

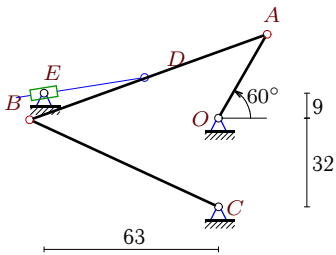
## Механизм с муфтой (1)

Плоский механизм с одной степенью свободы состоит из шарнирно соединенных стержней и муфты, скользящей по направляющему стержню и шарнирно закрепленной на другом стержне или вращающейся на неподвижном шарнире. Кривошип  $OA$  вращается против часовой стрелки с постоянной угловой скоростью  $\omega_{OA}$ . Горизонтальные и вертикальные размеры на рисунках даны для неподвижных шарниров и для линий движения ползунов (в см). Найти скорость муфты  $D$  (или  $E$ ) относительно направляющего стержня (в см/с).

Кирсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. – 384 с. (с.216.)

**Задача K13.1.**

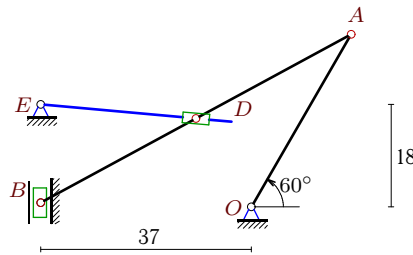
7



$$\omega_{OA} = 5\frac{1}{c}, \alpha = 60^\circ, OA = 35, \\ AB = 91, BC = 75, AD = AB/2.$$

**Задача K13.2.**

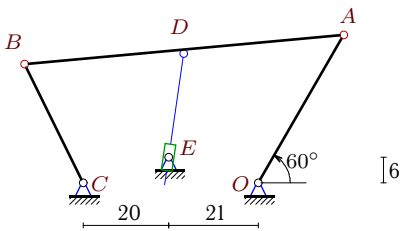
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$$\omega_{OA} = 18\frac{1}{c}, \alpha = 60^\circ, OA = 35, \\ AB = 62, AD = AB/2.$$

**Задача K13.3.**

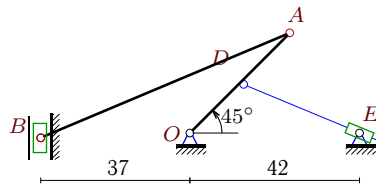
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$$\omega_{OA} = 17\frac{1}{c}, \alpha = 60^\circ, OA = 40, \\ AB = 75, BC = 31, AD = AB/2.$$

**Задача K13.4.**

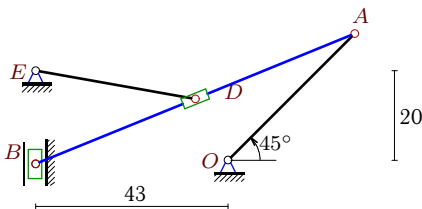
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$$\omega_{OA} = 28\frac{1}{c}, \alpha = 45^\circ, OA = 35, \\ AB = 67, OD = OA/2.$$

**Задача K13.5.**

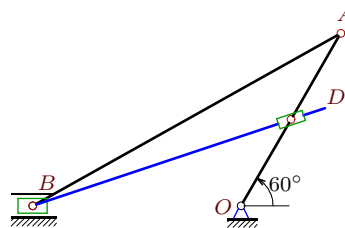
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$$\omega_{OA} = 21\frac{1}{c}, \alpha = 45^\circ, OA = 40, \\ AB = 77, AD = AB/2.$$

**Задача K13.6.**

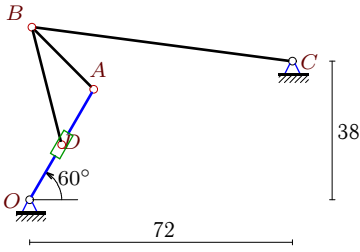
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$$\omega_{OA} = 32\frac{1}{c}, \alpha = 60^\circ, OA = 35, \\ AB = 62, OD = OA/2.$$

**Задача K13.7.**

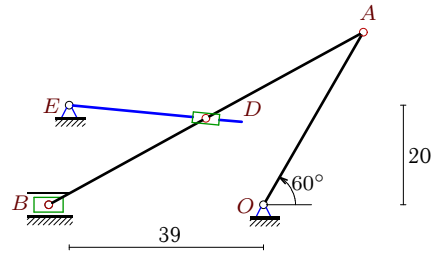
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$\omega_{OA} = 6\frac{1}{c}$ ,  $\alpha = 60^\circ$ ,  $OA = 35$ ,  
 $AB = 24$ ,  $BC = 72$ ,  $OD = OA/2$ .

**Задача K13.8.**

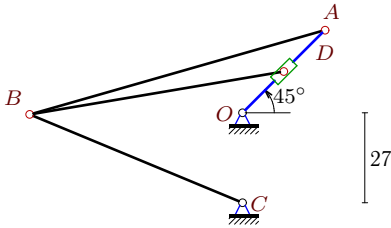
7



$\omega_{OA} = 19\frac{1}{c}$ ,  $\alpha = 60^\circ$ ,  $OA = 40$ ,  
 $AB = 72$ ,  $AD = AB/2$ .

**Задача K13.9.**

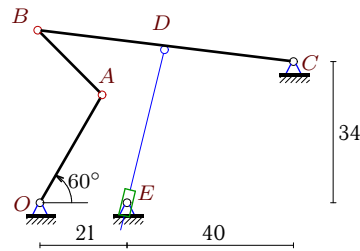
7



$\omega_{OA} = 11\frac{1}{c}$ ,  $\alpha = 45^\circ$ ,  $OA = 35$ ,  
 $AB = 92$ ,  $BC = 69$ ,  $OD = OA/2$ .

**Задача K13.10.**

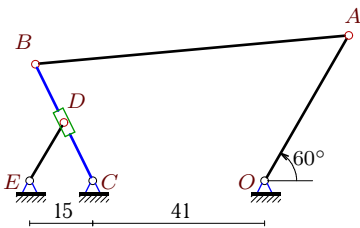
7



$\omega_{OA} = 23\frac{1}{c}$ ,  $\alpha = 60^\circ$ ,  $OA = 30$ ,  
 $AB = 22$ ,  $BC = 62$ ,  $BD = BC/2$ .

**Задача K13.11.**

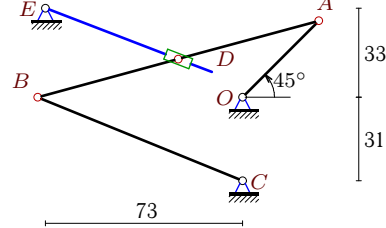
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$\omega_{OA} = 17\frac{1}{c}$ ,  $\alpha = 60^\circ$ ,  $OA = 40$ ,  
 $AB = 75$ ,  $BC = 31$ ,  $BD = BC/2$ .

**Задача K13.12.**

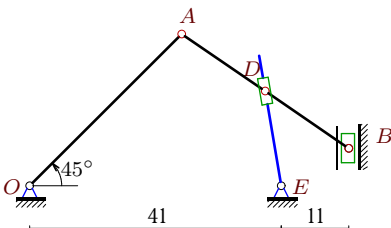
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$\omega_{OA} = 29\frac{1}{c}$ ,  $\alpha = 45^\circ$ ,  $OA = 40$ ,  
 $AB = 108$ ,  $BC = 82$ ,  $AD = AB/2$ .

**Задача K13.13.**

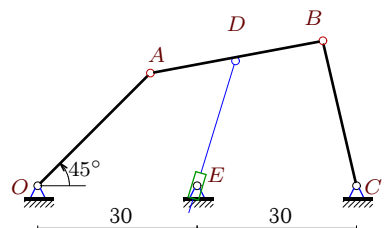
7



$\omega_{OA} = 5\frac{1}{c}$ ,  $\alpha = 45^\circ$ ,  $OA = 35$ ,  
 $AB = 33$ ,  $AD = AB/2$ .

**Задача K13.14.**

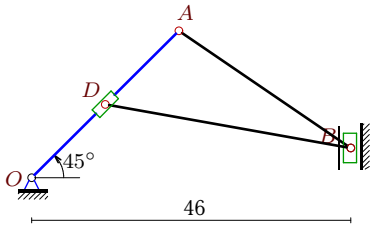
7



$\omega_{OA} = 33\frac{1}{c}$ ,  $\alpha = 45^\circ$ ,  $OA = 30$ ,  
 $AB = 33$ ,  $BC = 28$ ,  $AD = AB/2$ .

**Задача K13.15.**

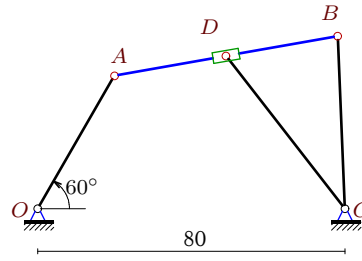
7



$$\omega_{OA} = 7\frac{1}{c}, \alpha = 45^\circ, OA = 30, AB = 30, OD = OA/2.$$

**Задача K13.16.**

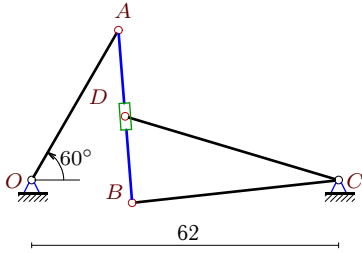
7



$$\omega_{OA} = 20\frac{1}{c}, \alpha = 60^\circ, OA = 40, AB = 59, BC = 45, AD = AB/2.$$

**Задача K13.17.**

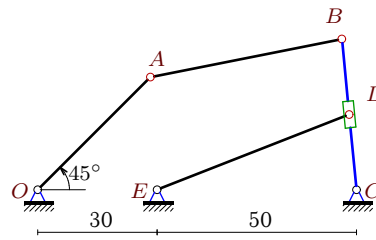
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$$\omega_{OA} = 33\frac{1}{c}, \alpha = 60^\circ, OA = 35, AB = 35, BC = 42, AD = AB/2.$$

**Задача K13.18.**

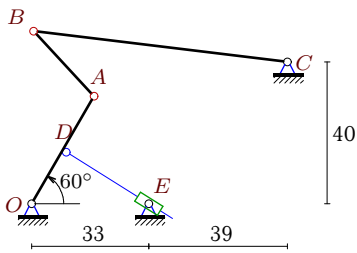
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$$\omega_{OA} = 22\frac{1}{c}, \alpha = 45^\circ, OA = 40, AB = 49, BC = 38, BD = BC/2.$$

**Задача K13.19.**

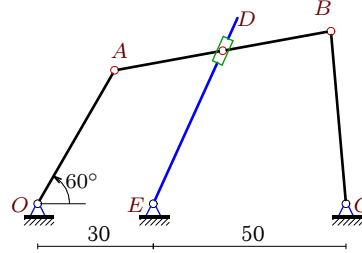
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$$\omega_{OA} = 32\frac{1}{c}, \alpha = 60^\circ, OA = 35, AB = 25, BC = 72, OD = OA/2.$$

**Задача K13.20.**

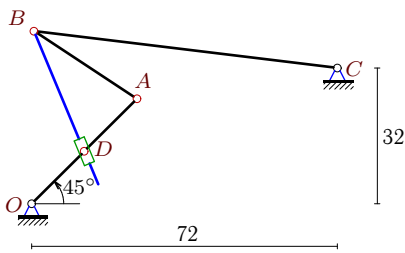
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$$\omega_{OA} = 24\frac{1}{c}, \alpha = 60^\circ, OA = 40, AB = 57, BC = 45, AD = AB/2.$$

**Задача K13.21.**

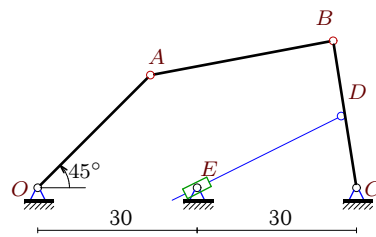
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$$\omega_{OA} = 32\frac{1}{c}, \alpha = 45^\circ, OA = 35, AB = 29, BC = 72, OD = OA/2.$$

**Задача K13.22.**

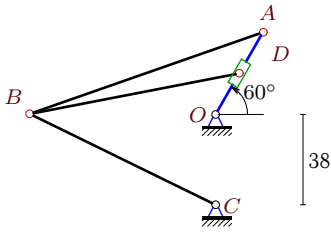
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$$\omega_{OA} = 11\frac{1}{c}, \alpha = 45^\circ, OA = 30, AB = 35, BC = 28, BD = BC/2.$$

**Задача K13.23.**

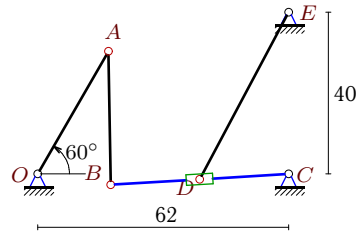
7



$$\omega_{OA} = 24 \frac{1}{c}, \alpha = 60^\circ, OA = 40, \\ AB = 104, BC = 87, OD = OA/2.$$

**Задача K13.24.**

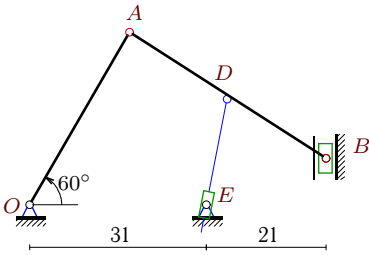
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$$\omega_{OA} = 9 \frac{1}{c}, \alpha = 60^\circ, OA = 35, \\ AB = 33, BC = 44, BD = BC/2.$$

**Задача K13.25.**

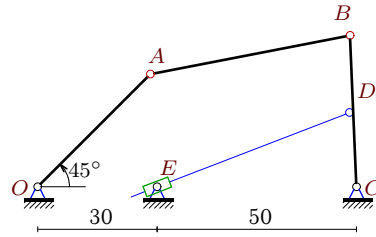
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$$\omega_{OA} = 13 \frac{1}{c}, \alpha = 60^\circ, OA = 35, \\ AB = 41, AD = AB/2.$$

**Задача K13.26.**

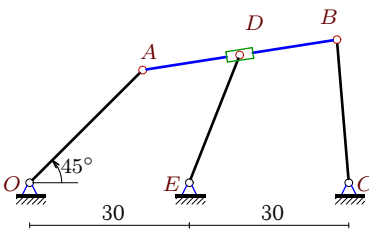
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$$\omega_{OA} = 27 \frac{1}{c}, \alpha = 45^\circ, OA = 40, \\ AB = 51, BC = 38, BD = BC/2.$$

**Задача K13.27.**

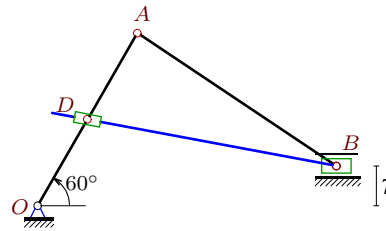
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$$\omega_{OA} = 16 \frac{1}{c}, \alpha = 45^\circ, OA = 30, \\ AB = 37, BC = 27, AD = AB/2.$$

**Задача K13.28.**

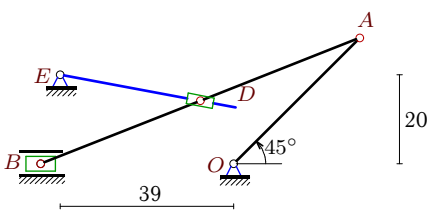
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$$\omega_{OA} = 3 \frac{1}{c}, \alpha = 60^\circ, OA = 35, \\ AB = 42, OD = OA/2.$$

**Задача K13.29.**

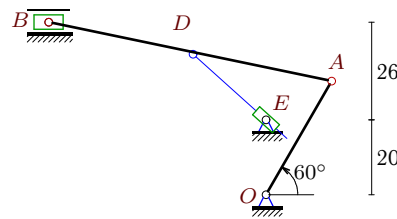
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$$\omega_{OA} = 22 \frac{1}{c}, \alpha = 45^\circ, OA = 40, \\ AB = 77, AD = AB/2.$$

**Задача K13.30.**

7



$$\omega_{OA} = 20 \frac{1}{c}, \alpha = 60^\circ, OA = 35, \\ AB = 77, AD = AB/2.$$

**К13 Ответы.**  
**Механизм с муфтой (1)**

30.04.2012

№	$v_A$	$v_B$	$v_D$	$v_r$	$x_B$	$y_B$
1	175	160.7015	113.2752	112.6350	-68.099	-0.574
2	630	690.9447	331.2889	254.7252	-37.000	0.752
3	680	594.9506	562.6802	42.2590	-54.689	27.814
4	980	952.6790	490.0000	-453.2549	-37.000	-1.253
5	840	860.3995	325.4938	318.3554	-43.000	-0.828
6	1120	656.1107	560.0000	-251.0809	-36.586	0.000
7	210	330.4938	105.0000	-326.2890	0.611	47.363
8	760	449.6272	585.5842	569.7464	-43.119	0.000
9	385	300.3477	192.5000	59.5085	-63.715	-0.515
10	690	1080.5667	540.2833	-536.5587	-0.538	41.556
11	680	594.9506	297.4753	451.0291	-54.689	27.814
12	1160	949.2274	590.0100	539.5904	-75.934	-0.047
13	175	304.9363	223.0913	-221.6782	52.000	6.138
14	990	560.1781	685.5603	-91.3642	53.652	27.271
15	210	366.2807	105.0000	-38.3879	46.000	4.313
16	800	617.6708	681.1113	-1178.4187	78.091	44.959
17	1155	654.6286	815.0129	-1912.3901	20.251	-4.581
18	880	491.6410	245.8205	861.9815	76.347	37.824
19	1120	1653.3204	560.0000	-559.6575	0.523	48.662
20	960	735.3474	809.1575	133.8968	76.082	44.829
21	1120	2465.0998	560.0000	-1624.4823	0.527	40.696
22	330	186.4872	93.2436	88.9624	55.615	27.655
23	960	879.0545	480.0000	254.8565	-78.146	0.240
24	315	162.4391	81.2196	132.6815	18.082	-2.684
25	455	841.1645	569.4981	-486.7559	52.000	8.158
26	1080	611.5008	305.7504	289.7328	78.357	37.964
27	480	283.8615	348.9677	64.7995	57.772	26.908
28	105	125.9619	52.5000	74.3115	52.437	7.000
29	880	376.5024	588.3694	547.8739	-43.333	0.000
30	700	679.0600	666.0404	-594.8835	-57.885	46.000

К13 файл о13к7А

№	$\omega_{AB}$	$\omega_{BC}$	$\omega_e$	$\varepsilon_{AB}$	$\varepsilon_{BC}$	$\varepsilon_e$	$a_A$	$a_B$	$a_D$	$a_r$
1	2.727	2.143	0.315	-0.902	4.503	16.975	8.750	4.823	6.189	2.208
2	18.458	—	-7.741	-436.324	-	105.099	113.400	240.294	76.491	18.246
3	8.070	19.192	-22.011	46.259	202.864	-132.048	115.600	130.356	119.502	-4.954
4	26.651	—	5.799	-940.491	-	-559.011	274.400	571.391	137.200	-62.924
5	20.402	—	20.402	-590.780	-	943.723	176.400	417.584	159.154	184.308
6	10.354	—	4.420	-513.795	-	-478.607	358.400	276.954	179.200	-137.824
7	-13.186	-4.590	6.000	88.172	74.910	-309.114	12.600	56.028	6.300	109.077
8	6.020	—	4.906	-178.232	-	-55.240	144.400	111.064	110.933	78.485
9	6.212	4.353	11.000	2.526	27.328	-7.087	42.350	22.945	21.175	9.423
10	-46.822	-17.428	-1.628	953.684	981.694	377.128	158.700	637.120	318.560	290.158
11	8.070	19.192	19.192	46.259	202.864	601.748	115.600	130.356	65.178	38.385
12	16.305	11.576	-4.531	18.656	185.054	-530.678	336.400	187.351	231.134	4.212
13	6.649	—	1.600	97.978	-	-37.893	8.750	28.741	11.693	-12.037
14	-25.495	20.006	-26.796	155.018	1747.852	-832.395	326.700	502.067	408.957	133.580
15	8.786	—	7.000	174.734	-	51.593	14.700	45.964	7.350	-36.169
16	-7.337	13.726	-7.337	93.177	276.876	833.369	160.000	150.704	152.145	214.902
17	26.621	-15.586	26.621	914.371	164.769	-3609.609	381.150	123.287	198.120	1559.775
18	-13.930	12.938	12.938	141.420	660.343	1403.624	193.600	258.867	129.433	687.789
19	-63.693	-22.963	-0.685	1564.563	1783.516	-599.466	358.400	1339.077	179.200	6.132
20	-9.700	16.341	18.286	129.567	427.479	262.263	230.400	226.812	224.012	68.302
21	-68.331	-34.237	-46.629	1144.075	1641.462	3908.950	358.400	1452.271	179.200	709.098
22	-7.632	6.660	-0.899	27.093	178.615	-10.192	36.300	51.531	25.766	25.467
23	12.936	10.104	24.000	-23.799	101.823	-143.965	230.400	125.445	115.200	114.270
24	7.968	-3.692	-3.692	62.890	8.210	-14.653	28.350	7.001	3.500	6.150
25	17.787	—	-15.086	626.238	-	585.673	59.150	234.916	93.028	-131.916
26	-15.779	16.092	-1.853	232.674	942.048	-40.377	291.600	371.257	185.628	183.519
27	-9.925	10.513	-9.925	60.740	357.650	252.630	76.800	101.072	87.170	7.941
28	-1.503	—	-0.913	6.302	-	-0.081	3.150	0.895	1.575	-0.015
29	8.689	—	6.700	-161.335	-	-56.703	193.600	128.463	149.295	103.544
30	4.643	—	-11.031	-165.319	-	196.894	140.000	27.813	77.890	-28.878