

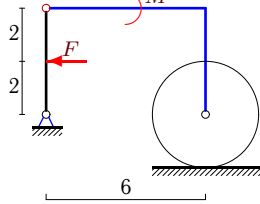
Трение качения

Механическая система состоит из невесомого уголка, невесомого стержня и цилиндра весом P радиусом R . Стержень, ось цилиндра и уголок соединены шарнирно. Цилиндр может кататься без проскальзывания с трением качения δ . В каких пределах меняется момент M при условии равновесия системы?

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

Задача S-18.1.

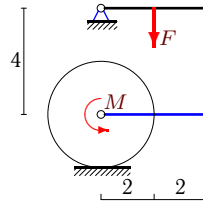
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$$P = 408 \text{ Н}, F = 8 \text{ Н}, R = 2 \text{ м}, \delta = 2 \text{ см}$$

Задача S-18.2.

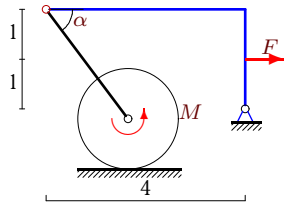
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$$P = 92 \text{ Н}, F = 16 \text{ Н}, R = 2 \text{ м}, \delta = 1 \text{ см}$$

Задача S-18.3.

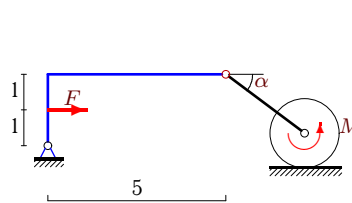
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$$P = 104 \text{ Н}, F = 10 \text{ Н}, R = 1 \text{ м}, \delta = 1 \text{ см}, \cos \alpha = 0,6.$$

Задача S-18.4.

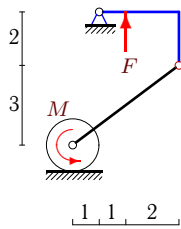
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$$P = 97 \text{ Н}, F = 23 \text{ Н}, R = 1 \text{ м}, \delta = 1 \text{ см}, \cos \alpha = 0,8.$$

Задача S-18.5.

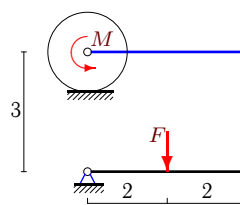
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$$P = F = 425 \text{ Н}, R = 1 \text{ м}, \delta = 2 \text{ см}$$

Задача S-18.6.

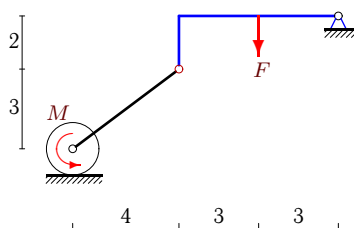
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$$P = 47 \text{ Н}, F = 6 \text{ Н}, R = 1 \text{ м}, \delta = 2 \text{ см}$$

Задача S-18.7.

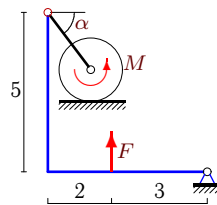
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$$P = F = 500 \text{ Н}, R = 1 \text{ м}, \delta = 2 \text{ см}$$

Задача S-18.8.

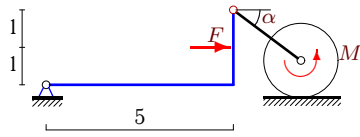
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$$P = 112 \text{ Н}, F = 5 \text{ Н}, R = 1 \text{ м}, \delta = 1 \text{ см}, \cos \alpha = 0,6.$$

Задача S-18.9.

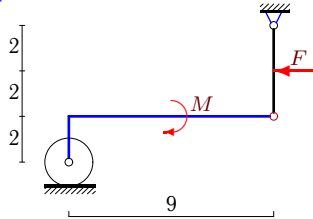
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$P = 197 \text{ H}$, $F = 23 \text{ H}$, $R = 1 \text{ м}$,
 $\delta = 2 \text{ см}$, $\cos \alpha = 0,8$.

Задача S-18.11.

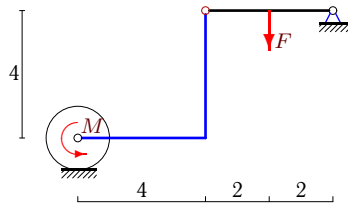
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$P = 209 \text{ H}$, $F = 4 \text{ H}$, $R = 1 \text{ м}$, $\delta = 1 \text{ см}$

Задача S-18.13.

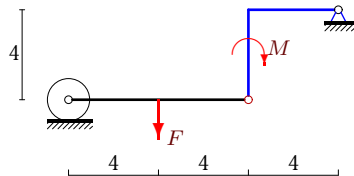
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$P = 42 \text{ H}$, $F = 16 \text{ H}$, $R = 1 \text{ м}$, $\delta = 2 \text{ см}$

Задача S-18.15.

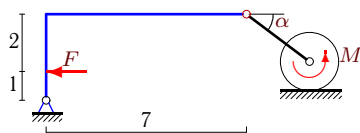
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$P = 10 \text{ H}$, $F = 30 \text{ H}$, $R = 1 \text{ м}$, $\delta = 1 \text{ см}$

Задача S-18.17.

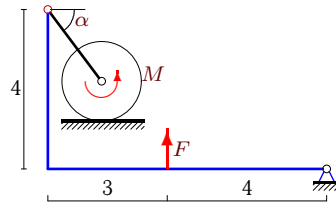
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$P = 103 \text{ H}$, $F = 33 \text{ H}$, $R = 1 \text{ м}$,
 $\delta = 1 \text{ см}$, $\cos \alpha = 0,8$.

Задача S-18.10.

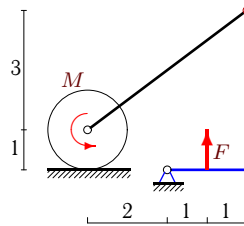
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$P = 216 \text{ H}$, $F = 16 \text{ H}$, $R = 1 \text{ м}$,
 $\delta = 1 \text{ см}$, $\cos \alpha = 0,6$.

Задача S-18.12.

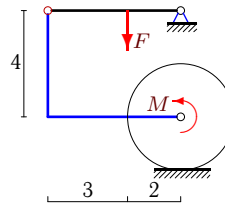
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$P = 1000 \text{ H}$, $F = 500 \text{ H}$, $R = 1 \text{ м}$, $\delta = 2 \text{ см}$

Задача S-18.14.

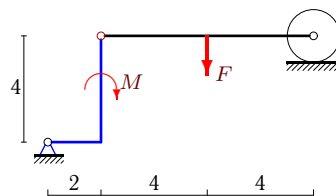
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$P = 46 \text{ H}$, $F = 10 \text{ H}$, $R = 2 \text{ м}$, $\delta = 2 \text{ см}$

Задача S-18.16.

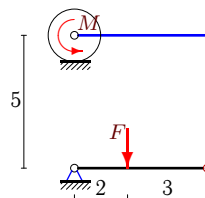
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$P = 5 \text{ H}$, $F = 40 \text{ H}$, $R = 1 \text{ м}$, $\delta = 2 \text{ см}$

Задача S-18.18.

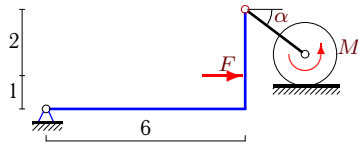
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$P = 90 \text{ H}$, $F = 25 \text{ H}$, $R = 1 \text{ м}$, $\delta = 1 \text{ см}$

Задача S-18.19.

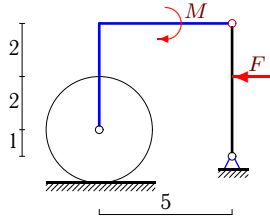
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$P = 97 \text{ H}, F = 30 \text{ H}, R = 1 \text{ м},$
 $\delta = 1 \text{ см}, \cos \alpha = 0,8.$

Задача S-18.21.

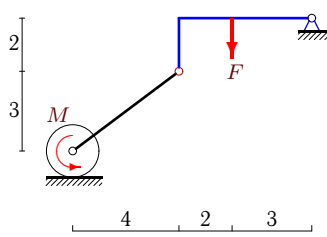
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$P = 612 \text{ H}, F = 10 \text{ H}, R = 2 \text{ м}, \delta = 2 \text{ см}$

Задача S-18.23.

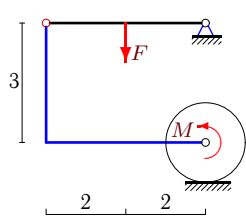
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$P = F = 175 \text{ H}, R = 1 \text{ м}, \delta = 2 \text{ см}$

Задача S-18.25.

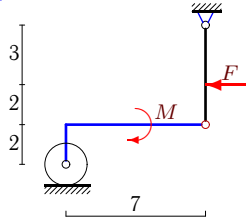
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$P = 94 \text{ H}, F = 12 \text{ H}, R = 1 \text{ м}, \delta = 1 \text{ см}$

Задача S-18.27.

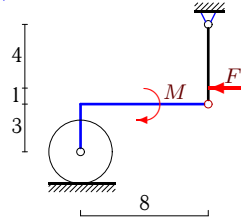
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$P = 313 \text{ H}, F = 5 \text{ H}, R = 1 \text{ м}, \delta = 1 \text{ см}$

Задача S-18.20.

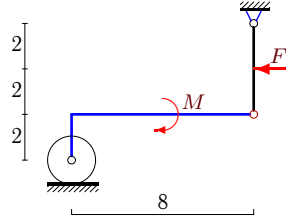
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$P = 807 \text{ H}, F = 10 \text{ H}, R = 2 \text{ м}, \delta = 2 \text{ см}$

Задача S-18.22.

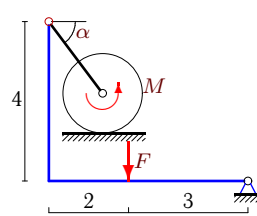
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$P = 209 \text{ H}, F = 4 \text{ H}, R = 1 \text{ м}, \delta = 1 \text{ см}$

Задача S-18.24.

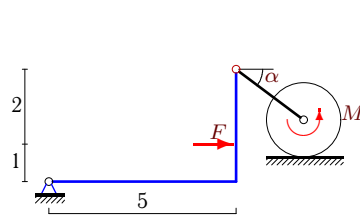
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$P = 88 \text{ H}, F = 8 \text{ H}, R = 1 \text{ м},$
 $\delta = 2 \text{ см}, \cos \alpha = 0,6.$

Задача S-18.26.

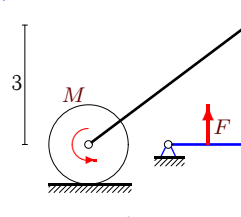
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$P = 197 \text{ H}, F = 27 \text{ H}, R = 1 \text{ м},$
 $\delta = 1 \text{ см}, \cos \alpha = 0,8.$

Задача S-18.28.

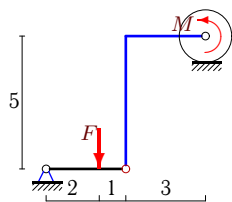
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$P = 120 \text{ H}, F = 60 \text{ H}, R = 1 \text{ м}, \delta = 2 \text{ см}$

Задача S-18.29.

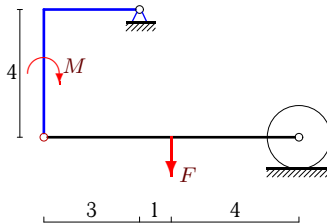
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$P = 90 \text{ Н}, F = 15 \text{ Н}, R = 1 \text{ м}, \delta = 1 \text{ см}$

Задача S-18.30.

9



$P = 25 \text{ Н}, F = 50 \text{ Н}, R = 1 \text{ м}, \delta = 1 \text{ см}$

**S-18 Ответы.
Трение качения**

05.05.2013

№	M_{min}	M_{max}
1	$-\infty$	32
2	-17	-15
3	-4	-2
4	3	5
5	93	107
6	3	5
7	-619	-581
8	-10	-8
9	0	8
10	-14	-10
11	$-\infty$	85
12	-223	-177
13	-9	-7
14	9	11
15	59	61
16	-38	-42
17	-5	-3
18	9	11
19	3	5
20	$-\infty$	80
21	$-\infty$	84
22	$-\infty$	76
23	-308	-292
24	7	11
25	7	9
26	2	6
27	$-\infty$	97
28	-43	-37
29	-7	-5
30	73	77