

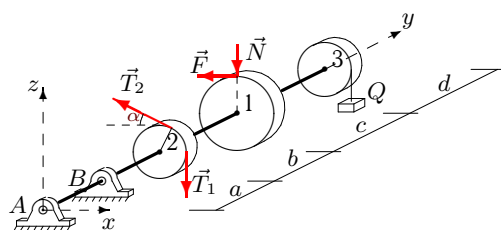
Равновесие вала

Горизонтальный вал весом G может вращаться в цилиндрических шарнирах A и B . К шкиву 1 приложено нормальное давление N и касательная сила сопротивления F , пропорциональная N . На шкив 2 действуют силы натяжения ремней T_1 и T_2 . Груз Q висит на нити, навитой на шкив 3. Определить силу давления N и реакции шарниров в условии равновесия вала (в Н). Учесть веса шкивов P_1, P_2, P_3 . Все нагрузки действуют в вертикальной плоскости. Силы даны в Н, размеры — в см.

Кирсанов М.Н. **Решебник. Теоретическая механика** с. 94.

Вариант 1

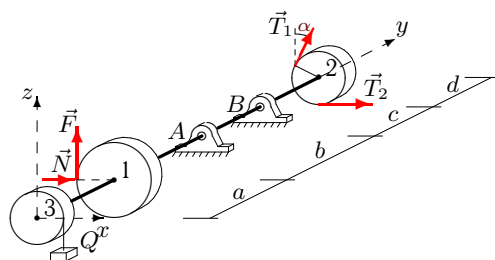
C19.



$$F = 0.2N, T_1 = 30, \\ T_2 = 17, P_1 = 38, \\ P_2 = 30, P_3 = 34, \\ Q = 10, G = 15, \\ \alpha = 60^\circ, R_1 = 22, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 23, \\ c = 26, d = 24.$$

Вариант 2

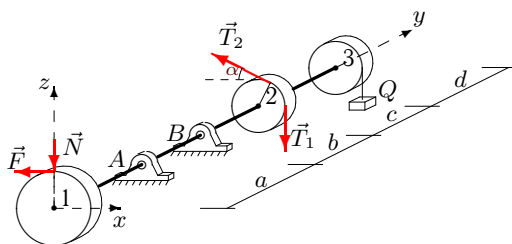
C19.



$$F = 0.2N, T_1 = 70, \\ T_2 = 137, P_1 = 22, \\ P_2 = 10, P_3 = 14, \\ Q = 18, G = 35, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 25, \\ c = 26, d = 26.$$

Вариант 3

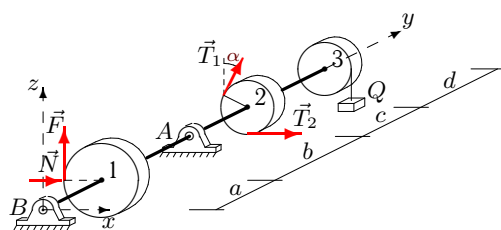
C19.



$$F = 0.2N, T_1 = 60, \\ T_2 = 32, P_1 = 16, \\ P_2 = 10, P_3 = 14, \\ Q = 26, G = 30, \\ \alpha = 30^\circ, R_1 = 14, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 27, \\ c = 28, d = 23.$$

Вариант 4

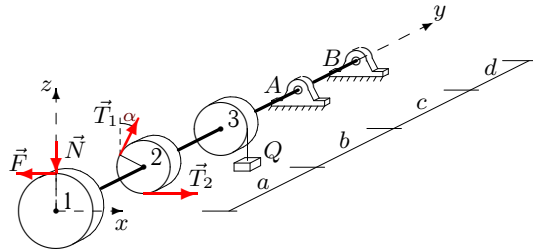
C19.



$$F = 0.3N, T_1 = 40, \\ T_2 = 78, P_1 = 26, \\ P_2 = 10, P_3 = 18, \\ Q = 14, G = 20, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 26, \\ c = 27, d = 28.$$

Вариант 5

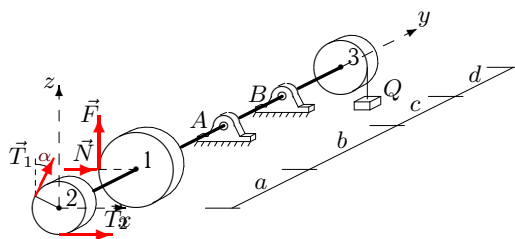
C19.



$$F = 0.1N, T_1 = 60, \\ T_2 = 31, P_1 = 40, \\ P_2 = 30, P_3 = 34, \\ Q = 26, G = 30, \\ \alpha = 60^\circ, R_1 = 26, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 27, \\ c = 30, d = 25.$$

Вариант 6

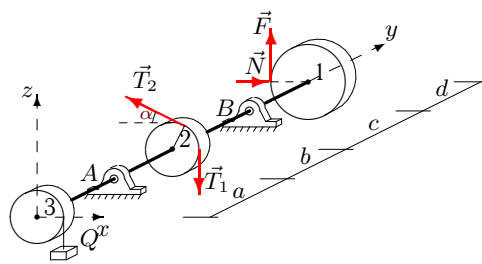
C19.



$$F = 0.2N, T_1 = 50, \\ T_2 = 98, P_1 = 22, \\ P_2 = 10, P_3 = 14, \\ Q = 14, G = 25, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 24, \\ c = 25, d = 26.$$

Вариант 7

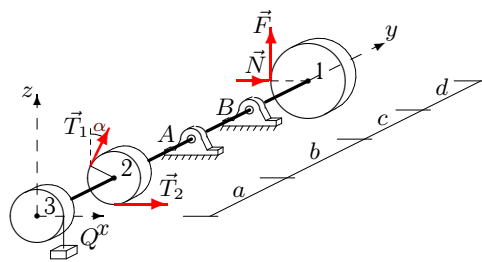
C19.



$$F = 0.3N, T_1 = 70, \\ T_2 = 136, P_1 = 40, \\ P_2 = 30, P_3 = 38, \\ Q = 22, G = 35, \\ \alpha = 60^\circ, R_1 = 18, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 28, \\ c = 31, d = 25.$$

Вариант 8

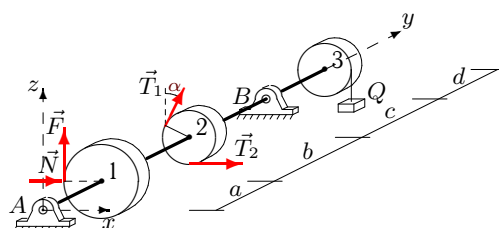
C19.



$$F = 0.1N, T_1 = 70, \\ T_2 = 138, P_1 = 20, \\ P_2 = 10, P_3 = 14, \\ Q = 14, G = 35, \\ \alpha = 30^\circ, R_1 = 22, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 24, \\ c = 25, d = 25.$$

Вариант 9

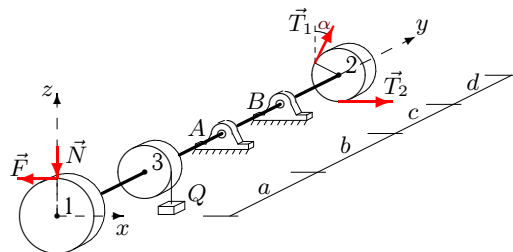
C19.



$$F = 0.4N, T_1 = 30, \\ T_2 = 58, P_1 = 46, \\ P_2 = 30, P_3 = 38, \\ Q = 14, G = 15, \\ \alpha = 60^\circ, R_1 = 30, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 26, \\ c = 29, d = 28.$$

Вариант 10

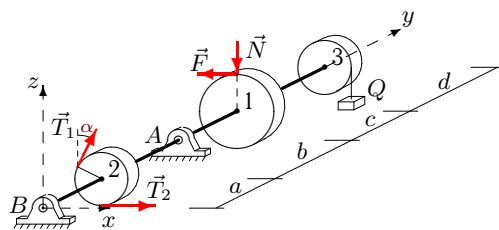
C19.



$F = 0.4N, T_1 = 60,$
 $T_2 = 34, P_1 = 26,$
 $P_2 = 10, P_3 = 18,$
 $Q = 26, G = 30,$
 $\alpha = 30^\circ, R_1 = 26,$
 $R_2 = 8, R_3 = 10,$
 $a = 24, b = 29,$
 $c = 30, d = 28.$

Вариант 11

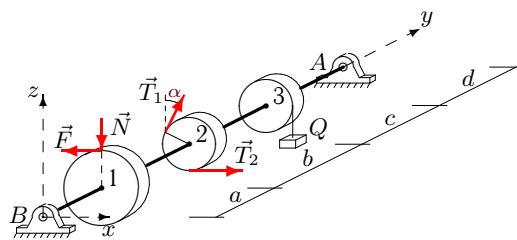
C19.



$F = 0.4N, T_1 = 40,$
 $T_2 = 24, P_1 = 24,$
 $P_2 = 10, P_3 = 18,$
 $Q = 10, G = 20,$
 $\alpha = 30^\circ, R_1 = 22,$
 $R_2 = 8, R_3 = 10,$
 $a = 24, b = 25,$
 $c = 26, d = 27.$

Вариант 12

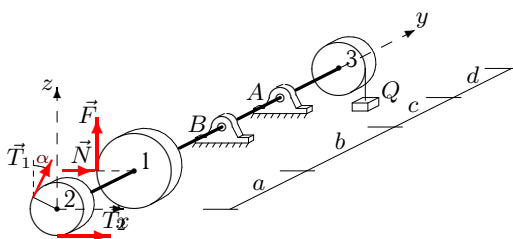
C19.



$F = 0.4N, T_1 = 40,$
 $T_2 = 24, P_1 = 46,$
 $P_2 = 30, P_3 = 38,$
 $Q = 26, G = 20,$
 $\alpha = 60^\circ, R_1 = 30,$
 $R_2 = 12, R_3 = 14,$
 $a = 24, b = 29,$
 $c = 32, d = 28.$

Вариант 13

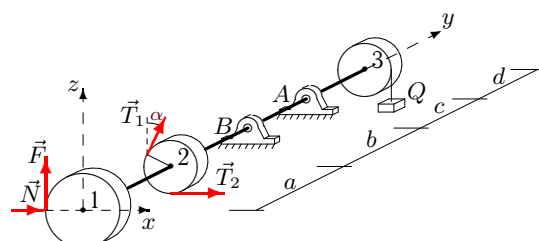
C19.



$F = 0.2N, T_1 = 50,$
 $T_2 = 98, P_1 = 30,$
 $P_2 = 20, P_3 = 24,$
 $Q = 14, G = 25,$
 $\alpha = 45^\circ, R_1 = 24,$
 $R_2 = 10, R_3 = 11,$
 $a = 22, b = 24,$
 $c = 26, d = 25.$

Вариант 14

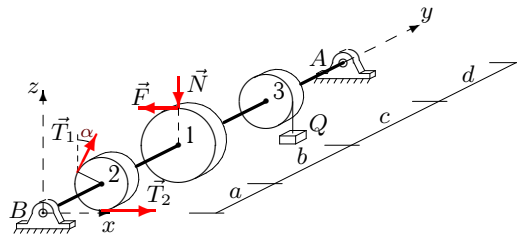
C19.



$F = 0.1N, T_1 = 60,$
 $T_2 = 116, P_1 = 30,$
 $P_2 = 20, P_3 = 24,$
 $Q = 22, G = 30,$
 $\alpha = 45^\circ, R_1 = 24,$
 $R_2 = 10, R_3 = 11,$
 $a = 22, b = 26,$
 $c = 28, d = 25.$

Вариант 15

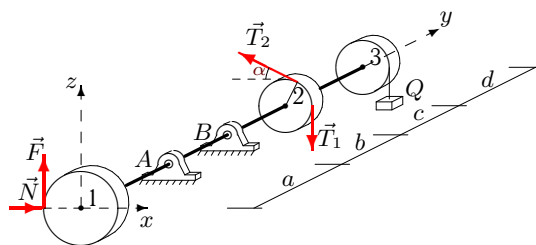
C19.



$F = 0.3N, T_1 = 40,$
 $T_2 = 23, P_1 = 34,$
 $P_2 = 20, P_3 = 28,$
 $Q = 26, G = 20,$
 $\alpha = 45^\circ, R_1 = 24,$
 $R_2 = 10, R_3 = 12,$
 $a = 24, b = 29,$
 $c = 31, d = 27.$

Вариант 16

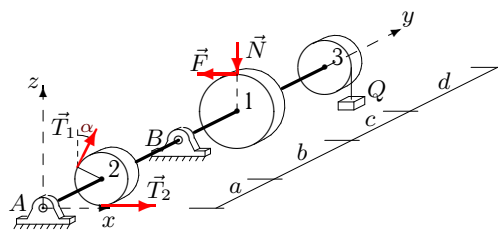
C19.



$F = 0.1N, T_1 = 60,$
 $T_2 = 116, P_1 = 26,$
 $P_2 = 20, P_3 = 24,$
 $Q = 22, G = 30,$
 $\alpha = 45^\circ, R_1 = 16,$
 $R_2 = 10, R_3 = 11,$
 $a = 22, b = 26,$
 $c = 28, d = 23.$

Вариант 17

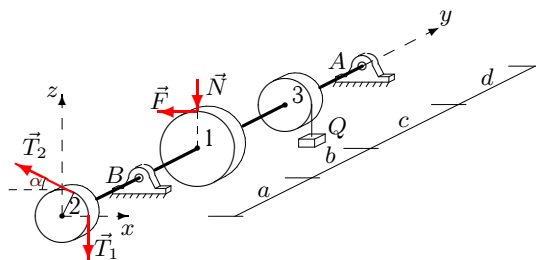
C19.



$F = 0.1N, T_1 = 30,$
 $T_2 = 16, P_1 = 20,$
 $P_2 = 10, P_3 = 14,$
 $Q = 26, G = 15,$
 $\alpha = 30^\circ, R_1 = 22,$
 $R_2 = 8, R_3 = 9,$
 $a = 22, b = 27,$
 $c = 28, d = 25.$

Вариант 18

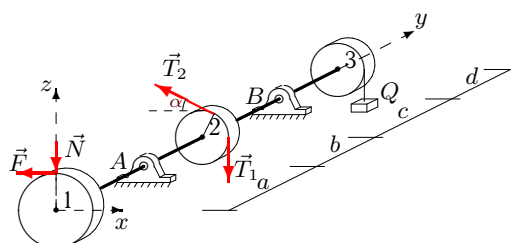
C19.



$F = 0.4N, T_1 = 50,$
 $T_2 = 29, P_1 = 42,$
 $P_2 = 30, P_3 = 38,$
 $Q = 26, G = 25,$
 $\alpha = 60^\circ, R_1 = 22,$
 $R_2 = 12, R_3 = 14,$
 $a = 24, b = 29,$
 $c = 32, d = 26.$

Вариант 19

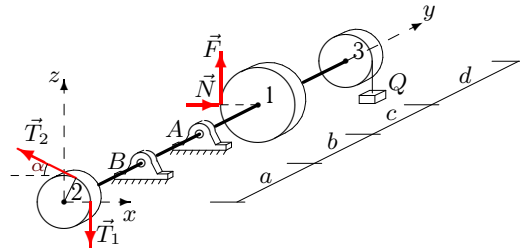
C19.



$F = 0.1N, T_1 = 60,$
 $T_2 = 31, P_1 = 36,$
 $P_2 = 30, P_3 = 34,$
 $Q = 26, G = 30,$
 $\alpha = 60^\circ, R_1 = 18,$
 $R_2 = 12, R_3 = 13,$
 $a = 22, b = 27,$
 $c = 30, d = 23.$

Вариант 20

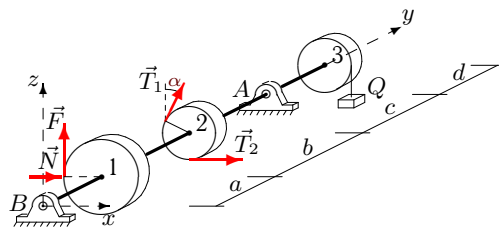
C19.



$F = 0.4N, T_1 = 50,$
 $T_2 = 98, P_1 = 22,$
 $P_2 = 10, P_3 = 18,$
 $Q = 14, G = 25,$
 $\alpha = 30^\circ, R_1 = 18,$
 $R_2 = 8, R_3 = 10,$
 $a = 24, b = 26,$
 $c = 27, d = 26.$

Вариант 21

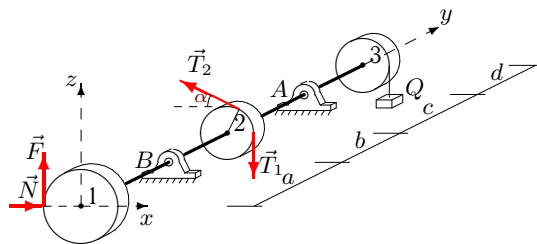
C19.



$F = 0.1N, T_1 = 40,$
 $T_2 = 76, P_1 = 32,$
 $P_2 = 20, P_3 = 24,$
 $Q = 22, G = 20,$
 $\alpha = 45^\circ, R_1 = 28,$
 $R_2 = 10, R_3 = 11,$
 $a = 22, b = 26,$
 $c = 28, d = 26.$

Вариант 22

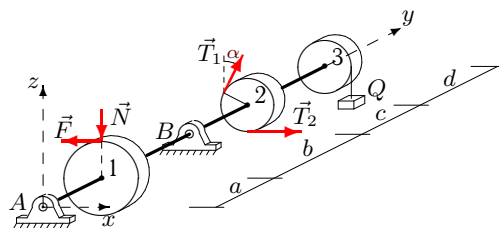
C19.



$F = 0.1N, T_1 = 60,$
 $T_2 = 118, P_1 = 38,$
 $P_2 = 30, P_3 = 34,$
 $Q = 14, G = 30,$
 $\alpha = 60^\circ, R_1 = 22,$
 $R_2 = 12, R_3 = 13,$
 $a = 22, b = 24,$
 $c = 27, d = 24.$

Вариант 23

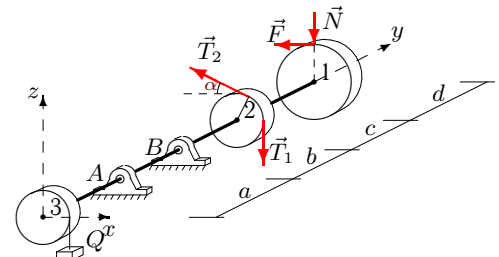
C19.



$F = 0.2N, T_1 = 30,$
 $T_2 = 17, P_1 = 32,$
 $P_2 = 20, P_3 = 24,$
 $Q = 26, G = 15,$
 $\alpha = 45^\circ, R_1 = 28,$
 $R_2 = 10, R_3 = 11,$
 $a = 22, b = 27,$
 $c = 29, d = 26.$

Вариант 24

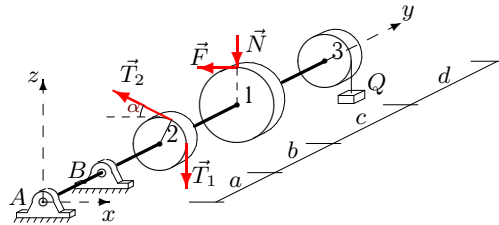
C19.



$F = 0.4N, T_1 = 70,$
 $T_2 = 39, P_1 = 30,$
 $P_2 = 20, P_3 = 28,$
 $Q = 26, G = 35,$
 $\alpha = 45^\circ, R_1 = 16,$
 $R_2 = 10, R_3 = 12,$
 $a = 24, b = 29,$
 $c = 31, d = 25.$

Вариант 25

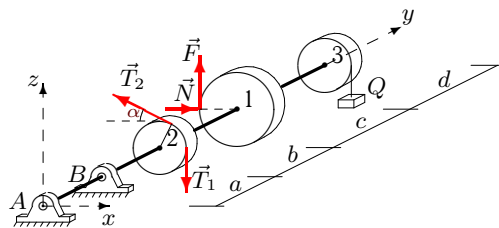
C19.



$$F = 0.2N, T_1 = 30, \\ T_2 = 17, P_1 = 16, \\ P_2 = 10, P_3 = 14, \\ Q = 10, G = 15, \\ \alpha = 30^\circ, R_1 = 14, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 23, \\ c = 24, d = 23.$$

Вариант 26

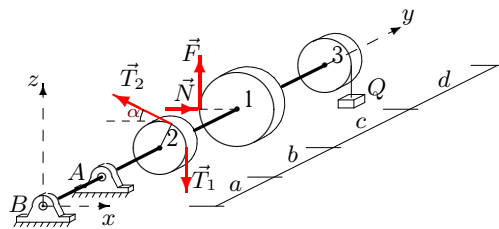
C19.



$$F = 0.1N, T_1 = 30, \\ T_2 = 56, P_1 = 36, \\ P_2 = 30, P_3 = 34, \\ Q = 22, G = 15, \\ \alpha = 60^\circ, R_1 = 18, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 26, \\ c = 29, d = 23.$$

Вариант 27

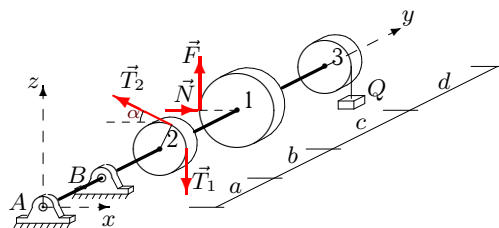
C19.



$$F = 0.3N, T_1 = 40, \\ T_2 = 78, P_1 = 30, \\ P_2 = 20, P_3 = 28, \\ Q = 14, G = 20, \\ \alpha = 45^\circ, R_1 = 16, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 26, \\ c = 28, d = 25.$$

Вариант 28

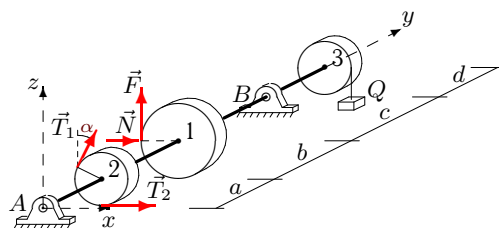
C19.



$$F = 0.2N, T_1 = 30, \\ T_2 = 56, P_1 = 26, \\ P_2 = 20, P_3 = 24, \\ Q = 22, G = 15, \\ \alpha = 45^\circ, R_1 = 16, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 26, \\ c = 28, d = 23.$$

Вариант 29

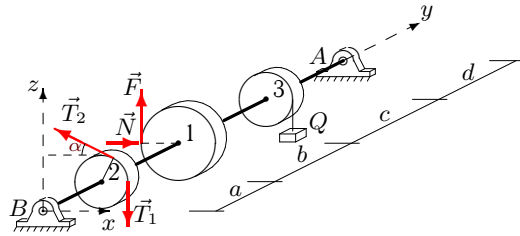
C19.



$$F = 0.4N, T_1 = 30, \\ T_2 = 58, P_1 = 44, \\ P_2 = 30, P_3 = 38, \\ Q = 14, G = 15, \\ \alpha = 60^\circ, R_1 = 26, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 26, \\ c = 29, d = 27.$$

Вариант 30

C19.



$F = 0.3N$, $T_1 = 40$,
 $T_2 = 76$, $P_1 = 42$,
 $P_2 = 30$, $P_3 = 38$,
 $Q = 22$, $G = 20$,
 $\alpha = 60^\circ$, $R_1 = 22$,
 $R_2 = 12$, $R_3 = 14$,
 $a = 24$, $b = 28$,
 $c = 31$, $d = 26$.

Отвeты

	N	X_A	Z_A	X_B	Z_B
1	65.000	-37.841	-440.131	59.341	647.409
2	71.923	30.920	187.040	-274.843	-163.047
3	163.571	30.631	193.222	29.796	110.349
4	21.026	-161.012	59.705	41.987	-12.654
5	263.846	-162.354	1458.400	105.777	-1064.554
6	49.615	-446.566	-77.525	273.951	109.300
7	89.630	73.707	86.713	-95.337	3.619
8	190.000	-149.080	11.501	-213.920	1.877
9	11.667	-38.951	20.694	-56.697	102.639
10	45.000	109.533	349.631	-155.533	-246.592
11	25.909	-5.688	143.424	-27.948	-70.156
12	46.333	-23.568	82.442	-16.540	103.891
13	67.917	298.629	88.956	-499.901	-24.894
14	132.500	374.253	81.860	-665.179	-11.537
15	66.944	-1.499	97.272	-29.702	69.388
16	198.750	-455.257	-78.474	338.531	158.574
17	157.273	-26.069	-153.982	10.796	370.274
18	70.000	5.333	76.118	37.167	179.767
19	381.111	60.979	601.866	-7.367	-31.602
20	33.889	-147.423	130.733	198.405	-54.288
21	42.143	-78.063	77.969	-68.364	7.532
22	233.636	128.549	74.126	-303.185	6.320
23	74.286	30.803	2.243	-54.159	167.830
24	97.188	-104.548	-215.452	171.000	494.062
25	69.286	-44.996	-307.860	73.575	463.646
26	14.444	3.020	-317.619	10.535	434.677
27	44.167	-28.637	287.699	39.624	-204.104
28	5.625	-32.991	-253.100	66.964	349.377
29	13.462	-63.409	11.783	-34.033	108.833
30	18.788	-0.596	73.957	19.808	46.589