

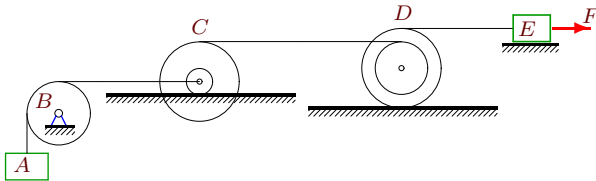
## Кинетическая энергия системы. Приведенные массы

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.

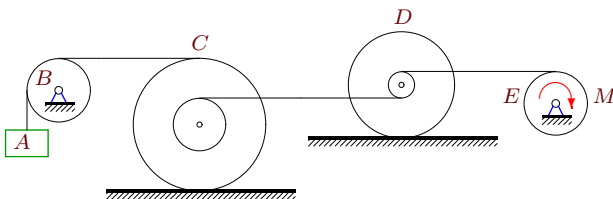
9



$$\begin{aligned} R_C &= 3, r_C = 1, i_C = 2, \\ R_D &= 3, r_D = 2, i_D = 2, \\ m_A &= 11, m_B = 12, \\ m_C &= 6, m_D = 25, \\ m_E &= 25. \end{aligned}$$

### Задача D33.2.

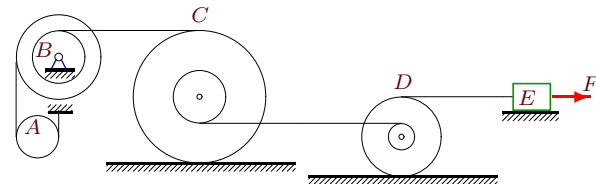
9



$$\begin{aligned} R_C &= 5, r_C = 2, i_C = 4, \\ R_D &= 4, r_D = 1, i_D = 3, \\ m_A &= 7, m_B = 8, \\ m_C &= 100, m_D = 108, \\ m_E &= 144. \end{aligned}$$

### Задача D33.3.

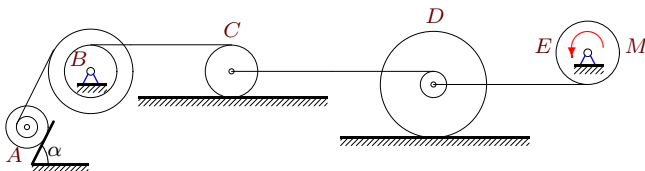
9



$$\begin{aligned} R_B &= 4, r_B = 2, i_B = 3, \\ R_C &= 5, r_C = 2, i_C = 4, \\ R_D &= 3, r_D = 1, i_D = 2, \\ m_A &= 6, m_B = 20, \\ m_C &= 100, m_D = 1600, \\ m_E &= 400. \end{aligned}$$

### Задача D33.4.

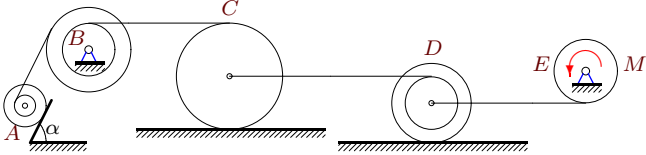
9



$$\begin{aligned} R_A &= 2, r_A = 1, i_A = 2, \\ R_B &= 3, r_B = 2, i_B = 3, \\ R_C &= 2, \\ R_D &= 4, r_D = 1, i_D = 3, \\ m_A &= 8, m_B = 16, \\ m_C &= 40, m_D = 16, \\ m_E &= 150. \end{aligned}$$

**Задача D33.5.**

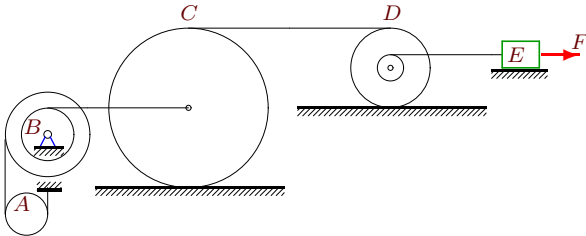
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 4, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 4, m_B = 24, \\
 m_C &= 32, m_D = 100, \\
 m_E &= 200.
 \end{aligned}$$

**Задача D33.6.**

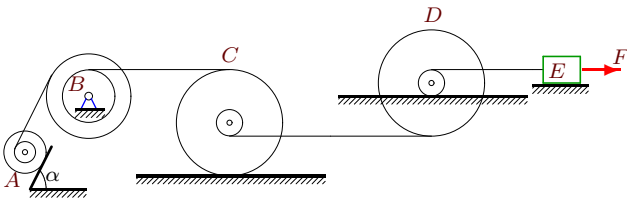
9



$$\begin{aligned}
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 6, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 6, m_B = 8, \\
 m_C &= 12, m_D = 45, \\
 m_E &= 36.
 \end{aligned}$$

**Задача D33.7.**

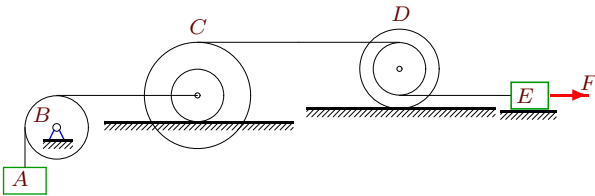
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 4, m_B = 12, \\
 m_C &= 256, m_D = 96, \\
 m_E &= 32.
 \end{aligned}$$

**Задача D33.8.**

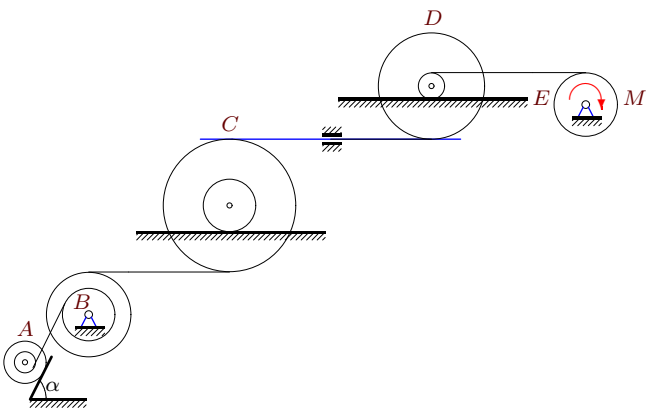
9



$$\begin{aligned}
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 13, m_B = 12, \\
 m_C &= 16, m_D = 75, \\
 m_E &= 50.
 \end{aligned}$$

**Задача D33.9.**

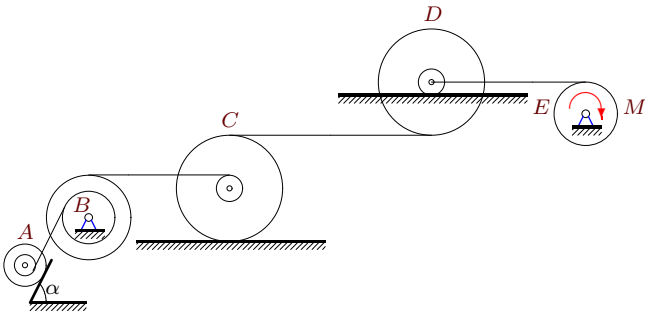
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 2, \\
 R_C &= 5, r_C = 2, i_C = 4, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 20, m_B = 48, \\
 m_C &= 72, m_D = 81, \\
 m_E &= 162.
 \end{aligned}$$

**Задача D33.10.**

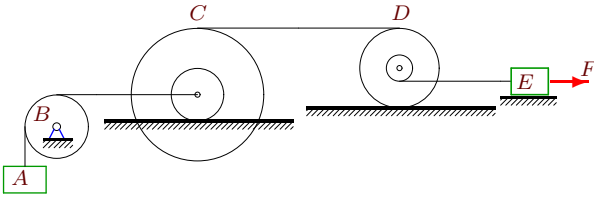
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 4, m_B = 48, \\
 m_C &= 4, m_D = 45, \\
 m_E &= 450.
 \end{aligned}$$

**Задача D33.11.**

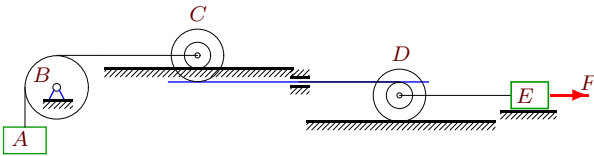
9



$$\begin{aligned}
 R_C &= 5, r_C = 2, i_C = 4, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 11, m_B = 4, \\
 m_C &= 5, m_D = 144, \\
 m_E &= 108.
 \end{aligned}$$

**Задача D33.12.**

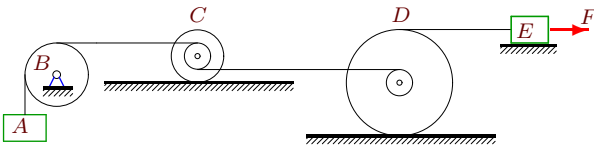
9



$$\begin{aligned}
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 17, m_B = 12, \\
 m_C &= 7, m_D = 54, \\
 m_E &= 45.
 \end{aligned}$$

**Задача D33.13.**

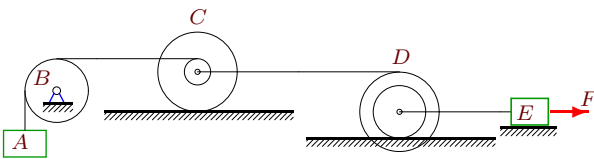
9



$$\begin{aligned}
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 11, m_B = 8, \\
 m_C &= 72, m_D = 63, \\
 m_E &= 225.
 \end{aligned}$$

**Задача D33.14.**

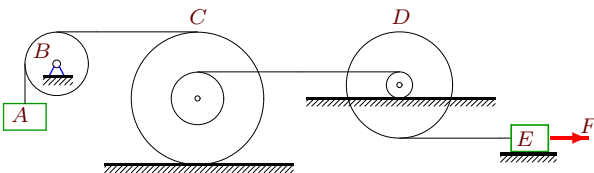
9



$$\begin{aligned}
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 15, m_B = 12, \\
 m_C &= 112, m_D = 300, \\
 m_E &= 100.
 \end{aligned}$$

**Задача D33.15.**

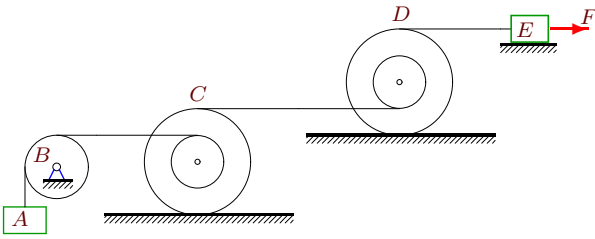
9



$$\begin{aligned}
 R_C &= 5, r_C = 2, i_C = 4, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 15, m_B = 8, \\
 m_C &= 100, m_D = 240, \\
 m_E &= 400.
 \end{aligned}$$

Задача D33.16.

9



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

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

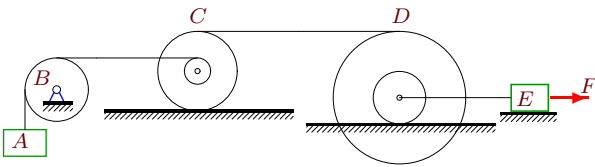
$$m_A = 7, m_B = 10,$$

$$m_C = 252, m_D = 54,$$

$$m_E = 9.$$

Задача D33.17.

9



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

$$R_D = 5, r_D = 2, i_D = 4,$$

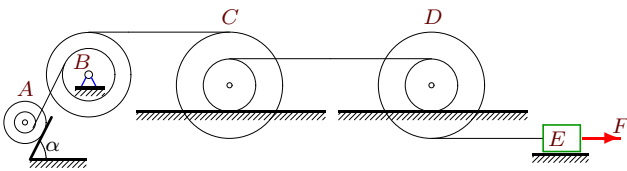
$$m_A = 9, m_B = 6,$$

$$m_C = 64, m_D = 147,$$

$$m_E = 98.$$

Задача D33.18.

9



$$R_A = 2, r_A = 1, i_A = 1,$$

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

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

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

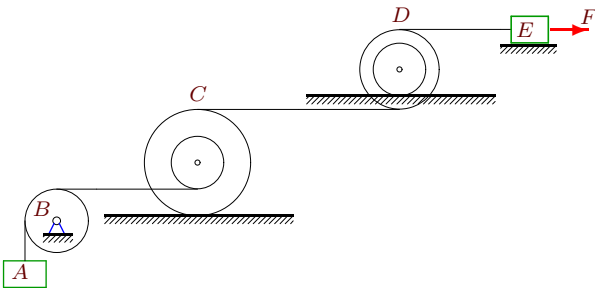
$$m_A = 8, m_B = 32,$$

$$m_C = 180, m_D = 144,$$

$$m_E = 27.$$

Задача D33.19.

9



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

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

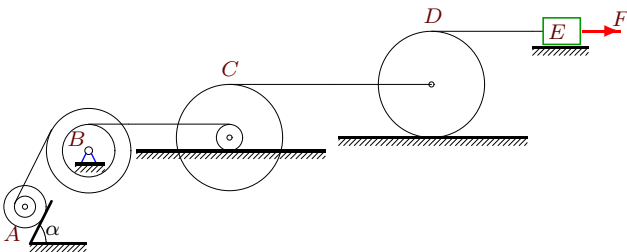
$$m_A = 14, m_B = 2,$$

$$m_C = 28, m_D = 1,$$

$$m_E = 1.$$

Задача D33.20.

9



$$R_A = 2, r_A = 1, i_A = 1,$$

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

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

$$R_D = 4,$$

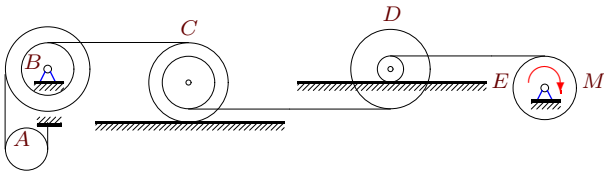
$$m_A = 20, m_B = 8,$$

$$m_C = 16, m_D = 56,$$

$$m_E = 6.$$

**Задача D33.21.**

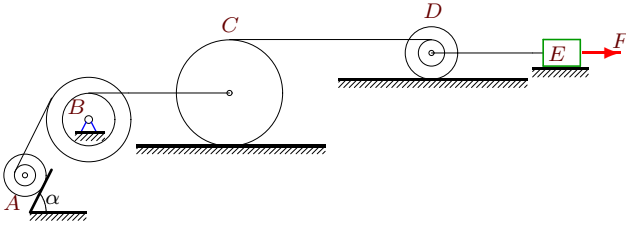
9



$$\begin{aligned}
 R_B &= 4, r_B = 2, i_B = 2, \\
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 2, m_B = 20, \\
 m_C &= 144, m_D = 144, \\
 m_E &= 144.
 \end{aligned}$$

**Задача D33.22.**

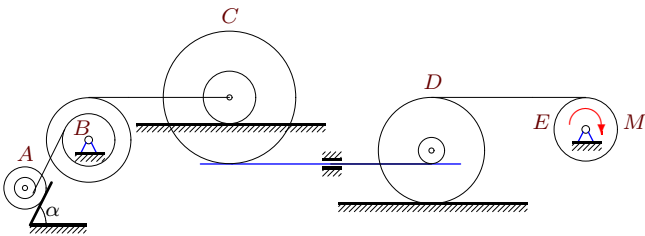
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 4, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 8, m_B = 24, \\
 m_C &= 10, m_D = 36, \\
 m_E &= 27.
 \end{aligned}$$

**Задача D33.23.**

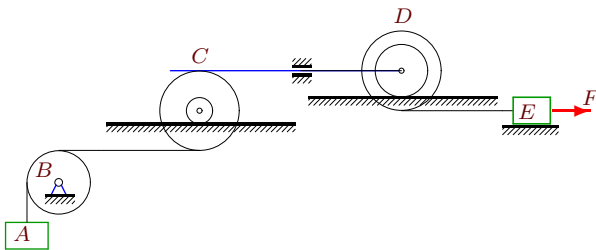
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 5, r_C = 2, i_C = 4, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 8, m_B = 48, \\
 m_C &= 5, m_D = 16, \\
 m_E &= 6.
 \end{aligned}$$

**Задача D33.24.**

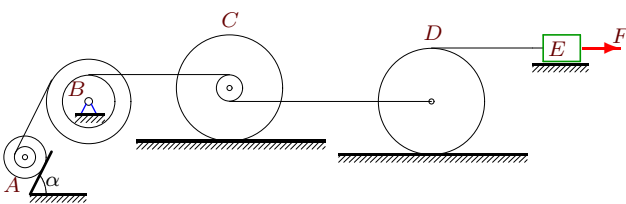
9



$$\begin{aligned}
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 22, m_B = 2, \\
 m_C &= 32, m_D = 7, \\
 m_E &= 6.
 \end{aligned}$$

**Задача D33.25.**

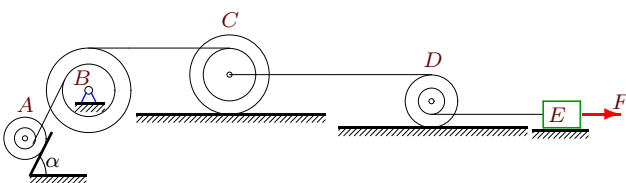
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 4, \\
 m_A &= 12, m_B = 16, \\
 m_C &= 6, m_D = 250, \\
 m_E &= 100.
 \end{aligned}$$

**Задача D33.26.**

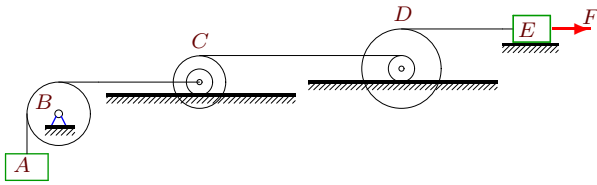
9



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 4, m_B = 16, \\
 m_C &= 100, m_D = 240, \\
 m_E &= 400.
 \end{aligned}$$

Задача D33.27.

9



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

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

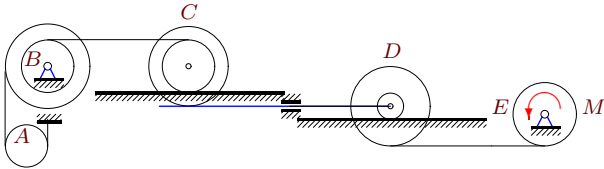
$$m_A = 16, m_B = 4,$$

$$m_C = 6, m_D = 20,$$

$$m_E = 4.$$

Задача D33.28.

9



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

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

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

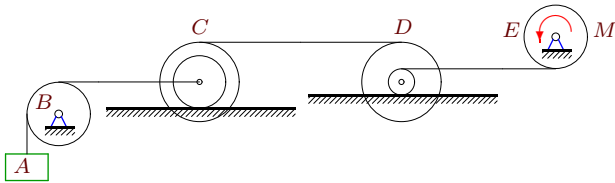
$$m_A = 2, m_B = 8,$$

$$m_C = 8, m_D = 48,$$

$$m_E = 16.$$

Задача D33.29.

9



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

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

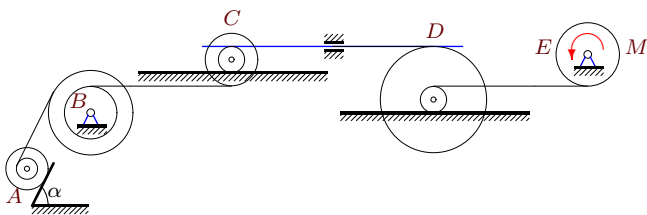
$$m_A = 17, m_B = 4,$$

$$m_C = 7, m_D = 64,$$

$$m_E = 160.$$

Задача D33.30.

9



$$R_A = 2, r_A = 1, i_A = 2,$$

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

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

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

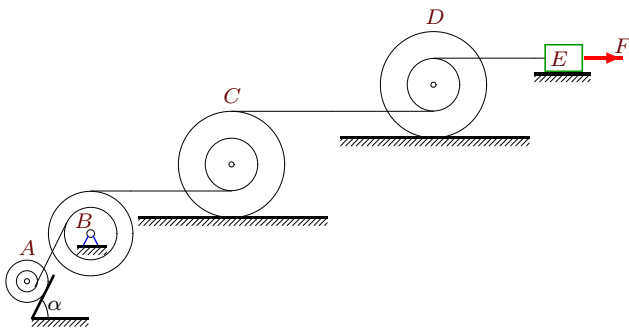
$$m_A = 20, m_B = 12,$$

$$m_C = 8, m_D = 35,$$

$$m_E = 300.$$

Задача D33.31.

9



$$R_A = 2, r_A = 1, i_A = 1,$$

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

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

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

$$m_A = 4, m_B = 32,$$

$$m_C = 16, m_D = 3,$$

$$m_E = 1.$$

**Д33 Ответы.****Кинетическая энергия системы. Приведенные массы** 17.09.2011

№	$\mu_A$	$\mu_B$	$\mu_C$	$\mu_D$	$\mu_E$	$\mu$
1	11	6	30	208	576	831
2	7	4	41	147	98	297
3	9	45	41	117	81	293
4	16	36	15	4	12	83
5	5	54	12	13	9	93
6	9	18	18	65	64	174
7	5	12	100	15	2	134
8	13	6	52	351	18	440
9	25	12	160	490	196	883
10	5	12	4	128	64	213
11	11	2	25	637	147	822
12	17	6	14	30	20	87
13	11	4	40	7	64	126
14	15	6	91	54	9	175
15	15	4	41	294	441	795
16	7	5	175	600	256	1043
17	9	3	52	135	18	217
18	10	8	65	52	3	138
19	14	1	175	128	400	718
20	25	18	40	525	150	758
21	3	20	52	5	2	82
22	10	54	15	80	48	207
23	10	27	25	100	48	210
24	22	1	40	56	6	125
25	15	36	6	135	144	336
26	8	9	52	27	9	105
27	16	2	12	225	144	399
28	3	8	4	15	2	32
29	17	2	14	125	125	283
30	40	12	16	56	96	220
31	5	18	100	300	144	567

Д33 файл о33d9В