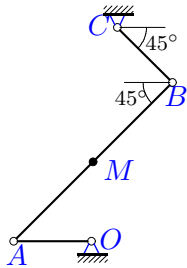


## Сложное движение точки, плоское переносное движение

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.

5



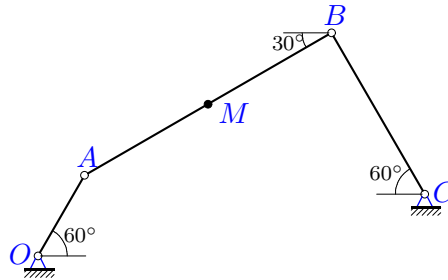
$$AM = 8t(2 + \cos(\pi t/3)); t = 6 \text{ с},$$

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

$$OA = 100, AB = 288, BC = 100$$

### Задача K12.2.

5



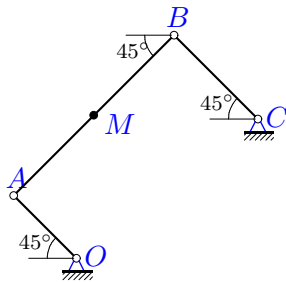
$$AM = 12(\sin(\pi t/6) + t^2); t = 5 \text{ с},$$

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

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

### Задача K12.3.

5



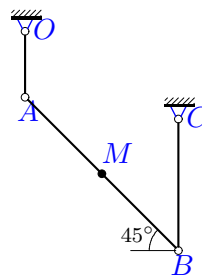
$$AM = 15(\sin(\pi t/6) + t^2); t = 5 \text{ с},$$

$$\omega_{OA} = 0.5 \frac{1}{\text{с}},$$

$$OA = 300, AB = 765, BC = 400$$

### Задача K12.4.

5



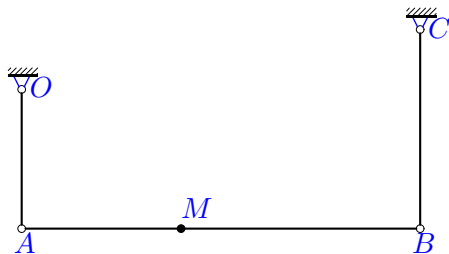
$$BM = 10t(14 - t); t = 3 \text{ с},$$

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

$$OA = 200, AB = 660, BC = 400$$

### Задача K12.5.

5



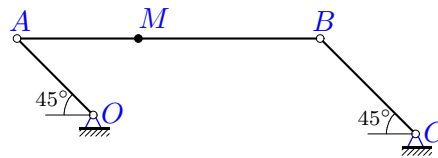
$$AM = 8(\sin(\pi t/6) + t^2); t = 3 \text{ с},$$

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

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

### Задача K12.6.

5



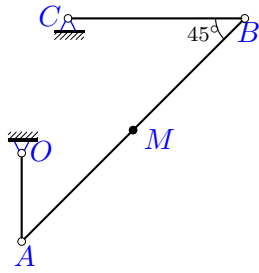
$$AM = 15t(2 + \cos(\pi t/3)); t = 4 \text{ с},$$

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

$$OA = 80, AB = 225, BC = 100$$

**Задача K12.7.**

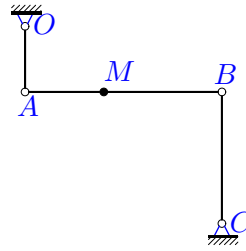
5



$AM = 7(\sin(\pi t/6) + t^2); t = 5 \text{ c},$   
 $\omega_{OA} = 0.7 \frac{1}{\text{c}},$   
 $OA = 100, AB = 357, BC = 200$

**Задача K12.8.**

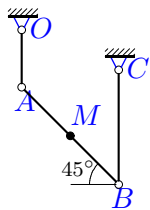
5



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

**Задача K12.9.**

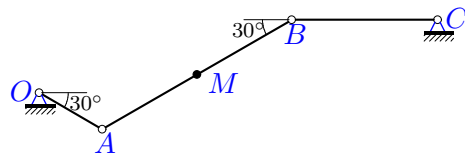
5



$BM = 8(\sin(\pi t/6) + t^2); t = 1 \text{ c},$   
 $\omega_{OA} = 2 \frac{1}{\text{c}},$   
 $OA = 10, AB = 24, BC = 20$

**Задача K12.10.**

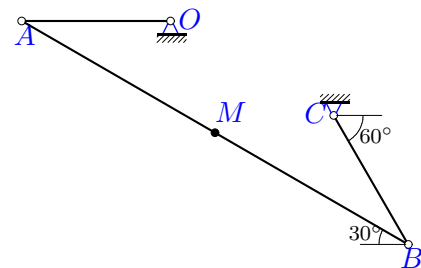
5



$AM = 10t + 8 \sin^2(\pi t/3); t = 3 \text{ c},$   
 $\omega_{OA} = 1.5 \frac{1}{\text{c}},$   
 $OA = 20, AB = 60, BC = 40$

**Задача K12.11.**

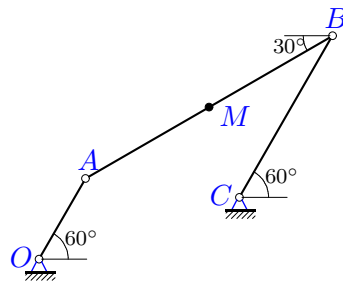
5



$BM = 10t(2 + \cos(\pi t/3)); t = 2 \text{ c},$   
 $\omega_{OA} = 1.2 \frac{1}{\text{c}},$   
 $OA = 20, AB = 60, BC = 20$

**Задача K12.12.**

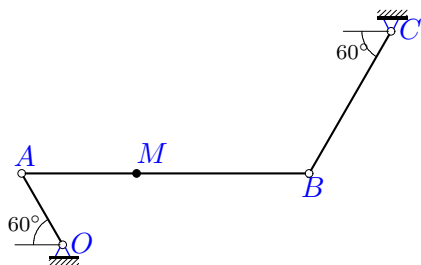
5



$AM = 12(\sin(\pi t/6) + t^2); t = 5 \text{ c},$   
 $\omega_{OA} = 0.6 \frac{1}{\text{c}},$   
 $OA = 200, AB = 612, BC = 400$

**Задача K12.13.**

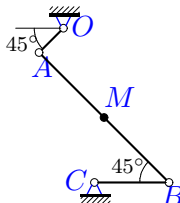
5



$AM = 14(\sin(\pi t/6) + t^2); t = 3 \text{ c},$   
 $\omega_{OA} = 0.8 \frac{1}{\text{c}},$   
 $OA = 100, AB = 350, BC = 200$

**Задача K12.14.**

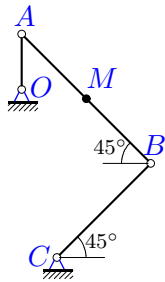
5



$BM = 14t + 8 \sin^2(\pi t/6); t = 1 \text{ c},$   
 $\omega_{OA} = 3.9 \frac{1}{\text{c}},$   
 $OA = 6, AB = 32, BC = 13$

**Задача K12.15.**

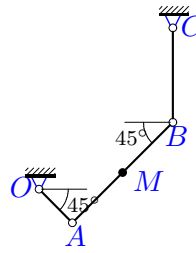
5



$BM = 11(\sin(\pi t/6) + t^2); t = 1 \text{ с},$   
 $\omega_{OA} = 2.7 \frac{1}{\text{с}},$   
 $OA = 10, AB = 33, BC = 24$

**Задача K12.16.**

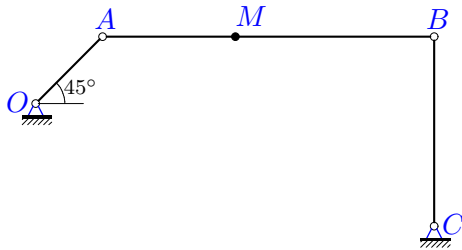
5



$AM = 15t(3 - t); t = 1 \text{ с},$   
 $\omega_{OA} = 1.8 \frac{1}{\text{с}},$   
 $OA = 20, AB = 60, BC = 40$

**Задача K12.17.**

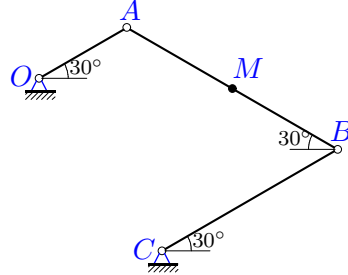
5



$AM = 14(\sin(\pi t/6) + t^2); t = 3 \text{ с},$   
 $\omega_{OA} = 0.8 \frac{1}{\text{с}},$   
 $OA = 100, AB = 350, BC = 200$

**Задача K12.18.**

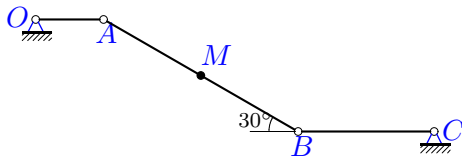
5



$BM = 10t + 8 \sin^2(\pi t/6); t = 1 \text{ с},$   
 $\omega_{OA} = 2.4 \frac{1}{\text{с}},$   
 $OA = 10, AB = 24, BC = 20$

**Задача K12.19.**

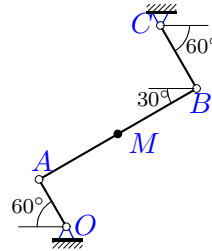
5



$BM = 11(\sin(\pi t/6) + t^2); t = 1 \text{ с},$   
 $\omega_{OA} = 2.7 \frac{1}{\text{с}},$   
 $OA = 10, AB = 33, BC = 20$

**Задача K12.20.**

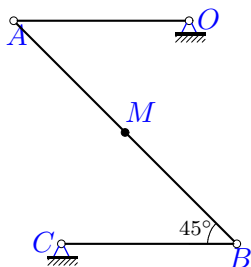
5



$AM = 25t(3 - t); t = 1 \text{ с},$   
 $\omega_{OA} = 1.8 \frac{1}{\text{с}},$   
 $OA = 30, AB = 100, BC = 40$

**Задача K12.21.**

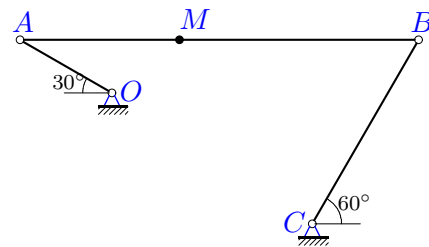
5



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

**Задача K12.22.**

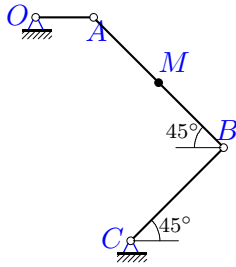
5



$AM = 15(\sin(\pi t/6) + t^2); t = 3 \text{ с},$   
 $\omega_{OA} = 0.9 \frac{1}{\text{с}},$   
 $OA = 100, AB = 375, BC = 200$

**Задача K12.23.**

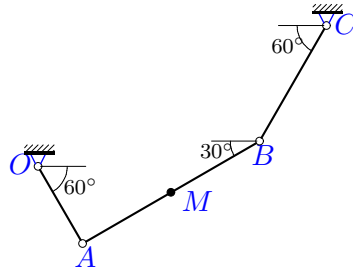
5



$BM = 7t(12 - t); t = 2 \text{ c,}$   
 $\omega_{OA} = 1.6 \frac{1}{\text{c}},$   
 $OA = 88, AB = 280, BC = 200$

**Задача K12.24.**

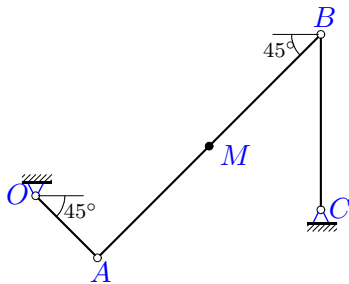
5



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

**Задача K12.25.**

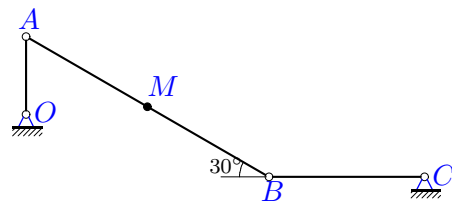
5



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

**Задача K12.26.**

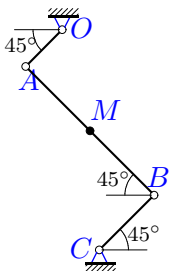
5



$BM = 6t(2 + \cos(\pi t/3)); t = 2 \text{ c,}$   
 $\omega_{OA} = 1.2 \frac{1}{\text{c}},$   
 $OA = 10, AB = 36, BC = 20$

**Задача K12.27.**

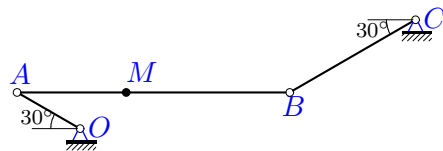
5



$BM = 9t(16 - t); t = 3 \text{ c,}$   
 $\omega_{OA} = 1.4 \frac{1}{\text{c}},$   
 $OA = 200, AB = 702, BC = 300$

**Задача K12.28.**

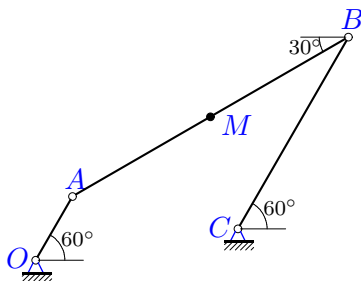
5



$AM = 15(\sin(\pi t/6) + t^2); t = 3 \text{ c,}$   
 $\omega_{OA} = 0.9 \frac{1}{\text{c}},$   
 $OA = 100, AB = 375, BC = 200$

**Задача K12.29.**

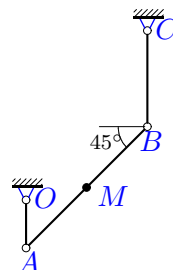
5



$AM = 12t(2 + \cos(\pi t/3)); t = 6 \text{ c,}$   
 $\omega_{OA} = 1.4 \frac{1}{\text{c}},$   
 $OA = 100, AB = 432, BC = 300$

**Задача K12.30.**

5



$AM = 7(\sin(\pi t/6) + t^2); t = 5 \text{ c,}$   
 $\omega_{OA} = 0.7 \frac{1}{\text{c}},$   
 $OA = 100, AB = 357, BC = 200$

**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	0.295	0.604	24.00	-30.00	-90.00	94.868	74.183	-52.638	90.56	14.14	36.694
2	-0.170	0.044	114.56	-77.94	15.00	79.373	75.343	22.355	74.65	38.91	78.450
3	-0.000	0.025	143.20	-106.07	-106.07	150.000	6.802	27.944	65.63	0.00	71.327
4	-0.000	-0.420	-80.00	280.00	-0.00	280.000	230.481	20.000	309.90	0.00	292.152
5	0.000	-0.051	48.00	49.00	-0.00	49.000	97.000	13.807	30.18	0.00	33.192
6	0.000	0.402	76.91	-113.14	-113.14	160.000	118.794	60.106	295.51	0.00	343.715
7	0.277	0.020	66.83	35.00	35.00	49.497	116.323	13.040	43.60	37.06	82.612
8	0.000	-1.125	14.00	45.00	-0.00	45.000	59.000	-9.870	27.00	0.00	28.747
9	-0.000	-1.179	-19.63	20.00	-0.00	20.000	15.169	-14.903	31.62	0.00	45.444
10	0.500	-3.982	10.00	7.50	38.97	39.686	46.847	17.546	85.90	10.00	71.582
11	0.693	0.609	3.14	10.39	-6.00	12.000	15.138	7.172	34.32	4.35	41.027
12	-0.000	0.118	114.56	-103.92	60.00	120.000	117.374	22.355	62.35	0.00	39.999
13	0.229	0.241	84.00	-69.28	-8.00	69.742	16.752	24.162	32.83	38.40	51.642
14	-0.731	-6.040	-17.63	8.27	-24.82	26.162	13.046	-2.193	10.11	25.78	23.058
15	0.579	1.102	-26.99	-20.25	6.75	21.345	47.058	-20.492	56.85	31.23	69.458
16	-0.600	0.943	15.00	38.18	12.73	40.249	54.083	-30.000	93.71	18.00	85.456
17	-0.162	0.084	84.00	-56.57	33.94	65.970	43.640	24.162	59.31	27.15	65.557
18	0.000	1.386	-13.63	-12.00	20.78	24.000	36.444	-2.193	43.99	0.00	45.459
19	-0.000	6.627	-26.99	0.00	27.00	27.000	46.755	-20.492	96.44	0.00	110.940
20	0.000	1.701	25.00	-46.77	-27.00	54.000	29.000	-50.000	12.15	0.00	51.455
21	-0.000	-3.536	-14.72	-0.00	-15.00	15.000	11.377	-11.178	22.50	0.00	16.599
22	0.277	0.003	90.00	-45.00	-36.37	57.862	57.862	25.888	71.02	49.88	85.082
23	-0.356	0.392	-56.00	-35.20	105.60	111.312	163.332	14.000	205.51	39.82	175.334
24	-0.302	0.460	85.92	103.92	-20.00	105.830	179.803	16.766	139.14	51.87	85.785
25	-0.361	-1.003	30.00	137.89	45.96	145.344	172.699	-65.797	26.15	21.67	95.242
26	0.667	1.970	1.88	-6.00	10.39	12.000	10.412	4.303	23.00	2.51	25.736
27	-0.000	-0.931	-90.00	197.99	-197.99	280.000	190.000	18.000	65.33	0.00	67.768
28	0.416	0.299	90.00	-45.00	-15.59	47.624	47.624	25.888	44.45	74.82	105.792
29	-0.000	0.605	36.00	-121.24	70.00	140.000	125.921	-78.957	172.86	0.00	250.834
30	-0.000	-0.097	66.83	70.00	-0.00	70.000	126.416	13.040	38.74	0.00	50.738

К12 файл o12k5A

$N_0$	$a_{xr}$	$a_{yr}$	$a_{xe}$	$a_{ye}$	$a_x$	$a_y$
1	-37.221	-37.221	73.705	52.617	26.485	25.396
2	19.360	11.178	-50.391	-55.074	-11.578	-77.590
3	19.759	19.759	46.404	-46.404	66.163	-26.645
4	14.142	-14.142	-98.000	294.000	-83.858	279.858
5	13.807	0.000	0.000	30.184	13.807	30.184
6	60.106	0.000	226.274	-190.070	286.380	-190.070
7	9.221	9.221	-12.250	41.839	-29.235	77.266
8	-9.870	0.000	0.000	27.000	-9.870	27.000
9	-10.538	10.538	-10.000	30.000	-20.538	40.538
10	15.195	8.773	14.264	-84.707	24.460	-67.273
11	6.211	-3.586	25.458	23.012	33.843	23.192
12	19.360	11.178	-54.000	-31.177	-34.640	-19.999
13	24.162	0.000	24.686	-21.642	48.848	16.758
14	-1.551	1.551	-9.855	2.245	6.824	22.025
15	-14.490	14.490	8.950	-56.139	-27.621	-63.730
16	-21.213	-21.213	-73.460	58.186	-81.945	24.245
17	24.162	0.000	-48.912	-33.553	-24.750	-60.706
18	-1.899	1.097	-41.569	-14.400	-43.469	-13.303
19	-17.747	10.246	-18.225	94.700	-35.972	104.946
20	-43.301	-25.000	6.075	-10.522	-37.226	-35.522
21	-7.904	7.904	-0.000	-22.500	-7.904	-14.596
22	25.888	0.000	58.628	-40.084	84.516	9.799
23	9.899	-9.899	-198.999	51.314	-160.939	69.574
24	14.520	8.383	-86.893	108.672	-46.435	72.130
25	-46.526	-46.526	-8.445	-24.749	-39.650	-86.596
26	3.727	-2.152	10.800	20.306	15.782	20.329
27	12.728	-12.728	46.198	46.198	58.926	33.470
28	25.888	0.000	44.228	4.395	70.116	79.219
29	-68.379	-39.478	-163.333	-56.580	-231.712	-96.059
30	9.221	9.221	12.250	36.750	21.471	45.971