

## Движение точки по звену механизма

Плоский шарнирно-стержневой механизм приводится в движение кривошипом  $OA$ , который вращается против часовой стрелки с постоянной угловой скоростью  $\omega$ . Вдоль стержня  $A$  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 см. Стержни, положение которых не задано углом, горизонтальны или вертикальны. Найти абсолютную скорость и абсолютное ускорение точки  $M$  в этот момент.

*Кирсанов М.Н. Решебник. Теоретическая механика с. 209.*

**Вариант 1**  
К12.

$\omega_{OA} = 0.7 \frac{1}{c}$ ,  
 $AM = 14(\sin(\pi t/6) + t^2)$ ;  $t = 3$  с,  
 $OA=123$ ,  $AB=350$ ,  $BC=233$

**Вариант 2**  
К12.

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

**Вариант 3**  
К12.

$\omega_{OA} = 0.7 \frac{1}{c}$ ,  
 $AM = 14(\sin(\pi t/6) + t^2)$ ;  $t = 3$  с,  
 $OA=120$ ,  $AB=350$ ,  $BC=180$

**Вариант 4**  
К12.

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

**Вариант 5**  
К12.

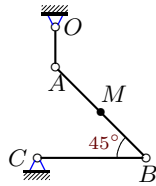
$\omega_{OA} = 2 \frac{1}{c}$ ,  
 $AM = 13t(2 + \cos(\pi t/3))$ ;  $t = 4$  с,  
 $OA=67$ ,  $AB=195$ ,  $BC=132$

**Вариант 6**  
К12.

$\omega_{OA} = 1.2 \frac{1}{c}$ ,  
 $AM = 11t(5 - t)$ ;  $t = 2$  с,  
 $OA=60$ ,  $AB=165$ ,  $BC=110$

**Вариант 7**

K12.



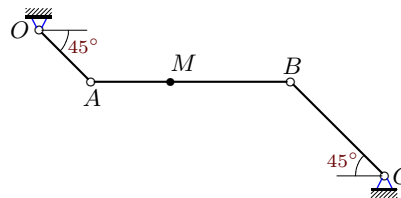
$$\omega_{OA} = 2.7 \frac{1}{c},$$

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

$$OA=12, AB=39, BC=33$$

**Вариант 8**

K12.



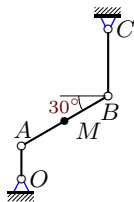
$$\omega_{OA} = 1.9 \frac{1}{c},$$

$$AM = 11t(2 + \cos(\pi t/3)); t = 4 \text{ c},$$

$$OA=60, AB=165, BC=110$$

**Вариант 9**

K12.



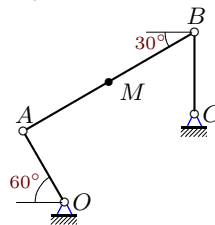
$$\omega_{OA} = 1.5 \frac{1}{c},$$

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

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

**Вариант 10**

K12.



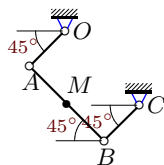
$$\omega_{OA} = 1.4 \frac{1}{c},$$

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

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

**Вариант 11**

K12.



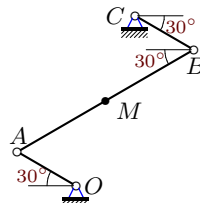
$$\omega_{OA} = 1.7 \frac{1}{c},$$

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

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

**Вариант 12**

K12.



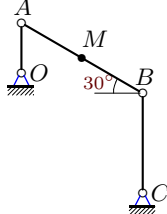
$$\omega_{OA} = 1.5 \frac{1}{c},$$

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

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

**Вариант 13**

K12.



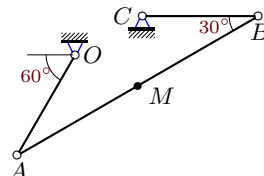
$$\omega_{OA} = 1.1 \frac{1}{c},$$

$$BM = 14t(2 + \cos(\pi t/3)); t = 2 \text{ c},$$

$$OA=30, AB=84, BC=60$$

**Вариант 14**

K12.



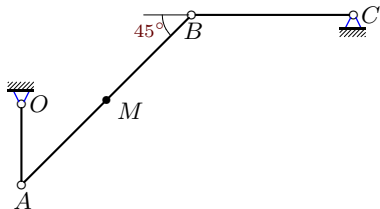
$$\omega_{OA} = 1.4 \frac{1}{c},$$

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

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

**Вариант 15**

K12.



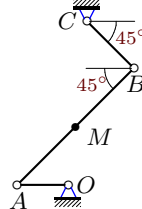
$$\omega_{OA} = 0.6 \frac{1}{c},$$

$$AM = 7(\sin(\pi t/6) + t^2); t = 5 \text{ c},$$

$$OA=120, AB=357, BC=240$$

**Вариант 16**

K12.



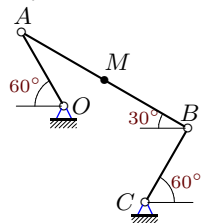
$$\omega_{OA} = 0.6 \frac{1}{c},$$

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

$$OA=95, AB=306, BC=123$$

**Вариант 17**

K12.



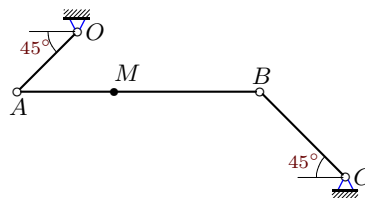
$$\omega_{OA} = 1.8 \frac{1}{c},$$

$$BM = 15(\sin(\pi t/6) + t^2); t = 1 \text{ c},$$

$$OA=20, AB=45, BC=20$$

**Вариант 18**

K12.



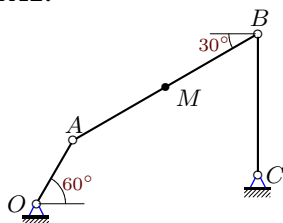
$$\omega_{OA} = 1.6 \frac{1}{c},$$

$$AM = 24t(3 - t); t = 1 \text{ c},$$

$$OA=42, AB=120, BC=60$$

**Вариант 19**

K12.



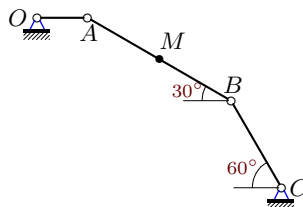
$$\omega_{OA} = 1.2 \frac{1}{c},$$

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

$$OA=160, AB=468, BC=310$$

**Вариант 20**

K12.



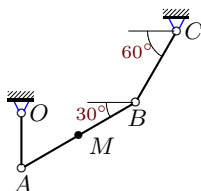
$$\omega_{OA} = 2.7 \frac{1}{c},$$

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

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

**Вариант 21**

K12.



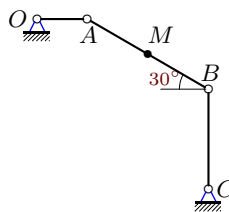
$$\omega_{OA} = 1.4 \frac{1}{c},$$

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

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

**Вариант 22**

K12.



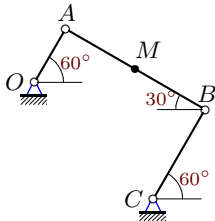
$$\omega_{OA} = 1.1 \frac{1}{c},$$

$$BM = 14t(2 + \cos(\pi t/3)); t = 2 \text{ c},$$

$$OA=30, AB=84, BC=60$$

**Вариант 23**

K12.



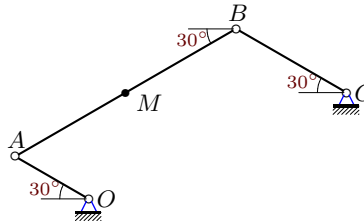
$$\omega_{OA} = 1.1 \frac{1}{c},$$

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

$$OA=30, AB=78, BC=50$$

**Вариант 24**

K12.



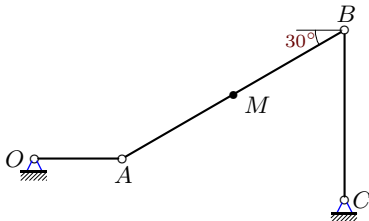
$$\omega_{OA} = 1.8 \frac{1}{c},$$

$$AM = 30t(3 - t); t = 1 \text{ c},$$

$$OA=40, AB=120, BC=60$$

**Вариант 25**

K12.



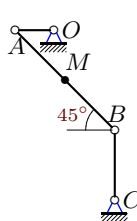
$$\omega_{OA} = 1.2 \frac{1}{c},$$

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

$$OA=160, AB=468, BC=310$$

**Вариант 26**

K12.



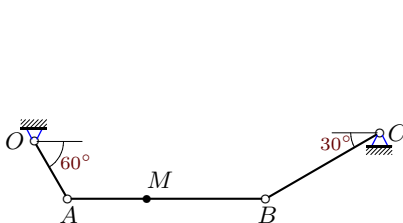
$$\omega_{OA} = 3 \frac{1}{c},$$

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

$$OA=11, AB=40, BC=20$$

**Вариант 27**

K12.



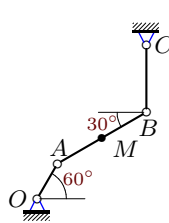
$$\omega_{OA} = 2 \frac{1}{c},$$

$$AM = 6t(2 + \cos(\pi t/3)); t = 4 \text{ c},$$

$$OA=30, AB=90, BC=60$$

**Вариант 28**

K12.



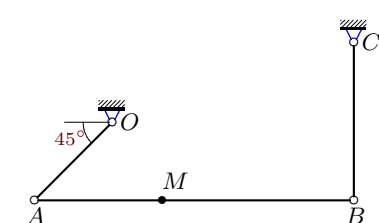
$$\omega_{OA} = 1.6 \frac{1}{c},$$

$$AM = 19t(3 - t); t = 1 \text{ c},$$

$$OA=30, AB=76, BC=50$$

**Вариант 29**

K12.



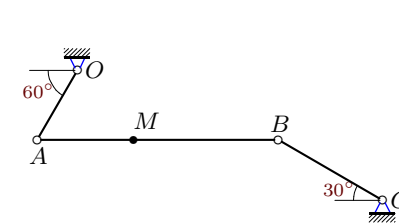
$$\omega_{OA} = 0.7 \frac{1}{c},$$

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

$$OA=112, AB=325, BC=161$$

**Вариант 30**

K12.



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

$$AM = 8t(5 - t); t = 2 \text{ c},$$

$$OA=40, AB=120, BC=60$$

Ответы

	$\omega_e$	$\varepsilon_e$	$v_r^T$	$v_e$	$v$	$W_r^T$	$W_e$	$W_C$	$W$
1	0.00	0.11	84.00	86.10	65.12	24.16	50.20	0.00	32.31
2	-0.58	0.82	-22.08	17.39	38.43	-16.77	45.11	25.44	55.52
3	-0.24	-0.48	84.00	104.92	76.43	24.16	120.14	40.32	164.95
4	-0.29	0.94	-20.00	45.83	60.83	10.00	83.74	11.55	76.51
5	-0.97	1.93	66.66	96.63	162.52	52.09	430.05	129.56	298.14
6	-0.44	-1.14	11.00	77.55	87.85	-22.00	16.76	9.60	34.60
7	-1.17	0.23	-31.89	22.91	8.98	-24.22	110.79	74.95	180.87
8	0.00	-2.87	56.40	114.00	158.97	44.08	157.38	0.00	114.93
9	0.00	1.30	10.00	30.00	21.92	17.55	22.50	0.00	4.95
10	0.34	-0.22	8.00	29.14	21.57	17.55	44.48	5.39	41.73
11	0.00	0.00	-17.17	17.00	0.17	-13.04	28.90	0.00	31.71
12	-0.00	1.73	10.00	30.00	21.92	17.55	25.98	0.00	42.10
13	-0.00	0.25	4.39	33.00	29.28	10.04	27.72	0.00	35.13
14	1.01	0.68	8.00	14.00	22.00	17.55	37.19	16.17	58.71
15	0.29	-0.17	66.83	50.91	117.74	13.04	16.04	38.12	48.54
16	0.13	0.12	57.28	45.06	26.35	11.18	22.22	15.09	34.09
17	0.69	0.36	-36.80	23.81	56.98	-27.94	51.42	50.99	77.27
18	0.79	-1.51	24.00	48.46	72.15	-48.00	46.04	38.01	41.41
19	-0.24	0.39	39.00	146.64	124.65	-85.54	213.89	18.48	301.05
20	-1.42	-7.90	-26.99	13.50	40.49	-20.49	192.54	76.49	147.58
21	-0.58	2.44	8.00	37.04	42.71	17.55	93.25	9.33	88.11
22	-0.45	-0.19	4.39	19.05	15.41	10.04	47.81	3.99	42.49
23	-0.00	0.19	4.08	33.00	28.92	9.32	29.04	0.00	30.50
24	-0.00	0.42	30.00	72.00	48.40	-60.00	108.72	0.00	87.43
25	-0.47	0.00	39.00	110.85	145.93	-85.54	277.44	36.95	346.70
26	1.17	-2.53	-21.63	23.33	1.71	-2.19	46.96	50.47	51.12
27	-1.33	7.08	30.77	54.99	84.66	24.04	379.60	82.04	294.23
28	-0.36	1.32	19.00	36.66	28.16	-38.00	72.53	13.86	109.58
29	0.17	-0.06	78.00	64.65	137.52	22.44	46.72	26.61	81.31
30	0.80	-3.03	8.00	43.99	51.62	-16.00	95.50	12.80	84.61