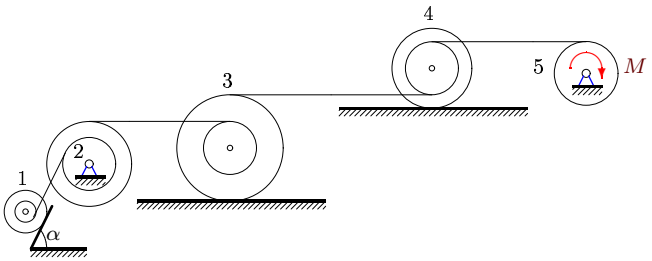
Кинетическая энергия системы. Приведенные массы

Механическая система, состоящая из пяти тел 1, 2, 3, 4 и 5, движется под действием внешних сил. Заданы радиусы цилиндров и блоков. Радиусы инерции ρ даны для блоков, цилиндры считать однородными. Горизонтальный стержень, находящийся в зацеплении с блоками, считать невесомым. Массы даны в килограммах, радиусы — в сантиметрах. Вычислить приведенную массу системы μ в формуле $T = \mu v_1^2/2$, где v_1 — скорость груза 1 (или центра цилиндра 1).

Кирсанов М.Н. Задачи по теоретической механике с решениями в **Maple** 11. – М.: ФИЗМАТЛИТ, 2010. — 264 с. (с.111)

Задача D-33.62. *21*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
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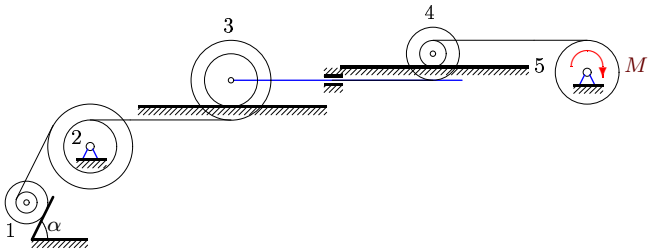
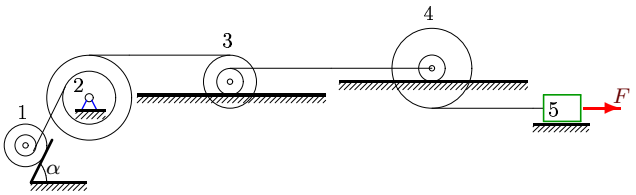
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 8$, $m_2 = 16$,
$m_3 = 180$, $m_4 = 9$,
$m_5 = 18$.

Задача D-33.63.



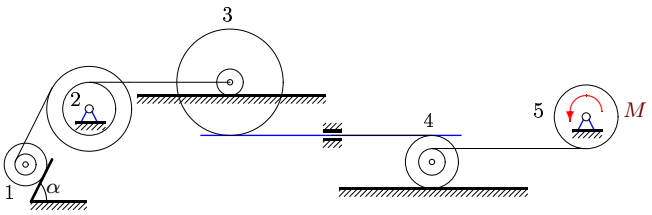
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 3$, $r_3 = 2$, $\rho_3 = 2$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 8$, $m_2 = 24$,
$m_3 = 5$, $m_4 = 4$,
$m_5 = 6$.

Задача D-33.64.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 12$, $m_2 = 80$,
$m_3 = 54$, $m_4 = 45$,
$m_5 = 36$.

Задача D-33.65.



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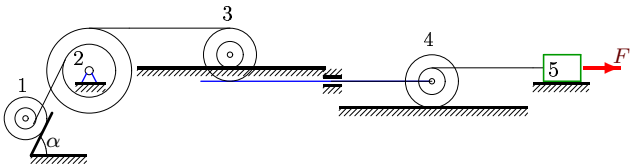
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 4$,
$m_3 = 4$, $m_4 = 48$,
$m_5 = 64$.

Задача D-33.66.



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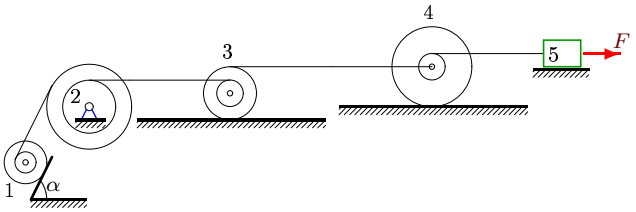
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 36$, $m_4 = 108$,
$m_5 = 8$.

Задача D-33.67.



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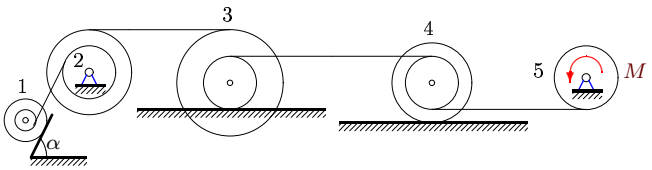
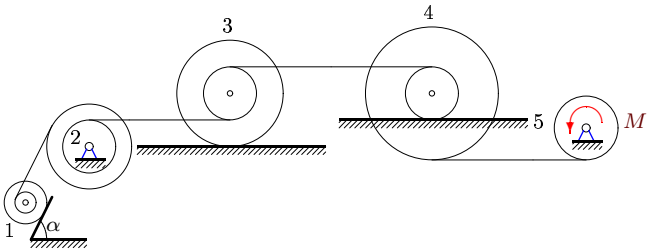
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 20$, $m_2 = 20$,
$m_3 = 72$, $m_4 = 81$,
$m_5 = 81$.

Задача D-33.68.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 144$, $m_4 = 225$,
$m_5 = 450$.

Задача D-33.69.



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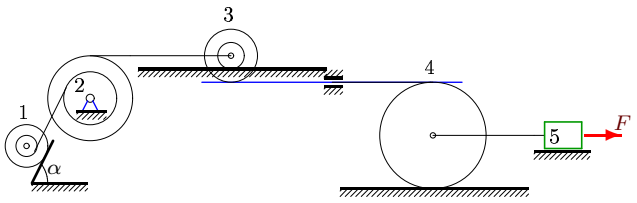
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 5$, $r_4 = 2$, $\rho_4 = 4$,
$m_1 = 8$, $m_2 = 16$,
$m_3 = 20$, $m_4 = 16$,
$m_5 = 96$.

Задача D-33.70.



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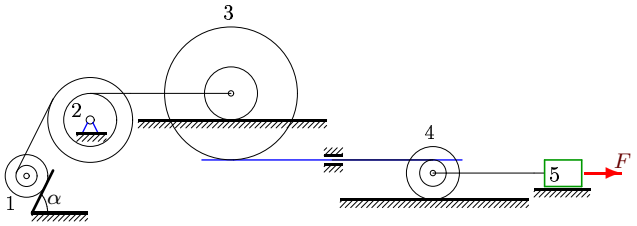
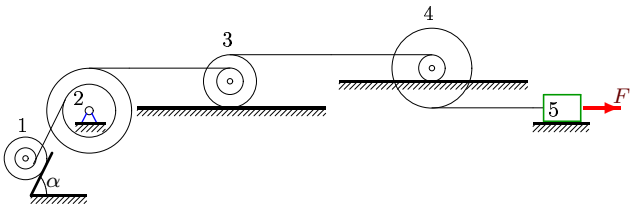
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 4$,
$m_1 = 4$, $m_2 = 32$,
$m_3 = 4$, $m_4 = 24$,
$m_5 = 8$.

Задача D-33.71.



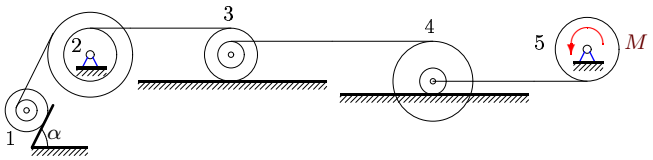
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 4$,
$m_3 = 4$, $m_4 = 12$,
$m_5 = 2$.

Задача D-33.72.



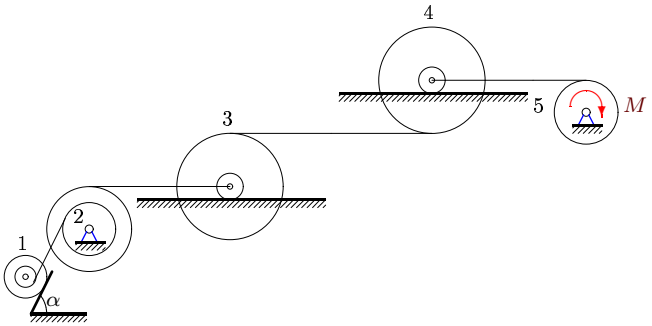
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 32$,
$m_3 = 36$, $m_4 = 27$,
$m_5 = 18$.

Задача D-33.73.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 20$,
$m_3 = 64$, $m_4 = 256$,
$m_5 = 512$.

Задача D-33.74.



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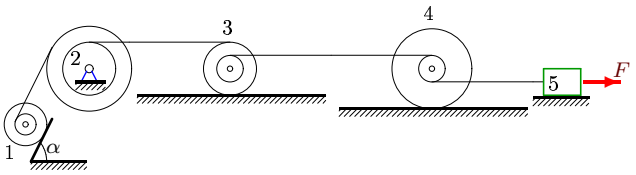
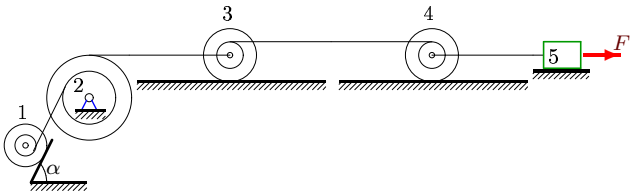
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 4$, $m_2 = 48$,
$m_3 = 4$, $m_4 = 9$,
$m_5 = 36$.

Задача D-33.75.



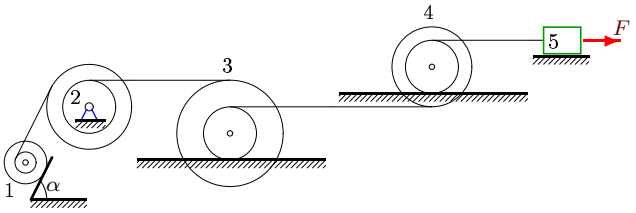
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 8$,
$m_3 = 64$, $m_4 = 256$,
$m_5 = 128$.

Задача D-33.76.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 96$,
$m_3 = 16$, $m_4 = 12$,
$m_5 = 2$.

Задача D-33.77.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
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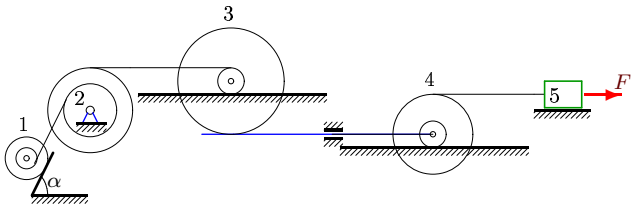
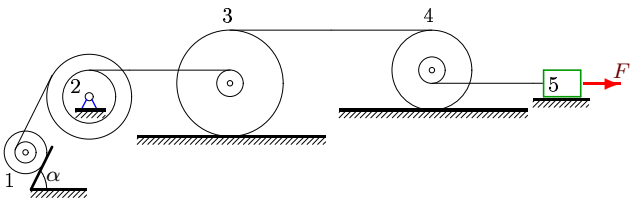
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 4$,
$m_3 = 144$, $m_4 = 27$,
$m_5 = 18$.

Задача D-33.78.



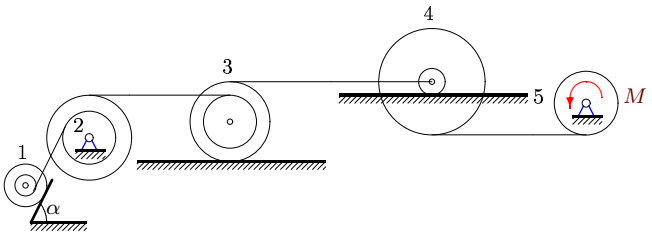
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 80$,
$m_3 = 8$, $m_4 = 12$,
$m_5 = 2$.

Задача D-33.79.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 12$, $m_2 = 8$,
$m_3 = 6$, $m_4 = 225$,
$m_5 = 225$.

Задача D-33.80.



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$R_3 = 3$, $r_3 = 2$, $\rho_3 = 2$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
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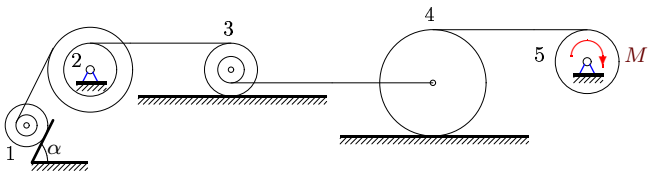
$m_3 = 100$, $m_4 = 15$,
$m_5 = 50$.

Задача D-33.81.



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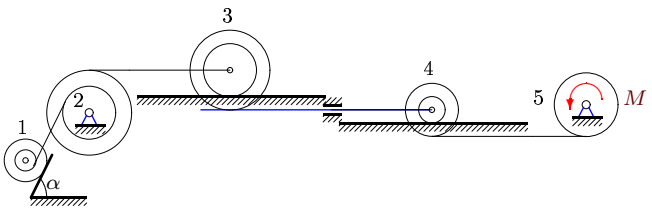
$R_4 = 4$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 64$, $m_4 = 96$,
$m_5 = 16$.

Задача D-33.82.



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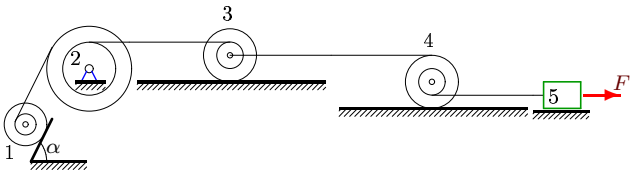
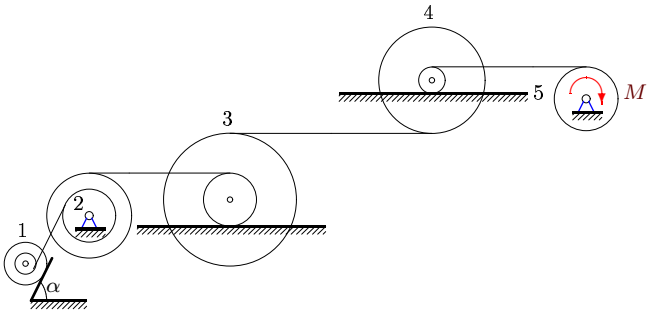
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 4$, $m_4 = 6$,
$m_5 = 16$.

Задача D-33.83.



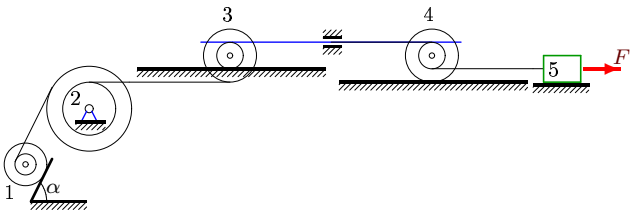
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 24$,
$m_3 = 36$, $m_4 = 108$,
$m_5 = 72$.

Задача D-33.84.



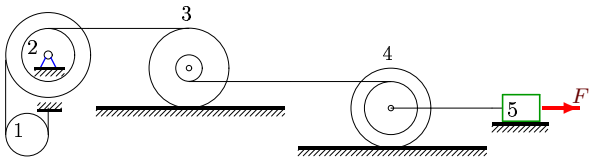
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 5,\ r_3 = 2,\ \rho_3 = 4,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 64,$
$m_3 = 16,\ m_4 = 72,$
$m_5 = 144.$

Задача D-33.85.



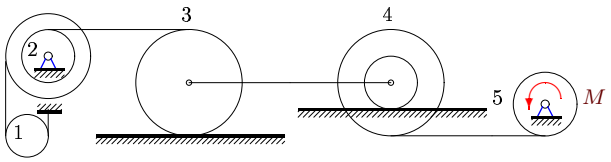
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 12$, $m_2 = 4$,
$m_3 = 6$, $m_4 = 45$,
$m_5 = 36$.

Задача D-33.86.



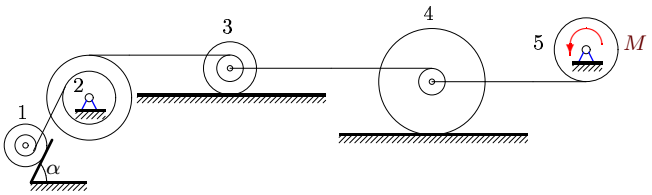
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 3$, $r_3 = 1$, $\rho_3 = 2$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 2$, $m_2 = 24$,
$m_3 = 144$, $m_4 = 225$,
$m_5 = 50$.

Задача D-33.87.



$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$,
$R_4 = 4$, $r_4 = 2$, $\rho_4 = 3$,
$m_1 = 2$, $m_2 = 8$,
$m_3 = 32$, $m_4 = 48$,
$m_5 = 16$.

Задача D-33.88.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
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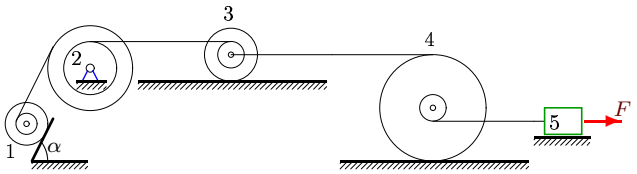
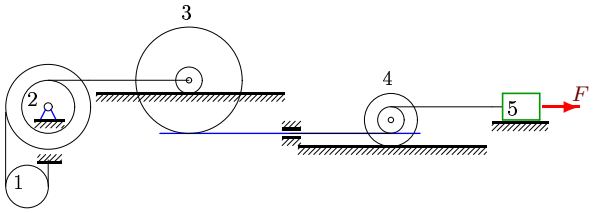
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 4$, $m_2 = 64$,
$m_3 = 36$, $m_4 = 27$,
$m_5 = 450$.

Задача D-33.89.



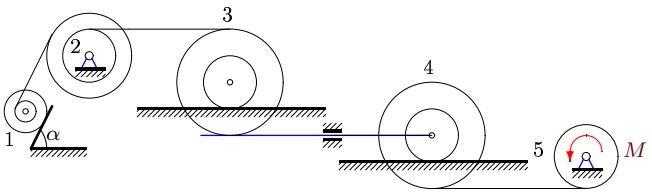
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 12$, $m_2 = 12$,
$m_3 = 54$, $m_4 = 144$,
$m_5 = 64$.

Задача D-33.90.



$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 10$, $m_2 = 24$,
$m_3 = 8$, $m_4 = 7$,
$m_5 = 6$.

Задача D-33.91.



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 4$, $r_4 = 2$, $\rho_4 = 3$,
$m_1 = 4$, $m_2 = 20$,
$m_3 = 144$, $m_4 = 108$,
$m_5 = 36$.

Ответы.

Кинетическая энергия системы. Приведенные массы 17.05.2015

№	μ_1	μ_2	μ_3	μ_4	μ_5	$\sum \mu_k$
62	10	9	125	208	400	752
63	16	24	40	32	48	160
64	24	20	12	100	64	220
65	5	9	40	135	162	351
66	8	9	8	15	2	42
67	40	45	40	208	256	589
68	5	9	52	52	4	122
69	10	16	125	180	243	574
70	8	18	8	9	2	45
71	5	9	20	15	2	51
72	8	8	20	60	32	128
73	8	20	20	45	9	102
74	5	12	40	250	50	357
75	8	18	20	117	18	181
76	8	54	20	15	2	99
77	5	4	52	96	128	285
78	5	20	20	135	72	252
79	15	18	6	208	64	311
80	8	16	52	216	324	616
81	8	36	20	9	2	75
82	8	4	8	3	2	25
83	8	54	20	15	2	99
84	5	16	20	245	98	384
85	24	9	12	100	16	161
86	3	54	52	13	2	124
87	3	8	12	39	2	64
88	8	36	20	12	64	140
89	24	27	30	25	4	110
90	15	54	80	315	486	950
91	5	20	52	39	2	118

D-33 файл o33d21F