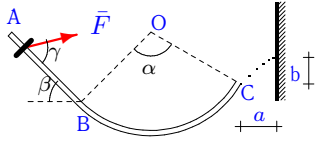


Основные теоремы динамики точки

На прямолинейном участке пути шайба разгоняется в течение времени $t = t_1$ переменной силой F , направленной под углом γ к перемещению. На криволинейном участке оси, изогнутой по дуге окружности радиуса r (геометрический центр в точке O), действует постоянная сила сопротивления F_{fr} . Участки оси сопрягаются в точке B без излома. Вся траектория находится в вертикальной плоскости. Сила F дана в Н. В зависимости от варианта найти расстояние b , скорость v_A или силу F_{fr} .

Задача 1.1



$$r = 5 \text{ м}, m = 2.5 \text{ кг},$$

$$a = 5 \text{ м}, t_1 = 5 \text{ с},$$

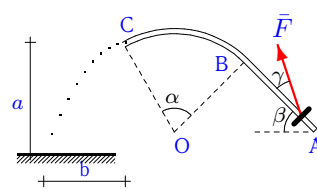
$$F = 2 \cos \frac{\pi t}{5} + 4,$$

$$F_{fr} = 5 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$$

$$b - ?$$

$$\alpha = 30^\circ, \beta = 15^\circ, \gamma = 60^\circ.$$

Задача 1.2



$$r = 5 \text{ м}, m = 0.4 \text{ кг},$$

$$a = 3 \text{ м}, t_1 = 3 \text{ с},$$

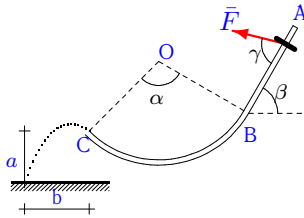
$$F = t \exp(t/4),$$

$$F_{fr} = 3 \text{ Н}, b = 9.8 \text{ м},$$

$$v_A - ?$$

$$\alpha = 30^\circ, \beta = 15^\circ, \gamma = 15^\circ.$$

Задача 1.3



$$r = 5 \text{ м}, m = 0.2 \text{ кг},$$

$$a = 22 \text{ м}, t_1 = 5 \text{ с},$$

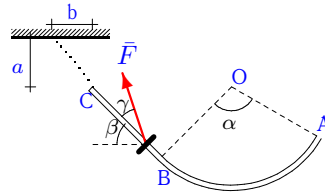
$$F = 7e^{2t}/(1 + e^{2t}),$$

$$F_{fr} = 2 \text{ Н}, b = 596.7 \text{ м},$$

$$v_A - ?$$

$$\alpha = 60^\circ, \beta = 45^\circ, \gamma = 75^\circ.$$

Задача 1.4



$$r = 4 \text{ м}, m = 0.7 \text{ кг},$$

$$a = 6 \text{ м}, t_1 = 4 \text{ с},$$

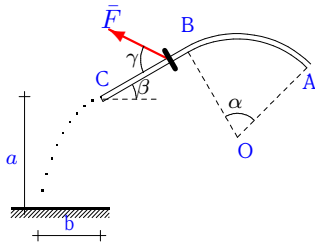
$$F = 2 \cos \frac{\pi t}{4} + 3t^2,$$

$$F_{fr} = 12 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$$

$$b - ?$$

$$\alpha = 45^\circ, \beta = 30^\circ, \gamma = 15^\circ.$$

Задача 1.5



$$r = 6 \text{ м}, m = 0.3 \text{ кг},$$

$$a = 5 \text{ м}, t_1 = 1 \text{ с},$$

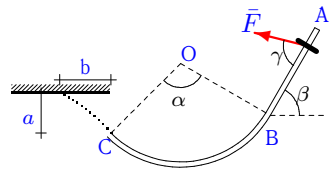
$$F = 8t/(2 + 3t),$$

$$F_{fr} = 3 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$$

$$b - ?$$

$$\alpha = 45^\circ, \beta = 30^\circ, \gamma = 30^\circ.$$

Задача 1.6



$$r = 3 \text{ м}, m = 0.2 \text{ кг},$$

$$a = 3 \text{ м}, t_1 = 2 \text{ с},$$

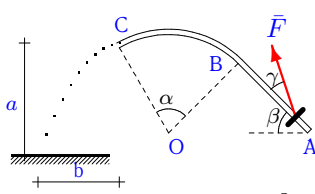
$$F = \sqrt{2t + 1},$$

$$v_A = 26 \frac{\text{м}}{\text{с}}, F_{fr} - ?$$

$$b = 12.3 \text{ м}.$$

$$\alpha = 60^\circ, \beta = 45^\circ, \gamma = 45^\circ.$$

Задача 1.7



$$r = 5 \text{ м}, m = 0.4 \text{ кг},$$

$$a = 3 \text{ м}, t_1 = 3 \text{ с},$$

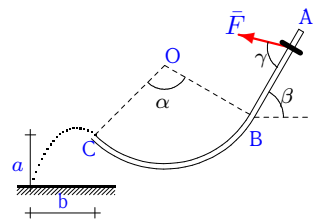
$$F = t \exp(t/4),$$

$$F_{fr} = 3 \text{ Н}, b = 9.8 \text{ м},$$

$$v_A - ?$$

$$\alpha = 30^\circ, \beta = 15^\circ, \gamma = 15^\circ.$$

Задача 1.8



$$r = 6 \text{ м}, m = 0.4 \text{ кг},$$

$$a = 14 \text{ м}, t_1 = 5 \text{ с},$$

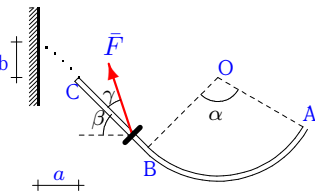
$$F = 4 \sin \frac{\pi t}{2} + 5t,$$

$$F_{fr} = 10 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$$

$$b - ?$$

$$\alpha = 75^\circ, \beta = 60^\circ, \gamma = 75^\circ.$$

Задача 1.9



$$r = 6 \text{ м}, m = 0.2 \text{ кг},$$

$$a = 11 \text{ м}, t_1 = 4 \text{ с},$$

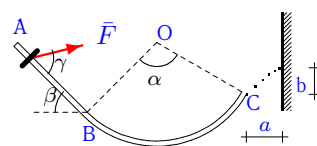
$$F = 9t^2/(2 + t^3),$$

$$F_{fr} = 6 \text{ Н}, v_A = 26 \frac{\text{м}}{\text{с}},$$

$$b - ?$$

$$\alpha = 75^\circ, \beta = 60^\circ, \gamma = 30^\circ.$$

Задача 1.10



$$r = 4 \text{ м}, m = 2 \text{ кг},$$

$$a = 7 \text{ м}, t_1 = 5 \text{ с},$$

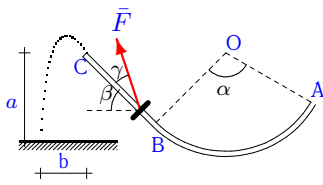
$$F = 0.3 \exp(\frac{t}{2}) + t^2,$$

$$F_{fr} = 6 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$$

$$b - ?$$

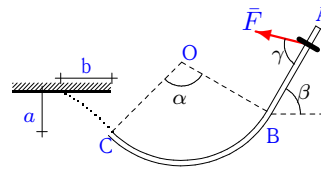
$$\alpha = 75^\circ, \beta = 60^\circ, \gamma = 60^\circ.$$

Задача 1.11



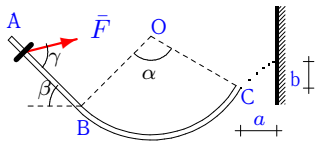
$r = 3 \text{ м}, m = 0.5 \text{ кг},$
 $a = 7 \text{ м}, t_1 = 2 \text{ с},$
 $F = 10 \sin^2(\pi t/6),$
 $F_{fr} = 1 \text{ Н}, v_A = 25 \frac{\text{м}}{\text{с}},$
 $b - ?$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 15^\circ.$

Задача 1.12



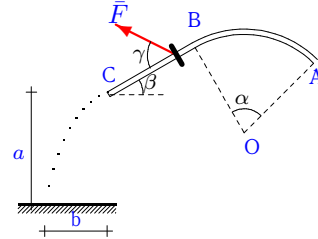
$r = 4 \text{ м}, m = 0.7 \text{ кг},$
 $a = 6 \text{ м}, t_1 = 2 \text{ с},$
 $F = 2 \cos \frac{\pi t}{4} + 3t^2,$
 $F_{fr} = 12 \text{ Н}, v_A = 25 \frac{\text{м}}{\text{с}},$
 $b - ?$
 $\alpha = 45^\circ, \beta = 30^\circ, \gamma = 45^\circ.$

Задача 1.13



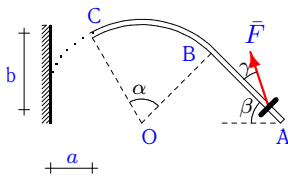
$r = 5 \text{ м}, m = 2.5 \text{ кг},$
 $a = 9 \text{ м}, t_1 = 5 \text{ с},$
 $F = 3 \cos \frac{\pi t}{2} + 4t,$
 $F_{fr} = 7 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$
 $b - ?$
 $\alpha = 90^\circ, \beta = 75^\circ, \gamma = 60^\circ.$

Задача 1.14



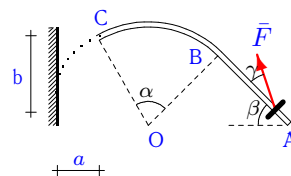
$r = 3 \text{ м}, m = 0.7 \text{ кг},$
 $a = 6 \text{ м}, t_1 = 1 \text{ с},$
 $F = 2 \cos \frac{\pi t}{4} + 3t^2,$
 $v_A = 27 \frac{\text{м}}{\text{с}}, F_{fr} - ?$
 $b = 9.5 \text{ м}.$
 $\alpha = 45^\circ, \beta = 30^\circ, \gamma = 30^\circ.$

Задача 1.15



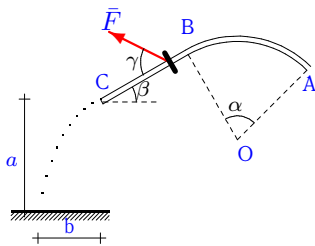
$r = 5 \text{ м}, m = 0.5 \text{ кг},$
 $a = 9 \text{ м}, t_1 = 3 \text{ с},$
 $F = 3 \cos \frac{\pi t}{2} + 4t,$
 $F_{fr} = 7 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$
 $b - ?$
 $\alpha = 90^\circ, \beta = 75^\circ, \gamma = 15^\circ.$

Задача 1.16



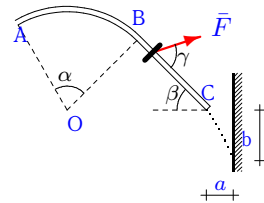
$r = 5 \text{ м}, m = 0.6 \text{ кг},$
 $a = 4 \text{ м}, t_1 = 3 \text{ с},$
 $F = 4 \cos \frac{\pi t}{3} + 3t,$
 $v_A = 25 \frac{\text{м}}{\text{с}}, F_{fr} - ?$
 $b = 1.14 \text{ м}.$
 $\alpha = 30^\circ, \beta = 15^\circ, \gamma = 15^\circ.$

Задача 1.17



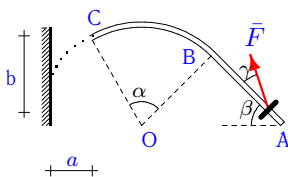
$r = 6 \text{ м}, m = 0.1 \text{ кг},$
 $a = 2 \text{ м}, t_1 = 1 \text{ с},$
 $F = 2 \cos^2 \frac{\pi t}{6},$
 $v_A = 25 \frac{\text{м}}{\text{с}}, F_{fr} - ?$
 $b = 3.4 \text{ м}.$
 $\alpha = 45^\circ, \beta = 30^\circ, \gamma = 30^\circ.$

Задача 1.18



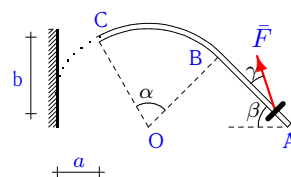
$r = 6 \text{ м}, m = 0.4 \text{ кг},$
 $a = 7 \text{ м}, t_1 = 1 \text{ с},$
 $F = 0.3 \exp(\frac{t}{2}) + t^2,$
 $v_A = 25 \frac{\text{м}}{\text{с}}, F_{fr} - ?$
 $b = 13.29 \text{ м}.$
 $\alpha = 75^\circ, \beta = 60^\circ, \gamma = 60^\circ.$

Задача 1.19



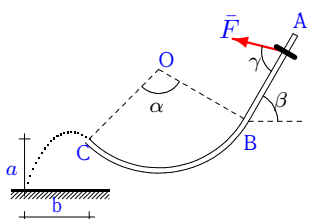
$r = 3 \text{ м}, m = 0.7 \text{ кг},$
 $a = 6 \text{ м}, t_1 = 3 \text{ с},$
 $F = 2 \cos \frac{\pi t}{4} + 3t^2,$
 $F_{fr} = 12 \text{ Н}, v_A = 25 \frac{\text{м}}{\text{с}},$
 $b - ?$
 $\alpha = 45^\circ, \beta = 30^\circ, \gamma = 15^\circ.$

Задача 1.20



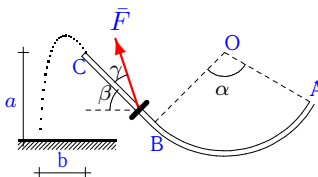
$r = 5 \text{ м}, m = 0.5 \text{ кг},$
 $a = 150 \text{ м}, t_1 = 3 \text{ с},$
 $F = 10 \sin^2(\pi t/6),$
 $F_{fr} = 1 \text{ Н}, b = 60.3 \text{ м},$
 $v_A - ?$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 15^\circ.$

Задача 1.21



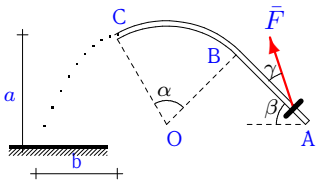
$r = 4 \text{ м}, m = 0.8 \text{ кг},$
 $a = 10 \text{ м}, t_1 = 5 \text{ с},$
 $F = 2 \sin \frac{\pi t}{3} + 9,$
 $v_A = 27 \frac{\text{м}}{\text{с}}, F_{fr} - ?$
 $b = 327.3 \text{ м}.$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 75^\circ.$

Задача 1.22



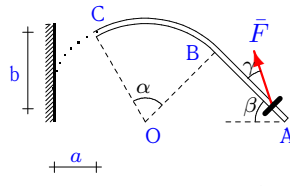
$r = 3 \text{ м}, m = 0.4 \text{ кг},$
 $a = 3 \text{ м}, t_1 = 2 \text{ с},$
 $F = t \exp(t/4),$
 $F_{fr} = 3 \text{ Н}, b = 46.9 \text{ м},$
 $v_A - ?$
 $\alpha = 30^\circ, \beta = 15^\circ, \gamma = 15^\circ.$

Задача 1.23



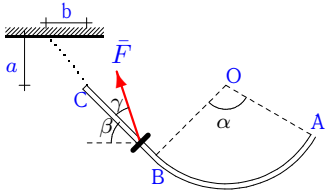
$r = 4 \text{ м}, m = 0.3 \text{ кг},$
 $a = 7 \text{ м}, t_1 = 3 \text{ с},$
 $F = 0.1 \exp(\frac{t}{6}) + 3t,$
 $F_{fr} = 13 \text{ Н}, v_A = 27 \frac{\text{м}}{\text{с}},$
 $b = ?$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 15^\circ.$

Задача 1.24



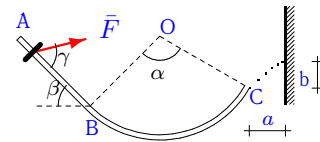
$r = 4 \text{ м}, m = 0.4 \text{ кг},$
 $a = 100 \text{ м}, t_1 = 3 \text{ с},$
 $F = 10/(1 + 2t),$
 $F_{fr} = 2 \text{ Н}, b = 40.2 \text{ м},$
 $v_A = ?$
 $\alpha = 75^\circ, \beta = 60^\circ, \gamma = 15^\circ.$

Задача 1.25



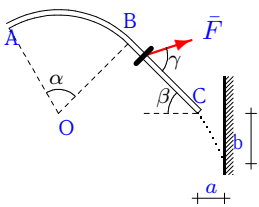
$r = 4 \text{ м}, m = 0.3 \text{ кг},$
 $a = 7 \text{ м}, t_1 = 4 \text{ с},$
 $F = 0.1 \exp(\frac{t}{6}) + 3t,$
 $v_A = 26 \frac{\text{м}}{\text{с}}, F_{fr} = ?$
 $b = 7.1 \text{ м}.$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 15^\circ.$

Задача 1.26



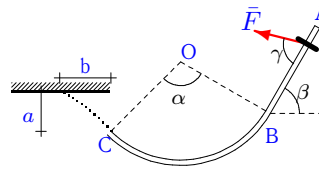
$r = 5 \text{ м}, m = 3.5 \text{ кг},$
 $a = 6 \text{ м}, t_1 = 5 \text{ с},$
 $F = 2 \cos \frac{\pi t}{4} + 3t^2,$
 $v_A = 27 \frac{\text{м}}{\text{с}}, F_{fr} = ?$
 $b = 1.55 \text{ м}.$
 $\alpha = 45^\circ, \beta = 30^\circ, \gamma = 60^\circ.$

Задача 1.27



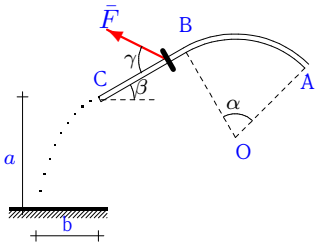
$r = 3 \text{ м}, m = 0.3 \text{ кг},$
 $a = 5 \text{ м}, t_1 = 1 \text{ с},$
 $F = 8t/(2 + 3t),$
 $v_A = 27 \frac{\text{м}}{\text{с}}, F_{fr} = ?$
 $b = 3.07 \text{ м}.$
 $\alpha = 45^\circ, \beta = 30^\circ, \gamma = 60^\circ.$

Задача 1.28



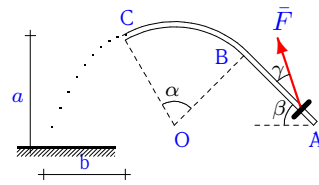
$r = 6 \text{ м}, m = 0.4 \text{ кг},$
 $a = 6 \text{ м}, t_1 = 2 \text{ с},$
 $F = 10/(1 + 2t),$
 $F_{fr} = 2 \text{ Н}, v_A = 25 \frac{\text{м}}{\text{с}},$
 $b = ?$
 $\alpha = 75^\circ, \beta = 60^\circ, \gamma = 45^\circ.$

Задача 1.29



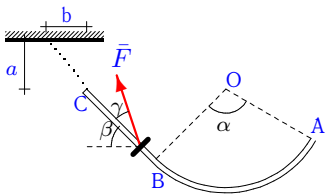
$r = 6 \text{ м}, m = 0.5 \text{ кг},$
 $a = 5 \text{ м}, t_1 = 1 \text{ с},$
 $F = 2 \cos \frac{\pi t}{5} + 4,$
 $v_A = 25 \frac{\text{м}}{\text{с}}, F_{fr} = ?$
 $b = 15.2 \text{ м}.$
 $\alpha = 30^\circ, \beta = 15^\circ, \gamma = 30^\circ.$

Задача 1.30



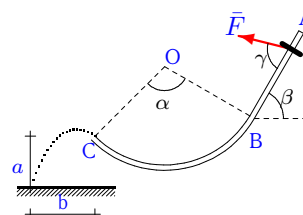
$r = 3 \text{ м}, m = 0.2 \text{ кг},$
 $a = 11 \text{ м}, t_1 = 3 \text{ с},$
 $F = 9t^2/(2 + t^3),$
 $F_{fr} = 6 \text{ Н}, v_A = 26 \frac{\text{м}}{\text{с}},$
 $b = ?$
 $\alpha = 75^\circ, \beta = 60^\circ, \gamma = 15^\circ.$

Задача 1.31



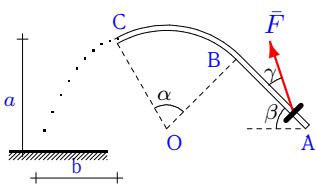
$r = 6 \text{ м}, m = 0.9 \text{ кг},$
 $a = 5 \text{ м}, t_1 = 4 \text{ с},$
 $F = t\sqrt{t^2 + 1},$
 $F_{fr} = 2 \text{ Н}, v_A = 26 \frac{\text{м}}{\text{с}},$
 $b = ?$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 15^\circ.$

Задача 1.32



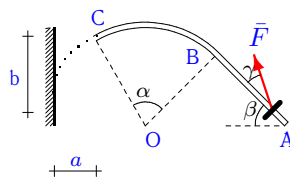
$r = 4 \text{ м}, m = 0.9 \text{ кг},$
 $a = 5 \text{ м}, t_1 = 5 \text{ с},$
 $F = t\sqrt{t^2 + 1},$
 $F_{fr} = 2 \text{ Н}, b = 299 \text{ м},$
 $v_A = ?$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 75^\circ.$

Задача 1.33



$r = 6 \text{ м}, m = 0.5 \text{ кг},$
 $a = 7 \text{ м}, t_1 = 3 \text{ с},$
 $F = 10 \sin^2(\frac{\pi t}{6}),$
 $F_{fr} = 1 \text{ Н}, b = 19.2 \text{ м},$
 $v_A = ?$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 15^\circ.$

Задача 1.34



$r = 4 \text{ м}, m = 0.2 \text{ кг},$
 $a = 3 \text{ м}, t_1 = 3 \text{ с},$
 $F = \sqrt{2t + 1},$
 $v_A = 27 \frac{\text{м}}{\text{с}}, F_{fr} = ?$
 $b = 0.85 \text{ м}.$
 $\alpha = 60^\circ, \beta = 45^\circ, \gamma = 15^\circ.$

Основные теоремы динамики точки

	F_{tr}	$\int F dt$	v_A	v_B	v_C	b
1	5.000	20.000	27.000	43.695	43.575	1.271
2	3.000	7.532	26.697	37.268	36.737	9.800
3	2.000	32.574	24.998	101.836	101.446	596.700
4	12.000	64.000	27.000	24.768	93.461	10.536
5	3.000	1.038	27.000	25.427	33.327	8.006
6	0.534	3.393	26.000	51.871	51.856	12.300
7	3.000	7.532	26.697	37.268	36.737	9.800
8	10.000	65.046	27.000	111.567	110.042	665.637
9	6.000	10.490	26.000	12.244	23.682	14.820
10	6.000	48.376	27.000	81.573	81.604	1.837
11	1.000	5.865	25.000	24.438	21.895	55.076
12	12.000	10.546	25.000	45.464	44.352	33.761
13	7.000	51.910	27.000	84.761	84.910	2.352
14	12.735	2.801	27.000	25.478	33.848	9.500
15	7.000	16.090	27.000	29.657	24.295	3.133
16	34.010	13.500	25.000	39.116	35.118	1.140
17	0.403	1.827	25.000	24.470	45.197	3.400
18	7.807	0.723	25.000	19.320	28.719	13.290
19	12.000	28.801	25.000	50.027	49.153	1.686
20	1.000	15.000	68.832	77.000	76.698	60.300
21	11.081	45.955	27.000	76.551	75.923	327.300
22	3.000	2.810	26.004	25.547	27.255	46.900
23	13.000	13.889	27.000	50.910	46.994	21.874
24	2.000	9.730	65.322	63.330	62.624	40.200
25	10.601	24.569	26.000	18.964	70.322	7.100
26	671.902	123.199	27.000	69.125	57.274	1.550
27	12.413	1.038	27.000	23.236	29.870	3.070
28	2.000	8.047	25.000	56.217	56.006	26.928
29	5.840	5.871	25.000	23.486	36.194	15.200
30	6.000	8.022	26.000	39.258	35.752	28.545
31	2.000	23.031	26.000	24.852	21.823	5.660
32	2.000	43.858	27.001	74.297	74.309	299.000
33	1.000	15.000	25.001	33.168	32.319	19.200
34	3.284	5.840	27.000	34.395	32.018	0.850