

## Трение качения

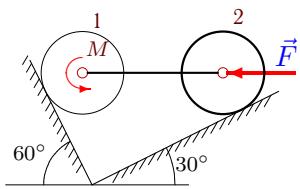
Система состоит из двух цилиндров весом  $G_1$  и  $G_2$  с одинаковыми радиусами  $R$ , соединенных однородным стержнем весом  $G_3$ . Цилиндры могут кататься без проскальзывания, цилиндр 1 без сопротивления, а цилиндр 2 с трением качения ( $\delta$ ). В каких пределах меняется внешний момент  $M$  при условии равновесия системы?

В ответах даны нормальные реакции опор и момент  $M$  для движения цилиндра 2 по часовой стрелке и против (последние три столбца).

**Кирсанов М.Н. Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. – 384 с. (с.80.)

**Задача 18.1.**

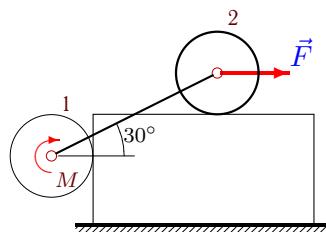
Аксенов Юрий



$$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 40 \text{ H}, \\ F = 15 \text{ H}, R = 65 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.3.**

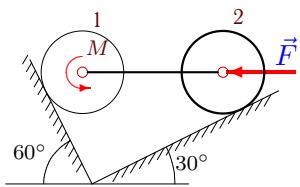
Воробьев Кирилл



$$P_1 = 25 \text{ H}, P_2 = 30 \text{ H}, P_3 = 30 \text{ H}, \\ F = 25 \text{ H}, R = 45 \text{ см}, \delta = 2 \text{ мм.}$$

**Задача 18.5.**

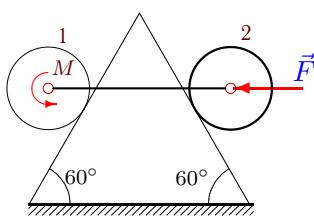
Грицай Виктор



$$P_1 = 21 \text{ H}, P_2 = 25 \text{ H}, P_3 = 10 \text{ H}, \\ F = 5 \text{ H}, R = 15 \text{ см}, \delta = 1 \text{ мм.}$$

**Задача 18.2.**

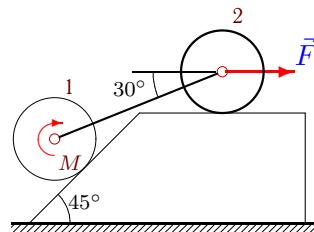
Бублей Александр



$$P_1 = 10 \text{ H}, P_2 = 25 \text{ H}, P_3 = 20 \text{ H}, \\ F = 5 \text{ H}, R = 55 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.4.**

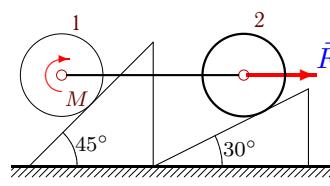
Гаджиев Джамал



$$P_1 = 22 \text{ H}, P_2 = 24 \text{ H}, P_3 = 10 \text{ H}, \\ F = 10 \text{ H}, R = 20 \text{ см}, \delta = 1 \text{ мм.}$$

**Задача 18.6.**

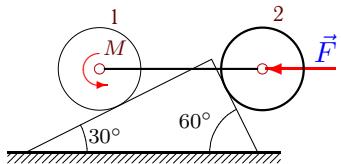
Желябовская Юля



$$P_1 = 25 \text{ H}, P_2 = 30 \text{ H}, P_3 = 30 \text{ H}, \\ F = 25 \text{ H}, R = 75 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.7.**

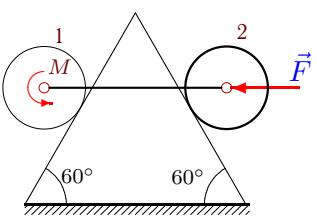
Зайцева Евгения



$$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 50 \text{ H}, \\ F = 15 \text{ H}, R = 25 \text{ см}, \delta = 1 \text{ мм.}$$

**Задача 18.9.**

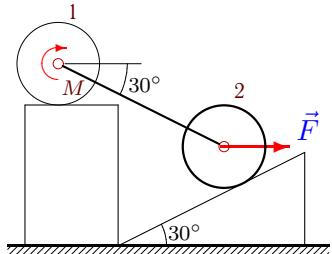
Костюков Дмитрий



$$P_1 = 11 \text{ H}, P_2 = 25 \text{ H}, P_3 = 30 \text{ H}, \\ F = 10 \text{ H}, R = 30 \text{ см}, \delta = 2 \text{ мм.}$$

**Задача 18.11.**

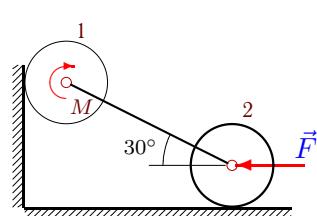
Котенко Вячеслав



$$P_1 = 24 \text{ H}, P_2 = 28 \text{ H}, P_3 = 40 \text{ H}, \\ F = 20 \text{ H}, R = 60 \text{ см}, \delta = 4 \text{ мм.}$$

**Задача 18.13.**

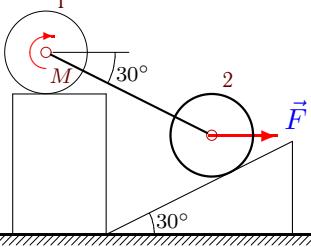
Настаева Зухра



$$P_1 = 5 \text{ H}, P_2 = 25 \text{ H}, P_3 = 20 \text{ H}, \\ F = 10 \text{ H}, R = 35 \text{ см}, \delta = 3 \text{ мм.}$$

**Задача 18.8.**

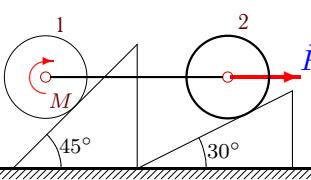
Колесник Анастасия



$$P_1 = 24 \text{ H}, P_2 = 28 \text{ H}, P_3 = 30 \text{ H}, \\ F = 20 \text{ H}, R = 50 \text{ см}, \delta = 3 \text{ мм.}$$

**Задача 18.10.**

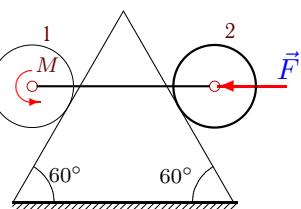
Коротеев Александр



$$P_1 = 24 \text{ H}, P_2 = 29 \text{ H}, P_3 = 40 \text{ H}, \\ F = 20 \text{ H}, R = 70 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.12.**

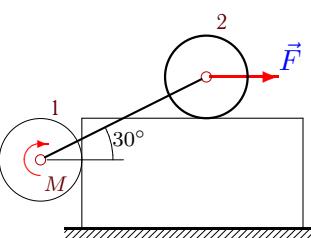
Мальцев Александр



$$P_1 = 10 \text{ H}, P_2 = 24 \text{ H}, P_3 = 20 \text{ H}, \\ F = 5 \text{ H}, R = 45 \text{ см}, \delta = 4 \text{ мм.}$$

**Задача 18.14.**

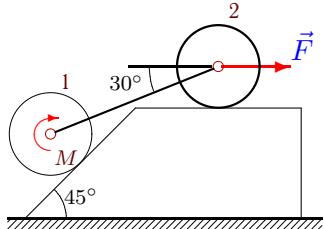
Никита Шевцов



$$P_1 = 24 \text{ H}, P_2 = 27 \text{ H}, P_3 = 30 \text{ H}, \\ F = 20 \text{ H}, R = 40 \text{ см}, \delta = 2 \text{ мм.}$$

**Задача 18.15.**

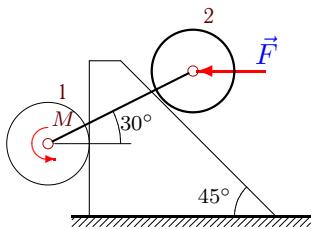
Светлов Вадим



$$P_1 = 25 \text{ H}, P_2 = 26 \text{ H}, P_3 = 50 \text{ H}, \\ F = 25 \text{ H}, R = 75 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.17.**

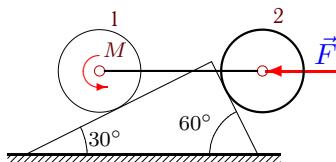
Степин Илья



$$P_1 = 21 \text{ H}, P_2 = 24 \text{ H}, P_3 = 10 \text{ H}, \\ F = 5 \text{ H}, R = 35 \text{ см}, \delta = 3 \text{ мм.}$$

**Задача 18.19.**

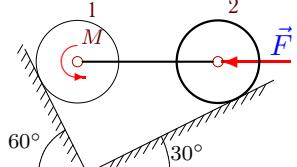
Ченцов Максим



$$P_1 = 25 \text{ H}, P_2 = 26 \text{ H}, P_3 = 50 \text{ H}, \\ F = 25 \text{ H}, R = 45 \text{ см}, \delta = 2 \text{ мм.}$$

**Задача 18.21.**

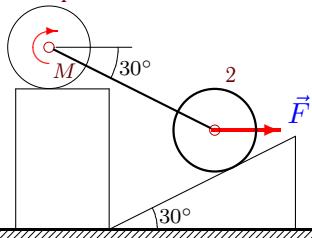
Шабан Михаил



$$P_1 = 21 \text{ H}, P_2 = 25 \text{ H}, P_3 = 50 \text{ H}, \\ F = 5 \text{ H}, R = 55 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.16.**

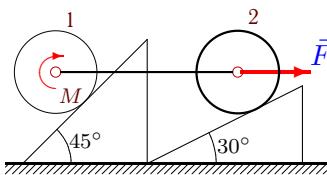
Смирнова Анастасия



$$P_1 = 25 \text{ H}, P_2 = 30 \text{ H}, P_3 = 10 \text{ H}, \\ F = 25 \text{ H}, R = 65 \text{ см}, \delta = 4 \text{ мм.}$$

**Задача 18.18.**

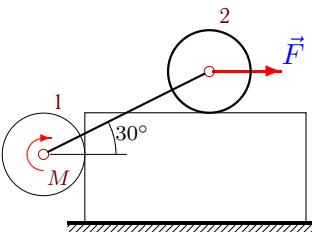
Цвирко Федор



$$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 50 \text{ H}, \\ F = 15 \text{ H}, R = 35 \text{ см}, \delta = 2 \text{ мм.}$$

**Задача 18.20.**

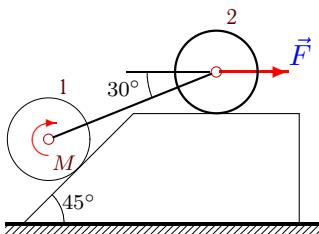
Чигидина Лиза



$$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 50 \text{ H}, \\ F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм.}$$

**Задача 18.22.**

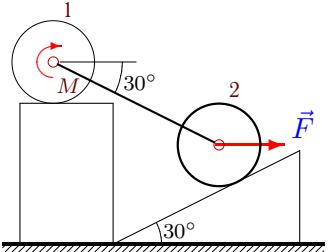
Шимарова Светлана



$$P_1 = 24 \text{ H}, P_2 = 25 \text{ H}, P_3 = 10 \text{ H}, \\ F = 20 \text{ H}, R = 70 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.23.**

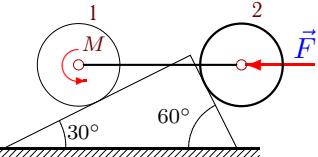
Шинкина Анна



$$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 10 \text{ H}, \\ F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм.}$$

**Задача 18.24.**

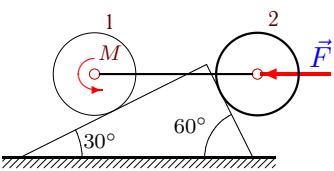
Шуйчиков Артем



$$P_1 = 23 \text{ H}, P_2 = 26 \text{ H}, P_3 = 50 \text{ H}, \\ F = 15 \text{ H}, R = 65 \text{ см}, \delta = 5 \text{ мм.}$$

**Задача 18.25.**

Бондаренко В.



$$P_1 = 24 \text{ H}, P_2 = 29 \text{ H}, P_3 = 20 \text{ H}, \\ F = 20 \text{ H}, R = 70 \text{ см}, \delta = 5 \text{ мм.}$$