Ответы (Движение по окружности)

1. $N_A = mg = 2$ кН;
$N_B = m\left(g + \dfrac{v^2}{R}\right) = 22{,}8$ кН;
$N_C = m\left(g\cos\alpha + \dfrac{v^2}{R}\right) = 20{,}1$ кН;
$N_D = m\left(g - \dfrac{v^2}{R}\right) = 17{,}2$ кН;
$v_0 = \sqrt{gR} = 44{,}7$ м/с

2. $T = 2mg$

3. $T_в = \dfrac{m(\omega^2 l\cos\alpha - g)}{2\cos\alpha}$;
$T_н = \dfrac{m(\omega^2 l\cos\alpha + g)}{2\cos\alpha}$

4. $Q = \dfrac{m}{2}\left(g + \dfrac{v^2}{R}\right) = 2450$ Н

5. $\tau = \dfrac{mv_0}{F\cos\alpha}$; $N = \dfrac{mv_0^2}{4\pi RF\cos\alpha}$

6. $v\sqrt{\dfrac{T}{\rho}}$

7. $M = \dfrac{\pi^2 l^3 \varphi^3}{GT^2} = 0{,}95\cdot 10^{30}$ кг

8. $l = l_0\dfrac{1}{1 - \frac{m\omega^2}{k}} = 0{,}4$ м

9. $\alpha = \arccos\left(\dfrac{g}{\omega^2 R}\right)$

10. $F = m\omega^2 L$

11. $R = \dfrac{3g}{2\pi^2\nu^2(\pi + \sqrt{3})} = 63{,}6$ см

12. $\nu \leqslant \sqrt{\dfrac{g}{2\pi^2 l}}$

13. $\nu = \dfrac{1}{2\pi}\sqrt{\dfrac{g\operatorname{tg}\alpha}{R + l\sin\alpha}} = 8{,}4$ об/мин

14. $T = \dfrac{m v_0^2 \operatorname{tg}^2\alpha}{L\cos^2\alpha}$

15. $\Delta l = 10$ см

16. $r = r_0 + \dfrac{m}{4\pi^2 k} g\operatorname{ctg}\alpha$
$\omega^2 = 2\pi^2\dfrac{k}{m}$

17. $v = \sqrt{gR\dfrac{v_0^2 - gR\operatorname{tg}\alpha}{gR + v_0^2\operatorname{tg}\alpha}}$

18. $2{,}5\ \dfrac{м}{с}$

19. $\omega = \sqrt{\dfrac{6\mu g}{x}}$