

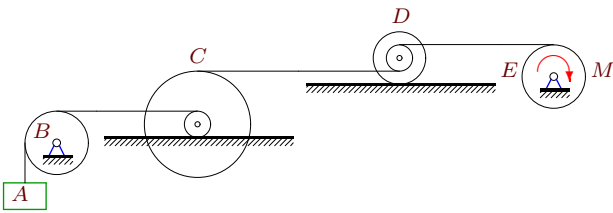
## Кинетическая энергия системы. Приведенные массы

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.

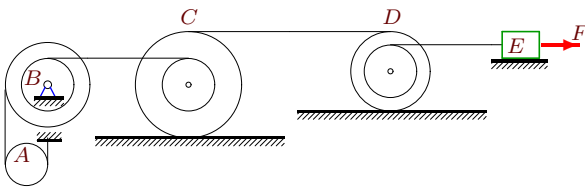
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$$\begin{aligned} R_C &= 4, r_C = 1, i_C = 3, \\ R_D &= 2, r_D = 1, i_D = 1, \\ m_A &= 12, m_B = 12, \\ m_C &= 8, m_D = 4, \\ m_E &= 8. \end{aligned}$$

### Задача D33.2.

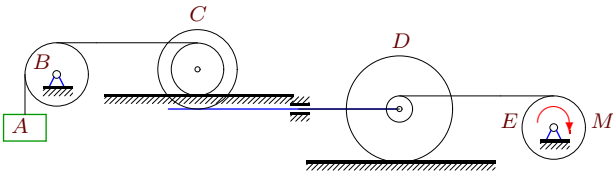
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$$\begin{aligned} R_B &= 4, r_B = 2, i_B = 3, \\ R_C &= 4, r_C = 2, i_C = 3, \\ R_D &= 3, r_D = 2, i_D = 2, \\ m_A &= 4, m_B = 4, \\ m_C &= 180, m_D = 324, \\ m_E &= 243. \end{aligned}$$

### Задача D33.3.

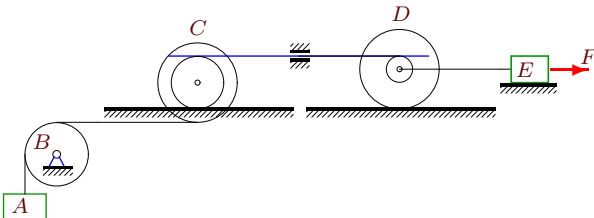
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$$\begin{aligned} R_C &= 3, r_C = 2, i_C = 2, \\ R_D &= 4, r_D = 1, i_D = 3, \\ m_A &= 17, m_B = 6, \\ m_C &= 12, m_D = 256, \\ m_E &= 512. \end{aligned}$$

### Задача D33.4.

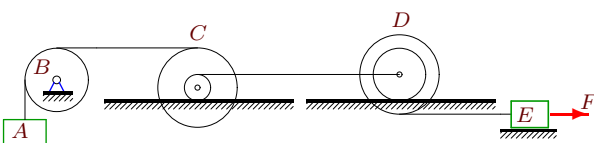
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$$\begin{aligned} R_C &= 3, r_C = 2, i_C = 2, \\ R_D &= 3, r_D = 1, i_D = 2, \\ m_A &= 19, m_B = 4, \\ m_C &= 8, m_D = 7, \\ m_E &= 6. \end{aligned}$$

### Задача D33.5.

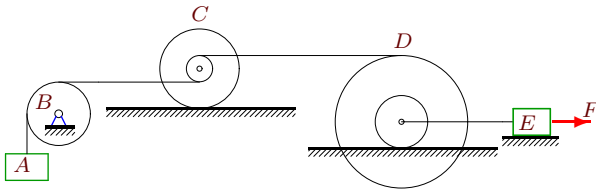
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$$\begin{aligned} R_C &= 3, r_C = 1, i_C = 2, \\ R_D &= 3, r_D = 2, i_D = 2, \\ m_A &= 18, m_B = 12, \\ m_C &= 96, m_D = 10, \\ m_E &= 64. \end{aligned}$$

**Задача D33.6.**

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

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

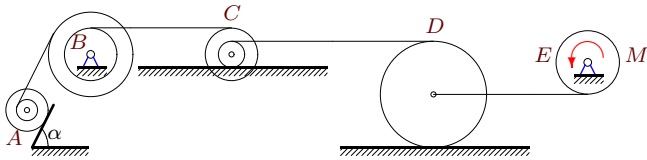
$$m_A = 13, m_B = 6,$$

$$m_C = 16, m_D = 147,$$

$$m_E = 98.$$

**Задача D33.7.**

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

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

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

$$R_D = 4,$$

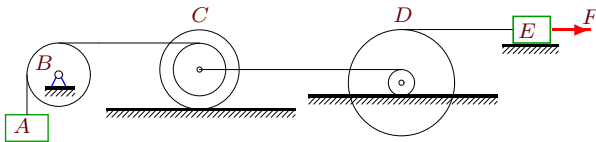
$$m_A = 4, m_B = 20,$$

$$m_C = 36, m_D = 18,$$

$$m_E = 36.$$

**Задача D33.8.**

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

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

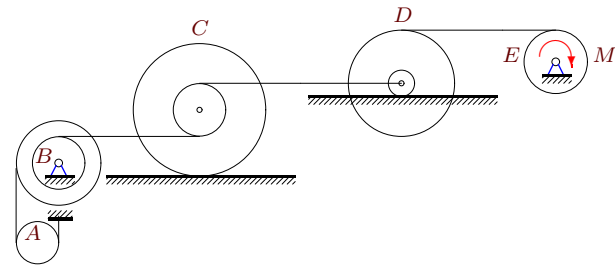
$$m_A = 12, m_B = 8,$$

$$m_C = 125, m_D = 40,$$

$$m_E = 12.$$

**Задача D33.9.**

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

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

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

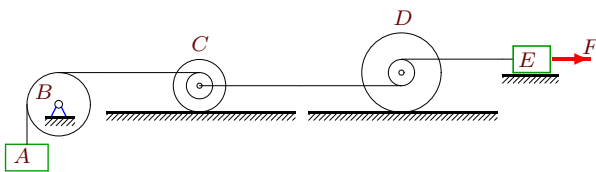
$$m_A = 6, m_B = 16,$$

$$m_C = 54, m_D = 9,$$

$$m_E = 18.$$

**Задача D33.10.**

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

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

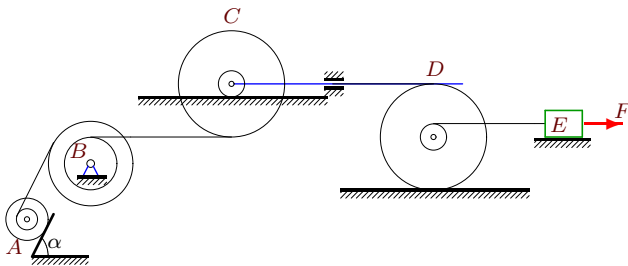
$$m_A = 14, m_B = 10,$$

$$m_C = 72, m_D = 63,$$

$$m_E = 54.$$

**Задача D33.11.**

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

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

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

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

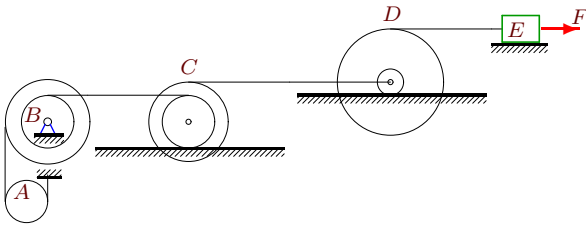
$$m_A = 8, m_B = 16,$$

$$m_C = 45, m_D = 576,$$

$$m_E = 576.$$

**Задача D33.12.**

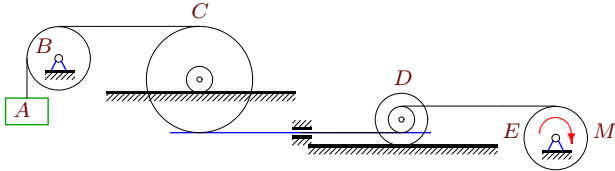
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$$\begin{aligned}
 R_B &= 4, r_B = 2, i_B = 2, \\
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 2, m_B = 16, \\
 m_C &= 8, m_D = 8, \\
 m_E &= 16.
 \end{aligned}$$

**Задача D33.13.**

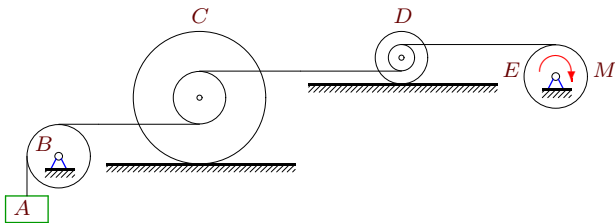
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$$\begin{aligned}
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 14, m_B = 2, \\
 m_C &= 20, m_D = 15, \\
 m_E &= 100.
 \end{aligned}$$

**Задача D33.14.**

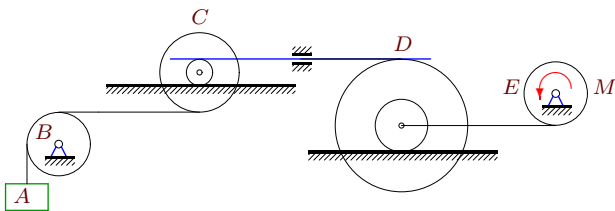
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$$\begin{aligned}
 R_C &= 5, r_C = 2, i_C = 4, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 15, m_B = 2, \\
 m_C &= 72, m_D = 9, \\
 m_E &= 12.
 \end{aligned}$$

**Задача D33.15.**

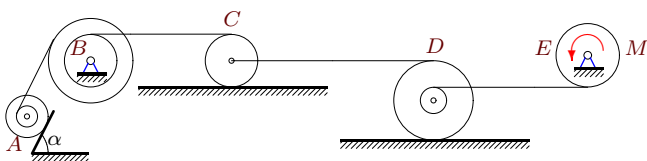
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$$\begin{aligned}
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 5, r_D = 2, i_D = 4, \\
 m_A &= 20, m_B = 6, \\
 m_C &= 24, m_D = 245, \\
 m_E &= 392.
 \end{aligned}$$

**Задача D33.16.**

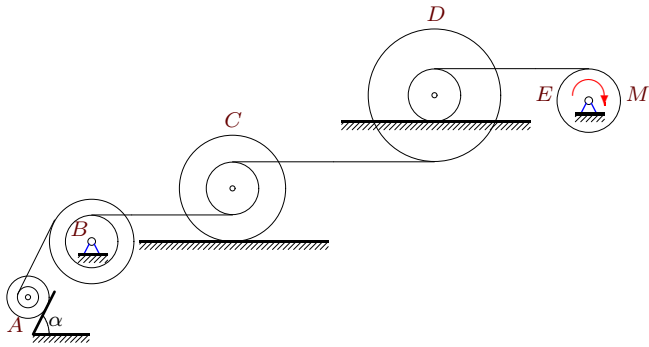
10



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 3, r_B = 2, i_B = 3, \\
 R_C &= 2, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 4, m_B = 8, \\
 m_C &= 32, m_D = 144, \\
 m_E &= 36.
 \end{aligned}$$

**Задача D33.17.**

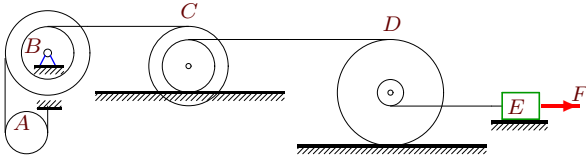
10



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 5, r_D = 2, i_D = 4, \\
 m_A &= 20, m_B = 12, \\
 m_C &= 32, m_D = 7, \\
 m_E &= 12.
 \end{aligned}$$

**Задача D33.18.**

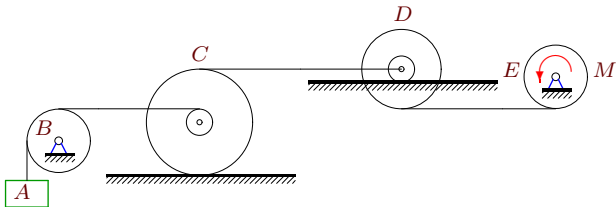
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$$\begin{aligned}
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 2, m_B = 16, \\
 m_C &= 100, m_D = 12, \\
 m_E &= 100.
 \end{aligned}$$

**Задача D33.19.**

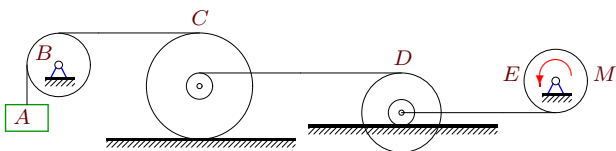
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$$\begin{aligned}
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 11, m_B = 4, \\
 m_C &= 4, m_D = 15, \\
 m_E &= 50.
 \end{aligned}$$

**Задача D33.20.**

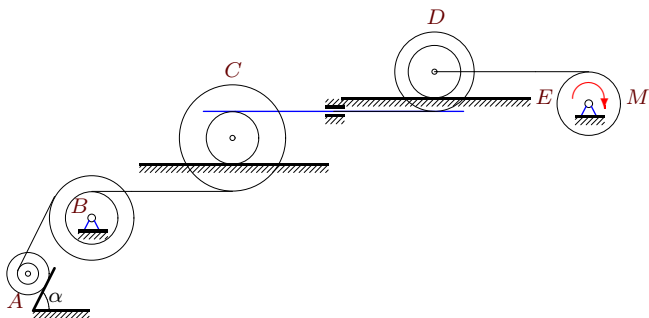
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$$\begin{aligned}
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 3, r_D = 1, i_D = 2, \\
 m_A &= 10, m_B = 10, \\
 m_C &= 320, m_D = 1024, \\
 m_E &= 2048.
 \end{aligned}$$

**Задача D33.21.**

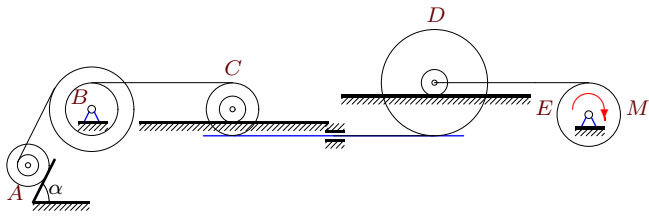
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$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 20, m_B = 24, \\
 m_C &= 32, m_D = 7, \\
 m_E &= 12.
 \end{aligned}$$

**Задача D33.22.**

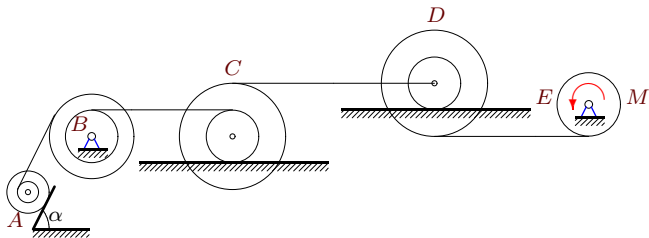
10



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 2, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 2, r_C = 1, i_C = 1, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 8, m_B = 16, \\
 m_C &= 45, m_D = 324, \\
 m_E &= 162.
 \end{aligned}$$

**Задача D33.23.**

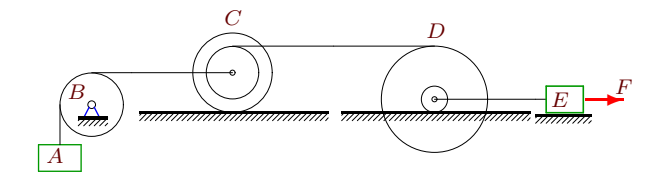
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$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 3, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 4, r_D = 2, i_D = 3, \\
 m_A &= 16, m_B = 20, \\
 m_C &= 112, m_D = 96, \\
 m_E &= 40.
 \end{aligned}$$

**Задача D33.24.**

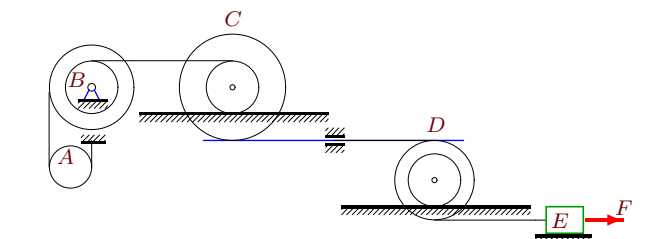
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$$\begin{aligned}
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 13, m_B = 8, \\
 m_C &= 45, m_D = 36, \\
 m_E &= 27.
 \end{aligned}$$

**Задача D33.25.**

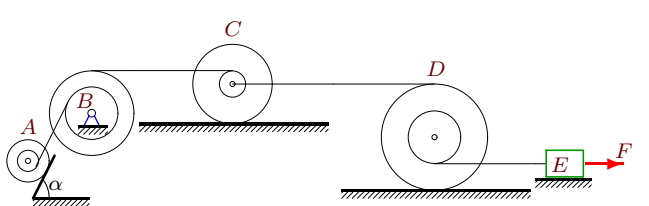
10



$$\begin{aligned}
 R_B &= 4, r_B = 2, i_B = 2, \\
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 4, m_B = 24, \\
 m_C &= 80, m_D = 100, \\
 m_E &= 100.
 \end{aligned}$$

**Задача D33.26.**

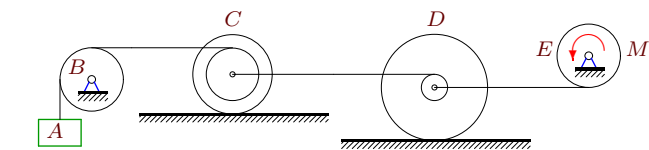
10



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 4, r_D = 2, i_D = 3, \\
 m_A &= 4, m_B = 32, \\
 m_C &= 64, m_D = 1024, \\
 m_E &= 256.
 \end{aligned}$$

**Задача D33.27.**

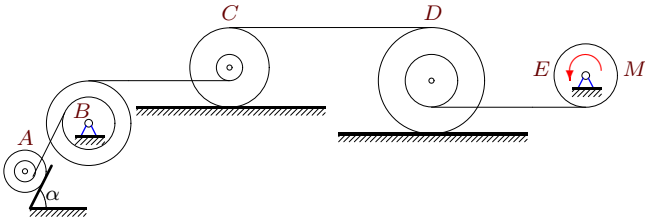
10



$$\begin{aligned}
 R_C &= 3, r_C = 2, i_C = 2, \\
 R_D &= 4, r_D = 1, i_D = 3, \\
 m_A &= 11, m_B = 8, \\
 m_C &= 150, m_D = 125, \\
 m_E &= 1250.
 \end{aligned}$$

**Задача D33.28.**

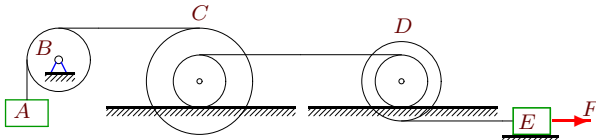
10



$$\begin{aligned}
 R_A &= 2, r_A = 1, i_A = 1, \\
 R_B &= 4, r_B = 2, i_B = 3, \\
 R_C &= 3, r_C = 1, i_C = 2, \\
 R_D &= 4, r_D = 2, i_D = 3, \\
 m_A &= 12, m_B = 32, \\
 m_C &= 24, m_D = 64, \\
 m_E &= 128.
 \end{aligned}$$

**Задача D33.29.**

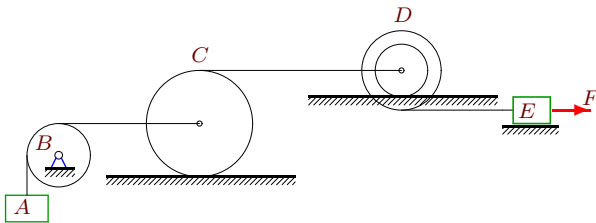
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$$\begin{aligned}
 R_C &= 4, r_C = 2, i_C = 3, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 19, m_B = 12, \\
 m_C &= 216, m_D = 45, \\
 m_E &= 144.
 \end{aligned}$$

**Задача D33.30.**

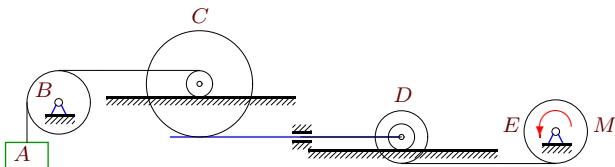
10



$$\begin{aligned}
 R_C &= 4, \\
 R_D &= 3, r_D = 2, i_D = 2, \\
 m_A &= 16, m_B = 12, \\
 m_C &= 14, m_D = 6, \\
 m_E &= 5.
 \end{aligned}$$

**Задача D33.31.**

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$$\begin{aligned}
 R_C &= 4, r_C = 1, i_C = 3, \\
 R_D &= 2, r_D = 1, i_D = 1, \\
 m_A &= 20, m_B = 12, \\
 m_C &= 8, m_D = 6, \\
 m_E &= 16.
 \end{aligned}$$

**D33 Ответы.****Кинетическая энергия системы. Приведенные массы** 17.09.2011

№	$\mu_A$	$\mu_B$	$\mu_C$	$\mu_D$	$\mu_E$	$\mu$
1	12	6	20	125	225	388
2	6	9	125	208	300	648
3	17	3	6	25	25	76
4	19	2	64	91	54	230
5	18	6	30	5	4	63
6	13	3	52	240	32	340
7	8	45	8	3	2	66
8	12	4	65	36	27	144
9	9	16	246	490	1225	1986
10	14	5	40	91	96	246
11	10	36	50	25	25	146
12	3	16	4	125	625	773
13	14	1	8	27	162	212
14	15	1	328	245	294	883
15	20	3	30	100	16	169
16	8	18	12	13	2	53
17	25	12	200	140	96	473
18	3	36	32	3	9	83
19	11	2	4	192	256	465
20	10	5	125	125	25	290
21	25	24	104	224	96	473
22	16	16	10	40	1	83
23	20	20	91	702	45	878
24	13	4	65	40	3	125
25	6	24	65	8	1	104
26	5	18	52	225	9	309
27	11	4	78	45	144	282
28	15	18	78	225	36	372
29	19	6	78	10	4	117
30	16	6	21	48	5	96
31	20	6	20	27	18	91

D33 файл о33d10B