

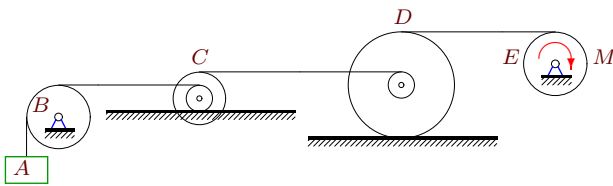
## Кинетическая энергия системы. Приведенные массы

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  $A$ .

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

### Задача 33.1.

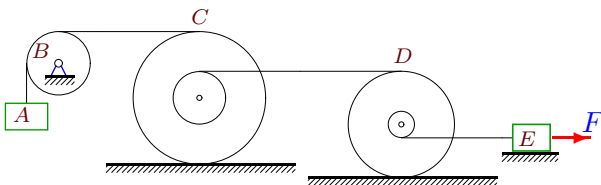
2



$$\begin{aligned} R_C &= 2, r_c = 1, i_C = 1, \\ R_D &= 4, r_D = 1, i_D = 3, \\ m_A &= 8, m_B = 8, \\ m_C &= 8, m_D = 12, \\ m_E &= 50. \end{aligned}$$

### Задача 33.2.

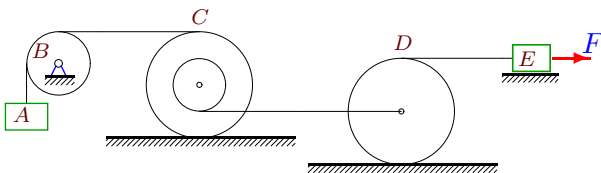
2



$$\begin{aligned} R_C &= 5, r_c = 2, i_C = 4, \\ R_D &= 4, r_D = 1, i_D = 3, \\ m_A &= 5, m_B = 6, \\ m_C &= 100, m_D = 256, \\ m_E &= 6400. \end{aligned}$$

### Задача 33.3.

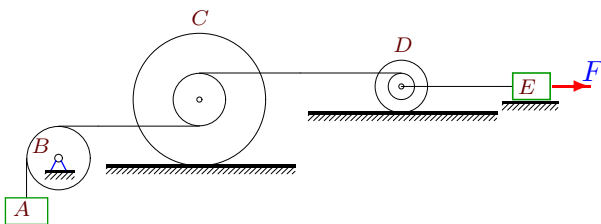
2



$$\begin{aligned} R_C &= 4, r_c = 2, i_C = 3, \\ R_D &= 4, \\ m_A &= 7, m_B = 2, \\ m_C &= 320, m_D = 128, \\ m_E &= 12. \end{aligned}$$

### Задача 33.4.

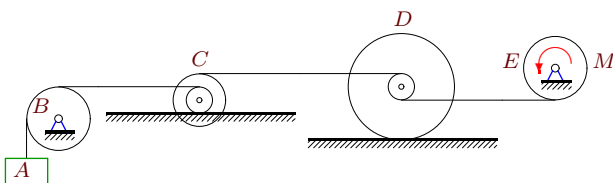
2



$$\begin{aligned} R_C &= 5, r_c = 2, i_C = 4, \\ R_D &= 2, r_D = 1, i_D = 1, \\ m_A &= 12, m_B = 12, \\ m_C &= 54, m_D = 81, \\ m_E &= 81. \end{aligned}$$

### Задача 33.5.

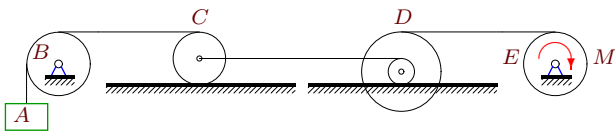
2



$$\begin{aligned} R_C &= 2, r_c = 1, i_C = 1, \\ R_D &= 4, r_D = 1, i_D = 3, \\ m_A &= 13, m_B = 6, \\ m_C &= 10, m_D = 16, \\ m_E &= 200. \end{aligned}$$

**Задача 33.6.**

2



$$R_C = 2,$$

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

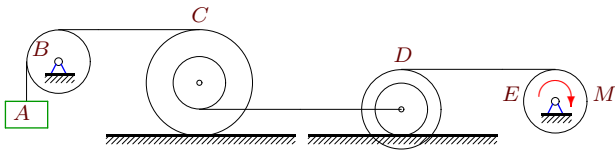
$$m_A = 13, m_B = 4,$$

$$m_C = 56, m_D = 96,$$

$$m_E = 10.$$

**Задача 33.7.**

2



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

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

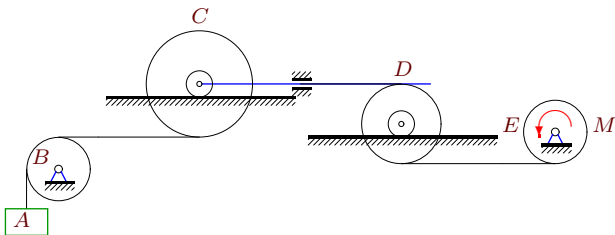
$$m_A = 13, m_B = 2,$$

$$m_C = 448, m_D = 48,$$

$$m_E = 128.$$

**Задача 33.8.**

2



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

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

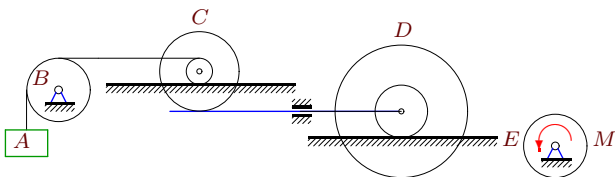
$$m_A = 21, m_B = 4,$$

$$m_C = 63, m_D = 144,$$

$$m_E = 360.$$

**Задача 33.9.**

2



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

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

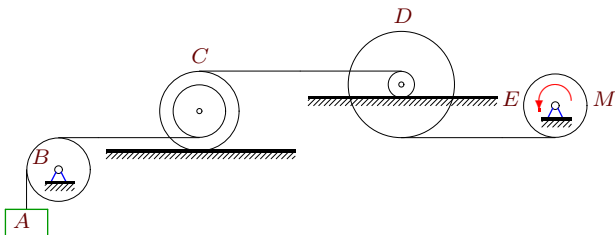
$$m_A = 20, m_B = 6,$$

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

$$m_E = 16.$$

**Задача 33.10.**

2



$$R_C = 3, r_c = 2, i_C = 2,$$

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

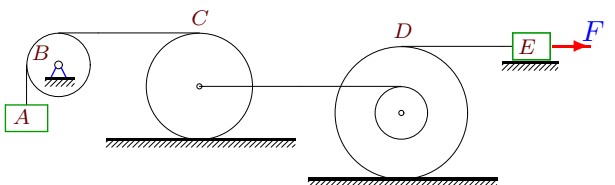
$$m_A = 17, m_B = 6,$$

$$m_C = 8, m_D = 7,$$

$$m_E = 12.$$

**Задача 33.11.**

2



$$R_C = 4,$$

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

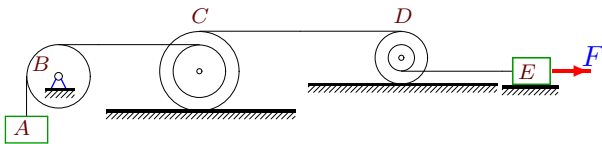
$$m_A = 8, m_B = 8,$$

$$m_C = 56, m_D = 196,$$

$$m_E = 245.$$

**Задача 33.12.**

2



$$R_C = 3, r_c = 2, i_C = 2,$$

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

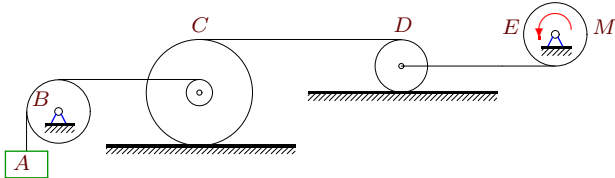
$$m_A = 5, m_B = 12,$$

$$m_C = 125, m_D = 80,$$

$$m_E = 100.$$

**Задача 33.13.**

2



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

$$R_D = 2,$$

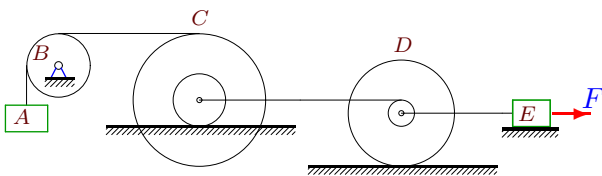
$$m_A = 9, m_B = 2,$$

$$m_C = 8, m_D = 175,$$

$$m_E = 300.$$

**Задача 33.14.**

2



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

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

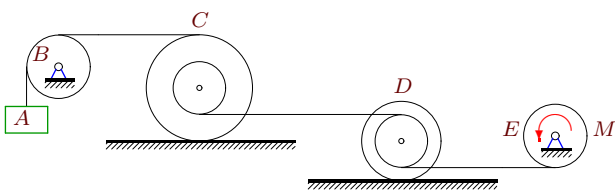
$$m_A = 12, m_B = 6,$$

$$m_C = 196, m_D = 147,$$

$$m_E = 1225.$$

**Задача 33.15.**

2



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

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

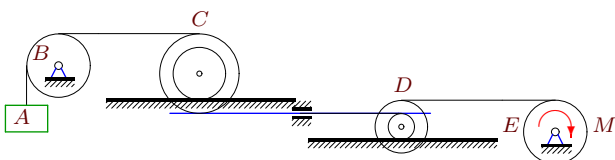
$$m_A = 12, m_B = 12,$$

$$m_C = 512, m_D = 400,$$

$$m_E = 800.$$

**Задача 33.16.**

2



$$R_C = 3, r_c = 2, i_C = 2,$$

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

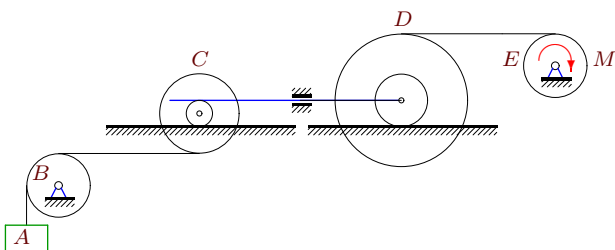
$$m_A = 18, m_B = 12,$$

$$m_C = 175, m_D = 300,$$

$$m_E = 200.$$

**Задача 33.17.**

2



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

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

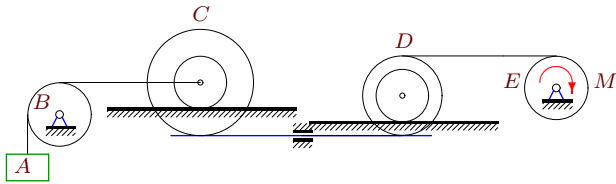
$$m_A = 19, m_B = 6,$$

$$m_C = 20, m_D = 4,$$

$$m_E = 24.$$

Задача 33.18.

2



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

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

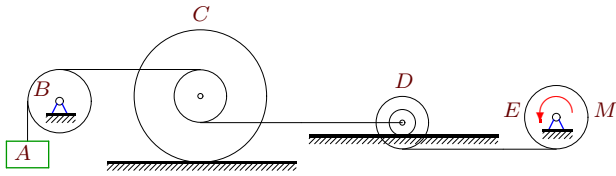
$$m_A = 22, m_B = 2,$$

$$m_C = 32, m_D = 7,$$

$$m_E = 12.$$

Задача 33.19.

2



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

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

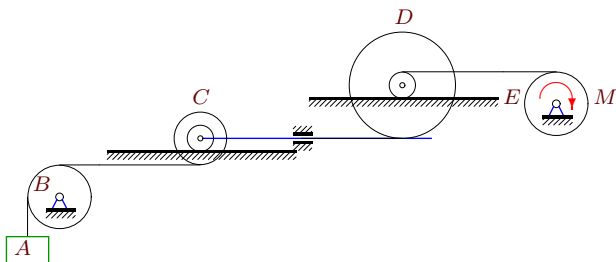
$$m_A = 15, m_B = 12,$$

$$m_C = 196, m_D = 147,$$

$$m_E = 196.$$

Задача 33.20.

2



$$R_C = 2, r_c = 1, i_C = 1,$$

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

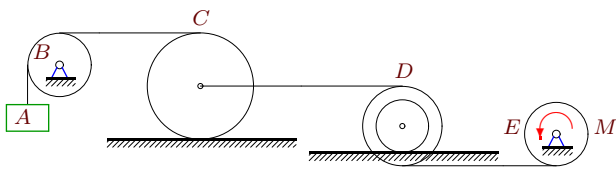
$$m_A = 23, m_B = 8,$$

$$m_C = 7, m_D = 54,$$

$$m_E = 90.$$

Задача 33.21.

2



$$R_C = 4,$$

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

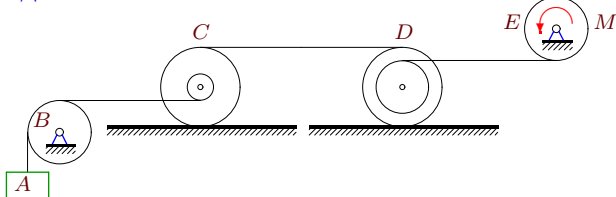
$$m_A = 14, m_B = 2,$$

$$m_C = 48, m_D = 125,$$

$$m_E = 200.$$

Задача 33.22.

2



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

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

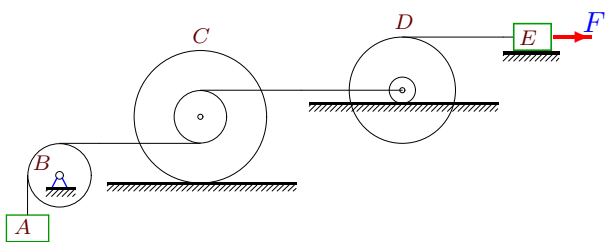
$$m_A = 4, m_B = 2,$$

$$m_C = 16, m_D = 12,$$

$$m_E = 16.$$

Задача 33.23.

2



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

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

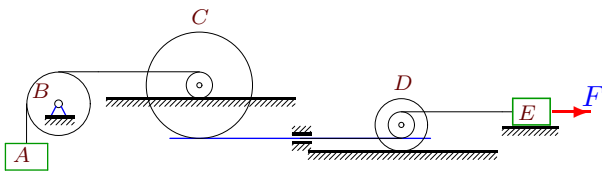
$$m_A = 13, m_B = 6,$$

$$m_C = 36, m_D = 9,$$

$$m_E = 9.$$

**Задача 33.24.**

2



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

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

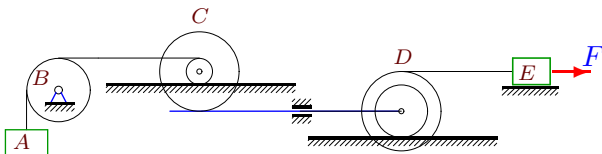
$$m_A = 20, m_B = 2,$$

$$m_C = 16, m_D = 28,$$

$$m_E = 24.$$

**Задача 33.25.**

2



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

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

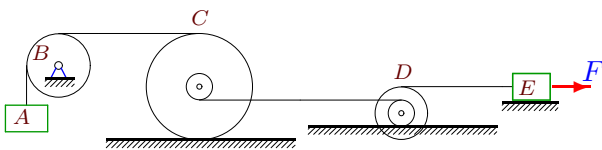
$$m_A = 18, m_B = 2,$$

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

$$m_E = 8.$$

**Задача 33.26.**

2



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

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

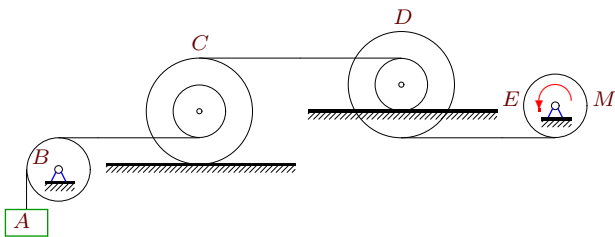
$$m_A = 10, m_B = 2,$$

$$m_C = 320, m_D = 128,$$

$$m_E = 256.$$

**Задача 33.27.**

2



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

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

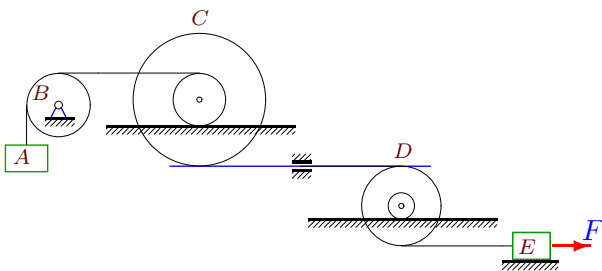
$$m_A = 16, m_B = 4,$$

$$m_C = 28, m_D = 6,$$

$$m_E = 10.$$

**Задача 33.28.**

2



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

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

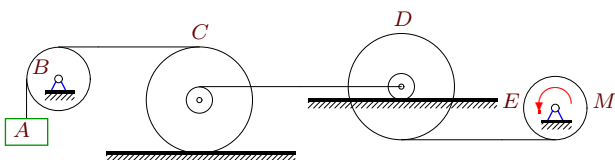
$$m_A = 23, m_B = 4,$$

$$m_C = 32, m_D = 256,$$

$$m_E = 384.$$

**Задача 33.29.**

2



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

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

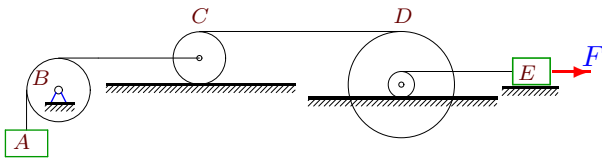
$$m_A = 12, m_B = 8,$$

$$m_C = 320, m_D = 32,$$

$$m_E = 128.$$

**Задача 33.30.**

2



$$R_C = 2,$$

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

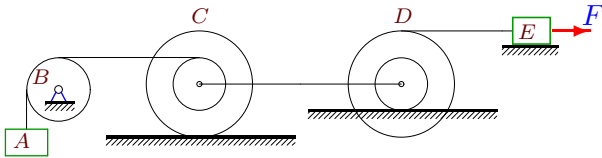
$$m_A = 12, m_B = 8,$$

$$m_C = 12, m_D = 25,$$

$$m_E = 100.$$

**Задача 33.31.**

2



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

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

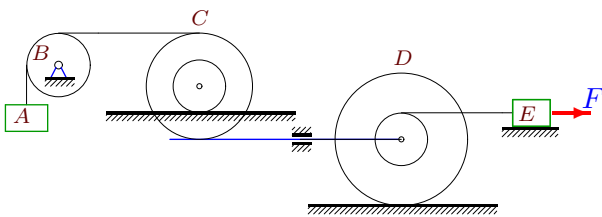
$$m_A = 16, m_B = 4,$$

$$m_C = 288, m_D = 63,$$

$$m_E = 6.$$

**Задача 33.32.**

2



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

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

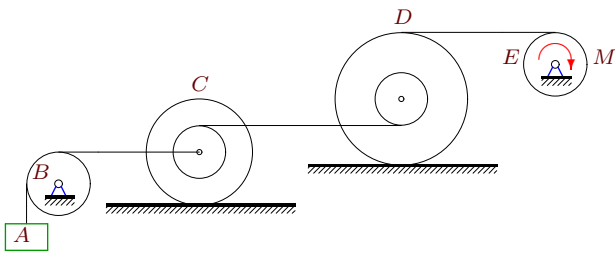
$$m_A = 13, m_B = 6,$$

$$m_C = 144, m_D = 225,$$

$$m_E = 225.$$

**Задача 33.33.**

2



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

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

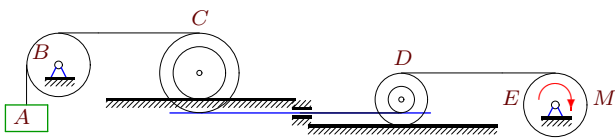
$$m_A = 8, m_B = 6,$$

$$m_C = 80, m_D = 16,$$

$$m_E = 6.$$

**Задача 33.34.**

2



$$R_C = 3, r_c = 2, i_C = 2,$$

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

$$m_A = 15, m_B = 12,$$

$$m_C = 200, m_D = 35,$$

$$m_E = 300.$$

**Кинетическая энергия системы. Приведенные массы**

	$\mu_A$	$\mu_B$	$\mu_C$	$\mu_D$	$\mu_E$	$\mu$
1	8	4	4	27	144	187
2	5	3	41	49	441	539
3	7	1	125	12	3	148
4	12	6	246	245	196	705
5	13	3	5	36	81	138
6	13	2	21	30	5	71
7	13	1	175	6	25	220
8	21	2	70	5	5	103
9	20	3	20	15	18	76
10	17	3	104	630	486	1240
11	8	4	21	41	125	199
12	5	6	65	36	9	121
13	9	1	8	168	96	282
14	12	3	80	12	64	171
15	12	6	200	13	1	232
16	18	6	56	6	9	95
17	19	3	25	20	147	214
18	22	1	104	56	150	333
19	15	6	164	54	18	257
20	23	4	14	60	20	121
21	14	1	18	10	1	44
22	4	1	52	39	50	146
23	13	3	164	490	1225	1895
24	20	1	40	315	486	862
25	18	1	20	6	50	95
26	10	1	125	9	81	226
27	16	2	175	78	20	291
28	23	2	40	45	54	164
29	12	4	125	125	225	491
30	12	4	18	40	64	138
31	16	2	200	91	24	333
32	13	3	52	41	49	158
33	8	3	125	164	75	375
34	15	6	64	7	96	188