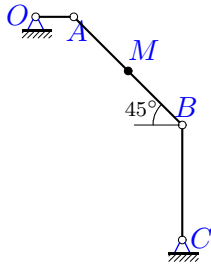


## Сложное движение точки, плоское переносное движение

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.

6



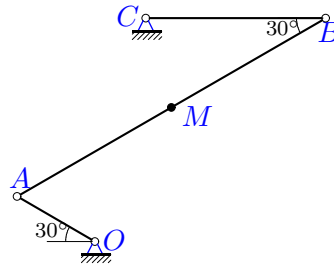
$$BM = 18t + 8 \sin^2(\pi t/6); t = 1 \text{ с},$$

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

$$OA = 10, AB = 40, BC = 30$$

### Задача K12.2.

6



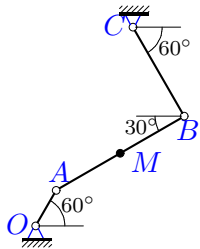
$$AM = 11t(2 + \cos(\pi t/3)); t = 6 \text{ с},$$

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

$$OA = 100, AB = 396, BC = 200$$

### Задача K12.3.

6



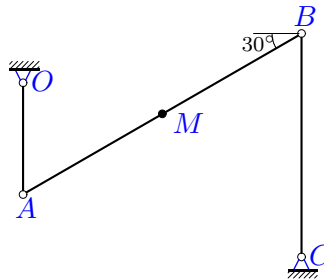
$$AM = 18t(3 - t); t = 1 \text{ с},$$

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

$$OA = 20, AB = 72, BC = 50$$

### Задача K12.4.

6



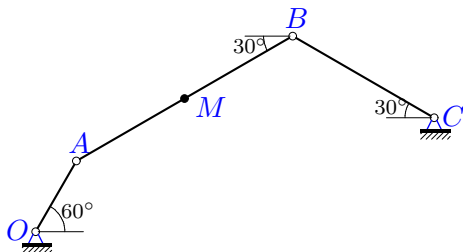
$$AM = 12t(5 - t); t = 2 \text{ с},$$

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

$$OA = 50, AB = 144, BC = 100$$

### Задача K12.5.

6



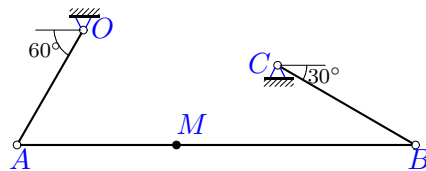
$$AM = 12(\sin(\pi t/6) + t^2); t = 5 \text{ с},$$

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

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

### Задача K12.6.

6



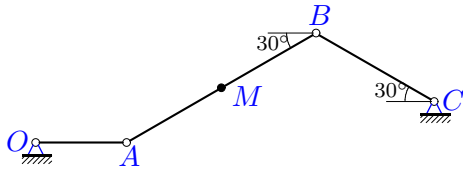
$$AM = 10t(2 + \cos(\pi t/3)); t = 4 \text{ с},$$

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

$$OA = 50, AB = 150, BC = 60$$

**Задача K12.7.**

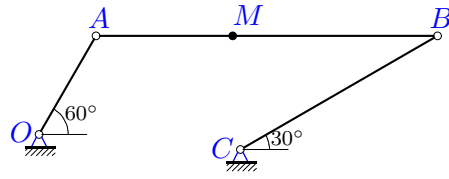
6



$AM = 8t + 8 \sin^2(\pi t/3); t = 3 \text{ c,}$   
 $\omega_{OA} = 1.4 \frac{1}{\text{c}},$   
 $OA = 20, AB = 48, BC = 30$

**Задача K12.8.**

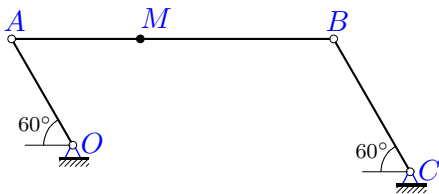
6



$AM = 12(\sin(\pi t/6) + t^2); t = 3 \text{ c,}$   
 $\omega_{OA} = 0.7 \frac{1}{\text{c}},$   
 $OA = 100, AB = 300, BC = 200$

**Задача K12.9.**

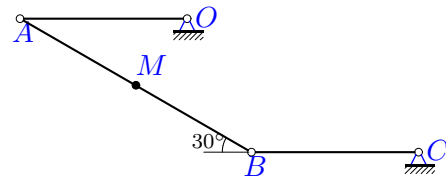
6



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

**Задача K12.10.**

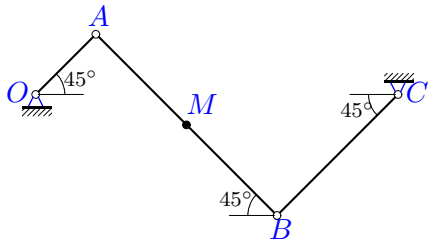
6



$BM = 6t + 8 \sin^2(\pi t/6); t = 1 \text{ c,}$   
 $\omega_{OA} = 2 \frac{1}{\text{c}},$   
 $OA = 10, AB = 16, BC = 10$

**Задача K12.11.**

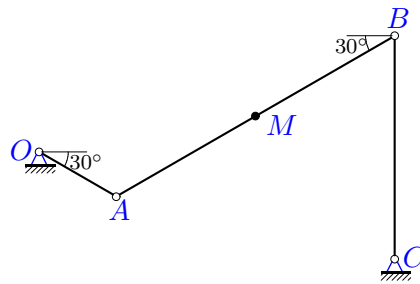
6



$BM = 10(\sin(\pi t/6) + t^2); t = 1 \text{ c,}$   
 $\omega_{OA} = 2.5 \frac{1}{\text{c}},$   
 $OA = 10, AB = 30, BC = 20$

**Задача K12.12.**

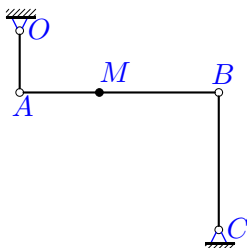
6



$AM = 12t + 8 \sin^2(\pi t/3); t = 3 \text{ c,}$   
 $\omega_{OA} = 1.6 \frac{1}{\text{c}},$   
 $OA = 20, AB = 72, BC = 50$

**Задача K12.13.**

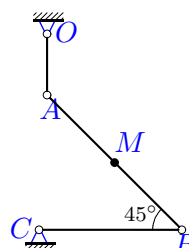
6



$AM = 20t(3 - t); t = 1 \text{ c,}$   
 $\omega_{OA} = 1.6 \frac{1}{\text{c}},$   
 $OA = 31, AB = 100, BC = 69$

**Задача K12.14.**

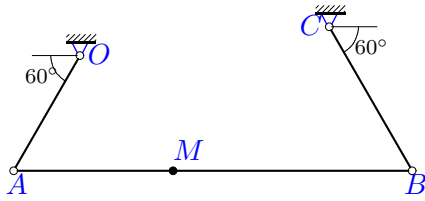
6



$BM = 14t(2 + \cos(\pi t/3)); t = 2 \text{ c,}$   
 $\omega_{OA} = 1.2 \frac{1}{\text{c}},$   
 $OA = 27, AB = 84, BC = 63$

**Задача K12.15.**

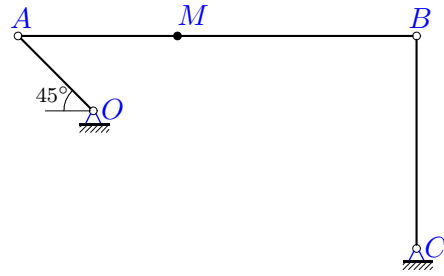
6



$AM = 8t(5 - t); t = 2 \text{ c},$   
 $\omega_{OA} = 1.2 \frac{1}{\text{c}},$   
 $OA = 40, AB = 120, BC = 50$

**Задача K12.16.**

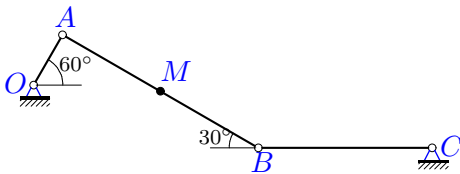
6



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

**Задача K12.17.**

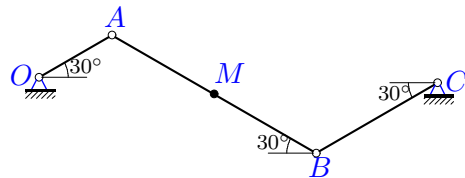
6



$BM = 13(\sin(\pi t/6) + t^2); t = 1 \text{ c},$   
 $\omega_{OA} = 3.2 \frac{1}{\text{c}},$   
 $OA = 10, AB = 39, BC = 30$

**Задача K12.18.**

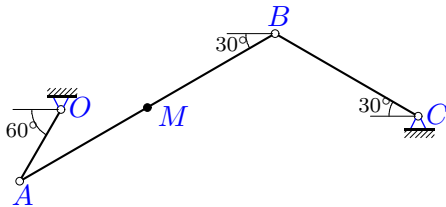
6



$BM = 7t(8 - t); t = 2 \text{ c},$   
 $\omega_{OA} = 1.5 \frac{1}{\text{c}},$   
 $OA = 60, AB = 168, BC = 100$

**Задача K12.19.**

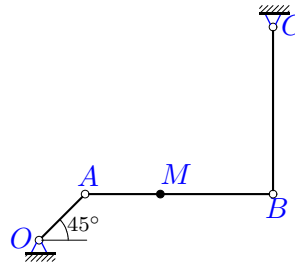
6



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

**Задача K12.20.**

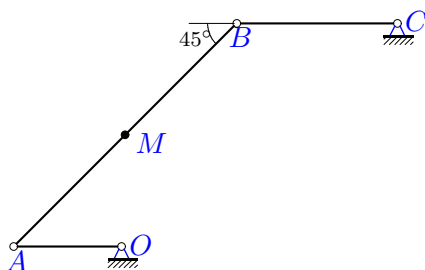
6



$AM = 9(\sin(\pi t/6) + t^2); t = 3 \text{ c},$   
 $\omega_{OA} = 0.7 \frac{1}{\text{c}},$   
 $OA = 78, AB = 225, BC = 200$

**Задача K12.21.**

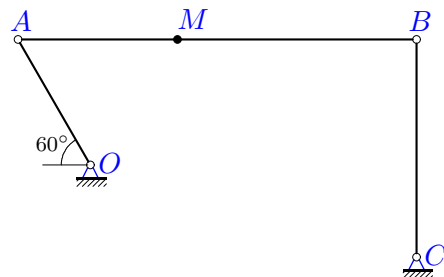
6



$AM = 20t + 8\sin^2(\pi t/3); t = 3 \text{ c},$   
 $\omega_{OA} = 1.5 \frac{1}{\text{c}},$   
 $OA = 41, AB = 120, BC = 61$

**Задача K12.22.**

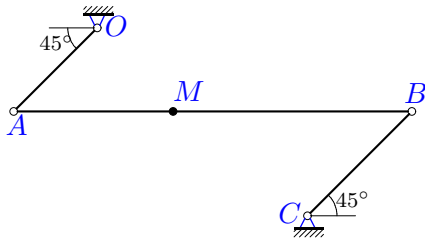
6



$AM = 22t(3 - t); t = 1 \text{ c},$   
 $\omega_{OA} = 1.6 \frac{1}{\text{c}},$   
 $OA = 40, AB = 110, BC = 60$

**Задача K12.23.**

6



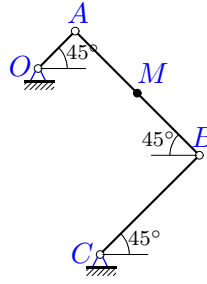
$$AM = 9t(5 - t); t = 2 \text{ c,}$$

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

$$OA = 40, AB = 135, BC = 50$$

**Задача K12.24.**

6



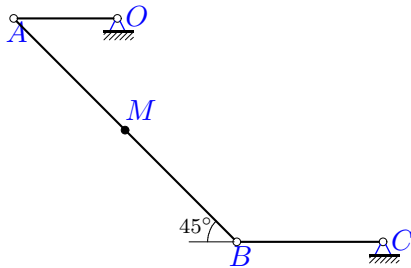
$$BM = 10(\sin(\pi t/6) + t^2); t = 1 \text{ c,}$$

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

$$OA = 9, AB = 30, BC = 24$$

**Задача K12.25.**

6



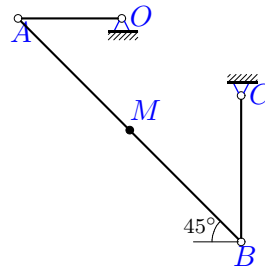
$$BM = 9t(8 - t); t = 2 \text{ c,}$$

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

$$OA = 71, AB = 216, BC = 100$$

**Задача K12.26.**

6



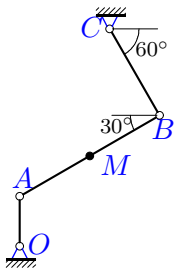
$$BM = 9t(8 - t); t = 2 \text{ c,}$$

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

$$OA = 71, AB = 216, BC = 100$$

**Задача K12.27.**

6



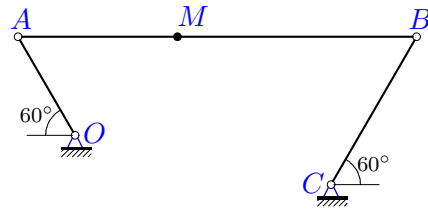
$$AM = 9t(2 + \cos(\pi t/3)); t = 6 \text{ c,}$$

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

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

**Задача K12.28.**

6



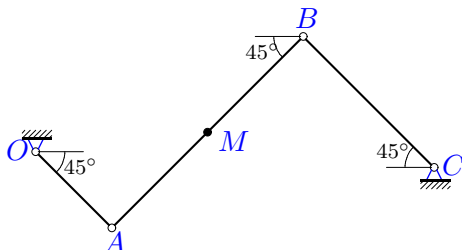
$$AM = 10t + 8 \sin^2(\pi t/4); t = 2 \text{ c,}$$

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

$$OA = 20, AB = 70, BC = 30$$

**Задача K12.29.**

6



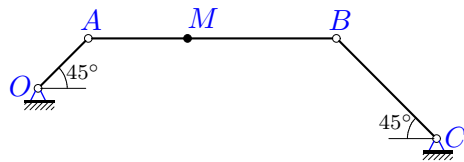
$$AM = 27t(3 - t); t = 1 \text{ c,}$$

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

$$OA = 43, AB = 108, BC = 74$$

**Задача K12.30.**

6



$$AM = 14(\sin(\pi t/6) + t^2); t = 3 \text{ c,}$$

$$\omega_{OA} = 0.8 \frac{1}{\text{c}},$$

$$OA = 100, AB = 350, BC = 200$$

**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	-1.131	-2.487	-21.63	-16.00	16.00	22.627	44.255	-2.193	156.60	48.94	124.094
2	-0.328	1.833	33.00	-32.50	-168.87	171.974	152.425	-72.377	225.56	21.67	195.092
3	-0.457	0.602	18.00	-24.68	4.75	25.135	16.485	-36.000	71.52	16.45	110.456
4	0.000	-0.866	12.00	60.00	-0.00	60.000	70.648	-24.000	36.00	0.00	12.000
5	-0.226	-0.052	114.56	-69.28	-0.00	69.282	64.627	22.355	93.77	51.87	117.846
6	1.333	3.587	51.28	86.60	30.00	91.652	141.105	40.070	388.51	136.74	526.250
7	-0.337	-1.092	8.00	4.04	21.00	21.385	27.301	17.546	37.26	5.39	22.572
8	0.233	-0.113	72.00	-60.62	63.00	87.430	64.019	20.710	64.00	33.60	24.638
9	-0.000	0.198	21.00	-51.96	-30.00	60.000	43.112	-42.000	82.90	0.00	69.693
10	0.000	0.000	-9.63	0.00	-20.00	20.000	17.325	-2.193	40.00	0.00	38.116
11	0.000	3.125	-24.53	-17.68	17.68	25.000	49.534	-18.629	15.62	0.00	24.314
12	-0.444	-0.625	12.00	24.00	13.86	27.713	39.713	17.546	39.33	10.67	18.838
13	0.000	-1.150	20.00	49.60	-0.00	49.600	69.600	-40.000	33.35	0.00	52.082
14	-0.545	0.017	4.39	16.20	-16.20	22.910	27.303	10.040	48.94	4.79	38.015
15	0.400	0.074	8.00	41.57	-4.80	41.845	49.801	-16.000	57.45	6.40	60.049
16	0.170	0.099	90.00	-63.64	-38.18	74.216	46.399	25.888	67.88	30.55	79.739
17	1.421	13.126	-31.89	-13.86	40.00	42.332	69.646	-24.218	158.52	90.66	89.448
18	-0.000	1.485	-28.00	-45.00	77.94	90.000	115.103	14.000	67.95	0.00	54.065
19	0.226	-0.056	66.83	40.41	0.00	40.415	103.812	13.040	36.31	30.26	64.418
20	-0.172	0.153	54.00	-38.61	23.16	45.024	27.812	15.533	32.49	18.53	34.772
21	0.000	0.356	20.00	0.00	-61.50	61.500	49.424	17.546	78.60	0.00	93.671
22	0.291	0.341	22.00	-55.43	-19.20	58.657	38.548	-44.000	87.66	12.80	60.988
23	0.000	-1.086	9.00	33.94	-33.94	48.000	54.735	-18.000	44.50	0.00	28.944
24	-0.000	1.367	-24.53	-17.18	17.18	24.300	48.834	-18.629	45.11	0.00	48.802
25	0.000	-0.303	-36.00	0.00	-106.50	106.500	84.948	18.000	138.54	0.00	153.567
26	0.697	0.256	-36.00	53.25	-53.25	75.307	39.307	18.000	153.09	50.20	119.729
27	-0.201	0.647	27.00	-113.75	-28.15	117.180	91.546	-59.218	100.03	10.83	159.089
28	0.429	-0.018	10.00	-25.98	-3.00	26.153	16.260	-9.870	43.11	8.57	31.789
29	-0.000	-1.612	27.00	48.65	48.65	68.800	95.800	-54.000	23.06	0.00	58.717
30	-0.323	-0.234	84.00	-56.57	11.31	57.689	29.673	24.162	98.32	54.31	137.029

К12 файл о12к6А

$N_0$	$a_{xr}$	$a_{yr}$	$a_{xe}$	$a_{ye}$	$a_x$	$a_y$
1	-1.551	1.551	-155.671	-17.067	-122.617	19.088
2	-62.680	-36.189	-53.571	219.111	-105.418	164.158
3	-31.177	-18.000	-53.443	-47.529	-76.393	-79.779
4	-20.785	-12.000	31.177	18.000	10.392	6.000
5	19.360	11.178	-41.592	-84.040	3.705	-117.788
6	40.070	0.000	-6.667	388.453	33.404	525.189
7	15.195	8.773	-28.457	-24.052	-10.567	-19.946
8	20.710	0.000	-31.033	-55.971	-10.323	-22.371
9	-42.000	0.000	45.000	-69.628	3.000	-69.628
10	-1.899	1.097	40.000	0.000	38.101	1.097
11	-13.173	13.173	-11.049	-11.049	-24.221	2.124
12	15.195	8.773	-39.250	2.560	-18.721	2.095
13	-40.000	0.000	0.000	33.354	-40.000	33.354
14	7.100	-7.100	-8.331	48.222	-4.621	37.733
15	-16.000	0.000	21.120	53.430	5.120	59.830
16	25.888	0.000	52.956	-42.465	78.843	-11.918
17	-20.973	12.109	42.667	152.670	-23.635	86.269
18	12.124	-7.000	-54.560	40.500	-42.435	33.500
19	11.293	6.520	21.575	29.202	17.738	61.928
20	15.533	0.000	-29.676	-13.234	-14.143	-31.766
21	12.407	12.407	77.127	15.123	89.534	27.530
22	-44.000	0.000	47.476	-73.689	3.476	-60.889
23	-18.000	0.000	40.729	-17.921	22.729	-17.921
24	-13.173	13.173	-31.895	-31.895	-45.068	-18.723
25	12.728	-12.728	136.586	-23.164	149.314	-35.892
26	12.728	-12.728	142.200	56.711	119.428	8.483
27	-51.284	-29.609	-58.080	-81.443	-103.947	-120.434
28	-9.870	0.000	17.357	-39.466	7.488	-30.895
29	-38.184	-38.184	-16.304	16.304	-54.488	-21.880
30	24.162	0.000	-59.883	-77.985	-35.722	-132.291