

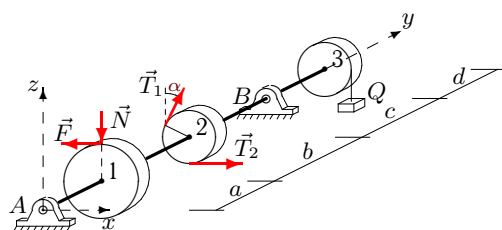
Равновесие вала

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

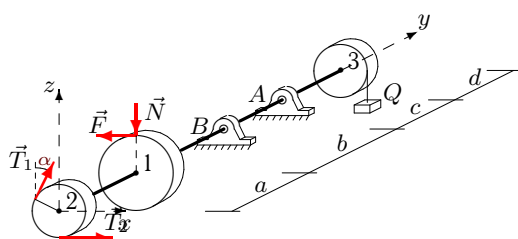
C19.



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

Вариант 2

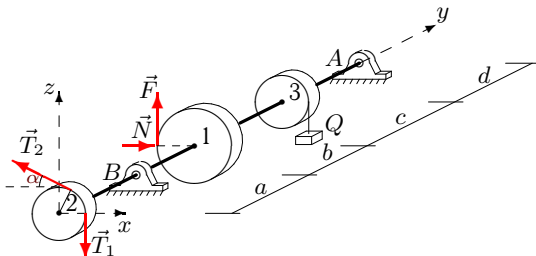
C19.



$$F = 0.2N, T_1 = 50, \\ T_2 = 27, P_1 = 30, \\ P_2 = 20, P_3 = 24, \\ Q = 10, G = 25, \\ \alpha = 45^\circ, R_1 = 24, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 23, \\ c = 25, d = 25.$$

Вариант 3

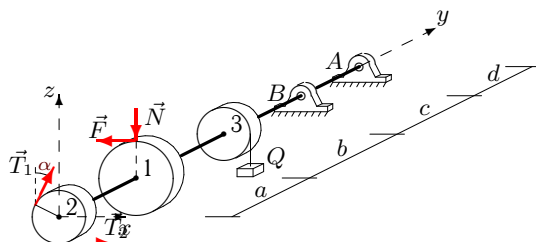
C19.



$$F = 0.3N, T_1 = 50, \\ T_2 = 98, P_1 = 32, \\ P_2 = 20, P_3 = 28, \\ Q = 14, G = 25, \\ \alpha = 45^\circ, R_1 = 20, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 26, \\ c = 28, d = 26.$$

Вариант 4

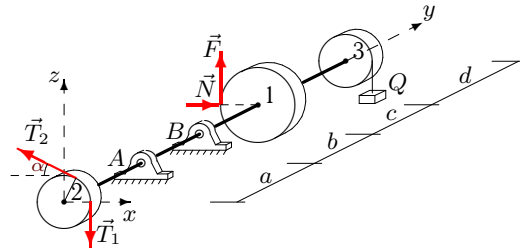
C19.



$$F = 0.3N, T_1 = 50, \\ T_2 = 28, P_1 = 44, \\ P_2 = 30, P_3 = 38, \\ Q = 26, G = 25, \\ \alpha = 60^\circ, R_1 = 26, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 29, \\ c = 32, d = 27.$$

Вариант 5

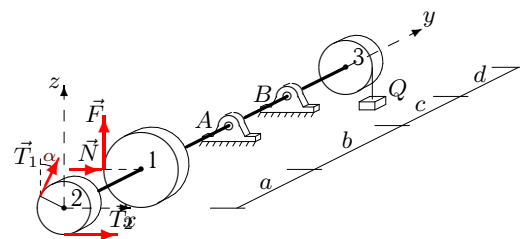
C19.



$$F = 0.3N, T_1 = 50, \\ T_2 = 97, P_1 = 20, \\ P_2 = 10, P_3 = 18, \\ Q = 18, G = 25, \\ \alpha = 30^\circ, R_1 = 14, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 27, \\ c = 28, d = 25.$$

Вариант 6

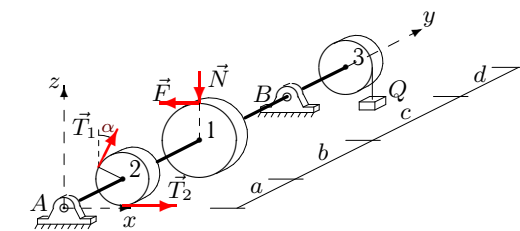
C19.



$$F = 0.4N, T_1 = 50, \\ T_2 = 98, P_1 = 26, \\ P_2 = 10, P_3 = 18, \\ Q = 14, G = 25, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 26, \\ c = 27, d = 28.$$

Вариант 7

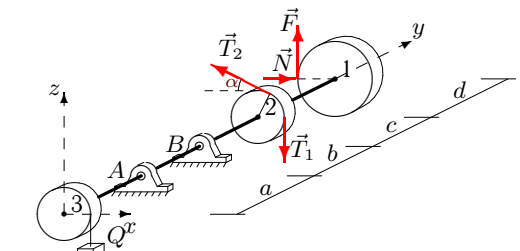
C19.



$$F = 0.4N, T_1 = 30, \\ T_2 = 19, P_1 = 44, \\ P_2 = 30, P_3 = 38, \\ Q = 10, G = 15, \\ \alpha = 60^\circ, R_1 = 26, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 25, \\ c = 28, d = 27.$$

Вариант 8

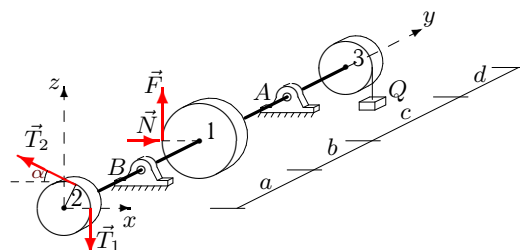
C19.



$$F = 0.1N, T_1 = 70, \\ T_2 = 136, P_1 = 26, \\ P_2 = 20, P_3 = 24, \\ Q = 22, G = 35, \\ \alpha = 45^\circ, R_1 = 16, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 26, \\ c = 28, d = 23.$$

Вариант 9

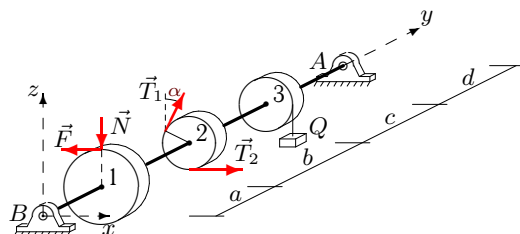
C19.



$$F = 0.2N, T_1 = 50, \\ T_2 = 96, P_1 = 38, \\ P_2 = 30, P_3 = 34, \\ Q = 22, G = 25, \\ \alpha = 60^\circ, R_1 = 22, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 26, \\ c = 29, d = 24.$$

Вариант 10

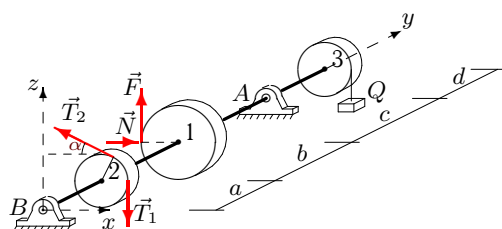
C19.



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

Вариант 11

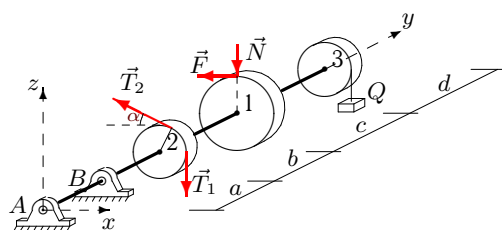
C19.



$$F = 0.2N, T_1 = 40, \\ T_2 = 78, P_1 = 38, \\ P_2 = 30, P_3 = 34, \\ Q = 14, G = 20, \\ \alpha = 60^\circ, R_1 = 22, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 24, \\ c = 27, d = 24.$$

Вариант 12

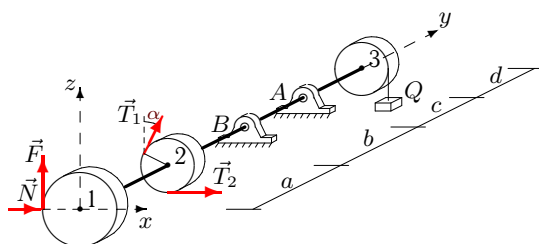
C19.



$$F = 0.4N, T_1 = 30, \\ T_2 = 19, P_1 = 22, \\ P_2 = 10, P_3 = 18, \\ Q = 26, G = 15, \\ \alpha = 30^\circ, R_1 = 18, \\ R_2 = 8, R_3 = 10, \\ a = 24, b = 29, \\ c = 30, d = 26.$$

Вариант 13

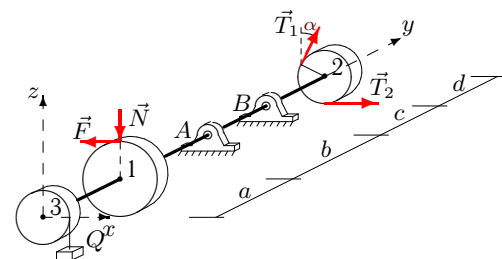
C19.



$$F = 0.2N, T_1 = 60, \\ T_2 = 117, P_1 = 30, \\ P_2 = 20, P_3 = 24, \\ Q = 18, G = 30, \\ \alpha = 45^\circ, R_1 = 24, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 25, \\ c = 27, d = 25.$$

Вариант 14

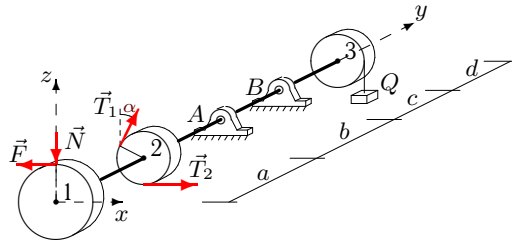
C19.



$$F = 0.1N, T_1 = 70, \\ T_2 = 36, P_1 = 22, \\ P_2 = 10, P_3 = 14, \\ Q = 26, G = 35, \\ \alpha = 30^\circ, R_1 = 26, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 27, \\ c = 28, d = 26.$$

Вариант 15

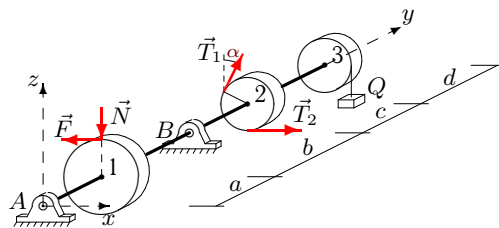
C19.



$F = 0.4N$, $T_1 = 60$,
 $T_2 = 34$, $P_1 = 24$,
 $P_2 = 10$, $P_3 = 18$,
 $Q = 10$, $G = 30$,
 $\alpha = 30^\circ$, $R_1 = 22$,
 $R_2 = 8$, $R_3 = 10$,
 $a = 24$, $b = 25$,
 $c = 26$, $d = 27$.

Вариант 16

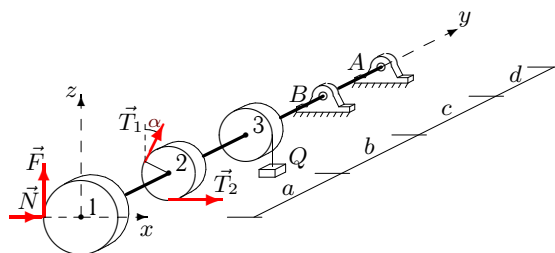
C19.



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

Вариант 17

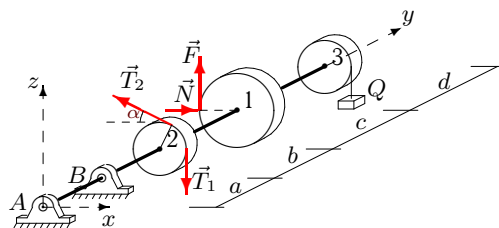
C19.



$F = 0.3N$, $T_1 = 60$,
 $T_2 = 117$, $P_1 = 44$,
 $P_2 = 30$, $P_3 = 38$,
 $Q = 18$, $G = 30$,
 $\alpha = 60^\circ$, $R_1 = 26$,
 $R_2 = 12$, $R_3 = 14$,
 $a = 24$, $b = 27$,
 $c = 30$, $d = 27$.

Вариант 18

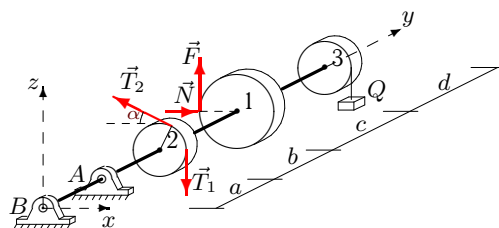
C19.



$F = 0.2N$, $T_1 = 30$,
 $T_2 = 57$, $P_1 = 16$,
 $P_2 = 10$, $P_3 = 14$,
 $Q = 18$, $G = 15$,
 $\alpha = 30^\circ$, $R_1 = 14$,
 $R_2 = 8$, $R_3 = 9$,
 $a = 22$, $b = 25$,
 $c = 26$, $d = 23$.

Вариант 19

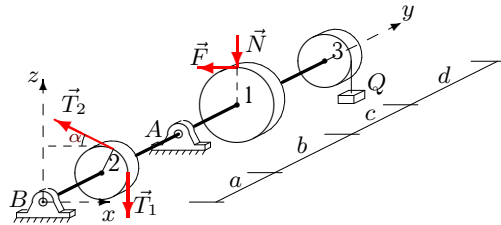
C19.



$F = 0.4N$, $T_1 = 40$,
 $T_2 = 78$, $P_1 = 20$,
 $P_2 = 10$, $P_3 = 18$,
 $Q = 14$, $G = 20$,
 $\alpha = 30^\circ$, $R_1 = 14$,
 $R_2 = 8$, $R_3 = 10$,
 $a = 24$, $b = 26$,
 $c = 27$, $d = 25$.

Вариант 20

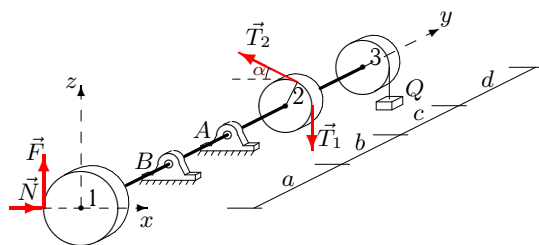
C19.



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

Вариант 21

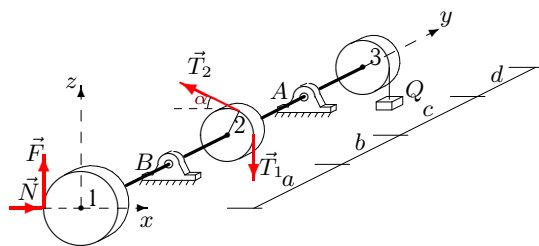
C19.



$F = 0.4N, T_1 = 60,$
 $T_2 = 117, P_1 = 22,$
 $P_2 = 10, P_3 = 18,$
 $Q = 18, G = 30,$
 $\alpha = 30^\circ, R_1 = 18,$
 $R_2 = 8, R_3 = 10,$
 $a = 24, b = 27,$
 $c = 28, d = 26.$

Вариант 22

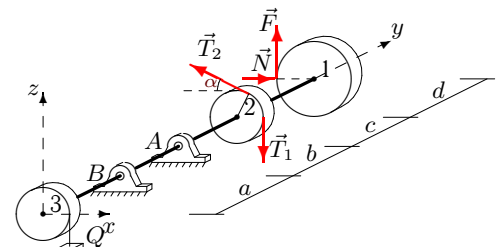
C19.



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

Вариант 23

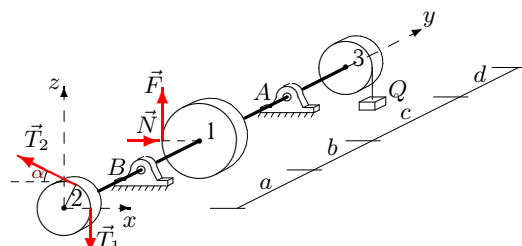
C19.



$F = 0.2N, T_1 = 70,$
 $T_2 = 138, P_1 = 18,$
 $P_2 = 10, P_3 = 14,$
 $Q = 14, G = 35,$
 $\alpha = 30^\circ, R_1 = 18,$
 $R_2 = 8, R_3 = 9,$
 $a = 22, b = 24,$
 $c = 25, d = 24.$

Вариант 24

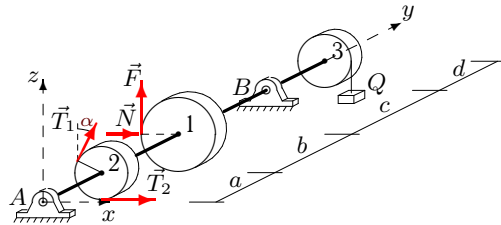
C19.



$F = 0.1N, T_1 = 50,$
 $T_2 = 97, P_1 = 38,$
 $P_2 = 30, P_3 = 34,$
 $Q = 18, G = 25,$
 $\alpha = 60^\circ, R_1 = 22,$
 $R_2 = 12, R_3 = 13,$
 $a = 22, b = 25,$
 $c = 28, d = 24.$

Вариант 25

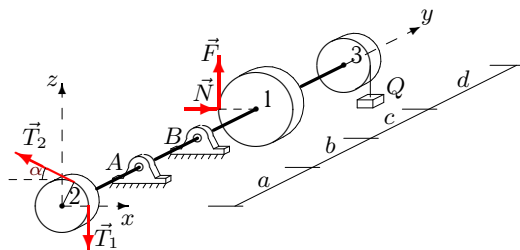
C19.



$F = 0.4N, T_1 = 30,$
 $T_2 = 56, P_1 = 44,$
 $P_2 = 30, P_3 = 38,$
 $Q = 22, G = 15,$
 $\alpha = 60^\circ, R_1 = 26,$
 $R_2 = 12, R_3 = 14,$
 $a = 24, b = 28,$
 $c = 31, d = 27.$

Вариант 26

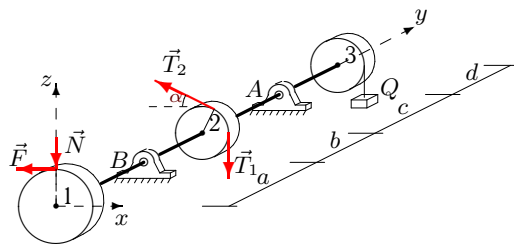
C19.



$F = 0.4N, T_1 = 50,$
 $T_2 = 96, P_1 = 20,$
 $P_2 = 10, P_3 = 18,$
 $Q = 22, G = 25,$
 $\alpha = 30^\circ, R_1 = 14,$
 $R_2 = 8, R_3 = 10,$
 $a = 24, b = 28,$
 $c = 29, d = 25.$

Вариант 27

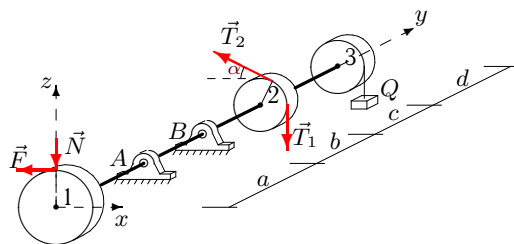
C19.



$F = 0.2N, T_1 = 60,$
 $T_2 = 32, P_1 = 38,$
 $P_2 = 30, P_3 = 34,$
 $Q = 10, G = 30,$
 $\alpha = 60^\circ, R_1 = 22,$
 $R_2 = 12, R_3 = 13,$
 $a = 22, b = 23,$
 $c = 26, d = 24.$

Вариант 28

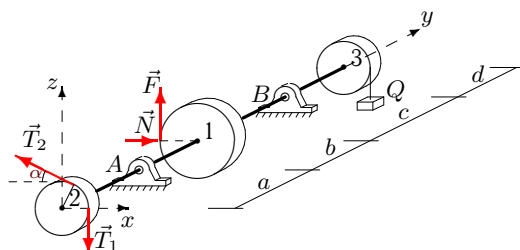
C19.



$F = 0.2N, T_1 = 60,$
 $T_2 = 32, P_1 = 16,$
 $P_2 = 10, P_3 = 14,$
 $Q = 10, G = 30,$
 $\alpha = 30^\circ, R_1 = 14,$
 $R_2 = 8, R_3 = 9,$
 $a = 22, b = 23,$
 $c = 24, d = 23.$

Вариант 29

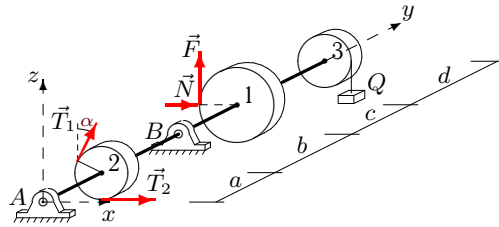
C19.



$F = 0.4N, T_1 = 50,$
 $T_2 = 98, P_1 = 40,$
 $P_2 = 30, P_3 = 38,$
 $Q = 14, G = 25,$
 $\alpha = 60^\circ, R_1 = 18,$
 $R_2 = 12, R_3 = 14,$
 $a = 24, b = 26,$
 $c = 29, d = 25.$

Вариант 30

C19.



$F = 0.3N, T_1 = 30,$
 $T_2 = 57, P_1 = 34,$
 $P_2 = 20, P_3 = 28,$
 $Q = 18, G = 15,$
 $\alpha = 45^\circ, R_1 = 24,$
 $R_2 = 10, R_3 = 12,$
 $a = 24, b = 27,$
 $c = 29, d = 27.$

Отвѣты

	N	X_A	Z_A	X_B	Z_B
1	82.333	-4.441	80.690	-22.073	133.643
2	70.833	99.206	5.373	-147.395	139.105
3	52.000	-37.689	42.219	54.985	41.885
4	80.513	169.897	-399.751	-217.045	618.264
5	46.667	207.070	-56.093	-169.732	134.593
6	23.462	-396.832	-72.855	250.370	113.169
7	26.154	-27.157	23.874	-7.363	124.280
8	261.250	408.888	89.790	-573.971	-15.081
9	60.455	-47.779	106.894	35.324	-3.124
10	46.333	-23.568	82.442	-16.540	103.891
11	62.273	-27.487	93.904	4.214	2.091
12	48.333	-67.410	-384.653	103.198	544.486
13	77.500	282.524	79.191	-519.451	-15.118
14	194.615	104.157	614.375	-155.695	-373.382
15	35.000	-85.154	86.499	35.154	-11.460
16	133.077	25.047	49.735	-42.739	144.361
17	55.385	522.850	-174.376	-747.197	287.761
18	19.286	-11.387	-166.581	41.465	237.224
19	29.286	46.771	228.000	-8.507	-156.714
20	31.667	29.568	179.082	3.883	-39.415
21	38.333	240.477	157.167	-177.485	-73.000
22	79.500	71.882	76.096	-69.358	9.980
23	116.111	-109.169	18.095	112.569	50.683
24	150.000	-90.887	101.030	-10.613	-5.035
25	0.385	-58.419	12.581	-23.946	121.265
26	26.429	181.772	-65.515	-125.063	151.944
27	105.909	-2.000	45.788	39.182	234.408
28	112.143	14.964	144.019	35.177	92.124
29	52.778	42.554	-8.400	-46.331	99.418
30	7.500	-37.142	-69.941	-48.571	161.478