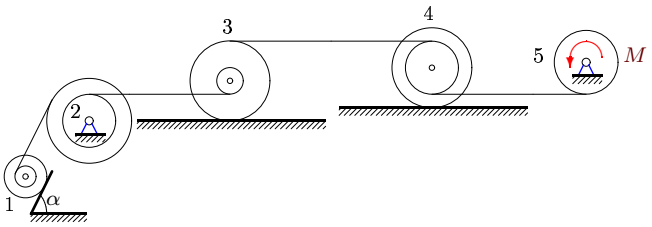
# Кинетическая энергия системы. Приведенные массы

Механическая система, состоящая из пяти тел 1, 2, 3, 4 и 5, движется под действием внешних сил. Заданы радиусы цилиндров и блоков. Радиусы инерции $\rho$ 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 $T = \mu v_1^2/2$, 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)

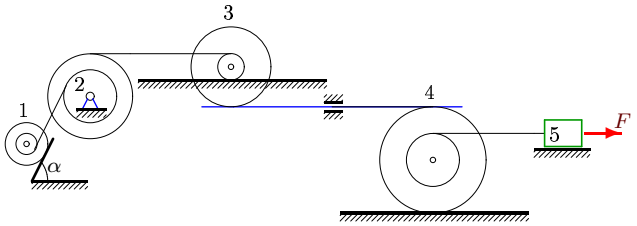
**Задача D-33.31.** *20*




$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 3$, $r_3 = 1$, $\rho_3 = 2$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 4$,
$m_3 = 16$, $m_4 = 75$,
$m_5 = 100$.

## Задача D-33.32.

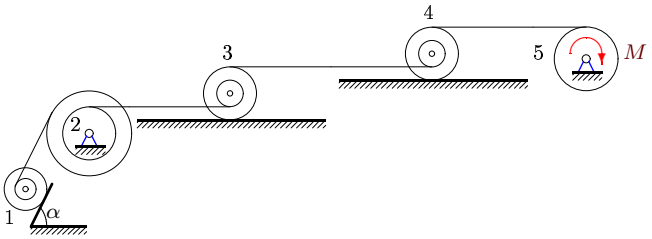





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 3$, $r_3 = 1$, $\rho_3 = 2$,
$R_4 = 4$, $r_4 = 2$, $\rho_4 = 3$,
$m_1 = 4$, $m_2 = 80$,
$m_3 = 16$, $m_4 = 192$,
$m_5 = 32$.

## Задача D-33.33.

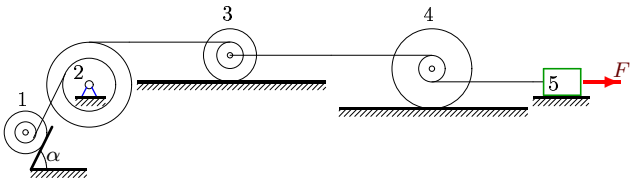





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 24$,
$m_3 = 4$, $m_4 = 3$,
$m_5 = 2$.

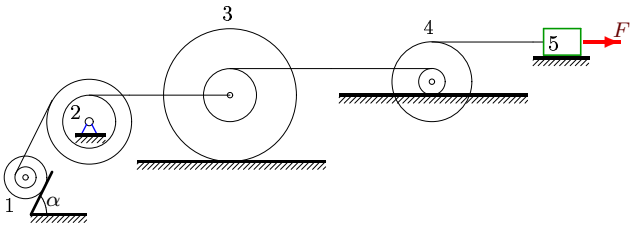
## Задача D-33.34.






$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 12$, $m_2 = 80$,
$m_3 = 54$, $m_4 = 180$,
$m_5 = 36$.

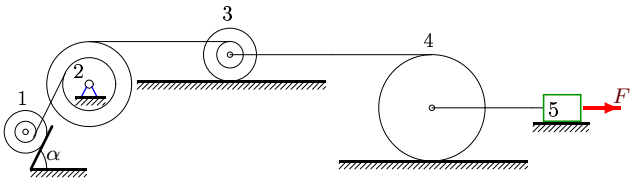
**Задача D-33.35.** 




$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 8$,
$m_3 = 100$, $m_4 = 60$,
$m_5 = 25$.

## Задача D-33.36.

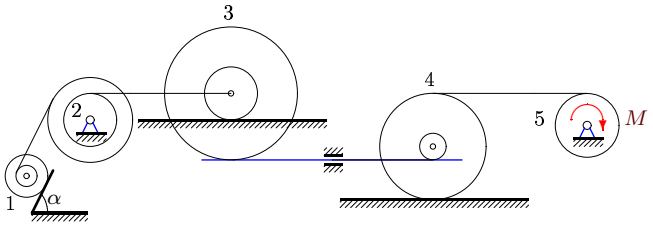





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 4$,
$m_1 = 4$, $m_2 = 64$,
$m_3 = 36$, $m_4 = 18$,
$m_5 = 18$.

## Задача D-33.37.

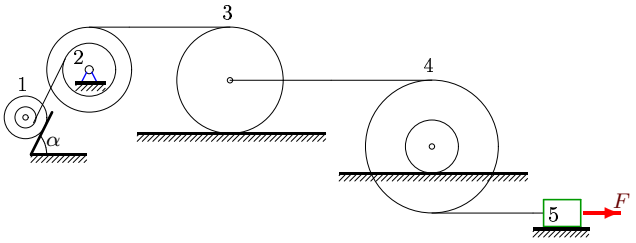





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 4$, $m_4 = 12$,
$m_5 = 4$.

## Задача D-33.38.

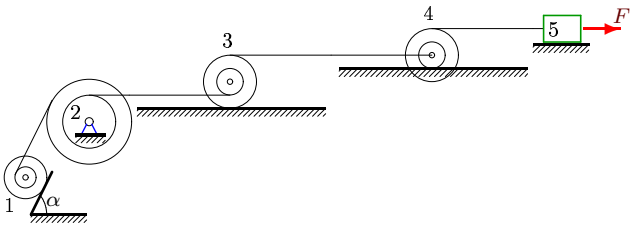





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$,
$R_4 = 5$, $r_4 = 2$, $\rho_4 = 4$,
$m_1 = 4$, $m_2 = 48$,
$m_3 = 32$, $m_4 = 147$,
$m_5 = 196$.

## Задача D-33.39.

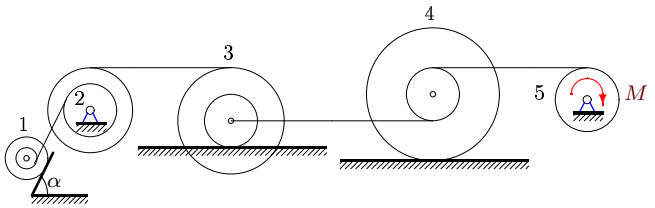





$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 4,\ m_2 = 24,$
$m_3 = 4,\ m_4 = 3,$
$m_5 = 1.$

## Задача D-33.40.

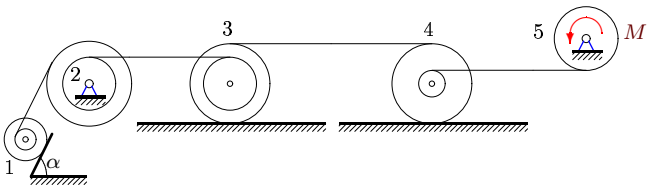





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 5$, $r_4 = 2$, $\rho_4 = 4$,
$m_1 = 8$, $m_2 = 48$,
$m_3 = 180$, $m_4 = 324$,
$m_5 = 162$.

## Задача D-33.41.

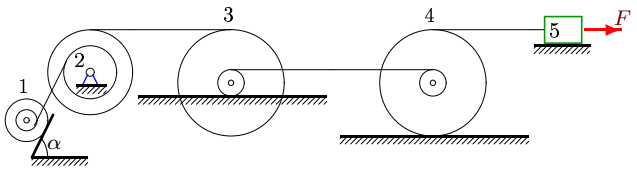





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 3$, $r_3 = 2$, $\rho_3 = 2$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 8$,
$m_3 = 100$, $m_4 = 75$,
$m_5 = 100$.

## Задача D-33.42.

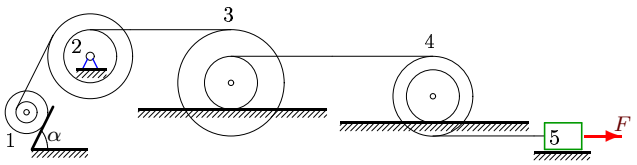





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 4$, $m_2 = 48$,
$m_3 = 20$, $m_4 = 75$,
$m_5 = 625$.

## Задача D-33.43.

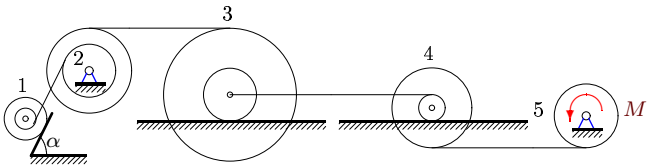





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 4$,
$m_3 = 144$, $m_4 = 225$,
$m_5 = 225$.

## Задача D-33.44.

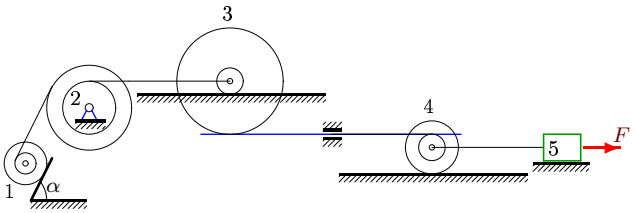





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 80$,
$m_3 = 196$, $m_4 = 147$,
$m_5 = 196$.

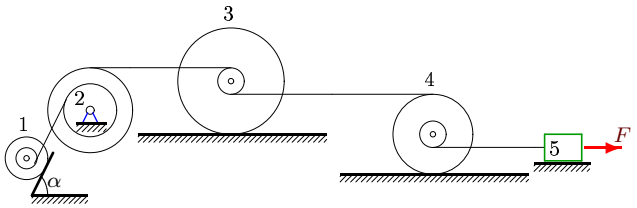
## Задача D-33.45.






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

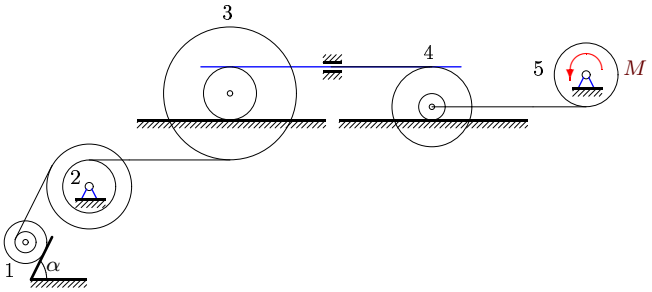
**Задача D-33.46.** 




$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 32$,
$m_3 = 4$, $m_4 = 100$,
$m_5 = 50$.

## Задача D-33.47.

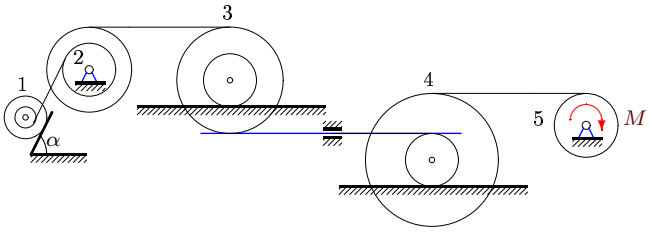





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 8$, $m_2 = 8$,
$m_3 = 45$, $m_4 = 36$,
$m_5 = 54$.

## Задача D-33.48.

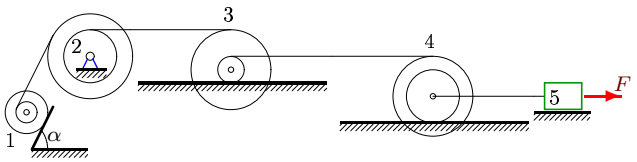





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 5$, $r_4 = 2$, $\rho_4 = 4$,
$m_1 = 8$, $m_2 = 64$,
$m_3 = 180$, $m_4 = 144$,
$m_5 = 288$.

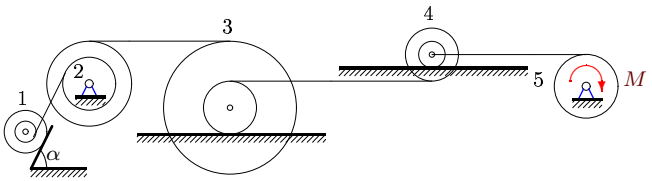
## Задача D-33.49.






$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 3$, $r_3 = 1$, $\rho_3 = 2$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 4$,
$m_3 = 64$, $m_4 = 75$,
$m_5 = 50$.

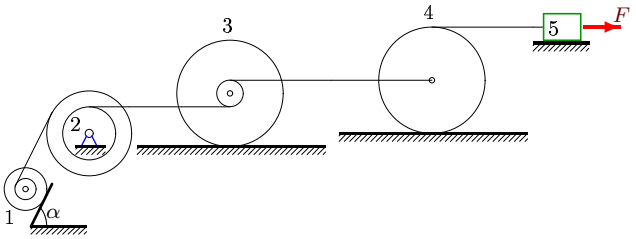
**Задача D-33.50.**




$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 96$,
$m_3 = 196$, $m_4 = 147$,
$m_5 = 196$.

## Задача D-33.51.

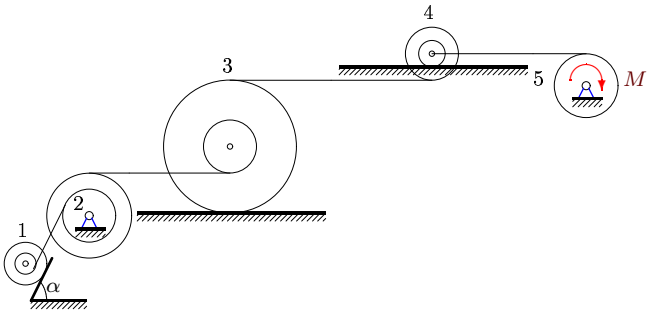





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 4$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 36$, $m_4 = 18$,
$m_5 = 18$.

## Задача D-33.52.

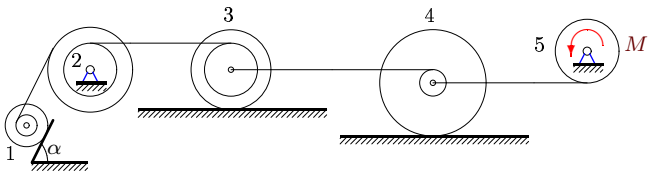





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 8$, $m_2 = 96$,
$m_3 = 45$, $m_4 = 9$,
$m_5 = 54$.

## Задача D-33.53.

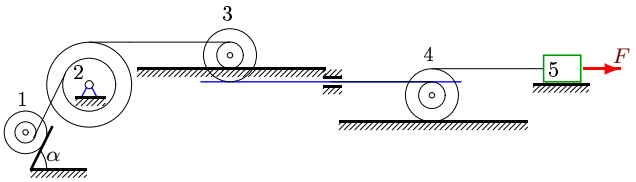





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 3$, $r_3 = 2$, $\rho_3 = 2$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 8$, $m_2 = 16$,
$m_3 = 125$, $m_4 = 100$,
$m_5 = 1250$.

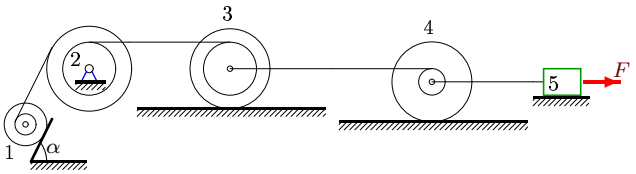
## Задача D-33.54.






$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 8$, $m_4 = 108$,
$m_5 = 18$.

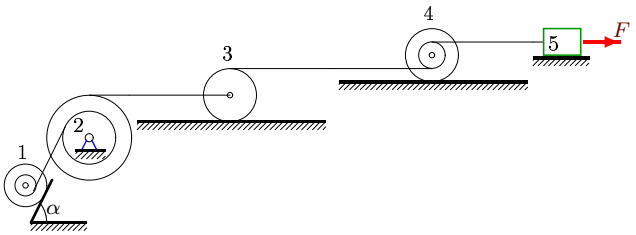
**Задача D-33.55.** 




$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 3$, $r_3 = 2$, $\rho_3 = 2$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 20$,
$m_3 = 100$, $m_4 = 400$,
$m_5 = 400$.

## Задача D-33.56.

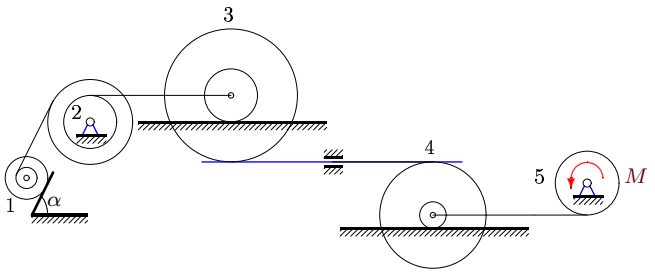





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 12$, $m_2 = 96$,
$m_3 = 12$, $m_4 = 5$,
$m_5 = 4$.

## Задача D-33.57.

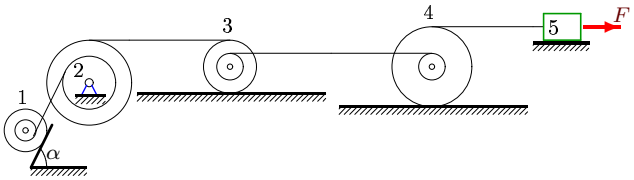





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 16$, $m_2 = 16$,
$m_3 = 7$, $m_4 = 60$,
$m_5 = 200$.

## Задача D-33.58.

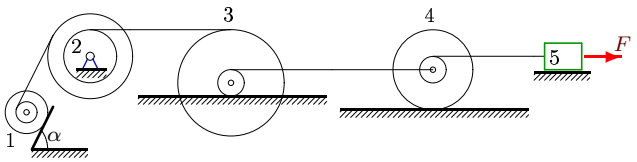





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 80$,
$m_3 = 64$, $m_4 = 256$,
$m_5 = 128$.

## Задача D-33.59.

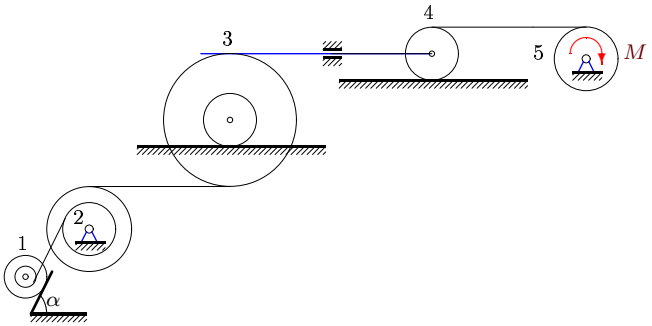





$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 8$,
$m_3 = 20$, $m_4 = 225$,
$m_5 = 225$.

## Задача D-33.60.






$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 2$,
$m_1 = 4$, $m_2 = 96$,
$m_3 = 36$, $m_4 = 18$,
$m_5 = 18$.

**Ответы.**

## Кинетическая энергия системы. Приведенные массы 17.05.2015

| № | $\mu_1$ | $\mu_2$ | $\mu_3$ | $\mu_4$ | $\mu_5$ | $\sum \mu_k$ |
|---|---|---|---|---|---|---|
| 31 | 5 | 9 | 52 | 351 | 18 | 435 |
| 32 | 5 | 45 | 20 | 75 | 18 | 163 |
| 33 | 8 | 54 | 20 | 240 | 256 | 578 |
| 34 | 24 | 45 | 30 | 65 | 4 | 168 |
| 35 | 5 | 8 | 164 | 147 | 196 | 520 |
| 36 | 8 | 36 | 20 | 3 | 2 | 69 |
| 37 | 5 | 36 | 20 | 75 | 32 | 168 |
| 38 | 5 | 12 | 12 | 15 | 9 | 53 |
| 39 | 8 | 24 | 20 | 96 | 144 | 292 |
| 40 | 10 | 27 | 65 | 164 | 49 | 315 |
| 41 | 8 | 18 | 52 | 39 | 32 | 149 |
| 42 | 5 | 27 | 8 | 12 | 256 | 308 |
| 43 | 5 | 4 | 52 | 32 | 4 | 97 |
| 44 | 5 | 20 | 80 | 15 | 8 | 128 |
| 45 | 5 | 9 | 40 | 15 | 8 | 77 |
| 46 | 5 | 18 | 4 | 13 | 2 | 42 |
| 47 | 10 | 8 | 100 | 20 | 3 | 141 |
| 48 | 10 | 16 | 65 | 20 | 49 | 160 |
| 49 | 5 | 4 | 20 | 6 | 2 | 37 |
| 50 | 5 | 24 | 80 | 96 | 32 | 237 |
| 51 | 5 | 36 | 100 | 75 | 200 | 416 |
| 52 | 10 | 24 | 205 | 200 | 300 | 739 |
| 53 | 16 | 36 | 65 | 36 | 144 | 297 |
| 54 | 8 | 9 | 4 | 15 | 8 | 44 |
| 55 | 8 | 45 | 52 | 117 | 81 | 303 |
| 56 | 24 | 54 | 18 | 100 | 144 | 340 |
| 57 | 20 | 16 | 35 | 54 | 9 | 134 |
| 58 | 8 | 45 | 20 | 117 | 162 | 352 |
| 59 | 5 | 18 | 8 | 52 | 64 | 147 |
| 60 | 5 | 54 | 80 | 147 | 196 | 482 |

*D-33* файл o33d20F