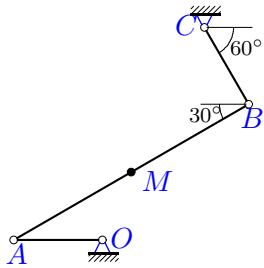


## Сложное движение точки, плоское переносное движение

Плоский шарнирно-стержневой механизм приводится в движение кривошипом  $OA$ , который вращается против часовой стрелки с постоянной угловой скоростью  $\omega$ . 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 K12.1.

8



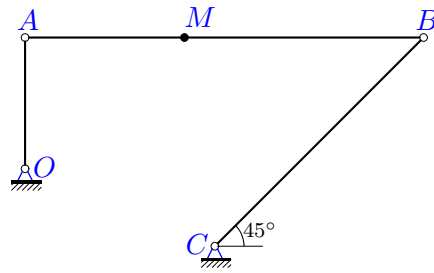
$$AM = 6(\sin(\pi t/6) + t^2); t = 5 \text{ с},$$

$$\omega_{OA} = 0.6 \frac{1}{\text{с}},$$

$$OA = 100, AB = 306, BC = 100$$

### Задача K12.2.

8



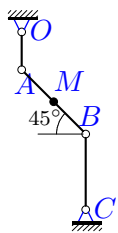
$$AM = 18t(5 - t); t = 2 \text{ с},$$

$$\omega_{OA} = 1.2 \frac{1}{\text{с}},$$

$$OA = 89, AB = 270, BC = 200$$

### Задача K12.3.

8



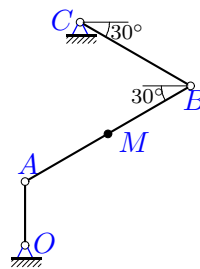
$$BM = 8(\sin(\pi t/6) + t^2); t = 1 \text{ с},$$

$$\omega_{OA} = 2 \frac{1}{\text{с}},$$

$$OA = 10, AB = 24, BC = 20$$

### Задача K12.4.

8



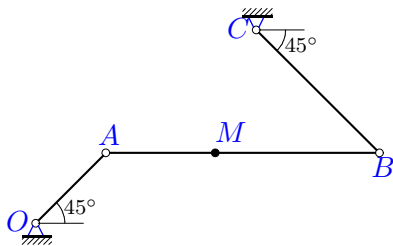
$$AM = 10t + 8 \sin^2(\pi t/3); t = 3 \text{ с},$$

$$\omega_{OA} = 1.5 \frac{1}{\text{с}},$$

$$OA = 20, AB = 60, BC = 40$$

### Задача K12.5.

8



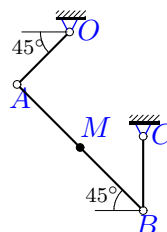
$$AM = 18t + 8 \sin^2(\pi t/4); t = 2 \text{ с},$$

$$\omega_{OA} = 1.4 \frac{1}{\text{с}},$$

$$OA = 40, AB = 110, BC = 70$$

### Задача K12.6.

8



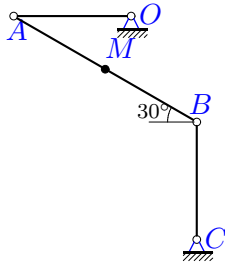
$$BM = 8t(2 + \cos(\pi t/3)); t = 2 \text{ с},$$

$$\omega_{OA} = 1.1 \frac{1}{\text{с}},$$

$$OA = 20, AB = 48, BC = 20$$

**Задача K12.7.**

8



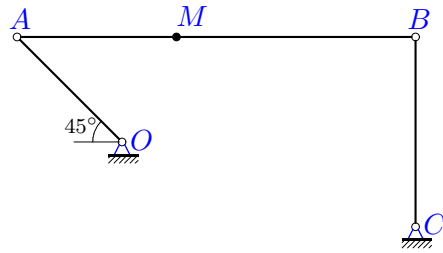
$$BM = 6(\sin(\pi t/6) + t^2); t = 1 \text{ с},$$

$$\omega_{OA} = 1.5 \frac{1}{\text{с}},$$

$$OA = 10, AB = 18, BC = 10$$

**Задача K12.8.**

8



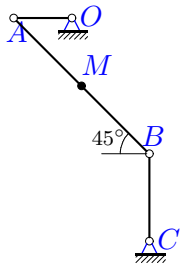
$$AM = 29t(3 - t); t = 1 \text{ с},$$

$$\omega_{OA} = 1.5 \frac{1}{\text{с}},$$

$$OA = 54, AB = 145, BC = 69$$

**Задача K12.9.**

8



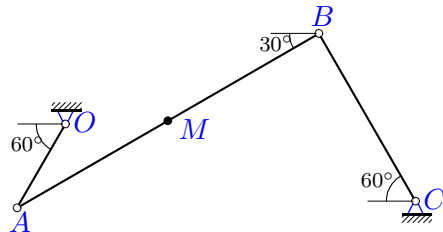
$$BM = 11t(2 + \cos(\pi t/3)); t = 2 \text{ с},$$

$$\omega_{OA} = 1.2 \frac{1}{\text{с}},$$

$$OA = 20, AB = 66, BC = 30$$

**Задача K12.10.**

8



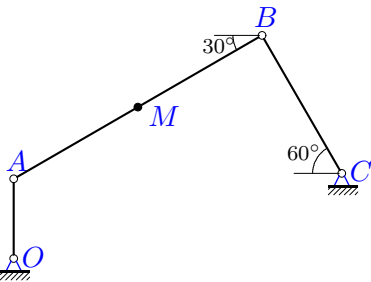
$$AM = 12t + 8 \sin^2(\pi t/3); t = 3 \text{ с},$$

$$\omega_{OA} = 1.6 \frac{1}{\text{с}},$$

$$OA = 20, AB = 72, BC = 40$$

**Задача K12.11.**

8



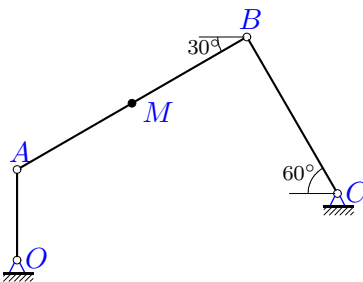
$$AM = 6t + 8 \sin^2(\pi t/3); t = 3 \text{ с},$$

$$\omega_{OA} = 1.6 \frac{1}{\text{с}},$$

$$OA = 10, AB = 36, BC = 20$$

**Задача K12.12.**

8



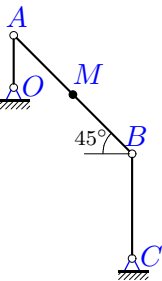
$$AM = 22t(3 - t); t = 1 \text{ с},$$

$$\omega_{OA} = 1.7 \frac{1}{\text{с}},$$

$$OA = 30, AB = 88, BC = 60$$

**Задача K12.13.**

8



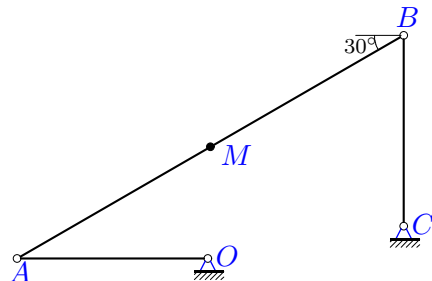
$$BM = 10t(10 - t); t = 2 \text{ с},$$

$$\omega_{OA} = 1.6 \frac{1}{\text{с}},$$

$$OA = 100, AB = 320, BC = 200$$

**Задача K12.14.**

8



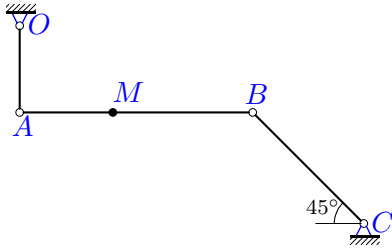
$$AM = 13t(2 + \cos(\pi t/3)); t = 6 \text{ с},$$

$$\omega_{OA} = 1.2 \frac{1}{\text{с}},$$

$$OA = 200, AB = 468, BC = 200$$

**Задача K12.15.**

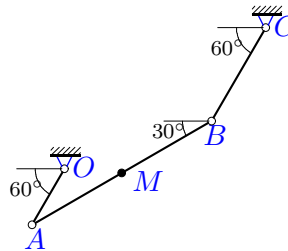
8



$AM = 18t + 8 \sin^2(\pi t/4); t = 2 \text{ с},$   
 $\omega_{OA} = 1.4 \frac{1}{\text{с}},$   
 $OA = 41, AB = 110, BC = 74$

**Задача K12.16.**

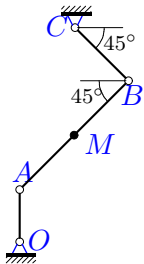
8



$AM = 8t(5 - t); t = 2 \text{ с},$   
 $\omega_{OA} = 1.3 \frac{1}{\text{с}},$   
 $OA = 30, AB = 96, BC = 50$

**Задача K12.17.**

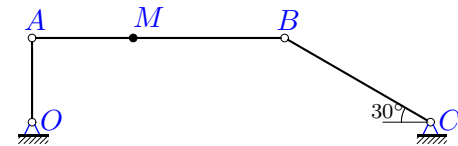
8



$AM = 17t(5 - t); t = 2 \text{ с},$   
 $\omega_{OA} = 1.2 \frac{1}{\text{с}},$   
 $OA = 69, AB = 204, BC = 100$

**Задача K12.18.**

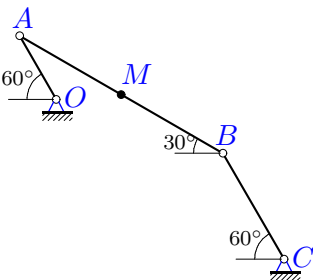
8



$AM = 8t + 8 \sin^2(\pi t/4); t = 2 \text{ с},$   
 $\omega_{OA} = 1.4 \frac{1}{\text{с}},$   
 $OA = 20, AB = 60, BC = 40$

**Задача K12.19.**

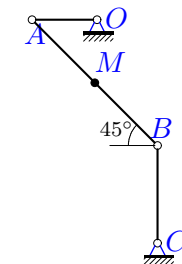
8



$BM = 8t(8 - t); t = 2 \text{ с},$   
 $\omega_{OA} = 1.5 \frac{1}{\text{с}},$   
 $OA = 60, AB = 192, BC = 100$

**Задача K12.20.**

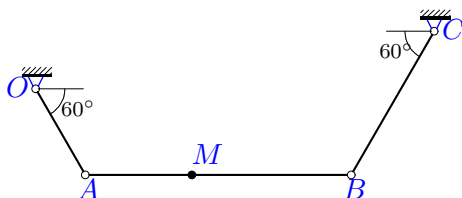
8



$BM = 7t(16 - t); t = 3 \text{ с},$   
 $\omega_{OA} = 1.4 \frac{1}{\text{с}},$   
 $OA = 200, AB = 546, BC = 300$

**Задача K12.21.**

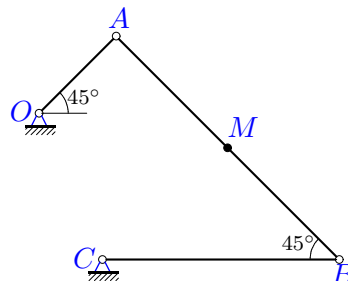
8



$AM = 12t + 8 \sin^2(\pi t/4); t = 2 \text{ с},$   
 $\omega_{OA} = 1.4 \frac{1}{\text{с}},$   
 $OA = 30, AB = 80, BC = 50$

**Задача K12.22.**

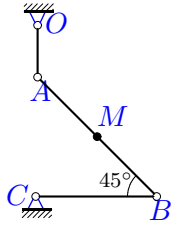
8



$BM = 14t(2 + \cos(\pi t/3)); t = 2 \text{ с},$   
 $\omega_{OA} = 1.2 \frac{1}{\text{с}},$   
 $OA = 29, AB = 84, BC = 63$

**Задача K12.23.**

8



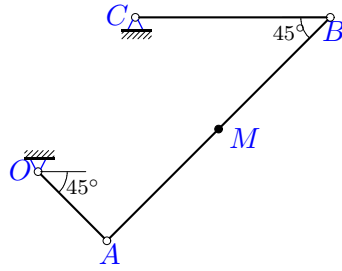
$$BM = 13(\sin(\pi t/6) + t^2); t = 1 \text{ с},$$

$$\omega_{OA} = 2.7 \frac{1}{\text{с}},$$

$$OA = 12, AB = 39, BC = 28$$

**Задача K12.24.**

8



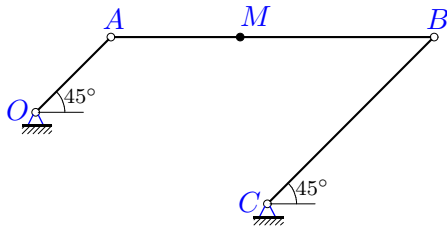
$$AM = 9t(2 + \cos(\pi t/3)); t = 6 \text{ с},$$

$$\omega_{OA} = 1.3 \frac{1}{\text{с}},$$

$$OA = 100, AB = 324, BC = 200$$

**Задача K12.25.**

8



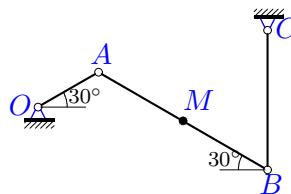
$$AM = 16t + 8 \sin^2(\pi t/4); t = 2 \text{ с},$$

$$\omega_{OA} = 1.5 \frac{1}{\text{с}},$$

$$OA = 33, AB = 100, BC = 73$$

**Задача K12.26.**

8



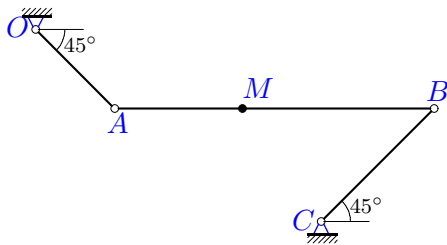
$$BM = 12t + 8 \sin^2(\pi t/6); t = 1 \text{ с},$$

$$\omega_{OA} = 2.6 \frac{1}{\text{с}},$$

$$OA = 10, AB = 28, BC = 20$$

**Задача K12.27.**

8



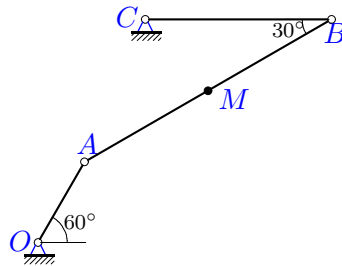
$$AM = 8(\sin(\pi t/6) + t^2); t = 3 \text{ с},$$

$$\omega_{OA} = 0.7 \frac{1}{\text{с}},$$

$$OA = 70, AB = 200, BC = 100$$

**Задача K12.28.**

8



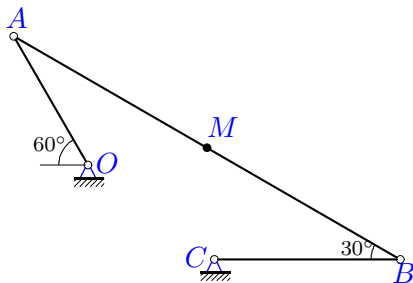
$$AM = 12(\sin(\pi t/6) + t^2); t = 5 \text{ с},$$

$$\omega_{OA} = 0.6 \frac{1}{\text{с}},$$

$$OA = 200, AB = 612, BC = 400$$

**Задача K12.29.**

8



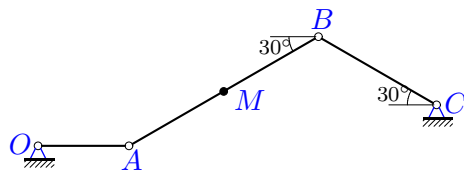
$$BM = 10t(8 - t); t = 2 \text{ с},$$

$$\omega_{OA} = 1.5 \frac{1}{\text{с}},$$

$$OA = 80, AB = 240, BC = 100$$

**Задача K12.30.**

8



$$AM = 8t + 8 \sin^2(\pi t/3); t = 3 \text{ с},$$

$$\omega_{OA} = 1.4 \frac{1}{\text{с}},$$

$$OA = 20, AB = 48, BC = 30$$

**К12 Ответы.****Сложное движение точки, плоское переносное движение**

07.04.2012

№	$\omega_e$	$\varepsilon_e$	$v_r^T$	$v_{xe}$	$v_{ye}$	$v_e$	$v$	$a_r^T$	$a_e$	$a_C$	$a$
1	0.170	0.088	57.28	-12.99	-37.50	39.686	37.672	11.178	27.14	19.45	40.783
2	0.396	0.034	18.00	-106.80	42.72	115.027	98.542	-36.000	125.66	14.24	122.312
3	0.000	-3.536	-19.63	20.00	-0.00	20.000	15.169	-14.903	31.62	0.00	45.444
4	-0.500	0.722	10.00	-22.50	-12.99	25.981	15.981	17.546	34.64	10.00	30.025
5	-0.720	0.058	18.00	-39.60	7.92	40.382	23.004	-9.870	94.45	25.92	118.223
6	0.458	0.712	2.51	23.33	-7.78	24.597	26.866	5.737	41.59	2.30	43.589
7	0.962	-1.016	-14.72	4.33	-7.50	8.660	8.420	-11.178	11.35	28.33	26.221
8	0.395	0.265	29.00	-57.28	-34.37	66.794	44.503	-58.000	104.34	22.91	51.253
9	0.514	-0.676	3.45	12.00	-12.00	16.971	20.422	7.889	11.80	3.55	19.593
10	0.385	-0.444	12.00	20.78	-4.00	21.166	31.241	17.546	40.17	9.24	59.608
11	-0.222	0.349	6.00	-14.00	-3.46	14.422	8.816	17.546	20.97	2.67	18.949
12	-0.290	0.484	22.00	-44.62	-11.04	45.971	25.572	-44.000	71.47	12.75	112.773
13	-0.000	0.566	-60.00	-160.00	0.00	160.000	206.825	20.000	202.39	0.00	220.456
14	0.592	-0.034	39.00	-69.28	-120.00	138.564	106.588	-85.537	226.12	46.19	133.803
15	0.522	-2.148	18.00	57.40	22.96	61.822	78.818	-9.870	18.53	18.79	22.339
16	-0.000	-0.422	8.00	33.77	-19.50	39.000	43.555	-16.000	44.20	0.00	28.364
17	-0.287	0.512	17.00	-62.10	-20.70	65.459	50.826	-34.000	80.69	9.76	116.027
18	-0.808	-3.092	8.00	-28.00	-19.40	34.063	27.863	-9.870	114.48	12.93	128.889
19	0.000	0.563	-32.00	-77.94	-45.00	90.000	109.563	16.000	117.69	0.00	133.597
20	0.725	-1.203	-70.00	140.00	-140.00	197.990	127.990	14.000	143.07	101.53	212.392
21	-0.525	0.244	12.00	36.37	4.20	36.615	48.555	-9.870	70.07	12.60	66.638
22	0.414	0.022	4.39	-12.30	36.91	38.908	35.033	10.040	41.49	3.64	37.324
23	-1.175	0.021	-31.89	16.20	-16.20	22.910	8.985	-24.218	108.43	74.95	177.747
24	0.401	0.055	27.00	45.96	137.89	145.344	169.924	-59.218	179.82	21.67	217.050
25	-0.000	0.575	16.00	-35.00	35.00	49.500	39.827	-9.870	60.22	0.00	68.992
26	-0.929	2.290	-15.63	-19.50	11.26	22.517	38.144	-2.193	52.97	29.02	48.132
27	-0.346	-0.050	48.00	34.65	6.93	35.334	82.938	13.807	39.46	33.26	23.889
28	-0.340	-0.200	114.56	-51.96	-30.00	60.000	54.559	22.355	137.73	77.81	190.458
29	0.866	-0.651	-40.00	-51.96	30.00	60.000	100.000	20.000	180.56	69.28	252.455
30	-0.337	-1.092	8.00	4.04	21.00	21.385	27.301	17.546	37.26	5.39	22.572

К12 файл o12k8A

$N_0$	$a_{xr}$	$a_{yr}$	$a_{xe}$	$a_{ye}$	$a_x$	$a_y$
1	9.680	5.589	25.429	9.485	25.383	31.921
2	-36.000	0.000	-16.898	-124.521	-52.898	-110.281
3	-10.538	10.538	-30.000	10.000	-40.538	20.538
4	15.195	8.773	-17.321	-30.000	2.875	-29.887
5	-9.870	0.000	-78.244	-52.902	-88.114	-78.820
6	4.057	-4.057	25.626	32.756	31.310	30.326
7	-9.680	5.589	10.712	-3.750	-13.133	-22.696
8	-58.000	0.000	76.864	-70.565	18.864	-47.655
9	5.578	-5.578	6.858	-9.600	14.946	-12.668
10	15.195	8.773	28.981	27.817	39.558	44.590
11	15.195	8.773	-3.912	-20.601	12.616	-14.138
12	-38.105	-22.000	-13.843	-70.113	-45.573	-103.155
13	14.142	-14.142	64.000	-192.000	78.142	-206.142
14	-74.077	-42.768	220.968	-48.000	123.797	-50.768
15	-9.870	0.000	-11.981	-14.138	-21.851	4.648
16	-13.856	-8.000	35.490	26.344	21.634	18.344
17	-24.042	-24.042	-42.900	-68.341	-60.042	-99.283
18	-9.870	0.000	-15.680	-113.399	-25.550	-126.331
19	13.856	-8.000	94.500	-70.148	108.356	-78.148
20	9.899	-9.899	58.267	-130.667	-3.629	-212.361
21	-9.870	0.000	-38.220	58.730	-48.090	46.130
22	7.100	-7.100	-33.987	-23.793	-24.314	-28.319
23	-17.125	17.125	-18.746	106.801	17.124	176.920
24	-41.873	-41.873	-144.251	107.367	-201.444	80.815
25	-9.870	0.000	-52.503	-29.488	-62.372	-29.488
26	-1.899	1.097	-52.968	-0.000	-40.356	26.231
27	13.807	0.000	-33.858	20.276	-20.051	-12.987
28	19.360	11.178	-36.000	-132.942	22.266	-189.152
29	17.321	-10.000	-27.000	-178.535	-44.321	-248.535
30	15.195	8.773	-28.457	-24.052	-10.567	-19.946