

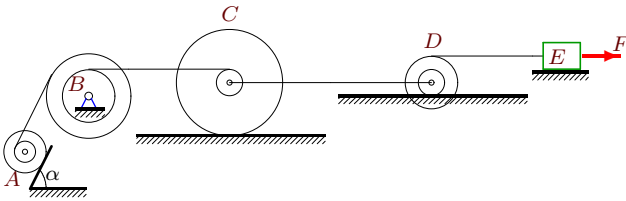
## Кинетическая энергия системы. Приведенные массы

Механическая система, состоящая из пяти тел  $A$ ,  $B$ ,  $C$ ,  $D$  и  $E$ , движется под действием внешних сил. Заданы радиусы цилиндров и блоков. Радиусы инерции 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  $\mu$  в формуле  $T = \mu v_A^2/2$ , где  $v_A$  — скорость груза  $A$  (или центра цилиндра  $A$ ).

Кирсанов М.Н. **Решбник. Теоретическая механика**/Под ред. А. И. Кириллова.— М.: ФИЗМАТЛИТ, 2008. — 384 с. (с.257.)

### Задача D33.1.

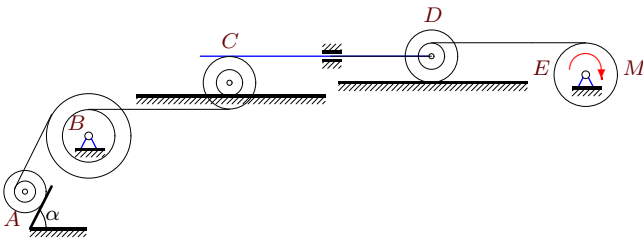
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 8, m_B = 4, \\
 m_C &= 5, m_D = 100, \\
 m_E &= 25.
 \end{aligned}$$

### Задача D33.2.

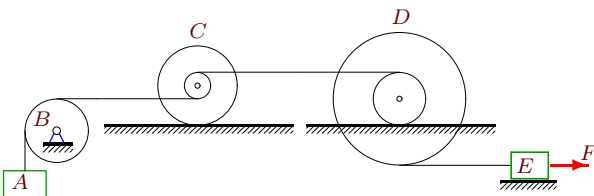
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 16, m_B = 4, \\
 m_C &= 7, m_D = 24, \\
 m_E &= 40.
 \end{aligned}$$

### Задача D33.3.

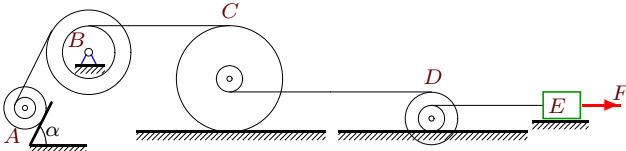
6



$$\begin{aligned}
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 5, r_D = 2, i_D = 4, \\
 m_A &= 16, m_B = 6, \\
 m_C &= 16, m_D = 3, \\
 m_E &= 8.
 \end{aligned}$$

### Задача D33.4.

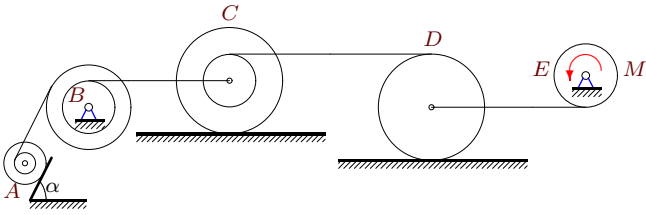
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 20, m_B = 24, \\
 m_C &= 512, m_D = 224, \\
 m_E &= 96.
 \end{aligned}$$

**Задача D33.5.**

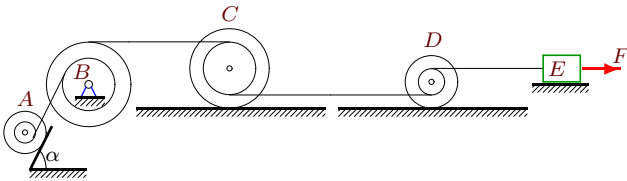
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 4, \\
 m_A &= 16, m_B = 24, \\
 m_C &= 112, m_D = 192, \\
 m_E &= 160.
 \end{aligned}$$

**Задача D33.6.**

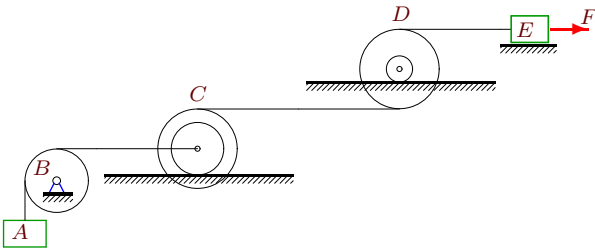
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 8, m_B = 16, \\
 m_C &= 125, m_D = 20, \\
 m_E &= 75.
 \end{aligned}$$

**Задача D33.7.**

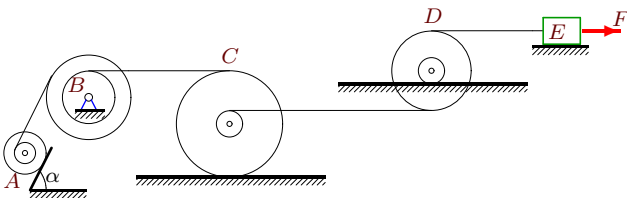
6



$$\begin{aligned}
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 19, m_B = 4, \\
 m_C &= 7, m_D = 16, \\
 m_E &= 5.
 \end{aligned}$$

**Задача D33.8.**

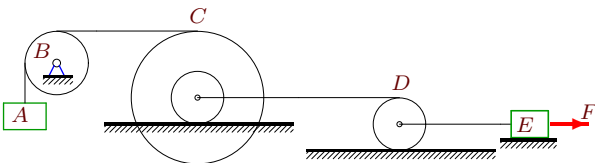
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 8, m_B = 8, \\
 m_C &= 320, m_D = 256, \\
 m_E &= 48.
 \end{aligned}$$

**Задача D33.9.**

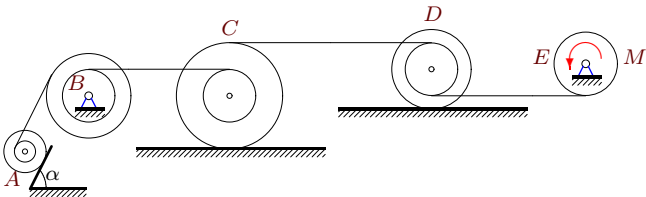
6



$$\begin{aligned}
 R_C &= 5, r_C = 2, i_C = 4, \\
 R_D &= 2, \\
 m_A &= 12, m_B = 2, \\
 m_C &= 245, m_D = 392, \\
 m_E &= 147.
 \end{aligned}$$

**Задача D33.10.**

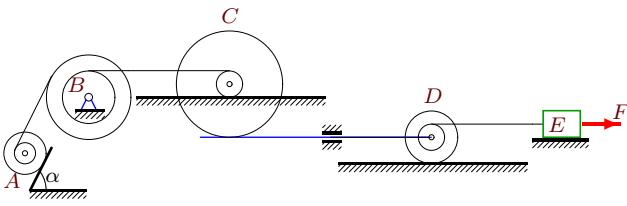
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 12, m_B = 24, \\
 m_C &= 216, m_D = 225, \\
 m_E &= 450.
 \end{aligned}$$

**Задача D33.11.**

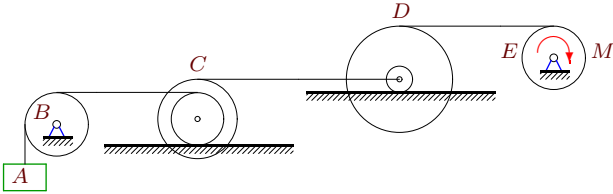
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 8, m_B = 4, \\
 m_C &= 10, m_D = 64, \\
 m_E &= 48.
 \end{aligned}$$

**Задача D33.12.**

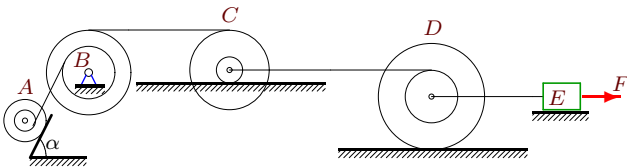
6



$$\begin{aligned}
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 15, m_B = 6, \\
 m_C &= 10, m_D = 8, \\
 m_E &= 32.
 \end{aligned}$$

**Задача D33.13.**

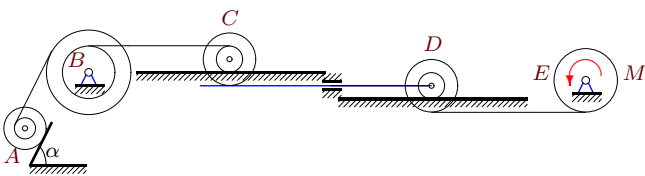
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 4, r_D = 2, i_D = 3, \\
 m_A &= 16, m_B = 32, \\
 m_C &= 112, m_D = 576, \\
 m_E &= 180.
 \end{aligned}$$

**Задача D33.14.**

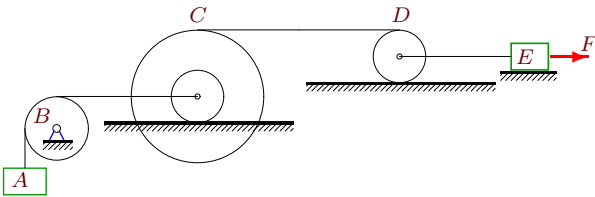
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 16, m_B = 24, \\
 m_C &= 14, m_D = 12, \\
 m_E &= 40.
 \end{aligned}$$

**Задача D33.15.**

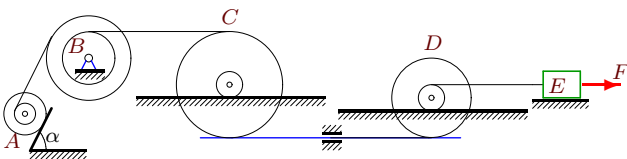
6



$$\begin{aligned}
 R_C &= 5, r_C = 2, i_C = 4, \\
 R_D &= 2, \\
 m_A &= 14, m_B = 12, \\
 m_C &= 7, m_D = 32, \\
 m_E &= 80.
 \end{aligned}$$

**Задача D33.16.**

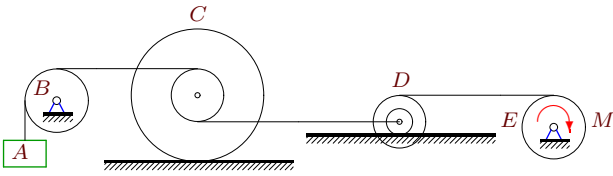
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 8, m_B = 20, \\
 m_C &= 25, m_D = 80, \\
 m_E &= 75.
 \end{aligned}$$

Задача D33.17.

6



$$R_C = 5, r_C = 2, i_C = 4,$$

$$R_D = 2, r_D = 1, i_D = 1,$$

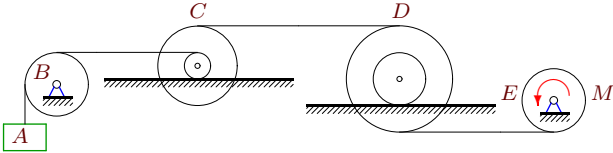
$$m_A = 17, m_B = 2,$$

$$m_C = 392, m_D = 343,$$

$$m_E = 588.$$

Задача D33.18.

6



$$R_C = 3, r_C = 1, i_C = 2,$$

$$R_D = 4, r_D = 2, i_D = 3,$$

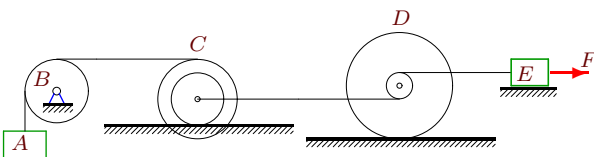
$$m_A = 17, m_B = 10,$$

$$m_C = 24, m_D = 45,$$

$$m_E = 72.$$

Задача D33.19.

6



$$R_C = 3, r_C = 2, i_C = 2,$$

$$R_D = 4, r_D = 1, i_D = 3,$$

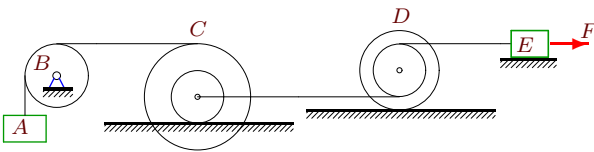
$$m_A = 17, m_B = 8,$$

$$m_C = 200, m_D = 63,$$

$$m_E = 54.$$

Задача D33.20.

6



$$R_C = 4, r_C = 2, i_C = 3,$$

$$R_D = 3, r_D = 2, i_D = 2,$$

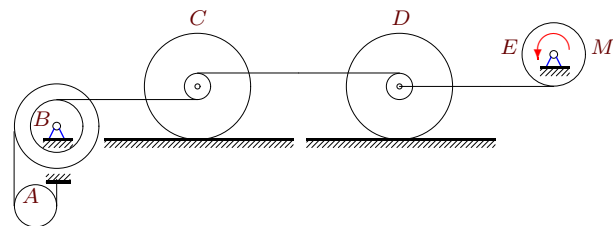
$$m_A = 13, m_B = 12,$$

$$m_C = 144, m_D = 27,$$

$$m_E = 18.$$

Задача D33.21.

6



$$R_B = 4, r_B = 2, i_B = 3,$$

$$R_C = 4, r_C = 1, i_C = 3,$$

$$R_D = 4, r_D = 1, i_D = 3,$$

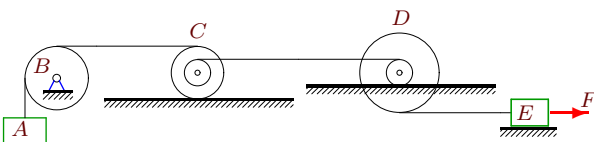
$$m_A = 6, m_B = 16,$$

$$m_C = 54, m_D = 45,$$

$$m_E = 72.$$

Задача D33.22.

6



$$R_C = 2, r_C = 1, i_C = 1,$$

$$R_D = 3, r_D = 1, i_D = 2,$$

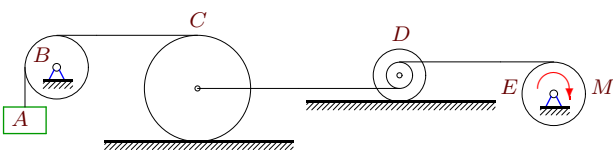
$$m_A = 14, m_B = 4,$$

$$m_C = 96, m_D = 320,$$

$$m_E = 64.$$

Задача D33.23.

6



$$R_C = 4,$$

$$R_D = 2, r_D = 1, i_D = 1,$$

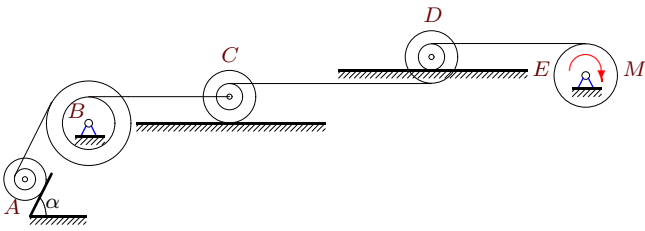
$$m_A = 10, m_B = 12,$$

$$m_C = 40, m_D = 16,$$

$$m_E = 24.$$

**Задача D33.24.**

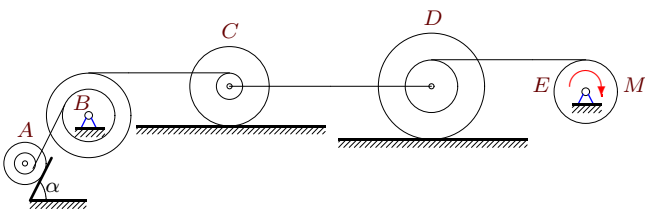
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 20, m_B = 4, \\
 m_C &= 32, m_D = 14, \\
 m_E &= 12.
 \end{aligned}$$

**Задача D33.25.**

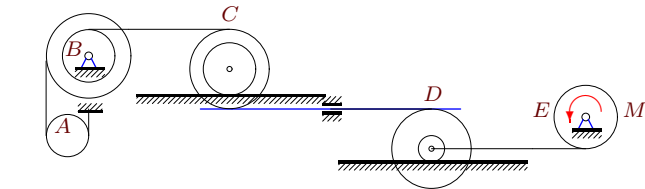
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 4, r_D = 2, i_D = 3, \\
 m_A &= 16, m_B = 32, \\
 m_C &= 112, m_D = 256, \\
 m_E &= 128.
 \end{aligned}$$

**Задача D33.26.**

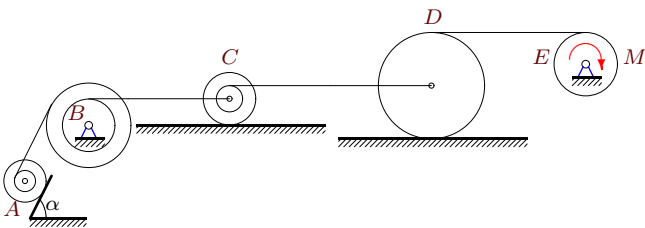
6



$$\begin{aligned}
 R_B &= 4, r_B = 2, i_B = 2, \\
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 2, m_B = 20, \\
 m_C &= 100, m_D = 240, \\
 m_E &= 800.
 \end{aligned}$$

**Задача D33.27.**

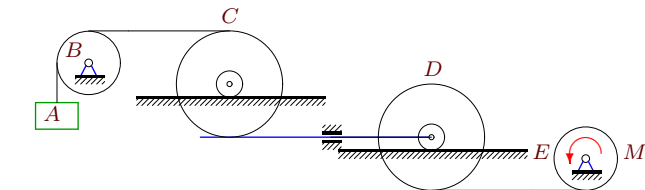
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 4, \\
 m_A &= 8, m_B = 20, \\
 m_C &= 20, m_D = 32, \\
 m_E &= 6.
 \end{aligned}$$

**Задача D33.28.**

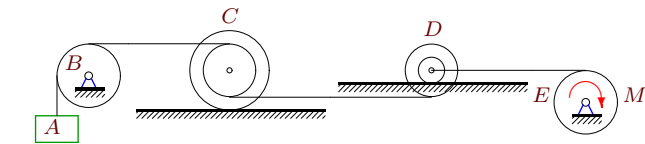
6



$$\begin{aligned}
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 18, m_B = 8, \\
 m_C &= 20, m_D = 15, \\
 m_E &= 100.
 \end{aligned}$$

**Задача D33.29.**

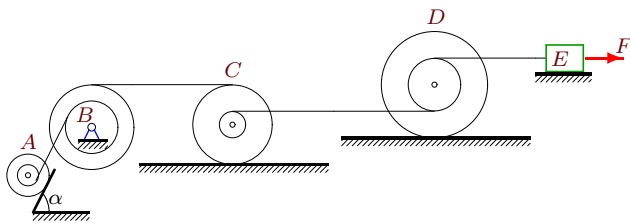
6



$$\begin{aligned}
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 17, m_B = 12, \\
 m_C &= 150, m_D = 125, \\
 m_E &= 200.
 \end{aligned}$$

**Задача D33.30.**

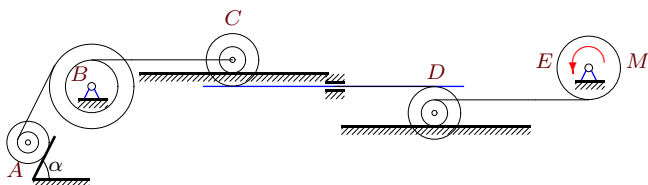
6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 4, r_D = 2, i_D = 3, \\
 m_A &= 8, m_B = 32, \\
 m_C &= 180, m_D = 36, \\
 m_E &= 3.
 \end{aligned}$$

**Задача D33.31.**

6



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 8, m_B = 4, \\
 m_C &= 5, m_D = 36, \\
 m_E &= 54.
 \end{aligned}$$

**D33 Ответы.**

**Кинетическая энергия системы. Приведенные массы** 17.09.2011

№	$\mu_A$	$\mu_B$	$\mu_C$	$\mu_D$	$\mu_E$	$\mu$
1	10	4	5	128	144	291
2	32	9	14	270	405	730
3	16	3	52	15	18	104
4	25	24	200	7	6	262
5	20	54	175	162	45	456
6	16	9	65	4	27	121
7	19	2	14	125	125	285
8	10	8	125	125	75	343
9	12	1	100	12	3	128
10	15	54	150	208	16	443
11	10	9	25	180	243	467
12	15	3	5	125	625	773
13	20	18	35	25	5	103
14	32	24	7	6	5	74
15	14	6	35	147	245	447
16	10	20	10	36	27	103
17	17	1	328	126	486	958
18	17	5	30	65	16	133
19	17	4	64	28	24	137
20	13	6	52	39	50	160
21	9	36	150	125	64	384
22	14	2	30	225	36	307
23	10	6	15	20	27	78
24	40	4	40	63	54	201
25	20	18	91	225	81	435
26	3	20	32	3	1	59
27	16	45	25	108	27	221
28	18	4	8	54	162	246
29	17	6	78	10	4	115
30	10	18	65	100	12	205
31	16	4	10	8	12	50