

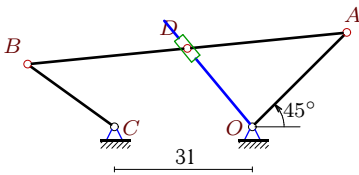
Механизм с муфтой (1)

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 ω_{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**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. – 384 с. (с.216.)

Задача K13.1.

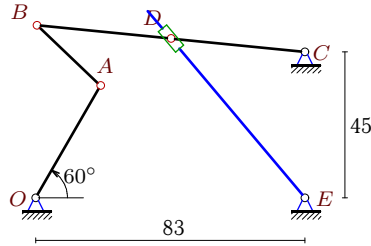
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$$\omega_{OA} = 9\frac{1}{c}, \alpha = 45^\circ, OA = 30, \\ AB = 72, BC = 24, AD = AB/2.$$

Задача K13.2.

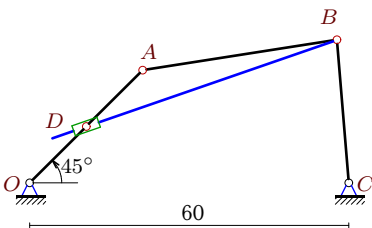
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$$\omega_{OA} = 3\frac{1}{c}, \alpha = 60^\circ, OA = 40, \\ AB = 27, BC = 83, BD = BC/2.$$

Задача K13.3.

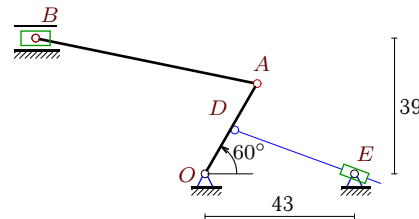
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$$\omega_{OA} = 9\frac{1}{c}, \alpha = 45^\circ, OA = 30, \\ AB = 37, BC = 27, OD = OA/2.$$

Задача K13.4.

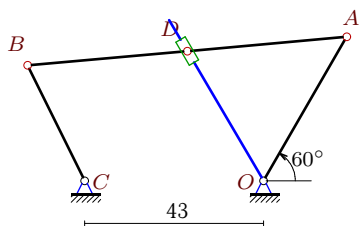
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$$\omega_{OA} = 5\frac{1}{c}, \alpha = 60^\circ, OA = 30, \\ AB = 65, OD = OA/2.$$

Задача K13.5.

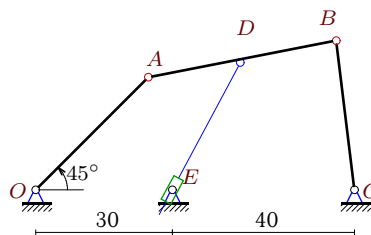
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$$\omega_{OA} = 17\frac{1}{c}, \alpha = 60^\circ, OA = 40, \\ AB = 77, BC = 31, AD = AB/2.$$

Задача K13.6.

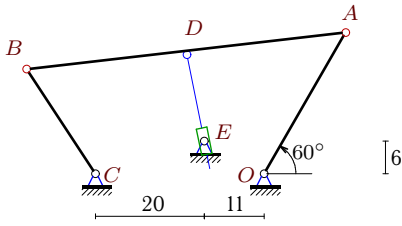
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$$\omega_{OA} = 31\frac{1}{c}, \alpha = 45^\circ, OA = 35, \\ AB = 42, BC = 33, AD = AB/2.$$

Задача K13.7.

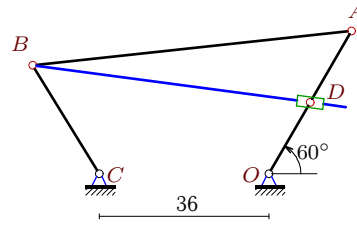
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$\omega_{OA} = 31\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 30$,
 $AB = 59$, $BC = 23$, $AD = AB/2$.

Задача K13.8.

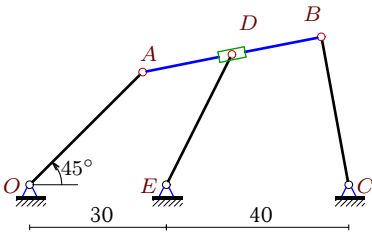
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$\omega_{OA} = 2\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 35$,
 $AB = 68$, $BC = 27$, $OD = OA/2$.

Задача K13.9.

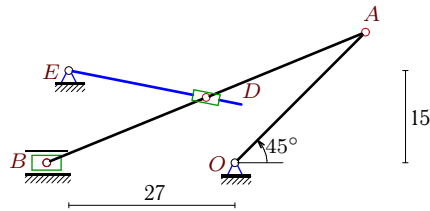
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$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 35$,
 $AB = 40$, $BC = 33$, $AD = AB/2$.

Задача K13.10.

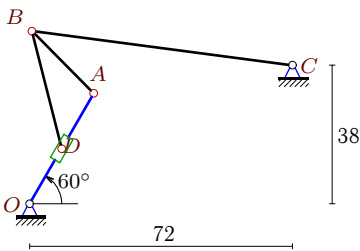
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$\omega_{OA} = 5\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 30$,
 $AB = 56$, $AD = AB/2$.

Задача K13.11.

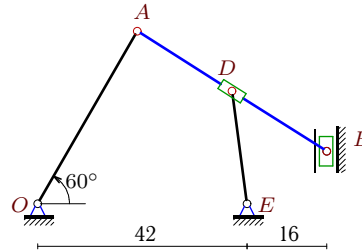
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$\omega_{OA} = 23\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 35$,
 $AB = 24$, $BC = 72$, $OD = OA/2$.

Задача K13.12.

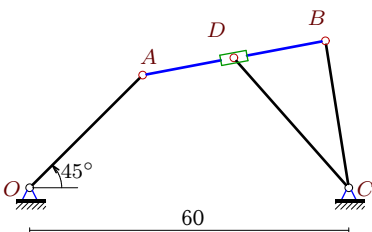
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$\omega_{OA} = 14\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 40$,
 $AB = 45$, $AD = AB/2$.

Задача K13.13.

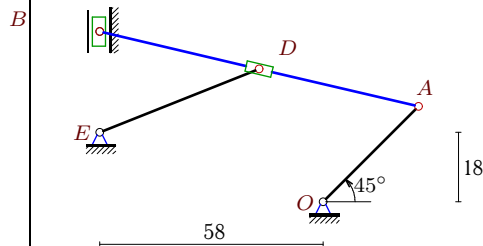
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$\omega_{OA} = 29\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 30$,
 $AB = 35$, $BC = 28$, $AD = AB/2$.

Задача K13.14.

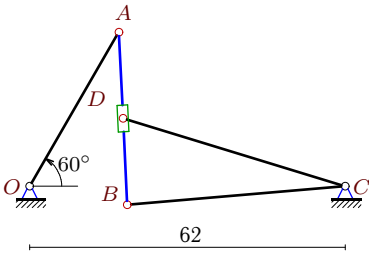
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$\omega_{OA} = 32\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 35$,
 $AB = 85$, $AD = AB/2$.

Задача K13.15.

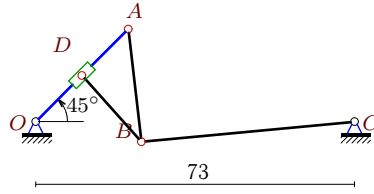
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$\omega_{OA} = 15\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 35$,
 $AB = 34$, $BC = 43$, $AD=AB/2$.

Задача K13.16.

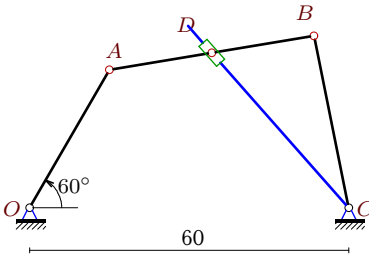
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$\omega_{OA} = 33\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 30$,
 $AB = 26$, $BC = 49$, $OD=OA/2$.

Задача K13.17.

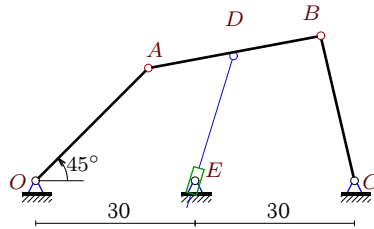
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$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 30$,
 $AB = 39$, $BC = 33$, $AD=AB/2$.

Задача K13.18.

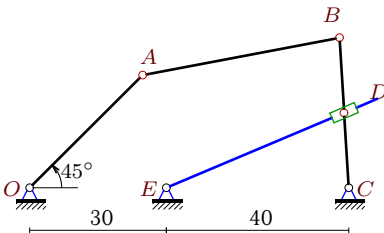
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$\omega_{OA} = 12\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 30$,
 $AB = 33$, $BC = 28$, $AD=AB/2$.

Задача K13.19.

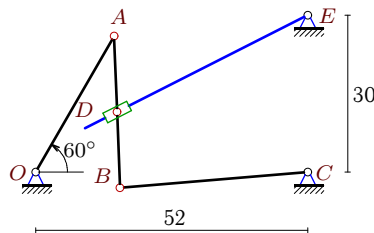
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$\omega_{OA} = 29\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 35$,
 $AB = 44$, $BC = 33$, $BD=BC/2$.

Задача K13.20.

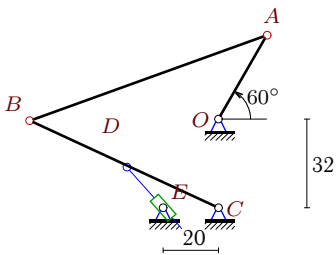
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$\omega_{OA} = 1\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 30$,
 $AB = 29$, $BC = 36$, $AD=AB/2$.

Задача K13.21.

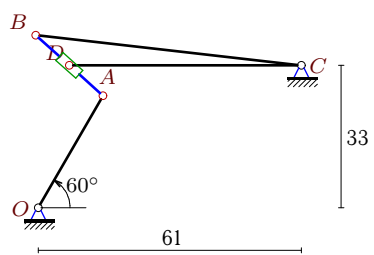
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$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 35$,
 $AB = 91$, $BC = 75$, $BD=BC/2$.

Задача K13.22.

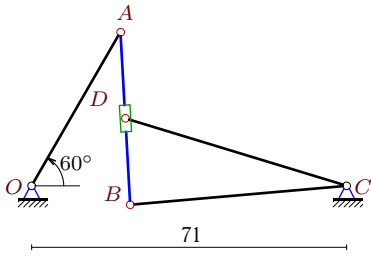
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$\omega_{OA} = 27\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 30$,
 $AB = 21$, $BC = 62$, $AD=AB/2$.

Задача K13.23.

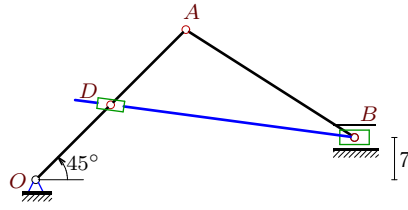
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$\omega_{OA} = 6\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 40$,
 $AB = 39$, $BC = 49$, $AD = AB/2$.

Задача K13.24.

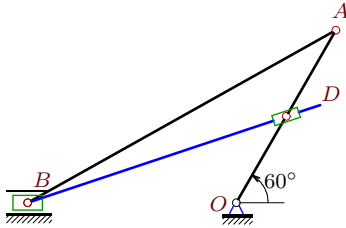
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$\omega_{OA} = 32\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 35$,
 $AB = 33$, $OD = OA/2$.

Задача K13.25.

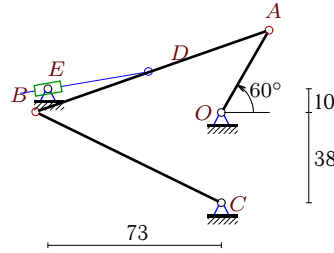
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$\omega_{OA} = 3\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 35$,
 $AB = 62$, $OD = OA/2$.

Задача K13.26.

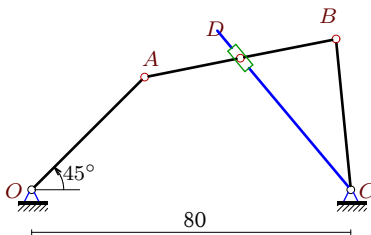
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$\omega_{OA} = 31\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 40$,
 $AB = 104$, $BC = 87$, $AD = AB/2$.

Задача K13.27.

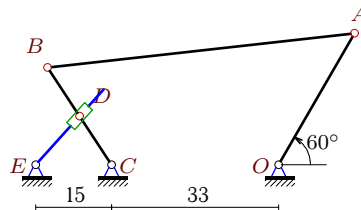
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$\omega_{OA} = 19\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 40$,
 $AB = 49$, $BC = 38$, $AD = AB/2$.

Задача K13.28.

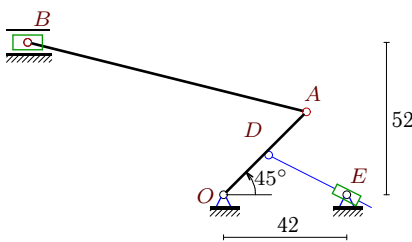
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$\omega_{OA} = 6\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 30$,
 $AB = 61$, $BC = 23$, $BD = BC/2$.

Задача K13.29.

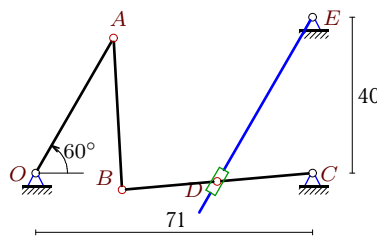
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$\omega_{OA} = 24\frac{1}{c}$, $\alpha = 45^\circ$, $OA = 40$,
 $AB = 98$, $OD = OA/2$.

Задача K13.30.

10



$\omega_{OA} = 23\frac{1}{c}$, $\alpha = 60^\circ$, $OA = 40$,
 $AB = 39$, $BC = 49$, $BD = BC/2$.

K13 Ответы.
Механизм с муфтой (1)

30.04.2012

| № | v_A | v_B | v_D | v_r | x_B | y_B |
|----|-------|-----------|-----------|------------|---------|--------|
| 1 | 270 | 257.5970 | 171.2705 | -102.2681 | -50.433 | 14.084 |
| 2 | 120 | 190.4150 | 95.2075 | -66.4427 | 0.408 | 53.219 |
| 3 | 270 | 159.6721 | 135.0000 | 95.6616 | 57.772 | 26.908 |
| 4 | 150 | 145.2367 | 75.0000 | -73.8830 | -48.683 | 39.000 |
| 5 | 680 | 596.5229 | 563.3183 | -317.6813 | -56.696 | 27.810 |
| 6 | 1085 | 608.3864 | 768.1420 | 17.4512 | 65.979 | 32.754 |
| 7 | 930 | 836.0118 | 752.2560 | -150.0977 | -43.613 | 19.233 |
| 8 | 70 | 62.5411 | 35.0000 | -16.1639 | -50.108 | 23.021 |
| 9 | 560 | 312.3510 | 390.3320 | -10.3616 | 64.000 | 32.450 |
| 10 | 150 | 62.6520 | 99.6441 | 93.0192 | -30.613 | 0.000 |
| 11 | 805 | 1266.8929 | 402.5000 | -1250.7746 | 0.611 | 47.363 |
| 12 | 560 | 1044.5646 | 705.2786 | -1072.0827 | 58.000 | 10.537 |
| 13 | 870 | 491.6480 | 612.6453 | -1103.7824 | 55.615 | 27.655 |
| 14 | 1120 | 4164.2245 | 2509.5299 | -668.7573 | -58.000 | 44.182 |
| 15 | 525 | 284.5084 | 363.0948 | -912.7908 | 19.155 | -3.649 |
| 16 | 990 | 776.4179 | 495.0000 | -2345.8693 | 24.218 | -4.613 |
| 17 | 480 | 371.1523 | 398.5656 | -320.4751 | 53.477 | 32.349 |
| 18 | 360 | 203.7011 | 249.2947 | -33.2233 | 53.652 | 27.271 |
| 19 | 1015 | 576.1548 | 288.0774 | 271.7390 | 67.980 | 32.938 |
| 20 | 30 | 16.0125 | 20.6421 | -5.1665 | 16.125 | -2.997 |
| 21 | 560 | 514.2450 | 257.1225 | 102.2276 | -68.099 | -0.574 |
| 22 | 810 | 1363.9477 | 921.5221 | 368.0946 | -0.599 | 40.040 |
| 23 | 240 | 131.5419 | 166.6939 | -411.0899 | 22.189 | -4.298 |
| 24 | 1120 | 1297.2080 | 560.0000 | 840.8002 | 52.569 | 7.000 |
| 25 | 105 | 61.5104 | 52.5000 | -23.5388 | -36.586 | 0.000 |
| 26 | 1240 | 1135.4453 | 811.4882 | 808.8166 | -78.146 | 0.240 |
| 27 | 760 | 424.5991 | 540.4294 | -498.5606 | 76.347 | 37.824 |
| 28 | 180 | 162.5951 | 81.2976 | 78.6717 | -45.625 | 19.225 |
| 29 | 960 | 848.1280 | 480.0000 | -456.2860 | -66.803 | 52.000 |
| 30 | 920 | 504.2438 | 252.1219 | 206.2636 | 22.189 | -4.298 |

K13 файл o13k10A

| № | ω_{AB} | ω_{BC} | ω_e | ε_{AB} | ε_{BC} | ε_e | a_A | a_B | a_D | a_r |
|----|---------------|---------------|------------|--------------------|--------------------|-----------------|---------|----------|----------|-----------|
| 1 | 5.576 | 10.733 | 5.996 | 30.830 | 107.186 | 38.574 | 24.300 | 37.765 | 27.566 | 9.498 |
| 2 | -6.609 | -2.294 | -1.063 | 20.956 | 18.047 | 8.185 | 3.600 | 15.603 | 7.801 | 6.066 |
| 3 | -5.583 | 5.914 | -1.641 | 19.218 | 113.163 | 1.182 | 24.300 | 31.980 | 12.150 | 19.671 |
| 4 | 1.178 | — | 0.341 | -10.483 | - | -11.106 | 7.500 | 1.502 | 3.750 | -0.689 |
| 5 | 7.869 | 19.243 | 12.845 | 46.396 | 208.016 | 13.926 | 115.600 | 131.660 | 120.255 | 23.630 |
| 6 | -20.406 | 18.436 | -23.557 | 255.584 | 1354.487 | -636.852 | 336.350 | 460.838 | 390.159 | 154.458 |
| 7 | 15.755 | 36.348 | -43.532 | 205.566 | 787.329 | 50.629 | 288.300 | 353.741 | 308.359 | -37.738 |
| 8 | 1.001 | 2.316 | 0.889 | 0.796 | 3.134 | 1.218 | 1.400 | 1.678 | 0.700 | 0.055 |
| 9 | -11.535 | 9.465 | -11.535 | 54.500 | 385.688 | -27.621 | 89.600 | 130.666 | 108.277 | -80.022 |
| 10 | 2.047 | — | 1.572 | -8.518 | - | -2.936 | 7.500 | 4.940 | 5.767 | 3.951 |
| 11 | -50.545 | -17.596 | 23.000 | 1295.634 | 1100.760 | -4542.261 | 185.150 | 823.301 | 92.575 | 1602.828 |
| 12 | 20.120 | — | 20.120 | 800.829 | - | -4672.080 | 78.400 | 333.996 | 134.486 | -1029.940 |
| 13 | -20.120 | 17.559 | -20.120 | 188.311 | 1241.446 | 2510.557 | 252.300 | 358.164 | 299.773 | 343.627 |
| 14 | -40.753 | — | -40.753 | 5767.853 | - | -3232.304 | 358.400 | 5349.001 | 2804.078 | -1169.715 |
| 15 | 12.677 | -6.616 | 12.677 | 182.071 | 28.485 | -827.824 | 78.750 | 22.459 | 40.601 | 361.582 |
| 16 | 24.276 | -15.845 | 33.000 | 1454.405 | 95.730 | 294007.458 | 326.700 | 131.665 | 163.350 | 59801.992 |
| 17 | -8.144 | 11.247 | 6.089 | 38.381 | 230.667 | 104.776 | 76.800 | 86.815 | 80.587 | -3.211 |
| 18 | -9.271 | 7.275 | -9.744 | 20.498 | 231.121 | -110.069 | 43.200 | 66.389 | 54.077 | 17.663 |
| 19 | -17.418 | 17.459 | 2.260 | 254.705 | 1112.100 | 60.849 | 294.350 | 380.530 | 190.265 | 187.626 |
| 20 | 0.851 | -0.445 | -0.489 | 0.804 | 0.131 | 0.410 | 0.300 | 0.085 | 0.155 | -0.199 |
| 21 | 8.726 | 6.857 | -11.193 | -9.234 | 46.112 | -150.594 | 89.600 | 49.389 | 24.695 | -3.356 |
| 22 | -60.909 | -21.999 | -60.909 | 2025.126 | 1611.767 | 2313.989 | 218.700 | 1043.372 | 609.316 | 453.611 |
| 23 | 5.042 | -2.685 | 5.042 | 29.460 | 4.586 | -130.051 | 14.400 | 4.186 | 7.408 | 64.933 |
| 24 | -28.467 | — | -12.624 | 393.951 | - | -305.996 | 358.400 | 408.951 | 179.200 | 231.917 |
| 25 | 0.971 | — | 0.414 | -4.516 | - | -4.207 | 3.150 | 2.434 | 1.575 | -1.211 |
| 26 | 16.709 | 13.051 | 1.477 | -39.706 | 169.881 | 617.687 | 384.400 | 209.293 | 272.547 | 104.506 |
| 27 | -12.031 | 11.174 | 4.837 | 105.481 | 492.529 | 265.059 | 144.400 | 193.080 | 164.743 | -37.077 |
| 28 | 2.957 | 7.069 | 1.582 | 7.769 | 30.609 | -16.866 | 10.800 | 13.479 | 6.740 | 4.531 |
| 29 | 7.139 | — | 4.769 | -184.046 | - | -489.832 | 230.400 | 70.809 | 115.200 | -42.869 |
| 30 | 19.326 | -10.291 | -2.977 | 432.891 | 67.395 | 37.863 | 211.600 | 61.507 | 30.754 | -2.904 |