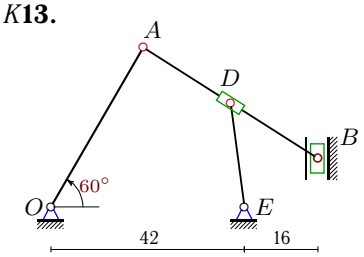
# Механизм с муфтой

Плоский механизм с одной степенью свободы состоит из шарнирно соединенных стержней и муфты, скользящей по направляющему стержню и шарнирно закрепленной на другом стержне или вращающейся на неподвижном шарнире. Кривошип $OA$ вращается против часовой стрелки с постоянной угловой скоростью $\omega_{OA}$. Горизонтальные и вертикальные размеры на рисунках даны для неподвижных шарниров и для линий движения ползунов (в см). Найти скорость муфты $D$ (или $E$) относительно направляющего стержня (в см/с).

*Кирсанов М.Н.* **Решебник. Теоретическая механика** с. 216.

**Вариант 1**

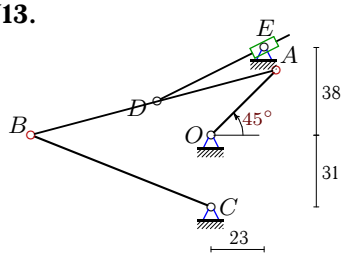
**К13.**




$\omega_{OA} = 1\frac{1}{c}$, $\alpha = 60°$, $OA = 40$, $AB = 45$, $AD{=}AB/2$.

**Вариант 2**

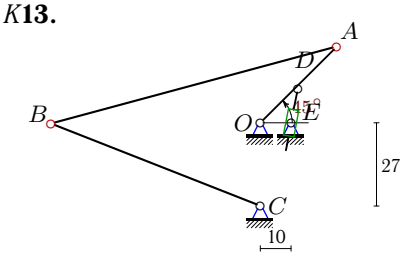
**К13.**




$\omega_{OA} = 2\frac{1}{c}$, $\alpha = 45°$, $OA = 40$, $AB = 110$, $BC = 84$, $AD{=}AB/2$.

**Вариант 3**

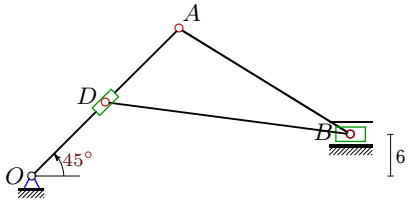
**К13.**




$\omega_{OA} = 3\frac{1}{c}$, $\alpha = 45°$, $OA = 35$, $AB = 96$, $BC = 73$, $OD{=}OA/2$.

**Вариант 4**

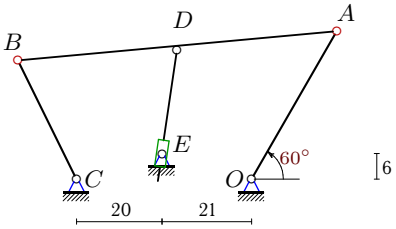
**К13.**




$\omega_{OA} = 4\frac{1}{c}$, $\alpha = 45°$, $OA = 30$, $AB = 29$, $OD{=}OA/2$.

**Вариант 5**

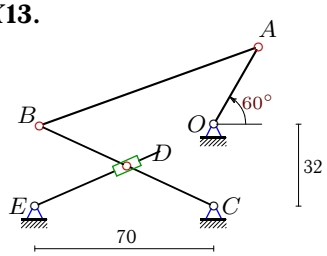
**К13.**




$\omega_{OA} = 5\frac{1}{c}$, $\alpha = 60°$, $OA = 40$, $AB = 75$, $BC = 31$, $AD{=}AB/2$.

**Вариант 6**

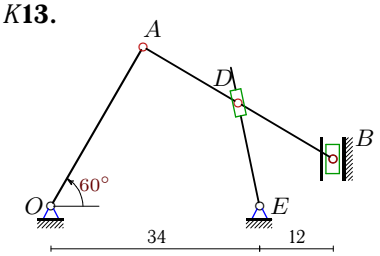
**К13.**




$\omega_{OA} = 6\frac{1}{c}$, $\alpha = 60°$, $OA = 35$, $AB = 91$, $BC = 75$, $BD{=}BC/2$.

**Вариант 7**

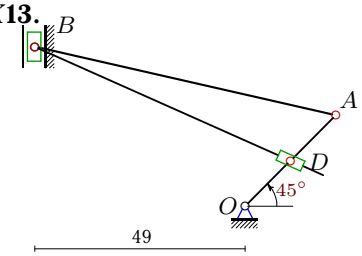
**К13.**




$\omega_{OA} = 7\frac{1}{c}$, $\alpha = 60°$, $OA = 30$, $AB = 36$, $AD{=}AB/2$.

**Вариант 8**

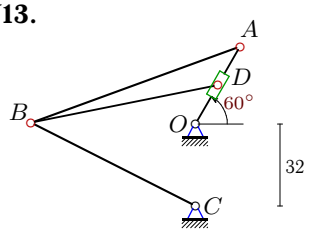
**К13.**




$\omega_{OA} = 8\frac{1}{c}$, $\alpha = 45°$, $OA = 30$, $AB = 72$, $OD{=}OA/2$.

**Вариант 9**

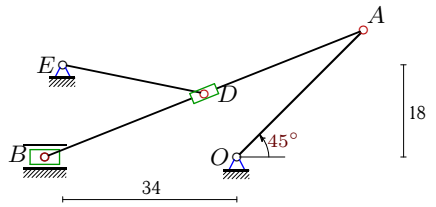
**К13.**




$\omega_{OA} = 9\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 87$, $BC = 72$, $OD{=}OA/2$.

**Вариант 10**

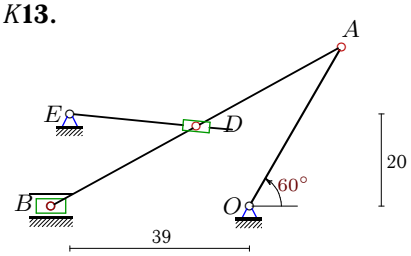
**К13.**




$\omega_{OA} = 10\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 67$, $AD{=}AB/2$.

**Вариант 11**

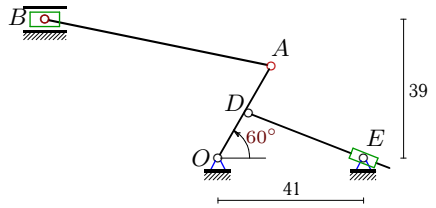
**К13.**




$\omega_{OA} = 11\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 72$, $AD{=}AB/2$.

**Вариант 12**

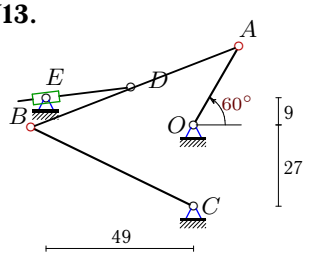
**К13.**




$\omega_{OA} = 12\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 65$, $OD{=}OA/2$.

**Вариант 13**

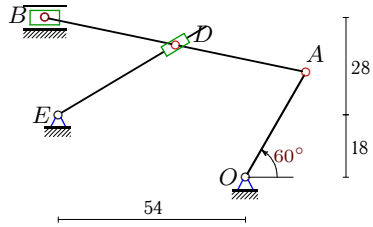
**К13.**




$\omega_{OA} = 13\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 74$, $BC = 60$, $AD{=}AB/2$.

**Вариант 14**

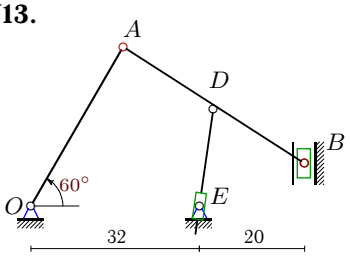
**К13.**




$\omega_{OA} = 14\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 77$, $AD{=}AB/2$.

**Вариант 15**

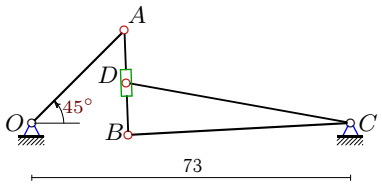
**К13.**




$\omega_{OA} = 15\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 41$, $AD{=}AB/2$.

**Вариант 16**

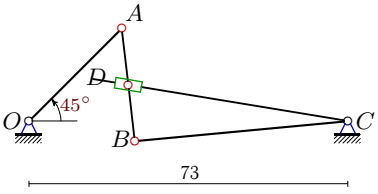
**К13.**




$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 24$, $BC = 51$, $AD{=}AB/2$.

**Вариант 17**

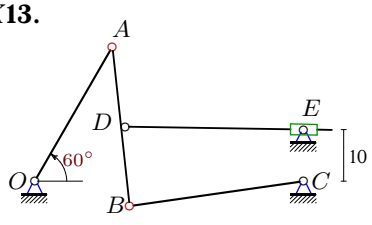
**К13.**




$\omega_{OA} = 17\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 26$, $BC = 49$, $AD{=}AB/2$.

**Вариант 18**

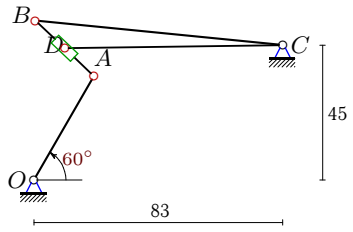
**К13.**




$\omega_{OA} = 18\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 31$, $BC = 34$, $AD{=}AB/2$.

**Вариант 19**

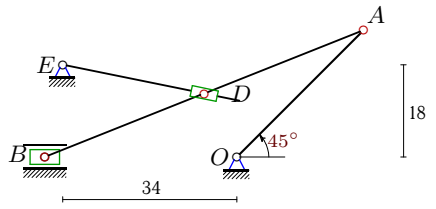
**$K$13.**




$\omega_{OA} = 19\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 27$, $BC = 83$, $AD{=}AB/2$.

**Вариант 20**

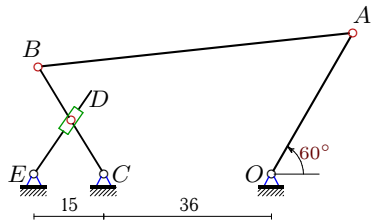
**$K$13.**




$\omega_{OA} = 20\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 67$, $AD{=}AB/2$.

**Вариант 21**

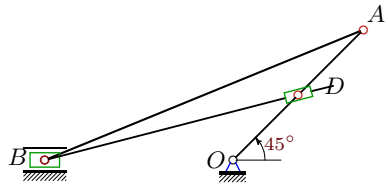
**$K$13.**




$\omega_{OA} = 21\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 68$, $BC = 27$, $BD{=}BC/2$.

**Вариант 22**

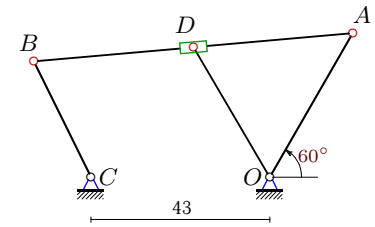
**$K$13.**




$\omega_{OA} = 22\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 56$, $OD{=}OA/2$.

**Вариант 23**

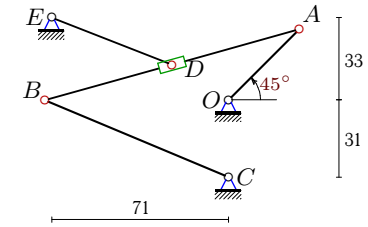
**$K$13.**




$\omega_{OA} = 23\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 77$, $BC = 31$, $AD{=}AB/2$.

**Вариант 24**

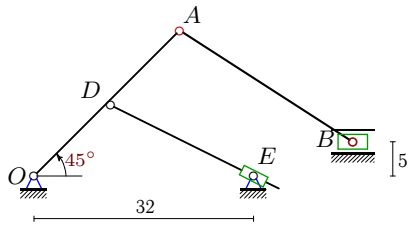
**$K$13.**




$\omega_{OA} = 24\frac{1}{c}$, $\alpha = 45°$, $OA = 40$,
$AB = 106$, $BC = 80$, $AD{=}AB/2$.

**Вариант 25**

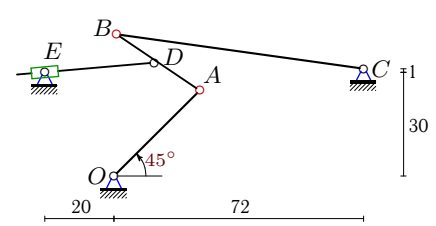
**$K$13.**




$\omega_{OA} = 25\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 30$, $OD{=}OA/2$.

**Вариант 26**

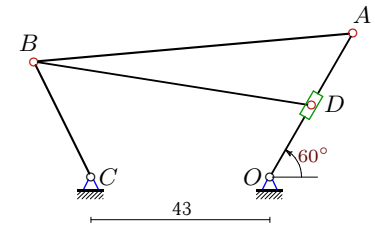
**$K$13.**




$\omega_{OA} = 26\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 29$, $BC = 72$, $AD{=}AB/2$.

**Вариант 27**

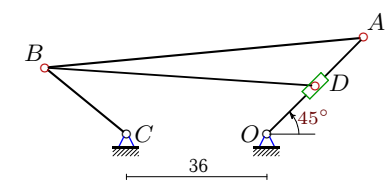
**$K$13.**




$\omega_{OA} = 27\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 77$, $BC = 31$, $OD{=}OA/2$.

**Вариант 28**

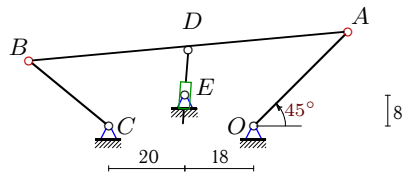
**$K$13.**




$\omega_{OA} = 28\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 82$, $BC = 27$, $OD{=}OA/2$.

**Вариант 29**

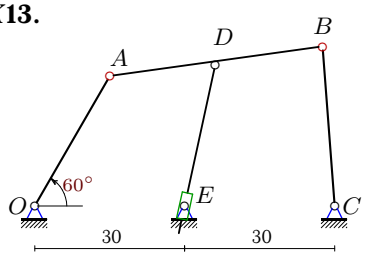
*K***13.**




$\omega_{OA} = 29\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 84$, $BC = 27$, $AD$=$AB/2$.

**Вариант 30**

*K***13.**




$\omega_{OA} = 30\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 43$, $BC = 32$, $AD$=$AB/2$.

Ответы

| | $v_A$ | $v_B$ | $v_D$ | $v_r$ | $x_B$ | $y_B$ |
|---|---|---|---|---|---|---|
| 1 | 40 | 74.6118 | 50.3770 | -76.5773 | 58.000 | 10.537 |
| 2 | 80 | 67.4233 | 40.8706 | -37.8433 | -78.039 | 0.080 |
| 3 | 105 | 87.7938 | 52.5000 | -29.4625 | -67.932 | -0.276 |
| 4 | 120 | 137.1381 | 60.0000 | 145.0416 | 45.902 | 6.000 |
| 5 | 200 | 174.9855 | 165.4942 | 12.4291 | -54.689 | 27.814 |
| 6 | 210 | 192.8419 | 96.4209 | 72.0820 | -68.099 | -0.574 |
| 7 | 210 | 413.0273 | 274.5120 | -272.1028 | 46.000 | 7.678 |
| 8 | 240 | 917.1993 | 120.0000 | -261.1261 | -49.000 | 37.154 |
| 9 | 315 | 277.2644 | 157.5000 | 80.4936 | -64.239 | 0.517 |
| 10 | 350 | 149.1120 | 233.7419 | 261.7054 | -37.513 | 0.000 |
| 11 | 440 | 260.3105 | 339.0224 | 329.8532 | -43.119 | 0.000 |
| 12 | 360 | 348.5681 | 180.0000 | -177.8787 | -48.683 | 39.000 |
| 13 | 390 | 333.3936 | 247.2769 | 246.2109 | -53.981 | -0.808 |
| 14 | 490 | 475.3420 | 466.2282 | 323.6606 | -57.885 | 46.000 |
| 15 | 525 | 970.5744 | 657.1132 | -578.1558 | 52.000 | 8.158 |
| 16 | 480 | 351.4445 | 388.9386 | -1120.1348 | 22.075 | -2.771 |
| 17 | 510 | 399.9728 | 428.4954 | -258.2710 | 24.218 | -4.613 |
| 18 | 540 | 319.0903 | 389.3721 | -261.2328 | 18.346 | -4.838 |
| 19 | 760 | 1205.9615 | 834.6803 | 360.2527 | 0.408 | 53.219 |
| 20 | 700 | 298.2241 | 467.4838 | 438.0166 | -37.513 | 0.000 |
| 21 | 735 | 656.6813 | 328.3407 | 300.2329 | -50.108 | 23.021 |
| 22 | 660 | 275.6690 | 330.0000 | -99.1379 | -30.613 | 0.000 |
| 23 | 920 | 807.0603 | 762.1365 | 1003.9064 | -56.696 | 27.810 |
| 24 | 960 | 762.0357 | 486.3684 | 561.2292 | -73.823 | -0.176 |
| 25 | 750 | 870.9738 | 375.0000 | -355.3540 | 46.455 | 5.000 |
| 26 | 910 | 2037.0213 | 1342.7642 | 65.2221 | 0.689 | 40.940 |
| 27 | 1080 | 947.4186 | 540.0000 | 753.1185 | -56.696 | 27.810 |
| 28 | 980 | 889.7683 | 490.0000 | 222.2720 | -56.894 | 17.101 |
| 29 | 1015 | 926.3090 | 652.0452 | 46.1791 | -58.902 | 17.092 |
| 30 | 900 | 711.3464 | 770.3106 | -35.4968 | 57.589 | 31.909 |