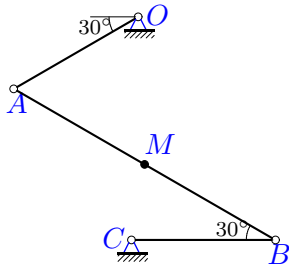


## Сложное движение точки, плоское переносное движение

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.

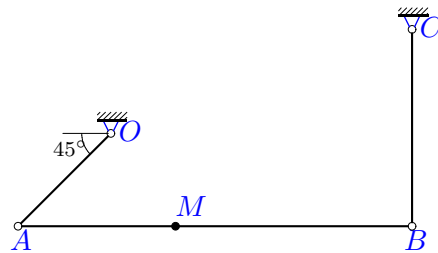


$$BM = 7(\sin(\pi t/6) + t^2); t = 1 \text{ с},$$

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

$$OA = 10, AB = 21, BC = 10$$

### Задача K12.2.

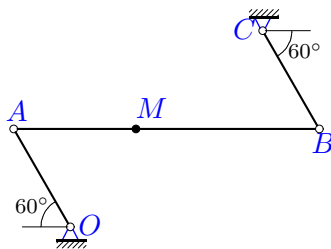


$$AM = 12t(5 - t); t = 2 \text{ с},$$

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

$$OA = 60, AB = 180, BC = 90$$

### Задача K12.3.

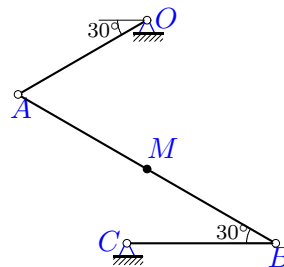


$$AM = 9t(2 + \cos(\pi t/3)); t = 4 \text{ с},$$

$$\omega_{OA} = 1.9 \frac{1}{\text{с}},$$

$$OA = 50, AB = 135, BC = 50$$

### Задача K12.4.

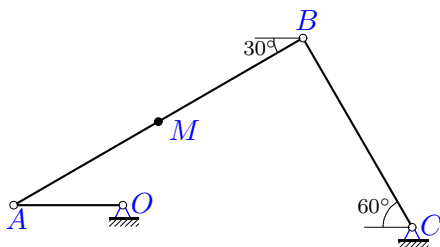


$$BM = 8t + 8\sin^2(\pi t/6); t = 1 \text{ с},$$

$$\omega_{OA} = 2.2 \frac{1}{\text{с}},$$

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

### Задача K12.5.

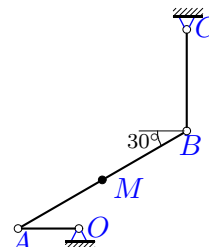


$$AM = 6(\sin(\pi t/6) + t^2); t = 5 \text{ с},$$

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

$$OA = 100, AB = 306, BC = 200$$

### Задача K12.6.



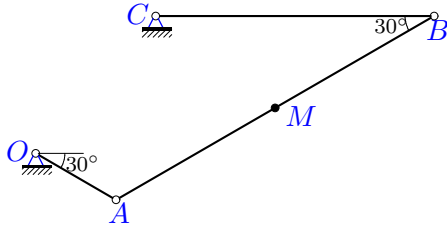
$$AM = 8t(5 - t); t = 2 \text{ с},$$

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

$$OA = 30, AB = 96, BC = 50$$

**Задача K12.7.**

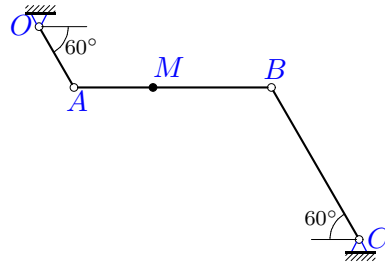
1



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

**Задача K12.8.**

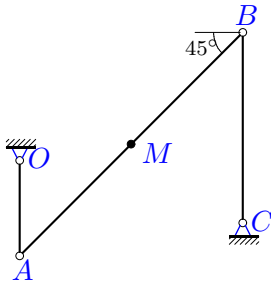
1



$AM = 9(\sin(\pi t/6) + t^2); t = 3 \text{ c},$   
 $\omega_{OA} = 0.7 \frac{1}{\text{c}},$   
 $OA = 80, AB = 225, BC = 200$

**Задача K12.9.**

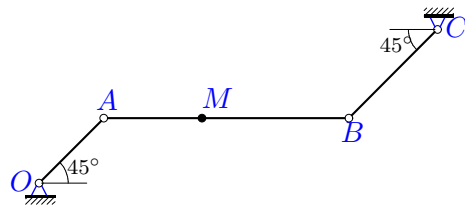
1



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

**Задача K12.10.**

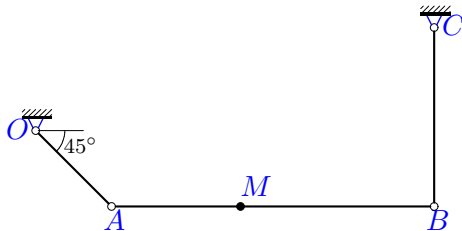
1



$AM = 13t(2 + \cos(\pi t/3)); t = 4 \text{ c},$   
 $\omega_{OA} = 1.9 \frac{1}{\text{c}},$   
 $OA = 73, AB = 195, BC = 100$

**Задача K12.11.**

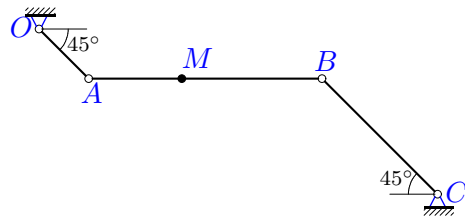
1



$AM = 12t(5 - t); t = 2 \text{ c},$   
 $\omega_{OA} = 1.2 \frac{1}{\text{c}},$   
 $OA = 60, AB = 180, BC = 100$

**Задача K12.12.**

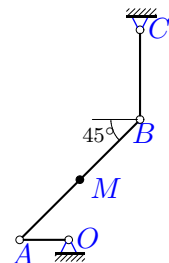
1



$AM = 16t + 8 \sin^2(\pi t/4); t = 2 \text{ c},$   
 $\omega_{OA} = 1.5 \frac{1}{\text{c}},$   
 $OA = 30, AB = 100, BC = 70$

**Задача K12.13.**

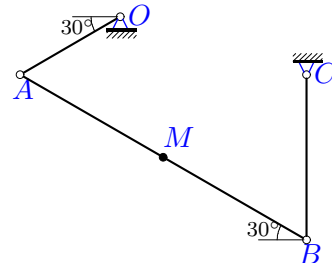
1



$AM = 13t(5 - t); t = 2 \text{ c},$   
 $\omega_{OA} = 1.3 \frac{1}{\text{c}},$   
 $OA = 45, AB = 156, BC = 82$

**Задача K12.14.**

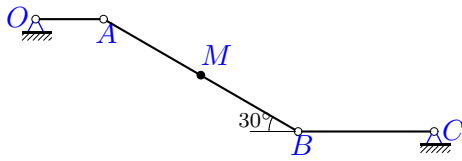
1



$BM = 5t(12 - t); t = 2 \text{ c},$   
 $\omega_{OA} = 1.6 \frac{1}{\text{c}},$   
 $OA = 70, AB = 200, BC = 100$

**Задача K12.15.**

1



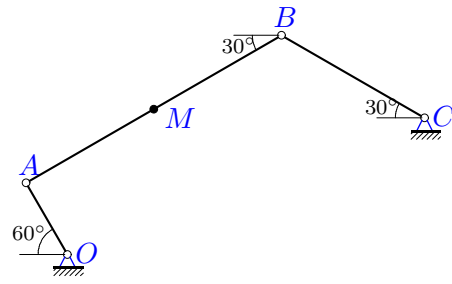
$$BM = 11(\sin(\pi t/6) + t^2); t = 1 \text{ с},$$

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

$$OA = 10, AB = 33, BC = 20$$

**Задача K12.16.**

1



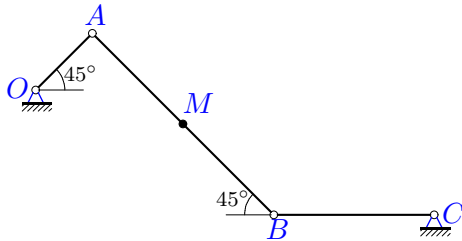
$$AM = 14(\sin(\pi t/6) + t^2); t = 5 \text{ с},$$

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

$$OA = 200, AB = 714, BC = 400$$

**Задача K12.17.**

1



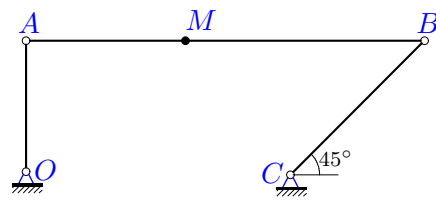
$$BM = 10t(10 - t); t = 2 \text{ с},$$

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

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

**Задача K12.18.**

1



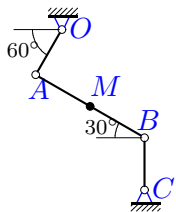
$$AM = 14t(2 + \cos(\pi t/3)); t = 4 \text{ с},$$

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

$$OA = 69, AB = 210, BC = 100$$

**Задача K12.19.**

1



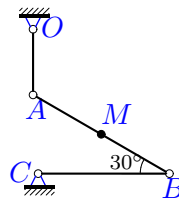
$$BM = 8(\sin(\pi t/6) + t^2); t = 1 \text{ с},$$

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

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

**Задача K12.20.**

1



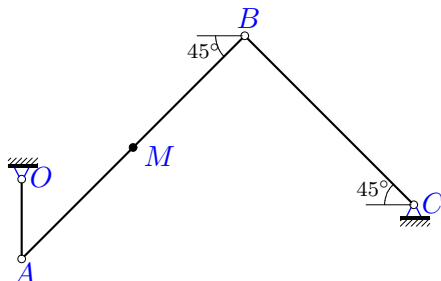
$$BM = 10t + 8 \sin^2(\pi t/6); t = 1 \text{ с},$$

$$\omega_{OA} = 2.4 \frac{1}{\text{с}},$$

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

**Задача K12.21.**

1



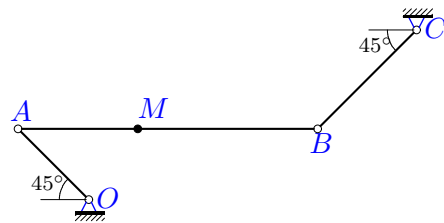
$$AM = 11t(2 + \cos(\pi t/3)); t = 6 \text{ с},$$

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

$$OA = 100, AB = 396, BC = 300$$

**Задача K12.22.**

1



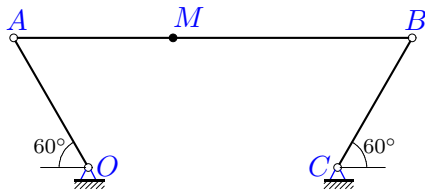
$$AM = 14t + 8 \sin^2(\pi t/4); t = 2 \text{ с},$$

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

$$OA = 30, AB = 90, BC = 42$$

**Задача K12.23.**

1



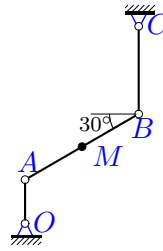
$$AM = 12t + 8 \sin^2(\pi t/4); t = 2 \text{ c,}$$

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

$$OA = 30, AB = 80, BC = 30$$

**Задача K12.24.**

1



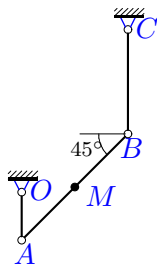
$$AM = 10t + 8 \sin^2(\pi t/3); t = 3 \text{ c,}$$

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

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

**Задача K12.25.**

1



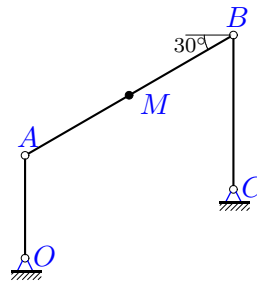
$$AM = 12t(5 - t); t = 2 \text{ c,}$$

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

$$OA = 46, AB = 144, BC = 100$$

**Задача K12.26.**

1



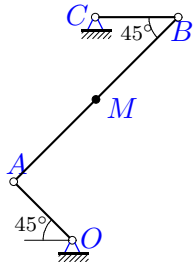
$$AM = 13t(2 + \cos(\pi t/3)); t = 6 \text{ c,}$$

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

$$OA = 200, AB = 468, BC = 300$$

**Задача K12.27.**

1



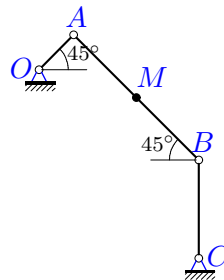
$$AM = 11(\sin(\pi t/6) + t^2); t = 5 \text{ c,}$$

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

$$OA = 200, AB = 561, BC = 200$$

**Задача K12.28.**

1



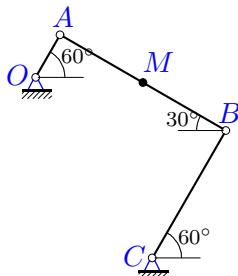
$$BM = 16t + 8 \sin^2(\pi t/6); t = 1 \text{ c,}$$

$$\omega_{OA} = 3 \frac{1}{\text{c}},$$

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

**Задача K12.29.**

1



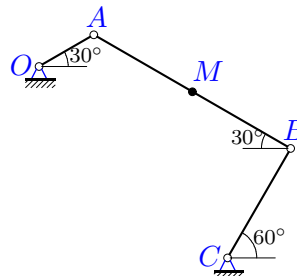
$$BM = 13(\sin(\pi t/6) + t^2); t = 1 \text{ c,}$$

$$\omega_{OA} = 3.2 \frac{1}{\text{c}},$$

$$OA = 10, AB = 39, BC = 30$$

**Задача K12.30.**

1



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

$$\omega_{OA} = 2.9 \frac{1}{\text{c}},$$

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

**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	-0.810	-9.506	-17.17	4.25	-22.08	22.489	17.176	-13.040	75.16	27.81	47.294
2	0.283	-0.179	12.00	50.91	-30.55	59.373	69.936	-24.000	73.37	6.79	63.269
3	0.000	3.088	46.15	-82.27	-47.50	95.000	59.676	36.063	90.85	0.00	126.743
4	-1.100	-16.616	-11.63	5.50	-28.58	29.103	23.219	-2.193	124.83	25.58	99.158
5	0.170	0.044	57.28	-12.99	-37.50	39.686	37.672	11.178	29.03	19.45	38.819
6	0.469	0.249	8.00	-11.26	-19.50	22.517	16.093	-16.000	35.94	7.51	18.318
7	0.328	-0.072	33.00	32.50	168.87	171.974	195.178	-72.377	169.22	21.67	235.344
8	0.000	-0.282	54.00	48.50	28.00	56.000	106.253	15.533	21.40	0.00	9.514
9	0.000	-0.230	124.11	120.00	-0.00	120.000	225.529	24.218	56.92	0.00	79.325
10	0.000	3.306	66.66	-98.08	98.08	138.700	102.985	52.092	199.61	0.00	152.131
11	-0.283	-0.195	12.00	50.91	30.55	59.373	69.936	-24.000	81.74	6.79	99.365
12	-0.000	-1.364	16.00	31.82	31.82	45.000	57.439	-9.870	48.21	0.00	58.001
13	0.530	0.756	13.00	-29.25	-29.25	41.366	28.366	-26.000	32.25	13.79	19.835
14	0.560	0.026	-40.00	84.00	-48.50	96.995	56.995	10.000	168.18	44.80	131.988
15	-0.000	6.627	-26.99	0.00	27.00	27.000	46.755	-20.492	96.44	0.00	110.940
16	-0.113	0.024	133.65	-101.04	-105.00	145.717	40.910	26.081	89.48	30.26	121.540
17	0.500	2.181	-60.00	-56.57	169.71	178.885	234.094	20.000	101.26	60.00	38.604
18	0.657	-0.819	71.79	-138.00	55.20	148.631	86.205	56.099	346.69	94.35	251.220
19	0.481	-4.366	-19.63	20.21	-5.00	20.817	5.786	-14.903	12.70	18.89	35.933
20	-2.000	-0.272	-13.63	12.00	-20.78	24.000	13.972	-2.193	89.84	54.51	128.326
21	0.232	-0.373	33.00	97.50	32.50	102.774	133.111	-72.377	118.02	15.32	71.053
22	0.707	1.258	14.00	-31.82	-6.36	32.450	18.922	-9.870	29.83	19.80	26.367
23	0.525	-0.265	12.00	-36.37	-4.20	36.615	24.732	-9.870	62.87	12.60	48.019
24	0.000	1.299	10.00	-30.00	0.00	30.000	21.918	17.546	22.50	0.00	4.954
25	-0.000	-0.412	12.00	59.80	-0.00	59.800	68.810	-24.000	60.51	0.00	39.982
26	-0.000	0.237	39.00	-240.00	0.00	240.000	207.145	-85.537	241.59	0.00	300.531
27	-0.178	0.309	105.01	-35.36	-106.07	111.803	50.251	20.492	37.86	37.44	11.597
28	-0.833	-1.730	-19.63	-31.82	10.61	33.541	51.845	-2.193	121.78	32.71	89.639
29	0.000	1.750	-31.89	-27.71	16.00	32.000	63.895	-24.218	68.27	0.00	72.435
30	-0.403	1.147	-29.44	-18.13	18.84	26.140	55.036	-22.355	68.89	23.72	73.097

К12 файл o12k1A

$N_0$	$a_{xr}$	$a_{yr}$	$a_{xe}$	$a_{ye}$	$a_x$	$a_y$
1	-11.293	6.520	-30.836	-68.547	-28.226	-37.947
2	-24.000	0.000	55.334	48.176	31.334	54.965
3	36.063	0.000	90.250	10.421	126.313	10.421
4	-1.899	1.097	-51.642	-113.647	-40.751	-90.397
5	9.680	5.589	28.804	3.640	28.758	26.075
6	-13.856	-8.000	35.576	5.070	17.967	3.570
7	-62.680	-36.189	-157.679	61.432	-231.193	44.007
8	15.533	0.000	-19.600	8.600	-4.067	8.600
9	17.125	17.125	54.000	18.000	71.125	35.125
10	52.092	0.000	-186.344	71.556	-134.252	71.556
11	-24.000	0.000	-66.854	47.024	-90.854	40.236
12	-9.870	0.000	-47.730	-6.819	-57.599	-6.819
13	-18.385	-18.385	18.858	26.167	-9.276	17.532
14	8.660	-5.000	129.326	107.520	115.587	63.722
15	-17.747	10.246	-18.225	94.700	-35.972	104.946
16	22.587	13.040	40.719	-79.677	78.436	-92.843
17	14.142	-14.142	37.490	94.059	9.206	37.490
18	56.099	0.000	-36.274	-344.784	19.824	-250.436
19	-12.907	7.452	-8.604	-9.346	-30.954	-18.251
20	-1.899	1.097	-43.200	78.775	-17.844	127.079
21	-51.178	-51.178	44.664	109.247	-17.348	68.902
22	-9.870	0.000	29.730	-2.456	19.860	17.343
23	-9.870	0.000	20.580	-59.409	10.710	-46.809
24	15.195	8.773	-19.486	-11.250	-4.290	-2.477
25	-16.971	-16.971	20.990	56.750	4.019	39.780
26	-74.077	-42.768	-27.713	-240.000	-101.790	-282.768
27	14.490	14.490	-32.322	19.718	8.640	7.736
28	-1.551	1.551	-94.497	-76.820	-72.917	-52.138
29	-20.973	12.109	-34.133	-59.121	-55.107	-47.012
30	-19.360	11.178	-65.038	-22.709	-72.540	9.008