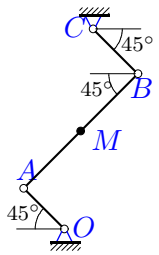
Сложное движение точки, плоское переносное движение

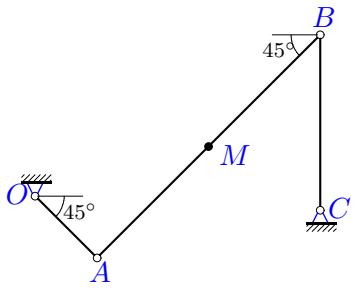
Плоский шарнирно-стержневой механизм приводится в движение кривошипом OA, который вращается против часовой стрелки с постоянной угловой скоростью ω. Вдоль стержня AB движется точка M по закону $AM = \sigma(t)$ или $BM = \sigma(t)$. Положение механизма при $t = t_1$ указано на рисунке. Все размеры даны в сантиметрах. Стержни, положение которых не задано углом, горизонтальны или вертикальны. Найти абсолютную скорость и абсолютное ускорение точки M в этот момент.

Задача К12.1. *3*



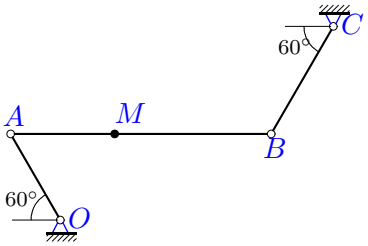
$AM = 21t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.7\ \frac{1}{c}$,
$OA = 30$, $AB = 84$, $BC = 33$

Задача К12.2. *3*



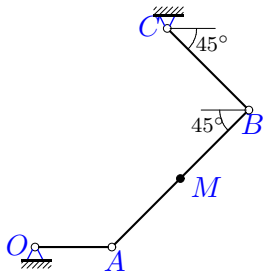
$AM = 10t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.3\ \frac{1}{c}$,
$OA = 100$, $AB = 360$, $BC = 200$

Задача К12.3. *3*



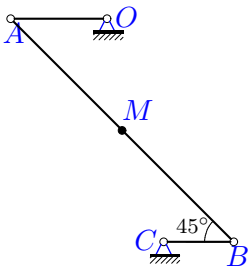
$AM = 21t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 40$, $AB = 105$, $BC = 50$

Задача К12.4. *3*



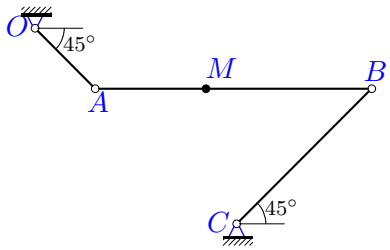
$AM = 14t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 200$, $AB = 504$, $BC = 300$

Задача К12.5. *3*



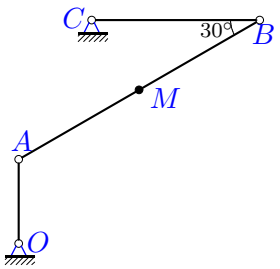
$BM = 16t + 8\sin^2(\pi t/6)$; $t = 1$ с,
$\omega_{OA} = 2.8\ \frac{1}{c}$,
$OA = 11$, $AB = 36$, $BC = 8$

Задача К12.6. *3*



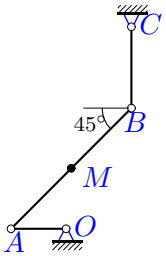
$AM = 20t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 37$, $AB = 120$, $BC = 83$

Задача К12.7. 3



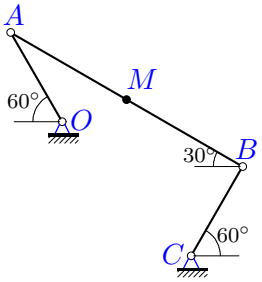
$AM = 13(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.6$ $\frac{1}{c}$,
$OA = 200$, $AB = 663$, $BC = 400$

Задача К12.8. 3



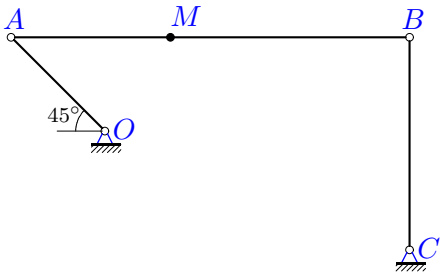
$AM = 24t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.8$ $\frac{1}{c}$,
$OA = 31$, $AB = 96$, $BC = 46$

Задача К12.9. 3



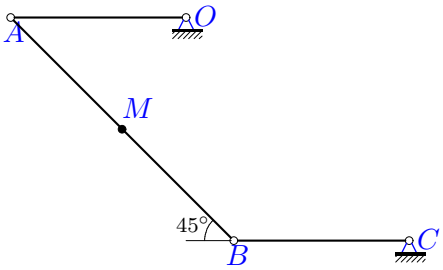
$BM = 13t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.1$ $\frac{1}{c}$,
$OA = 30$, $AB = 78$, $BC = 30$

Задача К12.10. 3



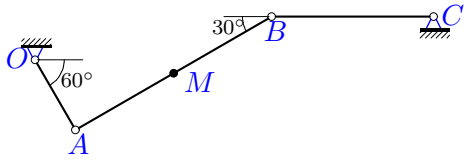
$AM = 10t(2 + \cos(\pi t/3))$; $t = 4$ с,
$\omega_{OA} = 2$ $\frac{1}{c}$,
$OA = 50$, $AB = 150$, $BC = 80$

Задача К12.11. 3



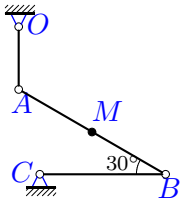
$BM = 6(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 1.5$ $\frac{1}{c}$,
$OA = 10$, $AB = 18$, $BC = 10$

Задача К12.12. 3



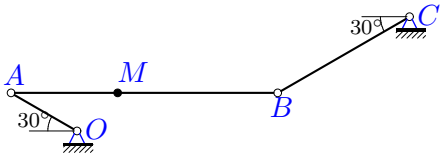
$AM = 14t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.7$ $\frac{1}{c}$,
$OA = 20$, $AB = 56$, $BC = 40$

Задача К12.13. 3



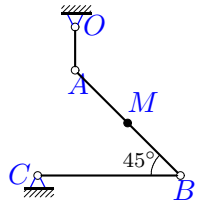
$BM = 9(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 2.2$ $\frac{1}{c}$,
$OA = 10$, $AB = 27$, $BC = 20$

Задача К12.14. 3



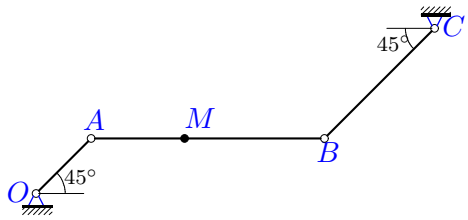
$AM = 10t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.5$ $\frac{1}{c}$,
$OA = 20$, $AB = 70$, $BC = 40$

Задача К12.15. 3



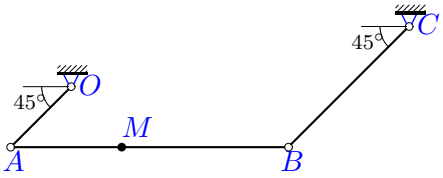
$BM = 8(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 2.8\ \frac{1}{c}$,
$OA = 7$, $AB = 24$, $BC = 23$

Задача К12.16. 3



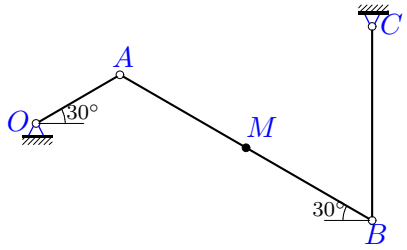
$AM = 14t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 30$, $AB = 90$, $BC = 60$

Задача К12.17. 3



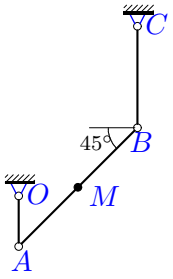
$AM = 13(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.8\ \frac{1}{c}$,
$OA = 100$, $AB = 325$, $BC = 200$

Задача К12.18. 3



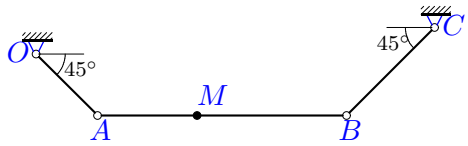
$BM = 5t(8 - t)$; $t = 2$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 40$, $AB = 120$, $BC = 80$

Задача К12.19. 3



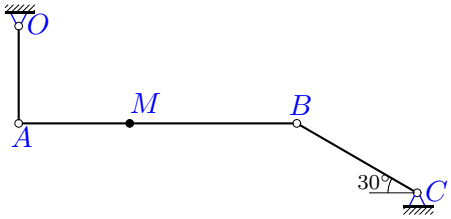
$AM = 13(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.6\ \frac{1}{c}$,
$OA = 200$, $AB = 663$, $BC = 400$

Задача К12.20. 3



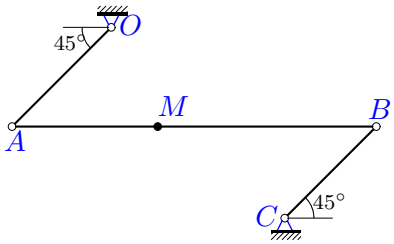
$AM = 8(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.7\ \frac{1}{c}$,
$OA = 70$, $AB = 200$, $BC = 100$

Задача К12.21. 3



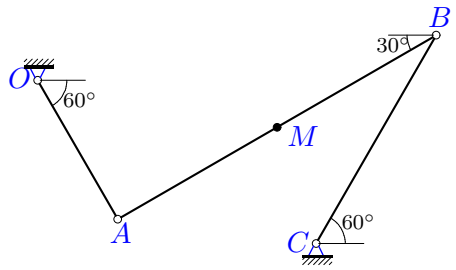
$AM = 8(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.7\ \frac{1}{c}$,
$OA = 70$, $AB = 200$, $BC = 100$

Задача К12.22. 3



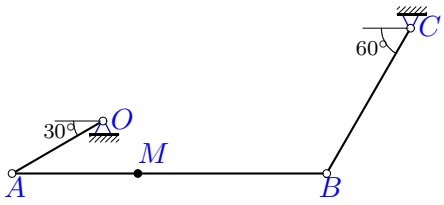
$AM = 9t(2 + \cos(\pi t/3))$; $t = 4$ с,
$\omega_{OA} = 1.9\ \frac{1}{c}$,
$OA = 52$, $AB = 135$, $BC = 48$

Задача К12.23. 3



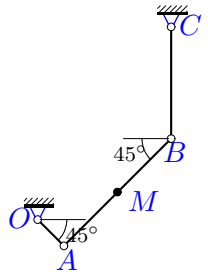
$AM = 9(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.4$ $\frac{1}{c}$,
$OA = 200$, $AB = 459$, $BC = 300$

Задача К12.24. 3



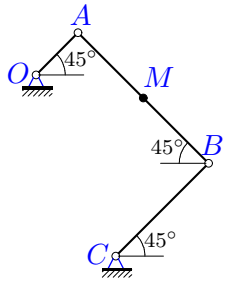
$AM = 6(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.7$ $\frac{1}{c}$,
$OA = 50$, $AB = 150$, $BC = 80$

Задача К12.25. 3



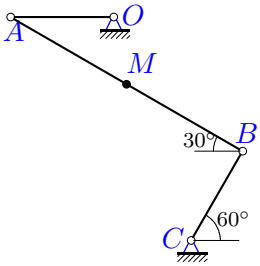
$AM = 8(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.8$ $\frac{1}{c}$,
$OA = 100$, $AB = 408$, $BC = 300$

Задача К12.26. 3



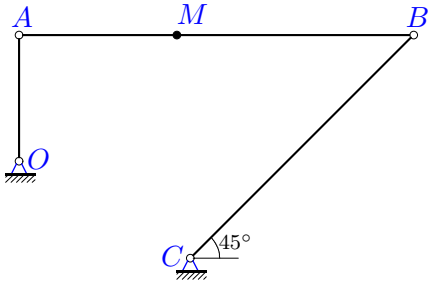
$BM = 15t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.2$ $\frac{1}{c}$,
$OA = 29$, $AB = 90$, $BC = 64$

Задача К12.27. 3



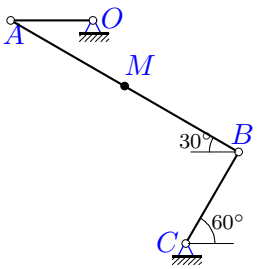
$BM = 13t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.1$ $\frac{1}{c}$,
$OA = 30$, $AB = 78$, $BC = 30$

Задача К12.28. 3



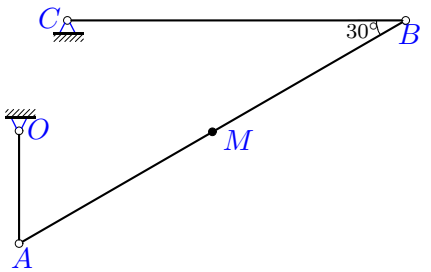
$AM = 10(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.8$ $\frac{1}{c}$,
$OA = 80$, $AB = 250$, $BC = 200$

Задача К12.29. 3



$BM = 2t(18 - t)$; $t = 4$ с,
$\omega_{OA} = 1.3$ $\frac{1}{c}$,
$OA = 70$, $AB = 224$, $BC = 90$

Задача К12.30. 3



$AM = 11t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.3$ $\frac{1}{c}$,
$OA = 100$, $AB = 396$, $BC = 300$

К12 **Ответы.**

Сложное движение точки, плоское переносное движение

07.04.2012

№	ω_e	ε_e	v_r^τ	v_{xe}	v_{ye}	v_e	v	a_r^τ	a_e	a_C	a
1	−0.000	1.970	21.00	−36.06	−36.06	51.000	30.000	−42.000	3.94	0.00	42.184
2	−0.361	−1.003	30.00	137.89	45.96	145.344	172.699	−65.797	26.15	21.67	95.242
3	0.571	1.475	21.00	−51.96	−6.00	52.307	31.538	−42.000	35.13	24.00	13.381
4	−0.337	−0.214	42.00	60.00	180.00	189.737	228.077	−92.116	276.36	28.28	346.359
5	0.000	−8.046	−19.63	0.00	−30.80	30.800	21.885	−2.193	103.68	0.00	102.404
6	−0.654	−0.010	20.00	39.24	7.85	40.022	59.762	−9.870	98.57	26.16	94.916
7	−0.362	0.099	124.11	−60.00	−103.92	120.000	63.303	24.218	84.77	89.85	131.589
8	0.822	1.673	24.00	−27.90	−27.90	39.457	15.457	−48.000	39.69	39.46	49.632
9	0.366	0.116	4.08	−21.43	−4.13	21.827	18.933	9.323	29.53	2.99	37.079
10	0.471	0.526	51.28	−70.71	−42.43	82.462	46.666	40.070	168.74	48.34	179.055
11	0.000	−0.000	−14.72	0.00	−15.00	15.000	11.377	−11.178	22.50	0.00	16.599
12	1.052	−7.076	14.00	14.72	42.50	44.978	56.312	−28.000	143.71	29.44	125.589
13	−1.630	−0.778	−22.08	11.00	−19.05	22.000	11.409	−16.766	67.77	71.97	128.797
14	0.742	0.954	10.00	−15.00	−5.20	15.875	7.211	−9.870	23.92	14.85	23.465
15	−1.155	0.350	−19.63	9.80	−9.80	13.859	5.768	−14.903	69.67	45.34	112.535
16	0.000	1.591	14.00	−31.82	31.82	45.000	36.470	−9.870	48.67	0.00	58.385
17	−0.000	−0.139	78.00	56.57	−56.57	80.000	145.975	22.436	52.78	0.00	72.934
18	−0.500	0.722	−20.00	−45.00	25.98	51.962	71.962	10.000	69.28	20.00	52.100
19	−0.000	−0.077	124.11	120.00	−0.00	120.000	225.529	24.218	56.92	0.00	79.325
20	−0.346	0.290	48.00	34.65	6.93	35.334	82.938	13.807	58.28	33.26	24.557
21	0.424	−1.444	48.00	49.00	33.95	59.611	102.769	13.807	82.47	40.74	40.471
22	0.000	−4.097	46.15	69.86	−69.86	98.800	135.422	36.063	159.53	0.00	190.591
23	−0.302	−0.284	85.92	103.92	−20.00	105.830	179.803	16.766	39.16	51.87	85.083
24	0.135	−0.114	36.00	17.50	−22.23	28.290	57.934	10.355	20.85	9.70	34.035
25	−0.196	0.029	76.37	84.85	28.28	89.443	161.407	14.903	70.45	29.95	40.680
26	−0.000	0.254	4.71	−24.61	24.61	34.800	30.093	10.758	30.34	0.00	32.192
27	0.366	−0.349	4.08	7.14	−20.63	21.827	25.054	9.323	26.59	2.99	36.313
28	0.256	0.039	60.00	−64.00	25.60	68.930	25.911	17.258	47.79	30.72	19.766
29	0.352	−0.367	−20.00	19.70	−56.87	60.191	46.935	4.000	90.41	14.07	92.674
30	0.657	0.107	33.00	65.00	112.58	130.000	159.435	−72.377	167.52	43.33	223.210

K12 файл o12k3A

№	a_{xr}	a_{yr}	a_{xe}	a_{ye}	a_x	a_y
1	-29.698	-29.698	2.787	-2.787	-26.912	-32.485
2	-46.526	-46.526	-8.445	-24.749	-39.650	-86.596
3	-42.000	0.000	31.286	-15.984	-10.714	8.016
4	-65.136	-65.136	-270.144	-58.262	-315.280	-143.398
5	-1.551	1.551	-16.170	-102.410	-17.721	-100.859
6	-9.870	0.000	-79.402	58.408	-89.271	32.245
7	20.973	12.109	-54.000	-65.347	11.898	-131.050
8	-33.941	-33.941	20.728	33.844	-41.113	27.803
9	8.074	-4.662	15.885	-24.889	25.453	-26.962
10	40.070	0.000	128.088	-109.853	168.158	-61.509
11	-7.904	7.904	22.500	-0.000	14.596	7.904
12	-24.249	-14.000	43.350	-137.013	4.379	-125.513
13	-14.520	8.383	-36.300	57.230	-14.836	127.939
14	-9.870	0.000	23.543	4.223	13.673	19.069
15	-10.538	10.538	-8.351	69.166	13.169	111.762
16	-9.870	0.000	-47.730	9.546	-57.599	9.546
17	22.436	0.000	45.255	27.153	67.691	27.153
18	8.660	-5.000	-69.282	-0.000	-50.622	12.321
19	17.125	17.125	18.000	54.000	35.125	71.125
20	13.807	0.000	-33.858	47.440	-20.051	14.178
21	13.807	0.000	-14.406	-81.204	-0.599	-40.466
22	36.063	0.000	132.738	-88.492	168.801	-88.492
23	14.520	8.383	-1.559	-39.129	38.898	-75.671
24	10.355	0.000	20.129	5.436	30.484	15.136
25	10.538	10.538	-55.053	43.961	-23.337	33.321
26	7.607	-7.607	-21.455	-21.455	-13.848	-29.061
27	8.074	-4.662	24.960	-9.171	34.528	-11.244
28	17.258	0.000	-6.554	-47.337	10.705	-16.617
29	3.464	-2.000	85.756	-28.642	82.183	-42.829
30	-62.680	-36.189	-84.500	144.651	-168.847	145.990