

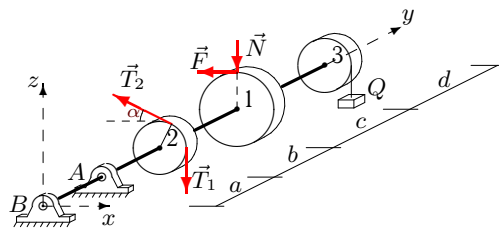
Равновесие вала

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

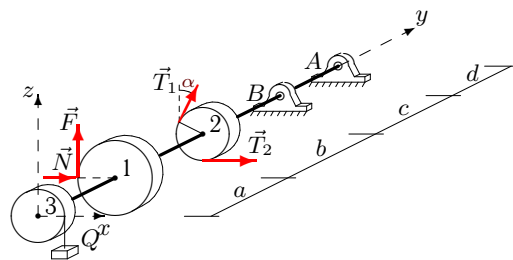
C19.



$$F = 0.1N, T_1 = 40, \\ T_2 = 21, P_1 = 36, \\ P_2 = 30, P_3 = 34, \\ Q = 10, G = 20, \\ \alpha = 60^\circ, R_1 = 18, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 23, \\ c = 26, d = 23.$$

Вариант 2

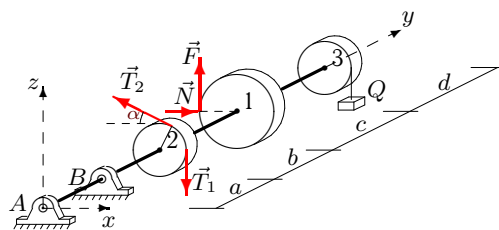
C19.



$$F = 0.3N, T_1 = 70, \\ T_2 = 136, P_1 = 46, \\ P_2 = 30, P_3 = 38, \\ Q = 22, G = 35, \\ \alpha = 60^\circ, R_1 = 30, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 28, \\ c = 31, d = 28.$$

Вариант 3

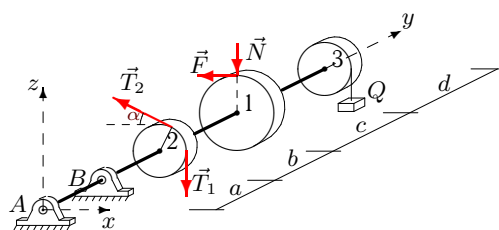
C19.



$$F = 0.1N, T_1 = 30, \\ T_2 = 57, P_1 = 26, \\ P_2 = 20, P_3 = 24, \\ Q = 18, G = 15, \\ \alpha = 45^\circ, R_1 = 16, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 25, \\ c = 27, d = 23.$$

Вариант 4

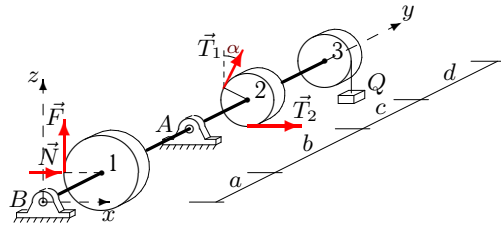
C19.



$$F = 0.1N, T_1 = 30, \\ T_2 = 16, P_1 = 36, \\ P_2 = 30, P_3 = 34, \\ Q = 10, G = 15, \\ \alpha = 60^\circ, R_1 = 18, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 23, \\ c = 26, d = 23.$$

Вариант 5

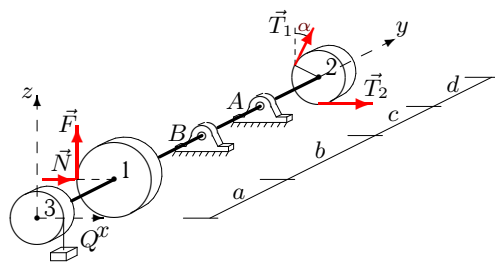
C19.



$F = 0.2N$, $T_1 = 40$,
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 $P_2 = 10$, $P_3 = 14$,
 $Q = 22$, $G = 20$,
 $\alpha = 30^\circ$, $R_1 = 26$,
 $R_2 = 8$, $R_3 = 9$,
 $a = 22$, $b = 26$,
 $c = 27$, $d = 26$.

Вариант 6

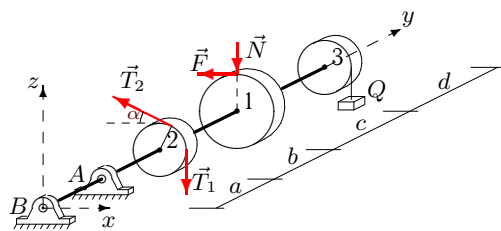
C19.



$F = 0.2N$, $T_1 = 70$,
 $T_2 = 137$, $P_1 = 32$,
 $P_2 = 20$, $P_3 = 24$,
 $Q = 18$, $G = 35$,
 $\alpha = 45^\circ$, $R_1 = 28$,
 $R_2 = 10$, $R_3 = 11$,
 $a = 22$, $b = 25$,
 $c = 27$, $d = 26$.

Вариант 7

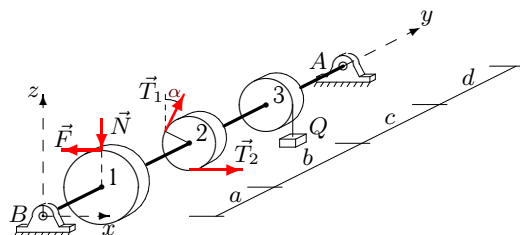
C19.



$F = 0.4N$, $T_1 = 40$,
 $T_2 = 24$, $P_1 = 40$,
 $P_2 = 30$, $P_3 = 38$,
 $Q = 26$, $G = 20$,
 $\alpha = 60^\circ$, $R_1 = 18$,
 $R_2 = 12$, $R_3 = 14$,
 $a = 24$, $b = 29$,
 $c = 32$, $d = 25$.

Вариант 8

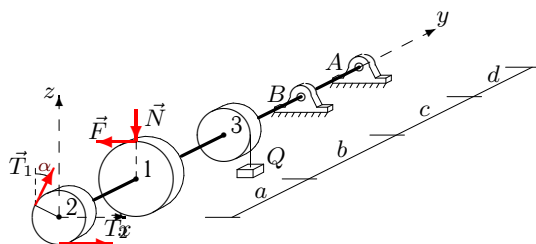
C19.



$F = 0.3N$, $T_1 = 40$,
 $T_2 = 23$, $P_1 = 36$,
 $P_2 = 20$, $P_3 = 28$,
 $Q = 26$, $G = 20$,
 $\alpha = 45^\circ$, $R_1 = 28$,
 $R_2 = 10$, $R_3 = 12$,
 $a = 24$, $b = 29$,
 $c = 31$, $d = 28$.

Вариант 9

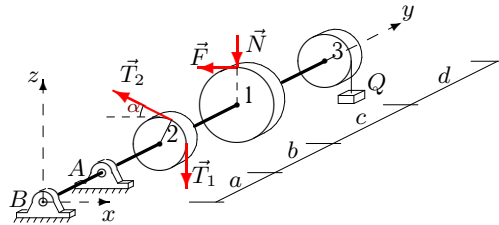
C19.



$F = 0.4N$, $T_1 = 50$,
 $T_2 = 29$, $P_1 = 46$,
 $P_2 = 30$, $P_3 = 38$,
 $Q = 26$, $G = 25$,
 $\alpha = 60^\circ$, $R_1 = 30$,
 $R_2 = 12$, $R_3 = 14$,
 $a = 24$, $b = 29$,
 $c = 32$, $d = 28$.

Вариант 10

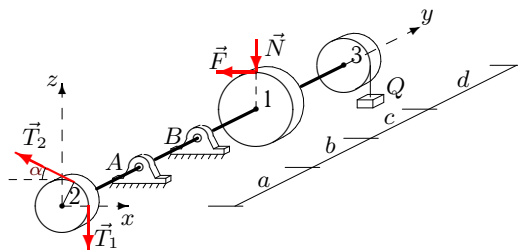
C19.



$F = 0.1N$, $T_1 = 40$,
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 $P_2 = 20$, $P_3 = 24$,
 $Q = 26$, $G = 20$,
 $\alpha = 45^\circ$, $R_1 = 16$,
 $R_2 = 10$, $R_3 = 11$,
 $a = 22$, $b = 27$,
 $c = 29$, $d = 23$.

Вариант 11

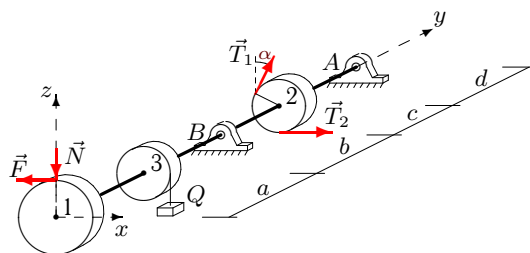
C19.



$F = 0.4N$, $T_1 = 50$,
 $T_2 = 29$, $P_1 = 20$,
 $P_2 = 10$, $P_3 = 18$,
 $Q = 26$, $G = 25$,
 $\alpha = 30^\circ$, $R_1 = 14$,
 $R_2 = 8$, $R_3 = 10$,
 $a = 24$, $b = 29$,
 $c = 30$, $d = 25$.

Вариант 12

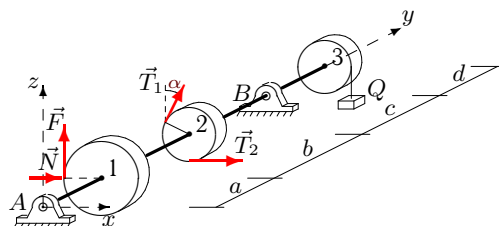
C19.



$F = 0.3N$, $T_1 = 60$,
 $T_2 = 33$, $P_1 = 36$,
 $P_2 = 20$, $P_3 = 28$,
 $Q = 26$, $G = 30$,
 $\alpha = 45^\circ$, $R_1 = 28$,
 $R_2 = 10$, $R_3 = 12$,
 $a = 24$, $b = 29$,
 $c = 31$, $d = 28$.

Вариант 13

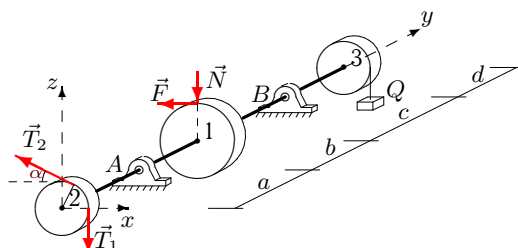
C19.



$F = 0.1N$, $T_1 = 30$,
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 $Q = 18$, $G = 15$,
 $\alpha = 60^\circ$, $R_1 = 30$,
 $R_2 = 12$, $R_3 = 13$,
 $a = 22$, $b = 25$,
 $c = 28$, $d = 26$.

Вариант 14

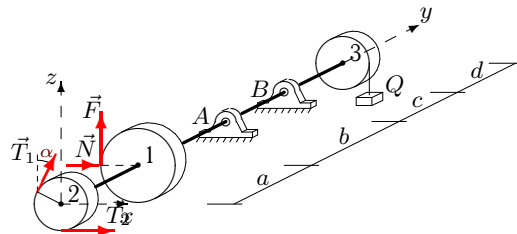
C19.



$F = 0.4N$, $T_1 = 50$,
 $T_2 = 29$, $P_1 = 40$,
 $P_2 = 30$, $P_3 = 38$,
 $Q = 10$, $G = 25$,
 $\alpha = 60^\circ$, $R_1 = 18$,
 $R_2 = 12$, $R_3 = 14$,
 $a = 24$, $b = 25$,
 $c = 28$, $d = 25$.

Вариант 15

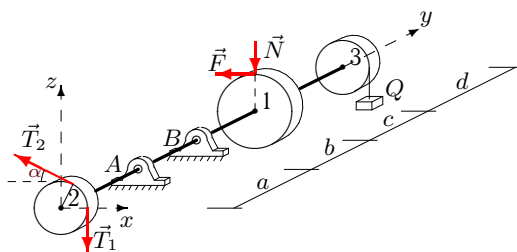
C19.



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

Вариант 16

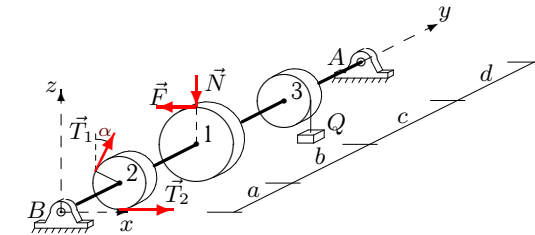
C19.



$F = 0.4N, T_1 = 50,$
 $T_2 = 29, P_1 = 30,$
 $P_2 = 20, P_3 = 28,$
 $Q = 10, G = 25,$
 $\alpha = 45^\circ, R_1 = 16,$
 $R_2 = 10, R_3 = 12,$
 $a = 24, b = 25,$
 $c = 27, d = 25.$

Вариант 17

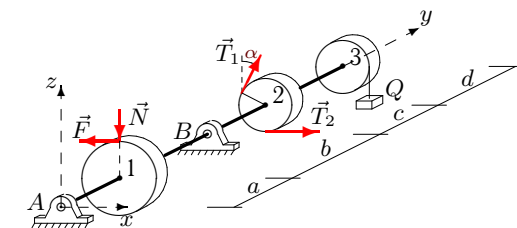
C19.



$F = 0.4N, T_1 = 40,$
 $T_2 = 24, P_1 = 44,$
 $P_2 = 30, P_3 = 38,$
 $Q = 10, G = 20,$
 $\alpha = 60^\circ, R_1 = 26,$
 $R_2 = 12, R_3 = 14,$
 $a = 24, b = 25,$
 $c = 28, d = 27.$

Вариант 18

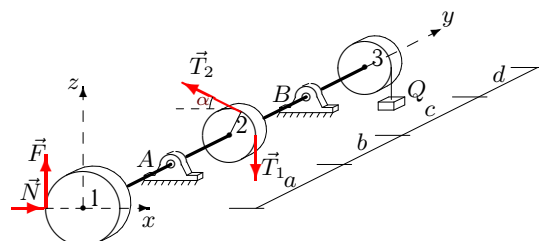
C19.



$F = 0.3N, T_1 = 30,$
 $T_2 = 18, P_1 = 26,$
 $P_2 = 10, P_3 = 18,$
 $Q = 10, G = 15,$
 $\alpha = 30^\circ, R_1 = 26,$
 $R_2 = 8, R_3 = 10,$
 $a = 24, b = 25,$
 $c = 26, d = 28.$

Вариант 19

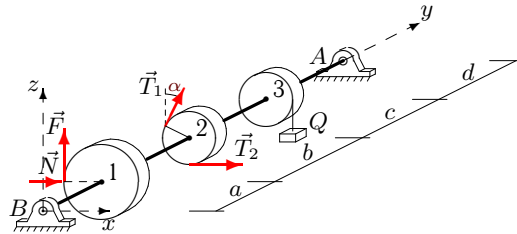
C19.



$F = 0.3N, T_1 = 60,$
 $T_2 = 117, P_1 = 40,$
 $P_2 = 30, P_3 = 38,$
 $Q = 18, G = 30,$
 $\alpha = 60^\circ, R_1 = 18,$
 $R_2 = 12, R_3 = 14,$
 $a = 24, b = 27,$
 $c = 30, d = 25.$

Вариант 20

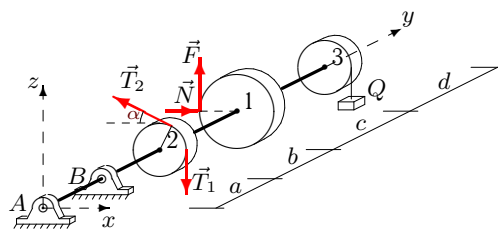
C19.



$$F = 0.4N, T_1 = 40, \\ T_2 = 77, P_1 = 46, \\ P_2 = 30, P_3 = 38, \\ Q = 18, G = 20, \\ \alpha = 60^\circ, R_1 = 30, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 27, \\ c = 30, d = 28.$$

Вариант 21

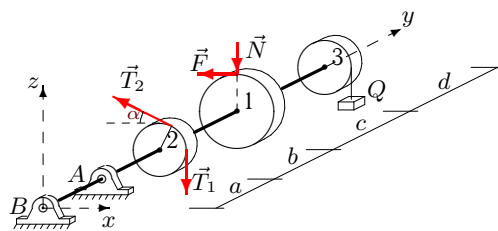
C19.



$$F = 0.4N, T_1 = 30, \\ T_2 = 57, P_1 = 40, \\ P_2 = 30, P_3 = 38, \\ Q = 18, G = 15, \\ \alpha = 60^\circ, R_1 = 18, \\ R_2 = 12, R_3 = 14, \\ a = 24, b = 27, \\ c = 30, d = 25.$$

Вариант 22

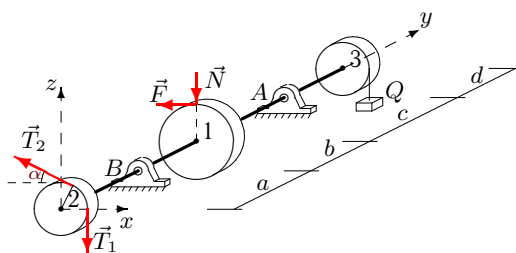
C19.



$$F = 0.2N, T_1 = 40, \\ T_2 = 22, P_1 = 16, \\ P_2 = 10, P_3 = 14, \\ Q = 26, G = 20, \\ \alpha = 30^\circ, R_1 = 14, \\ R_2 = 8, R_3 = 9, \\ a = 22, b = 27, \\ c = 28, d = 23.$$

Вариант 23

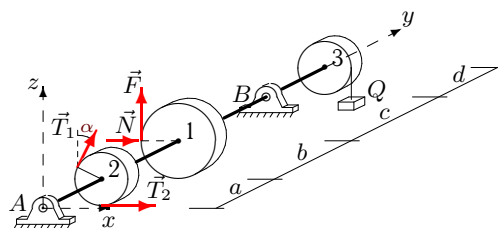
C19.



$$F = 0.1N, T_1 = 50, \\ T_2 = 26, P_1 = 28, \\ P_2 = 20, P_3 = 24, \\ Q = 26, G = 25, \\ \alpha = 45^\circ, R_1 = 20, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 27, \\ c = 29, d = 24.$$

Вариант 24

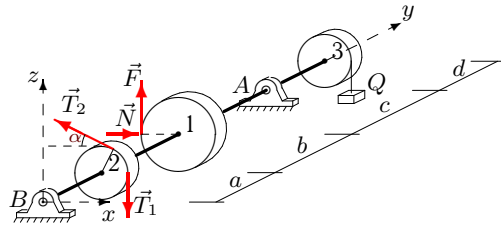
C19.



$$F = 0.1N, T_1 = 30, \\ T_2 = 58, P_1 = 40, \\ P_2 = 30, P_3 = 34, \\ Q = 14, G = 15, \\ \alpha = 60^\circ, R_1 = 26, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 24, \\ c = 27, d = 25.$$

Вариант 25

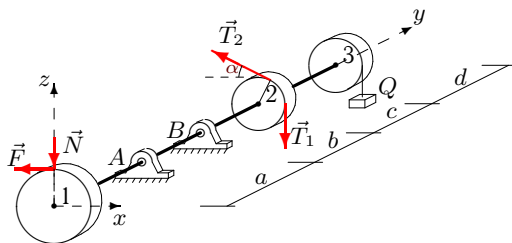
C19.



$$F = 0.2N, T_1 = 40, \\ T_2 = 76, P_1 = 38, \\ P_2 = 30, P_3 = 34, \\ Q = 22, G = 20, \\ \alpha = 60^\circ, R_1 = 22, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 26, \\ c = 29, d = 24.$$

Вариант 26

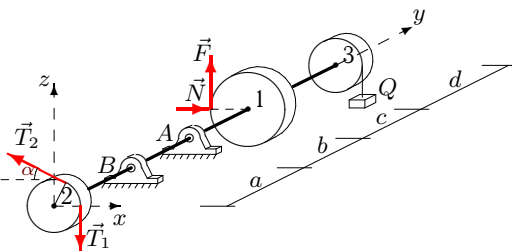
C19.



$$F = 0.3N, T_1 = 60, \\ T_2 = 33, P_1 = 30, \\ P_2 = 20, P_3 = 28, \\ Q = 26, G = 30, \\ \alpha = 45^\circ, R_1 = 16, \\ R_2 = 10, R_3 = 12, \\ a = 24, b = 29, \\ c = 31, d = 25.$$

Вариант 27

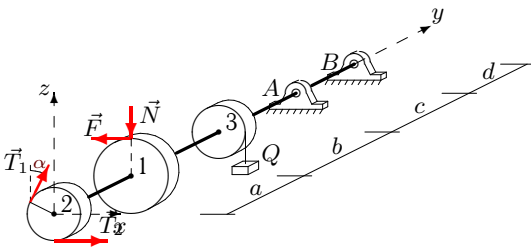
C19.



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

Вариант 28

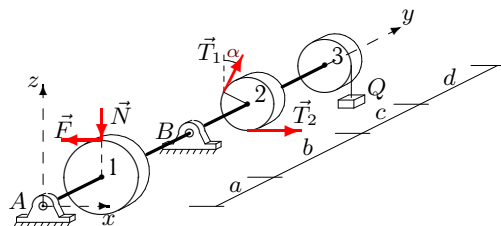
C19.



$$F = 0.2N, T_1 = 50, \\ T_2 = 27, P_1 = 42, \\ P_2 = 30, P_3 = 34, \\ Q = 10, G = 25, \\ \alpha = 60^\circ, R_1 = 30, \\ R_2 = 12, R_3 = 13, \\ a = 22, b = 23, \\ c = 26, d = 26.$$

Вариант 29

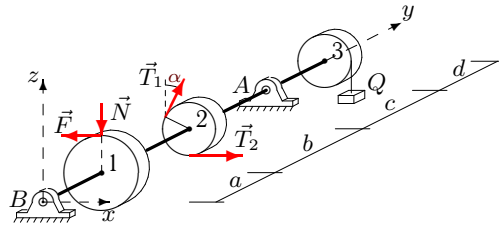
C19.



$$F = 0.1N, T_1 = 30, \\ T_2 = 16, P_1 = 32, \\ P_2 = 20, P_3 = 24, \\ Q = 26, G = 15, \\ \alpha = 45^\circ, R_1 = 28, \\ R_2 = 10, R_3 = 11, \\ a = 22, b = 27, \\ c = 29, d = 26.$$

Вариант 30

C19.



$F = 0.2N$, $T_1 = 40$,
 $T_2 = 22$, $P_1 = 32$,
 $P_2 = 20$, $P_3 = 24$,
 $Q = 26$, $G = 20$,
 $\alpha = 45^\circ$, $R_1 = 28$,
 $R_2 = 10$, $R_3 = 11$,
 $a = 22$, $b = 27$,
 $c = 29$, $d = 26$.

Отвѣты

	N	X_A	Z_A	X_B	Z_B
1	198.889	85.664	1094.760	-55.275	-744.058
2	53.778	331.006	-269.630	-581.405	389.496
3	45.000	60.562	-223.085	-65.257	311.280
4	165.556	-45.237	-658.206	69.793	964.905
5	17.308	-157.933	66.787	44.625	-16.889
6	84.286	-288.045	-141.146	17.262	203.791
7	77.222	135.898	863.013	-93.009	-612.575
8	57.381	-20.580	66.590	-13.490	92.507
9	51.333	174.753	-325.815	-226.521	517.149
10	297.500	138.551	1522.972	-93.951	-1084.321
11	76.429	14.274	-100.909	41.412	311.837
12	69.286	-58.303	-131.379	3.662	298.238
13	30.000	-52.179	20.033	-60.801	100.967
14	54.444	32.571	119.257	3.706	103.073
15	23.462	-396.832	-72.855	250.370	113.169
16	51.563	17.917	-71.619	23.214	265.676
17	31.923	-7.516	83.618	-38.356	70.305
18	25.128	21.356	2.943	-46.818	75.204
19	80.000	-82.895	6.952	61.395	83.723
20	16.000	-55.759	65.013	-71.882	60.587
21	10.000	-8.312	-306.924	26.812	424.561
22	135.000	136.935	842.636	-90.883	-592.636
23	263.000	5.458	204.401	39.227	213.214
24	59.231	-80.579	11.576	-62.633	100.501
25	33.182	-9.828	107.318	14.646	4.228
26	121.250	41.535	110.021	18.175	181.894
27	20.556	-113.107	162.673	175.690	-71.895
28	67.667	-223.239	469.635	166.471	-285.968
29	152.143	30.408	45.144	-52.406	202.786
30	83.214	-26.895	107.292	-6.747	69.638