

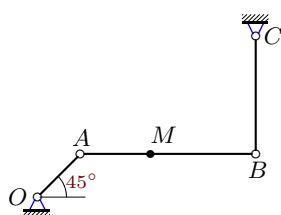
## Движение точки по звену механизма

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

K12.



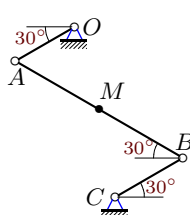
$$\omega_{OA} = 0.7 \frac{1}{c},$$

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

$$OA=78, AB=225, BC=151$$

### Вариант 2

K12.



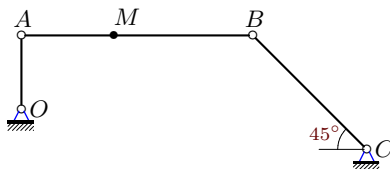
$$\omega_{OA} = 1.3 \frac{1}{c},$$

$$BM = 3t(14 - t); t = 3 \text{ с},$$

$$OA=70, AB=198, BC=80$$

### Вариант 3

K12.



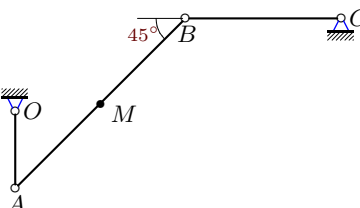
$$\omega_{OA} = 0.8 \frac{1}{c},$$

$$AM = 10(\sin(\pi t/6) + t^2); t = 3 \text{ с},$$

$$OA=79, AB=250, BC=174$$

### Вариант 4

K12.



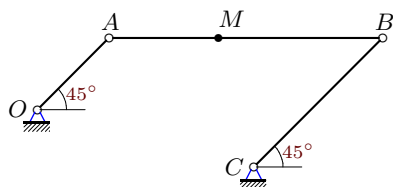
$$\omega_{OA} = 1.3 \frac{1}{c},$$

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

$$OA=70, AB=216, BC=140$$

### Вариант 5

K12.



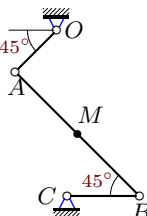
$$\omega_{OA} = 1.9 \frac{1}{c},$$

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

$$OA=50, AB=135, BC=90$$

### Вариант 6

K12.



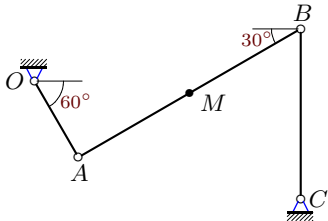
$$\omega_{OA} = 1.4 \frac{1}{c},$$

$$BM = 6t(16 - t); t = 3 \text{ с},$$

$$OA=156, AB=468, BC=193$$

**Вариант 7**

K12.



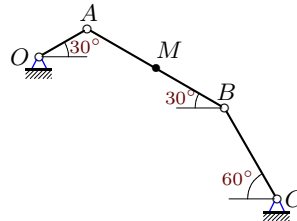
$$\omega_{OA} = 1.2 \frac{1}{c},$$

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

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

**Вариант 8**

K12.



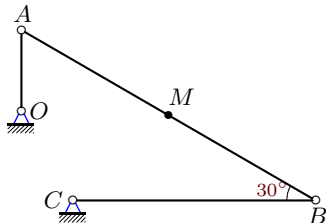
$$\omega_{OA} = 1.5 \frac{1}{c},$$

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

$$OA=90, AB=256, BC=170$$

**Вариант 9**

K12.



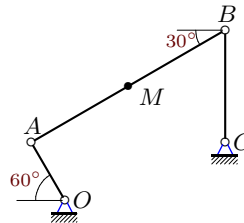
$$\omega_{OA} = 3.4 \frac{1}{c},$$

$$BM = 14(\sin(\pi t/6) + t^2); t = 1 \text{ c},$$

$$OA=10, AB=42, BC=30$$

**Вариант 10**

K12.



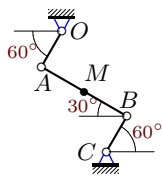
$$\omega_{OA} = 1.8 \frac{1}{c},$$

$$AM = 25t(3 - t); t = 1 \text{ c},$$

$$OA=30, AB=100, BC=50$$

**Вариант 11**

K12.



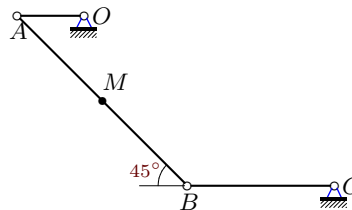
$$\omega_{OA} = 2 \frac{1}{c},$$

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

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

**Вариант 12**

K12.



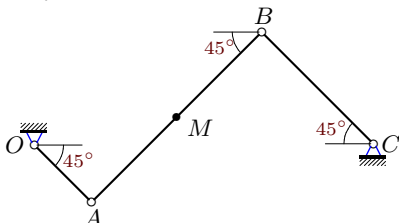
$$\omega_{OA} = 2.9 \frac{1}{c},$$

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

$$OA=5, AB=18, BC=11$$

**Вариант 13**

K12.



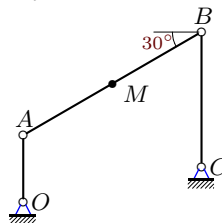
$$\omega_{OA} = 1.2 \frac{1}{c},$$

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

$$OA=133, AB=396, BC=260$$

**Вариант 14**

K12.



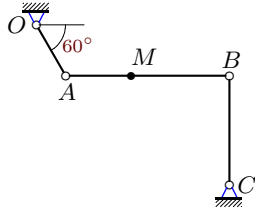
$$\omega_{OA} = 1.8 \frac{1}{c},$$

$$AM = 23t(3 - t); t = 1 \text{ c},$$

$$OA=30, AB=92, BC=60$$

**Вариант 15**

K12.



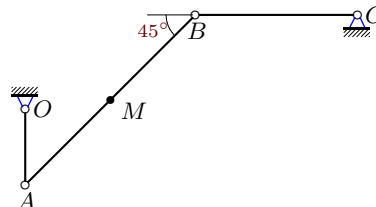
$$\omega_{OA} = 2 \frac{1}{c},$$

$$AM = 13t(2 + \cos(\pi t/3)); t = 4 \text{ c},$$

$$OA=70, AB=195, BC=130$$

**Вариант 16**

K12.



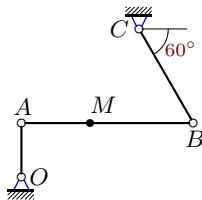
$$\omega_{OA} = 1.3 \frac{1}{c},$$

$$AM = 12t(2 + \cos(\pi t/3)); t = 6 \text{ c},$$

$$OA=136, AB=432, BC=291$$

**Вариант 17**

K12.



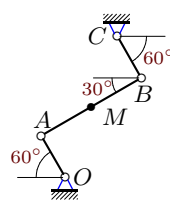
$$\omega_{OA} = 1.6 \frac{1}{c},$$

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

$$OA=30, AB=95, BC=60$$

**Вариант 18**

K12.



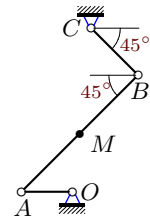
$$\omega_{OA} = 1.4 \frac{1}{c},$$

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

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

**Вариант 19**

K12.



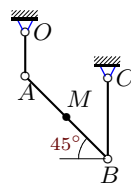
$$\omega_{OA} = 0.6 \frac{1}{c},$$

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

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

**Вариант 20**

K12.



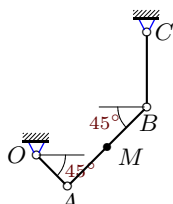
$$\omega_{OA} = 2.5 \frac{1}{c},$$

$$BM = 14t + 8 \sin^2(\pi t/6); t = 1 \text{ c},$$

$$OA=12, AB=32, BC=22$$

**Вариант 21**

K12.



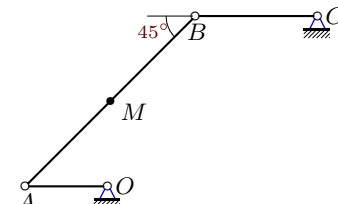
$$\omega_{OA} = 1.4 \frac{1}{c},$$

$$AM = 14t + 8 \sin^2(\pi t/3); t = 3 \text{ c},$$

$$OA=33, AB=84, BC=56$$

**Вариант 22**

K12.



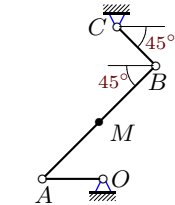
$$\omega_{OA} = 1.5 \frac{1}{c},$$

$$AM = 20t + 8 \sin^2(\pi t/3); t = 3 \text{ c},$$

$$OA=41, AB=120, BC=61$$

**Вариант 23**

K12.



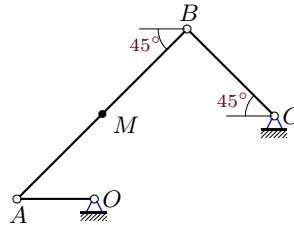
$$\omega_{OA} = 1.4 \frac{1}{c},$$

$$AM = 18t + 8 \sin^2(\pi t/3); t = 3 \text{ c},$$

$$OA=41, AB=108, BC=37$$

**Вариант 24**

K12.



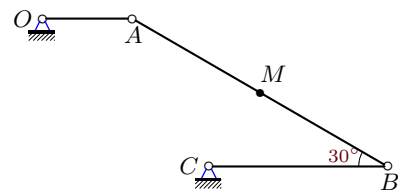
$$\omega_{OA} = 1.3 \frac{1}{c},$$

$$AM = 13t(5 - t); t = 2 \text{ c},$$

$$OA=50, AB=156, BC=80$$

**Вариант 25**

K12.



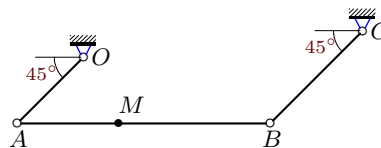
$$\omega_{OA} = 1.2 \frac{1}{c},$$

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

$$OA=20, AB=66, BC=40$$

**Вариант 26**

K12.



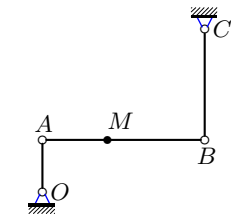
$$\omega_{OA} = 1.2 \frac{1}{c},$$

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

$$OA=50, AB=135, BC=70$$

**Вариант 27**

K12.



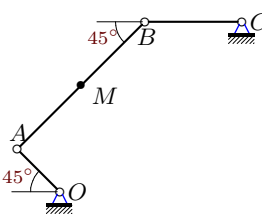
$$\omega_{OA} = 0.8 \frac{1}{c},$$

$$AM = 10(\sin(\pi t/6) + t^2); t = 3 \text{ c},$$

$$OA=80, AB=250, BC=170$$

**Вариант 28**

K12.



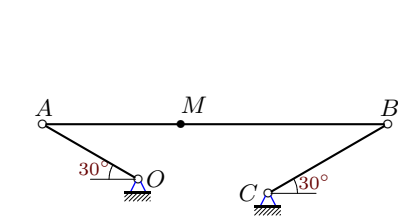
$$\omega_{OA} = 1.8 \frac{1}{c},$$

$$AM = 33t(3 - t); t = 1 \text{ c},$$

$$OA=44, AB=132, BC=71$$

**Вариант 29**

K12.



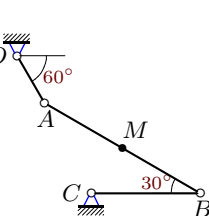
$$\omega_{OA} = 1.6 \frac{1}{c},$$

$$AM = 25t(3 - t); t = 1 \text{ c},$$

$$OA=40, AB=125, BC=50$$

**Вариант 30**

K12.



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

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

$$OA=20, AB=66, BC=40$$

Ответы

	$\omega_e$	$\varepsilon_e$	$v_r^T$	$v_e$	$v$	$W_r^T$	$W_e$	$W_C$	$W$
1	-0.17	0.16	54.00	45.02	27.81	15.53	32.11	18.53	33.89
2	0.00	-1.29	-24.00	91.00	71.23	6.00	64.46	0.00	70.00
3	-0.25	-0.12	60.00	68.07	25.48	17.26	63.02	30.34	93.67
4	0.60	-0.74	18.00	64.35	82.35	-39.48	45.45	21.45	25.61
5	0.00	0.84	46.15	95.00	70.39	36.06	151.84	0.00	123.09
6	-0.47	-1.93	-60.00	244.18	192.39	12.00	154.33	56.00	97.77
7	-0.24	-0.78	39.00	199.84	237.56	-85.54	50.46	18.48	103.20
8	-1.05	-4.44	-48.00	135.00	178.19	16.00	782.50	101.25	681.49
9	1.62	-0.96	-34.35	34.00	66.02	-26.08	120.40	111.22	232.76
10	0.31	0.19	25.00	56.20	32.92	-50.00	87.63	15.59	90.44
11	0.00	-3.33	-19.63	20.00	0.37	-14.90	0.00	0.00	14.90
12	0.00	-1.80	-14.72	14.50	11.18	-11.18	32.66	0.00	22.96
13	0.00	-0.73	33.00	159.60	192.60	-72.38	46.78	0.00	86.18
14	0.00	0.61	23.00	54.00	35.97	-46.00	74.24	0.00	109.99
15	-0.36	-1.76	66.66	128.31	192.54	52.09	183.10	47.86	113.37
16	0.58	-0.69	36.00	125.02	161.02	-78.96	91.28	41.67	56.99
17	-0.29	1.38	19.00	49.26	31.05	-38.00	24.51	11.09	54.33
18	0.00	1.63	8.00	28.00	20.00	17.55	0.00	0.00	17.55
19	0.13	0.12	57.28	45.06	26.35	11.18	22.22	15.09	34.09
20	0.00	-1.51	-17.63	30.00	21.51	-2.19	60.41	0.00	62.34
21	-0.55	0.82	14.00	51.65	64.48	17.55	99.76	15.40	83.69
22	0.00	0.36	20.00	61.50	49.42	17.55	78.60	0.00	93.67
23	0.38	0.94	18.00	45.38	30.37	17.55	49.58	13.53	67.15
24	0.29	0.21	13.00	51.39	40.18	-26.00	68.28	7.66	44.52
25	0.00	0.44	3.45	24.00	22.47	7.89	24.94	0.00	17.05
26	-0.00	-0.22	9.00	60.00	66.67	-18.00	64.30	0.00	51.24
27	0.00	0.30	60.00	64.00	4.00	17.26	21.08	0.00	27.25
28	-0.60	-1.17	33.00	88.55	60.85	-66.00	221.26	39.60	274.66
29	0.89	-0.77	25.00	33.87	13.11	-50.00	102.29	44.34	45.25
30	-0.63	0.69	3.45	12.00	15.45	7.89	53.11	4.35	44.49