

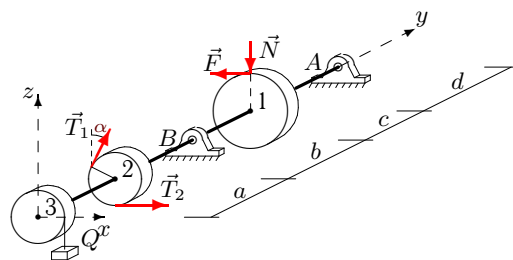
Равновесие вала

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.

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Вариант 1

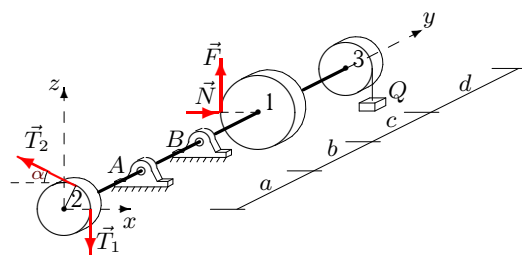
C19.



$$F = 0.3N, T_1 = 70, \\ T_2 = 38, P_1 = 34, \\ P_2 = 20, P_3 = 28, \\ Q = 10, G = 35, \\ \alpha = 45^\circ, R_1 = 24, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 25, \\ c = 27, d = 27.$$

Вариант 2

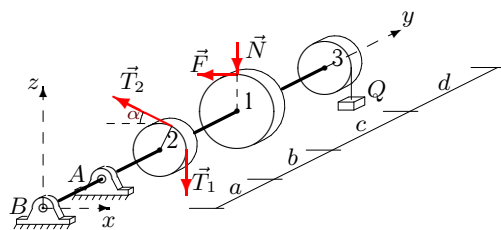
C19.



$$F = 0.3N, T_1 = 50, \\ T_2 = 96, P_1 = 20, \\ P_2 = 10, P_3 = 18, \\ Q = 22, G = 25, \\ \alpha = 30^\circ, R_1 = 14, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 28, \\ c = 29, d = 25.$$

Вариант 3

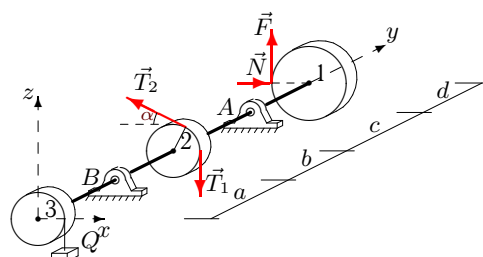
C19.



$$F = 0.3N, T_1 = 40, \\ T_2 = 23, P_1 = 20, \\ P_2 = 10, P_3 = 18, \\ Q = 10, G = 20, \\ \alpha = 30^\circ, R_1 = 14, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 25, \\ c = 26, d = 25.$$

Вариант 4

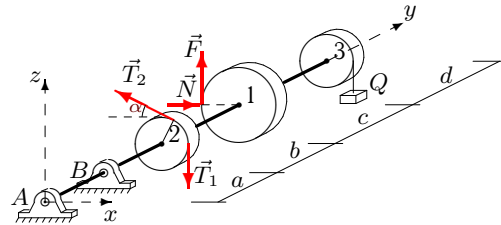
C19.



$$F = 0.2N, T_1 = 70, \\ T_2 = 136, P_1 = 38, \\ P_2 = 30, P_3 = 34, \\ Q = 22, G = 35, \\ \alpha = 60^\circ, R_1 = 22, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 26, \\ c = 29, d = 24.$$

Вариант 5

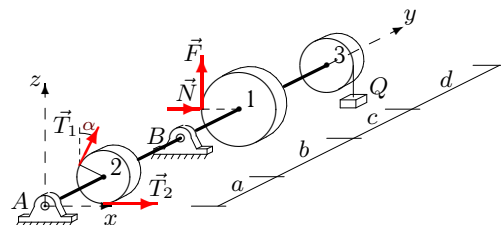
C19.



$$F = 0.3N, T_1 = 30, \\ T_2 = 57, P_1 = 32, \\ P_2 = 20, P_3 = 28, \\ Q = 22, G = 15, \\ \alpha = 45^\circ, R_1 = 20, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 28, \\ c = 30, d = 26.$$

Вариант 6

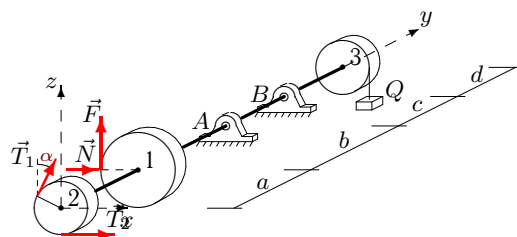
C19.



$$F = 0.4N, T_1 = 30, \\ T_2 = 57, P_1 = 34, \\ P_2 = 20, P_3 = 28, \\ Q = 22, G = 15, \\ \alpha = 45^\circ, R_1 = 24, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 28, \\ c = 30, d = 27.$$

Вариант 7

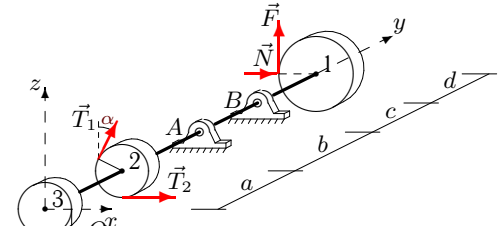
C19.



$$F = 0.4N, T_1 = 50, \\ T_2 = 96, P_1 = 26, \\ P_2 = 10, P_3 = 18, \\ Q = 22, G = 25, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 28, \\ c = 29, d = 28.$$

Вариант 8

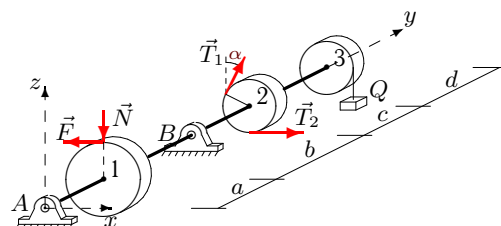
C19.



$$F = 0.4N, T_1 = 70, \\ T_2 = 137, P_1 = 24, \\ P_2 = 10, P_3 = 18, \\ Q = 18, G = 35, \\ \alpha = 30^\circ, R_1 = 22, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 27, \\ c = 28, d = 27.$$

Вариант 9

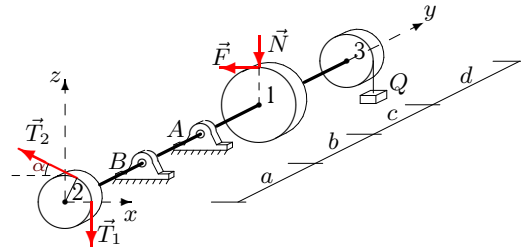
C19.



$$F = 0.4N, T_1 = 30, \\ T_2 = 19, P_1 = 36, \\ P_2 = 20, P_3 = 28, \\ Q = 26, G = 15, \\ \alpha = 45^\circ, R_1 = 28, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 29, \\ c = 31, d = 28.$$

Вариант 10

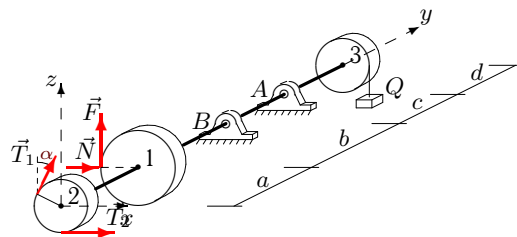
C19.



$$F = 0.3N, T_1 = 50, \\ T_2 = 28, P_1 = 22, \\ P_2 = 10, P_3 = 18, \\ Q = 26, G = 25, \\ \alpha = 30^\circ, R_1 = 18, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 29, \\ c = 30, d = 26.$$

Вариант 11

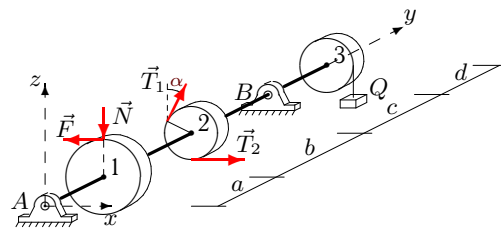
C19.



$$F = 0.1N, T_1 = 50, \\ T_2 = 98, P_1 = 30, \\ P_2 = 20, P_3 = 24, \\ Q = 14, G = 25, \\ \alpha = 45^\circ, R_1 = 24, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 24, \\ c = 26, d = 25.$$

Вариант 12

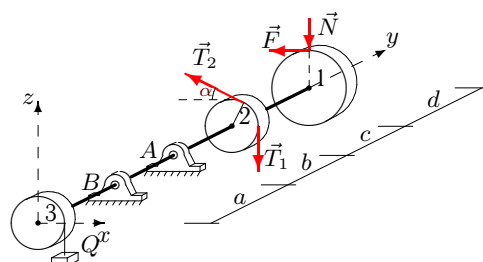
C19.



$$F = 0.2N, T_1 = 30, \\ T_2 = 17, P_1 = 42, \\ P_2 = 30, P_3 = 34, \\ Q = 26, G = 15, \\ \alpha = 60^\circ, R_1 = 30, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 27, \\ c = 30, d = 26.$$

Вариант 13

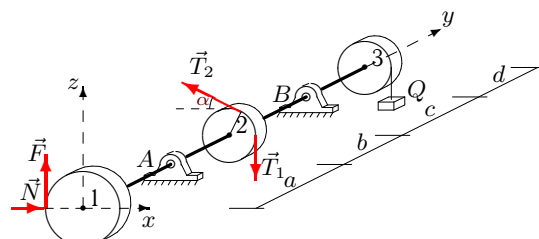
C19.



$$F = 0.3N, T_1 = 70, \\ T_2 = 38, P_1 = 22, \\ P_2 = 10, P_3 = 18, \\ Q = 26, G = 35, \\ \alpha = 30^\circ, R_1 = 18, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 29, \\ c = 30, d = 26.$$

Вариант 14

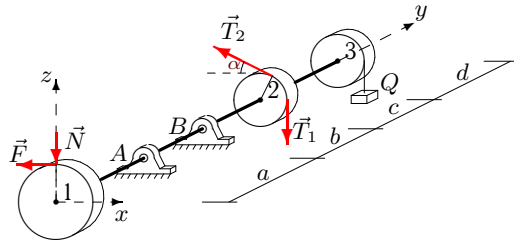
C19.



$$F = 0.1N, T_1 = 60, \\ T_2 = 117, P_1 = 36, \\ P_2 = 30, P_3 = 34, \\ Q = 18, G = 30, \\ \alpha = 60^\circ, R_1 = 18, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 25, \\ c = 28, d = 23.$$

Вариант 15

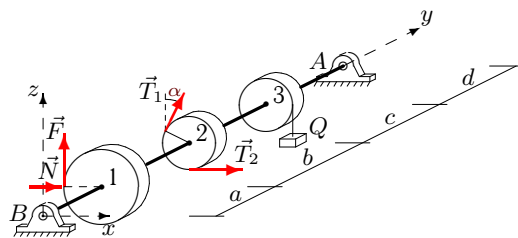
C19.



$$F = 0.3N, T_1 = 60, \\ T_2 = 33, P_1 = 30, \\ P_2 = 20, P_3 = 28, \\ Q = 10, G = 30, \\ \alpha = 45^\circ, R_1 = 16, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 25, \\ c = 27, d = 25.$$

Вариант 16

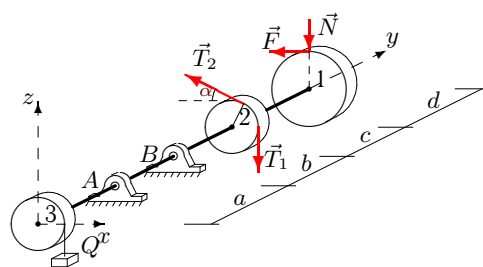
C19.



$$F = 0.3N, T_1 = 40, \\ T_2 = 77, P_1 = 36, \\ P_2 = 20, P_3 = 28, \\ Q = 18, G = 20, \\ \alpha = 45^\circ, R_1 = 28, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 27, \\ c = 29, d = 28.$$

Вариант 17

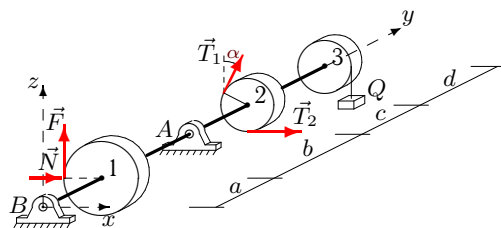
C19.



$$F = 0.4N, T_1 = 70, \\ T_2 = 39, P_1 = 30, \\ P_2 = 20, P_3 = 28, \\ Q = 10, G = 35, \\ \alpha = 45^\circ, R_1 = 16, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 25, \\ c = 27, d = 25.$$

Вариант 18

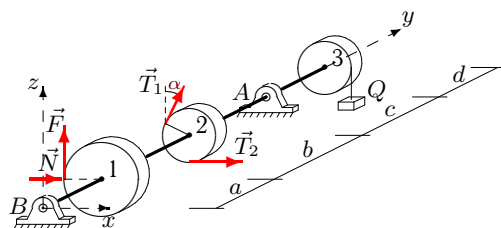
C19.



$$F = 0.2N, T_1 = 40, \\ T_2 = 77, P_1 = 22, \\ P_2 = 10, P_3 = 14, \\ Q = 18, G = 20, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 25, \\ c = 26, d = 26.$$

Вариант 19

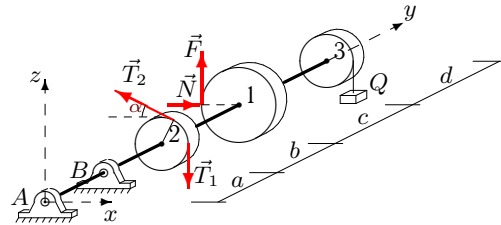
C19.



$$F = 0.1N, T_1 = 40, \\ T_2 = 76, P_1 = 42, \\ P_2 = 30, P_3 = 34, \\ Q = 22, G = 20, \\ \alpha = 60^\circ, R_1 = 30, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 26, \\ c = 29, d = 26.$$

Вариант 20

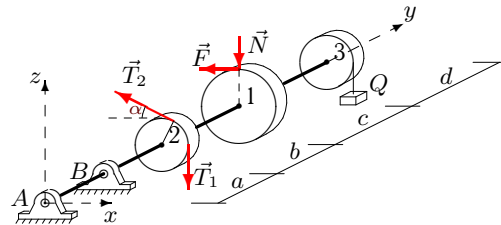
C19.



$$F = 0.3N, T_1 = 30, \\ T_2 = 58, P_1 = 22, \\ P_2 = 10, P_3 = 18, \\ Q = 22, G = 15, \\ \alpha = 30^\circ, R_1 = 18, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 28, \\ c = 29, d = 26.$$

Вариант 21

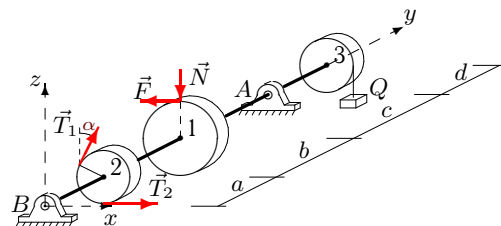
C19.



$$F = 0.3N, T_1 = 30, \\ T_2 = 18, P_1 = 40, \\ P_2 = 30, P_3 = 38, \\ Q = 10, G = 15, \\ \alpha = 60^\circ, R_1 = 18, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 25, \\ c = 28, d = 25.$$

Вариант 22

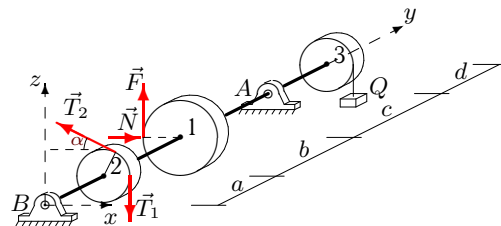
C19.



$$F = 0.2N, T_1 = 40, \\ T_2 = 22, P_1 = 40, \\ P_2 = 30, P_3 = 34, \\ Q = 10, G = 20, \\ \alpha = 60^\circ, R_1 = 26, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 23, \\ c = 26, d = 25.$$

Вариант 23

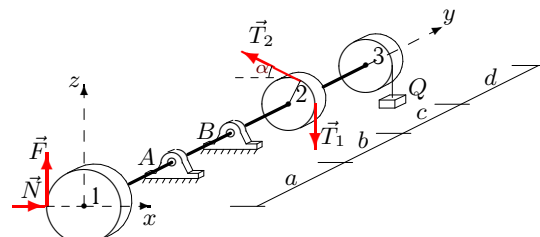
C19.



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

Вариант 24

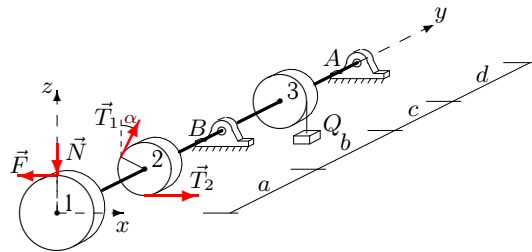
C19.



$$F = 0.4N, T_1 = 60, \\ T_2 = 118, P_1 = 20, \\ P_2 = 10, P_3 = 18, \\ Q = 14, G = 30, \\ \alpha = 30^\circ, R_1 = 14, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 26, \\ c = 27, d = 25.$$

Вариант 25

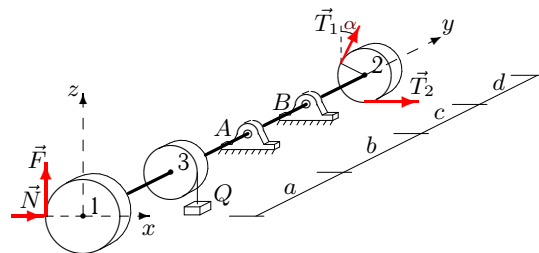
C19.



$$F = 0.3N, T_1 = 60, \\ T_2 = 33, P_1 = 34, \\ P_2 = 20, P_3 = 28, \\ Q = 26, G = 30, \\ \alpha = 45^\circ, R_1 = 24, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 29, \\ c = 31, d = 27.$$

Вариант 26

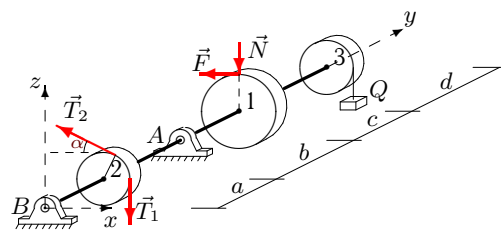
C19.



$$F = 0.4N, T_1 = 60, \\ T_2 = 117, P_1 = 26, \\ P_2 = 10, P_3 = 18, \\ Q = 18, G = 30, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 27, \\ c = 28, d = 28.$$

Вариант 27

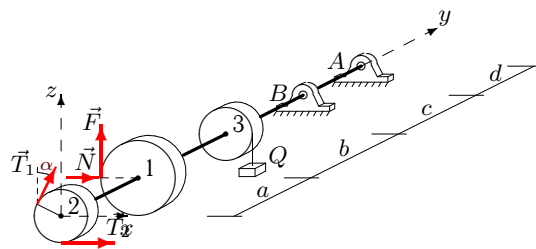
C19.



$$F = 0.3N, T_1 = 40, \\ T_2 = 23, P_1 = 22, \\ P_2 = 10, P_3 = 18, \\ Q = 26, G = 20, \\ \alpha = 30^\circ, R_1 = 18, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 29, \\ c = 30, d = 26.$$

Вариант 28

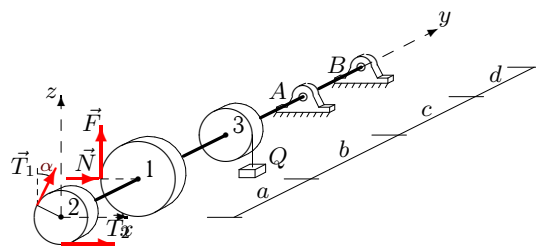
C19.



$$F = 0.3N, T_1 = 50, \\ T_2 = 97, P_1 = 46, \\ P_2 = 30, P_3 = 38, \\ Q = 18, G = 25, \\ \alpha = 60^\circ, R_1 = 30, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 27, \\ c = 30, d = 28.$$

Вариант 29

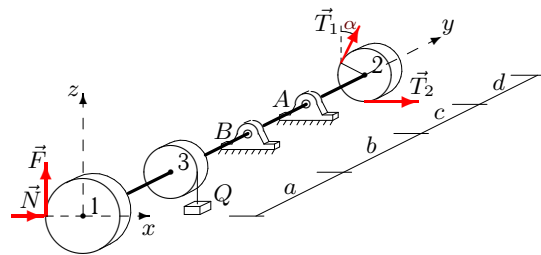
C19.



$$F = 0.2N, T_1 = 50, \\ T_2 = 96, P_1 = 40, \\ P_2 = 30, P_3 = 34, \\ Q = 22, G = 25, \\ \alpha = 60^\circ, R_1 = 26, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 26, \\ c = 29, d = 25.$$

Вариант 30

C19.



$F = 0.2N$, $T_1 = 60$,
 $T_2 = 116$, $P_1 = 32$,
 $P_2 = 20$, $P_3 = 24$,
 $Q = 22$, $G = 30$,
 $\alpha = 45^\circ$, $R_1 = 28$,
 $R_2 = 10$, $R_3 = 11$,
 $a = 22$, $b = 26$,
 $c = 28$, $d = 26$.

Ответы

	N	X_A	Z_A	X_B	Z_B
1	61.111	49.675	28.351	-118.839	110.263
2	35.238	190.897	-65.515	-142.996	151.944
3	56.190	93.346	475.033	-56.570	-312.342
4	115.000	-133.036	8.877	86.036	79.344
5	1.000	-43.781	-282.494	82.379	389.596
6	0.625	-41.216	-75.653	-36.622	173.190
7	14.231	-365.936	-68.875	230.706	120.881
8	40.455	-298.847	27.097	86.393	1.100
9	37.679	31.768	-19.938	-56.909	161.403
10	80.741	29.212	326.214	19.259	-108.473
11	135.833	361.321	88.956	-630.510	-24.894
12	82.333	-4.441	80.690	-22.073	133.643
13	95.556	150.976	469.059	-89.400	-211.504
14	250.000	-322.868	1.734	131.368	79.941
15	81.250	22.574	76.011	25.136	159.904
16	18.333	-53.792	46.940	-69.826	41.276
17	67.188	-85.683	-197.187	140.136	429.797
18	25.769	-162.722	58.081	39.953	-13.876
19	48.667	-82.876	105.129	-76.432	18.004
20	0.741	-54.821	-222.493	102.578	311.271
21	52.593	-44.218	-423.612	68.995	623.616
22	66.538	-9.116	143.637	-34.217	36.901
23	59.000	-21.707	89.454	16.447	4.906
24	57.857	-217.385	-82.621	261.719	152.478
25	80.833	15.554	-63.566	-66.730	239.972
26	26.538	72.124	183.404	-245.662	-143.981
27	73.333	43.473	277.786	-1.554	-79.953
28	34.667	476.443	-170.596	-651.411	292.196
29	51.154	-732.041	287.622	541.586	-171.852
30	56.786	-208.190	-118.139	-7.022	192.355