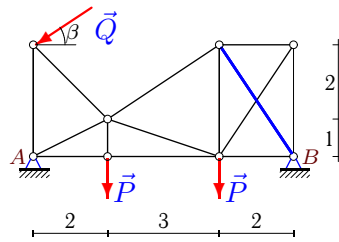
3



$P = 12 \text{ кН},$
 $Q = 5 \text{ кН},$
 $\beta = 45^\circ.$

Задача M24.14.

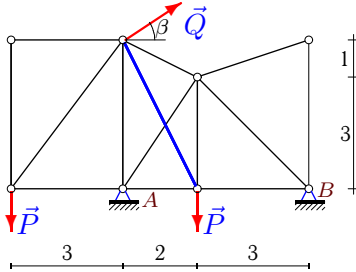
3



$P = 7 \text{ кН},$
 $Q = 4 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.15.

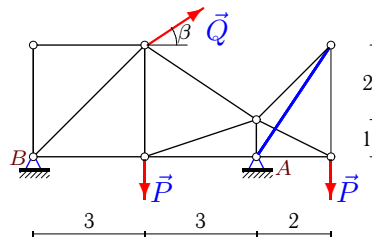
3



$P = 12 \text{ кН},$
 $Q = 7 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.16.

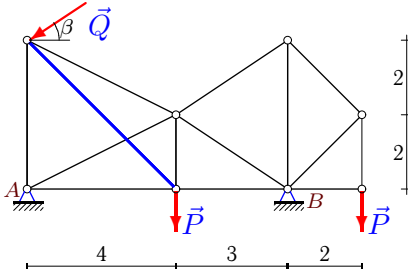
3



$P = 8 \text{ кН},$
 $Q = 9 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.17.

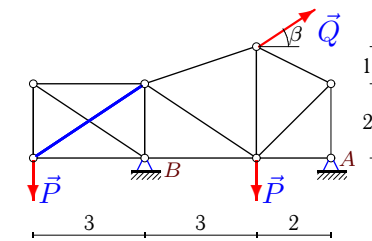
3



$P = 10 \text{ кН},$
 $Q = 5 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.18.

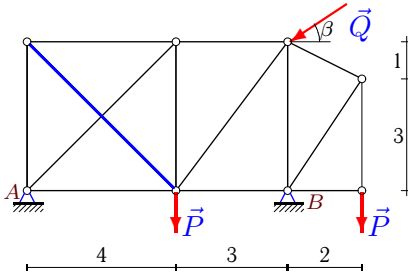
3



$P = 9 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 45^\circ.$

Задача M24.19.

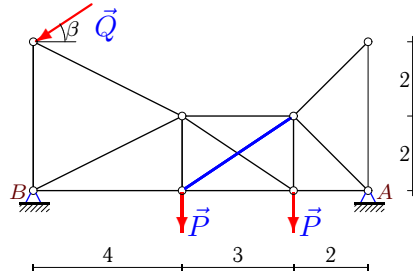
3



$P = 6 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.20.

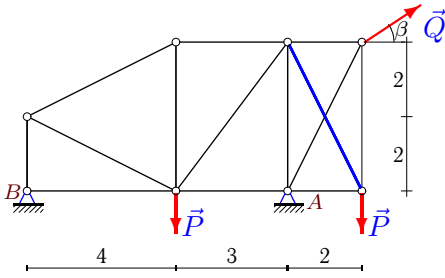
3



$P = 9 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.21.

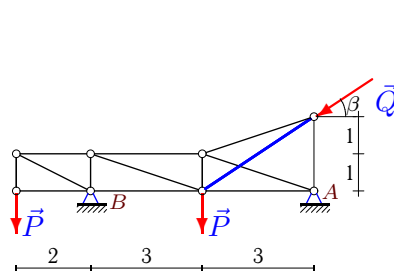
3



$P = 6 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.22.

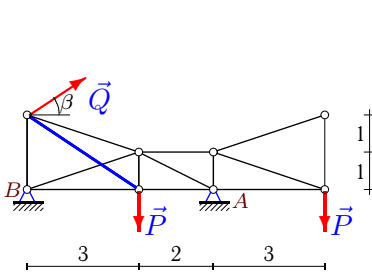
3



$P = 9 \text{ кН},$
 $Q = 9 \text{ кН},$
 $\beta = 45^\circ.$

Задача M24.23.

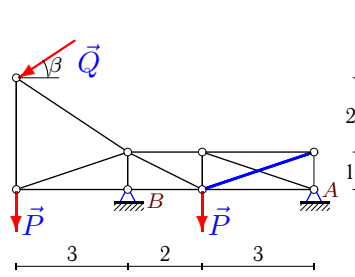
3



$P = 6 \text{ кН},$
 $Q = 4 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.24.

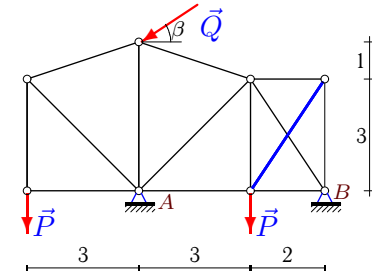
3



$P = 5 \text{ кН},$
 $Q = 7 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.25.

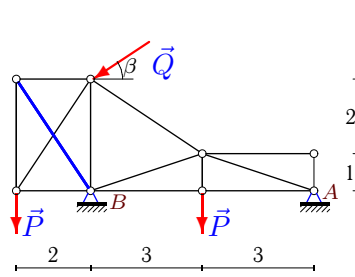
3



$P = 12 \text{ кН},$
 $Q = 7 \text{ кН},$
 $\beta = 30^\circ.$

Задача M24.26.

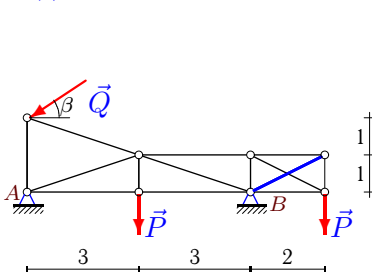
3



$P = 6 \text{ кН},$
 $Q = 5 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.27.

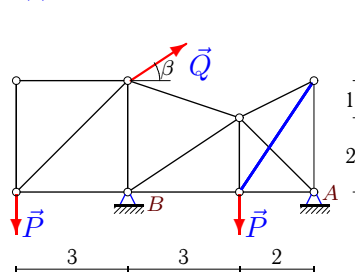
3



$P = 12 \text{ кН},$
 $Q = 6 \text{ кН},$
 $\beta = 15^\circ.$

Задача M24.28.

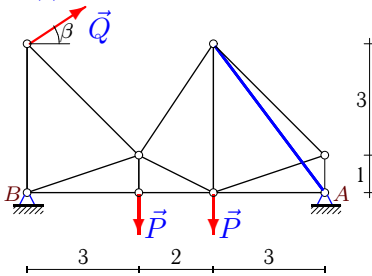
3



$P = 13 \text{ кН},$
 $Q = 6 \text{ кН},$
 $\beta = 45^\circ.$

Задача M24.29.

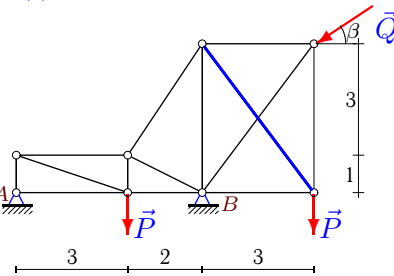
3



$P = 11 \text{ кН},$
 $Q = 8 \text{ кН},$
 $\beta = 45^\circ.$

Задача M24.30.

3



$P = 5 \text{ кН},$
 $Q = 3 \text{ кН},$
 $\beta = 45^\circ.$

М24 Ответы.**Расчет статически неопределимой фермы (2)**

16.06.2012

	δ_{11}	δ_{12}	δ_{22}	Δ_{1p}	Δ_{2p}	X_B	S	X_A	Y_A	Y_B
1	8.000	0.894	11.975	17.177	-27.544	-2.425	2.481	-5.370	6.397	3.103
2	8.000	-2.846	11.925	230.875	-189.029	-25.374	9.796	27.972	13.474	10.026
3	5.000	0.000	12.596	-2.080	-70.913	0.416	5.630	8.277	-7.623	25.952
4	8.000	2.121	10.770	-87.194	-67.175	9.755	4.316	-12.353	6.599	1.901
5	5.000	-1.109	9.129	-29.120	-21.552	6.524	3.154	2.170	9.545	12.784
6	7.000	1.109	7.745	-17.012	-33.296	1.790	4.043	-9.517	8.241	3.688
7	5.000	0.000	8.775	8.284	31.100	-1.657	-3.544	4.555	8.482	4.295
8	6.000	0.000	7.745	-17.010	61.517	2.835	-7.943	1.495	16.168	6.332
9	8.000	1.414	7.374	-154.950	-53.916	18.710	3.724	-15.882	9.293	13.536
10	5.000	2.121	14.485	38.785	109.912	-4.838	-6.879	-2.090	12.157	-4.157
11	5.000	1.789	8.072	26.603	-14.712	-6.487	3.260	3.589	2.205	9.019
12	6.000	0.000	9.657	13.662	94.231	-2.277	-9.758	5.741	20.691	5.309
13	5.000	0.000	11.200	-105.879	161.026	21.176	-14.378	-24.711	-4.950	25.414
14	7.000	-1.109	12.596	32.885	35.628	-5.219	-3.288	8.683	10.485	5.515
15	5.000	-0.894	11.975	15.046	-34.848	-2.522	2.722	-4.239	19.179	3.009
16	6.000	0.000	7.745	85.824	56.131	-14.304	-7.248	6.510	16.314	-4.814
17	7.000	-2.828	14.747	-8.978	-38.381	2.530	3.088	2.299	5.482	15.812
18	5.000	0.000	12.596	44.743	-94.551	-8.949	7.507	6.827	0.000	15.879
19	7.000	-2.828	19.314	-10.025	-24.633	2.070	1.579	0.528	2.342	11.158
20	9.000	2.496	12.596	-120.866	-36.052	13.371	0.212	-10.773	9.845	9.655
21	7.000	0.000	16.144	14.544	-26.125	-2.078	1.618	-0.520	10.699	-0.199
22	6.000	2.496	11.009	21.408	-18.971	-4.731	2.796	11.095	5.743	18.621
23	5.000	2.496	11.009	21.864	30.378	-3.378	-1.994	-0.486	14.745	-3.781
24	5.000	2.846	11.925	117.698	109.774	-21.176	-4.152	27.239	-6.737	20.237
25	5.000	-1.109	12.596	-16.166	-5.351	3.394	0.724	2.668	32.350	-4.850
26	6.000	0.000	12.596	-3.511	63.338	0.585	-5.029	4.244	-1.415	14.709
27	6.000	0.000	8.072	1.227	108.299	-0.204	-13.416	6.000	5.485	20.068
28	5.000	1.109	9.129	8.485	-27.738	-2.437	3.335	-1.806	2.546	19.212
29	8.000	1.800	11.200	-190.456	75.169	26.267	-10.933	-31.924	13.828	2.515
30	5.000	-0.000	17.280	-14.061	-50.849	2.812	2.943	-0.691	-0.576	12.697

М24 файл о24т3В

В первой строке — усилия от действия основной нагрузки, во второй — от единичной горизонтальной силы в опоре В, в третьей — от единичных сил в дополнительном раскосе.

	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
1	0.000 -1.000 0.000	3.103 -1.000 -0.447	-7.794 -1.000 0.000	-3.103 0.000 -0.000	3.897 0.000 -0.894	0.189 0.000 -0.671	-6.397 0.000 0.000	-3.103 0.000 -0.000	-0.423 0.000 -0.500	-0.379 0.000 0.000	4.388 0.000 0.000	-4.911 0.000 0.806	13.621 0.000 -0.000
2	28.129 1.000 0.000	28.129 1.000 0.000	30.077 1.000 -0.949	-3.232 0.000 -0.000	11.000 0.000 0.000	10.026 0.000 -0.316	0.000 0.000 -0.316	3.122 0.000 0.000	-30.077 0.000 0.000	0.000 0.000 -0.949	-32.389 0.000 0.000	2.179 0.000 0.000	-31.704 0.000 1.000
3	0.000 0.000 -0.832	-12.000 -1.000 -0.000	8.693 -1.000 -0.000	8.000 0.000 -0.555	-17.952 0.000 -0.555	-3.165 0.000 -0.000	7.623 0.000 -0.000	12.000 0.000 -0.832	-4.209 0.000 0.000	6.871 0.000 0.000	-14.422 0.000 1.000	21.179 0.000 0.000	-6.871 0.000 0.000
4	15.398 -1.000 -0.707	15.398 -1.000 -0.000	-2.598 -1.000 0.000	3.232 0.000 -0.236	5.000 0.000 -0.707	7.333 0.000 -0.000	-6.599 0.000 0.000	-3.122 0.000 -0.850	-5.288 0.000 0.000	-6.222 0.000 0.000	-16.231 0.000 0.745	-14.332 0.000 0.000	4.919 0.000 -0.000
5	-5.824 1.000 -0.555	-5.824 1.000 -0.000	0.000 0.000 -0.000	-6.676 0.000 -0.555	10.000 0.000 -0.832	-2.222 0.000 -0.000	10.000 0.000 0.000	9.719 0.000 -0.620	7.027 0.000 0.000	6.667 0.000 0.000	-4.058 0.000 0.784	-1.013 0.000 0.000	-12.019 0.000 0.000
6	0.000 -1.000 0.000	7.377 -1.000 -0.000	-2.559 -1.000 -0.555	-3.688 0.000 0.000	3.312 0.000 0.000	10.312 0.000 -0.832	-5.657 0.000 -0.277	-7.377 0.000 0.000	2.559 0.000 0.000	10.928 0.000 -0.784	8.247 0.000 -0.000	-10.473 0.000 -0.000	-5.779 0.000 0.620
7	-1.657 -1.000 0.000	-1.657 -1.000 0.000	-12.000 0.000 -0.447	-5.123 0.000 -0.000	6.000 0.000 0.000	-6.000 -0.000 -0.894	-0.000 0.000 -0.224	5.224 -0.000 0.000	12.000 -0.000 -0.000	0.000 0.000 -0.806	1.852 0.000 0.000	-7.848 0.000 0.000	13.416 0.000 0.500
8	2.835 -1.000 -0.000	2.835 -1.000 -0.000	-20.000 0.000 -0.555	-5.387 0.000 0.000	10.000 0.000 0.000	-10.000 0.000 -0.832	-0.000 0.000 -0.277	5.204 0.000 0.000	20.000 0.000 0.000	-0.000 0.000 -0.784	-2.988 0.000 0.000	-19.506 0.000 -0.000	22.361 0.000 0.620
9	29.293 -1.000 0.000	29.293 -1.000 -0.707	2.828 -1.000 0.000	-3.771 0.000 0.000	10.000 0.000 -0.707	11.616 0.000 -0.354	-9.293 0.000 -0.000	2.981 0.000 0.000	-15.585 0.000 -0.791	-14.693 0.000 0.000	-30.877 0.000 0.000	-14.004 0.000 0.791	14.693 0.000 -0.000
10	0.000 -1.000 0.000	-12.928 -1.000 -0.707	-0.000 0.000 0.000	4.157 0.000 0.000	-2.771 0.000 -0.707	-10.157 0.000 -0.707	6.000 0.000 0.000	3.919 0.000 0.000	2.771 0.000 -0.707	7.211 0.000 0.000	-3.098 0.000 0.000	14.364 0.000 1.000	-6.325 0.000 0.000
11	-9.875 0.000 0.000	-9.875 -1.000 0.000	1.511 -1.000 -0.894	2.708 0.000 0.000	-9.019 0.000 0.000	2.205 0.000 -0.447	-0.000 0.000 -0.447	-3.483 0.000 0.000	-4.409 0.000 0.000	-0.000 0.000 -0.894	10.409 0.000 0.000	12.002 0.000 0.000	-4.930 0.000 1.000
12	3.982 -1.000 0.000	-8.536 -1.000 0.000	-12.000 0.000 -0.707	-0.000 0.000 0.000	3.655 0.000 0.000	-20.691 0.000 -0.707	-0.000 0.000 -0.707	0.000 0.000 0.000	-0.622 0.000 0.000	0.000 0.000 -0.707	-6.637 0.000 0.000	15.045 0.000 0.000	16.971 0.000 1.000
13	1.061 1.000 0.000	-36.000 1.000 0.000	-36.000 0.000 -0.600	0.000 0.000 -0.000	-0.354 0.000 0.000	-25.414 0.000 -0.800	0.000 0.000 -0.200	0.000 0.000 0.000	-1.500 0.000 -0.000	-0.000 0.000 -0.849	5.534 0.000 -0.000	39.065 0.000 -0.000	37.947 0.000 0.632
14	6.577 1.000 0.000	6.577 1.000 0.000	0.000 1.000 -0.555	-5.464 0.000 0.000	7.000 0.000 0.000	2.451 0.000 -0.832	-5.515 0.000 -0.832	4.899 0.000 0.000	-4.419 0.000 -0.555	-3.677 0.000 0.000	-11.226 0.000 0.000	-3.057 0.000 0.000	6.629 0.000 1.000
15	-9.000 0.000 0.000	3.009 1.000 -0.447	3.009 1.000 0.000	0.000 0.000 0.000	-11.308 0.000 -0.671	12.000 0.000 -0.894	0.000 0.000 0.000	0.000 0.000 0.000	2.503 0.000 -0.500	-0.000 0.000 0.000	15.000 0.000 0.000	-9.460 0.000 0.806	-4.256 0.000 -0.000
16	-4.814 -1.000 -0.000	-23.794 -1.000 -0.000	-16.000 0.000 -0.555	0.000 0.000 0.000	1.673 0.000 -0.000	-16.314 0.000 -0.832	0.000 0.000 -0.277	0.000 0.000 0.000	-3.582 0.000 0.000	0.000 0.000 -0.784	6.808 0.000 0.000	20.007 0.000 0.000	17.889 0.000 0.620
17	-1.283 1.000 -0.707	-1.283 1.000 -0.000	0.000 0.000 -0.000	-3.709 0.000 -0.354	10.000 0.000 -0.707	-8.333 0.000 -0.000	10.000 0.000 0.000	5.400 0.000 -0.791	6.009 0.000 0.000	7.071 0.000 0.000	-3.966 0.000 0.791	-4.468 0.000 0.000	-7.071 0.000 0.000
18	0.000 0.000 -0.832	-13.500 -1.000 0.000	-2.121 -1.000 0.000	9.000 0.000 -0.555	-6.879 0.000 -0.555	1.414 0.000 -0.000	-0.000 0.000 -0.000	13.500 0.000 -0.832	2.236 0.000 0.000	0.000 0.000 0.000	-16.225 0.000 1.000	13.675 0.000 -0.000	0.000 0.000 0.000
19	-0.256 1.000 -0.707	-3.000 1.000 0.000	0.000 0.000 0.000	0.000 0.000 -0.707	2.342 0.000 -0.707	-6.658 0.000 0.000	6.000 0.000 0.000	0.000 0.000 -0.707	-2.342 0.000 0.000	3.354 0.000 0.000	-3.312 0.000 1.000	4.573 0.000 0.000	-5.408 0.000 0.000
20	13.711 -1.000 0.000	13.711 -1.000 -0.832	12.443 -1.000 0.000	-2.799 0.000 0.000	9.000 0.000 -0.555	9.845 0.000 -0.555	0.000 0.000 0.000	2.905 0.000 0.000	-9.845 0.000 -0.832	0.000 0.000 0.000	-15.330 0.000 0.000	-1.524 0.000 1.000	-13.923 0.000 0.000
21	0.000 -1.000 0.000	-4.848 -1.000 0.000	0.000 0.000 -0.447	0.199 0.000 0.000	-0.099 0.000 0.000	-6.199 0.000 -0.894	6.000 0.000 -0.894	0.222 0.000 0.000	0.199 0.000 0.000	4.848 0.000 -0.447	-0.222 0.000 0.000	7.749 0.000 0.000	-5.031 0.000 1.000
22	0.000 0.000 0.000	-18.000 -1.000 0.000	10.864 -1.000 -0.832	9.000 0.000 0.000	-9.621 0.000 -0.000	-0.621 0.000 -0.555	-4.243 0.000 -0.277	18.000 0.000 0.000	-10.864 0.000 -0.000	-6.708 0.000 -0.877	-20.125 0.000 0.000	30.425 0.000 0.000	-4.743 0.000 0.877
23	-4.373 -1.000 -0.832	-4.373 -1.000 0.000	-18.000 0.000 0.000	2.323 0.000 -0.277	6.000 0.000 -0.555	-6.000 0.000 -0.000	0.000 0.000 0.000	-4.073 0.000 -0.877	18.000 0.000 0.000	0.000 0.000 0.877	4.609 0.000 0.000	-19.555 0.000 -0.000	18.974 0.000 -0.000
24	-37.624 0.000 0.000	-37.624 -1.000 0.000	-14.150 -1.000 -0.949	-7.541 0.000 0.000	-20.237 0.000 -0.000	-6.737 0.000 -0.316	-0.000 0.000 -0.316	7.286 0.000 0.000	20.212 0.000 0.000	0.000 0.000 -0.949	39.660 0.000 0.000	26.245 0.000 0.000	21.305 0.000 1.000
25	0.000 0.000 0.000	-3.233 1.000 0.000	-3.233 1.000 -0.555	12.000 0.000 0.000	-11.521 0.000 0.000	12.000 0.000 -0.832	0.000 0.000 -0.832	9.487 0.000 0.000	15.877 0.000 0.000	0.000 0.000 -0.555	-12.728 0.000 0.000	-16.729 0.000 0.000	5.829 0.000 1.000
26	-4.000 0.000 -0.555	0.585 -1.000 0.000	0.585 -1.000 0.000	0.000 0.000 -0.832	-13.181 0.000 -0.832	6.000 0.000 0.000	0.000 0.000 0.000	0.000 0.000 -0.555	10.612 0.000 0.000	-0.000 0.000 0.000	7.211 0.000 1.000	-4.833 0.000 -0.000	4.474 0.000 -0.000
27	0.204 1.000 0.000	0.204 1.000 0.000	-24.000 0.000 -0.894	-3.485 0.000 -0.000	12.000 0.000 0.000	-12.000 0.000 -0.447	0.000 0.000 -0.447	6.109 0.000 0.000	24.000 0.000 -0.000	0.000 0.000 -0.894	-6.325 0.000 0.000	-25.514 0.000 0.000	26.833 0.000 1.000
28	-13.000 0.000 0.000	-1.697 -1.000 0.000	-1.697 -1.000 -0.555	0.000 0.000 0.000	-11.676 0.000 0.000	13.000 0.000 -0.832	0.000 0.000 -0.555	0.000 0.000 0.000	9.231 0.000 -0.000	-0.000 0.000 -0.620	18.385 0.000 -0.000	-13.584 0.000 -0.000	-3.600 0.000 0.784
29	41.485 -1.000 0.000	41.485 -1.000 0.000	-5.657 -1.000 -0.600	11.314 0.000 0.000	11.000 0.000 0.000	25.928 0.000 -0.200	-13.828 0.000 -0.800	-8.000 0.000 0.000	-18.697 0.000 0.000	-14.667 0.000 -0.849	-43.729 0.000 0.000	-41.111 0.000 0.000	10.932 0.000 0.632
30	-2.121 1.000 -0.000	-3.849 1.000 -0.000	0.000 0.000 -0.600	0.576 0.000 0.000	5.576 0.000 0.000	-4.830 0.000 -0.800	5.000 0.000 -0.800	1.727 0.000 0.000	5.804 0.000 0.000	3.220 0.000 -0.600	-1.821 0.000 0.000	-1.669 0.000 0.000	-8.902 0.000 1.000