Premo gibanje

$s = vt$

$v = at$

$v^2 = 2as$

$s = \frac{at^2}{2}$

Gibanje v ravnini

$$\vec{v} = \frac{dr}{dt}$$

$$\vec{a} = \frac{dv}{dt}$$

$$x(t) = x' + v'(t - t') + \frac{1}{2} a_0 (t^2 - t'^2)$$

$$v = v' + a_0 (t - t')$$

$$s = \frac{v^2 - v'^2}{2a}$$

Prosti pad

$v = gt$

$v^2 = 2gh$

$h = \frac{gt^2}{2}$

$t = \sqrt{\frac{2h}{g}}$

$h = \frac{v^2}{2g}$

$t = \frac{v}{g}$

$h = v_0 t + \frac{gt^2}{2}$

$t = \frac{v_0}{g} + \sqrt{\frac{v^2}{g^2} + \frac{2h}{g}}$

Vodoravni met

$y = \frac{gt^2}{2}$

$x = v_0 t$

$y = \frac{g x_0^2}{2 v_0^2}$

$h = \frac{gD^2}{2 v_0^2}$

$D = v_0 \sqrt{\frac{2h}{g}}$

Poševen met

$v^2 = v_0^2 - 2gh$

$D = \frac{v_0^2}{g} \sin(2\alpha)$

$h = \frac{v_0^2}{2g} \sin^2 \alpha = \frac{v_0^2}{4g} = \frac{h_{max}}{2}$

Trenje

$F_l = N k_l$

$F_{tr} = N k_{tr}$

$F_s (= -N) = F_g \cos$

$F_d = F_g \sin \varphi$

Kroženje

$\omega = \frac{\varphi}{t}$

$\varphi = \omega t$

$a_r = \omega^2 R = \frac{v^2}{R}$

$a_r = \omega v$

$v = \omega R$

$\omega = 2\pi\nu$

$t_0 = \frac{t}{N}$

$\nu = \frac{N}{t}$

$\nu = \frac{1}{t_0}$

Pospešeno kroženje:

$\omega = \omega_0 + \alpha t$

$\varphi = \omega_0 t + \frac{at^2}{2}$

$a_t = \alpha R$

$a = \sqrt{a_t^2 + a_r^2}$

$\alpha = \frac{\omega}{t}$

$\varphi_{(t)} = \varphi_0 + \omega_0 + \frac{\alpha t^2}{2}$

Sistemske sile

$\vec{F}_{psevdo} = -m\vec{a}$

$\vec{F}_{centrifug.} = -m\vec{a}_r$

$\vec{F}_{COR} = 2 m \omega v_r$

Curek

$F = \rho S v^2$

$\rho = \frac{m}{v}$

Vesolje

$F_r = ma_r$

$F_r = m\omega^2 R$

$F_r = m\frac{v^2}{R}$

$F_{12} = F_{21} = \frac{G m_1 m_2}{R^2}$

$F_g = mg_0$

$F = \frac{GmM}{R^2}$

$g_0 = G\frac{M}{R^2}$

$g = g_0 \frac{R^2}{(R+h)^2}$

$F_r = m\omega^2 (R+h) = \frac{mv^2}{R+h}$

$F_g = mg_0 \frac{R^2}{(R+h)^2}$

$G = 6{,}675 \cdot 10^{-11} \frac{Nm^2}{kg^2}$

$\omega^2 = g_0 \frac{R^2}{(R+h)^3}$

$v^2 = g_0 \frac{R^2}{R+h}$

Zemlja $m = 6 \cdot 10^{24}$ kg
$R = 6{,}4 \cdot 10^6$ m
$r_{sz} = 1$a.e.$= 150 \cdot 10^9$ m

Sonce $m = 2 \cdot 10^{30}$ kg
$R = 7 \cdot 10^8$ m$= 110\ R_z$

Luna m_z $m = 7{,}3 \cdot 10^{22}$ kg$= 1/80$
$R = 1{,}7 \cdot 10^6$ m
$r_{zl} = 3{,}84 \cdot 10^8$ m$= 60\ R_z$

Energija

$W_k = \frac{mv^2}{2}$

$W_p = mgh$

$W_{pr} = \frac{kx^2}{2}$

Delo in moč

$$A = Fs\cos\varphi$$

$$P = \frac{A}{t}$$

I. NZ

$$\Sigma\vec{F}_z = 0 \Rightarrow \vec{v} = konst. \vee \vec{v} = 0$$

II. NZ

$$\Sigma\vec{F}_z = m * \vec{a}_r$$

III NZ

$$\vec{F}_{1,2} = -\vec{F}_{2,1}$$

Gibalna količina

$$\Delta G = F\Delta t$$
$$G = mv$$
$$\Sigma\vec{F}_z * \Delta t = m_1 * \vec{v}_1 - m_0 * \vec{v}_0$$
$$G = m * \vec{v}$$

$$v_1 = v * \frac{m}{m+M}$$

$$\Phi_m = \frac{dm}{dt}$$
$$F = \Phi_m \Delta v$$

Energetika

$$A = \vec{F} * \vec{s}$$

$$P = \frac{A}{T} = \vec{F} * \vec{v} = |F| * |v| * \cos\varphi$$

kinetična energija

$$W_k = \frac{1}{2} * m * v^2$$

potencijalna energija

$$W_p = m * g * h$$

prožnostna

$$W_{pr} = \frac{1}{2} * k * x^2$$

$$A_{BT} = W_K - W_{K0} + W_P - W_{P0} + W_{PR} - W_{PR0}$$

Toplota

$$\Delta l = l * \alpha * \Delta T$$
$$\Delta V = V * \beta * \Delta T$$
$$\beta = 3 * \alpha$$

Plinski zakoni

$$p * V = \frac{m}{M} * R * T$$

$$R = 8314\,\frac{J}{kmolK}$$

$$\frac{p_0 * V_0}{T_0} = \frac{p * V}{T}$$

$$p_c = p_1 + p_2 + \ldots$$

$$p_c = \frac{R * T}{V} * (n_1 + n_2 + \ldots)$$

Integrali

$$\int dx = x + c$$
$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + c$$
$$\int sinx\,dx = -cosx + c$$
$$\int cosx\,dx = sinx + c$$
$$\int \frac{1}{(cosx)^2}\,dx = tgx + c$$
$$\int \frac{dx}{x} = \ln|x| + c$$
$$\int e^x\,dx = e^x + c$$
$$\int a^x\,dx = \frac{a^x}{\ln a} + c$$

Odvodi

$$\frac{d}{dx}(f * g) = g\frac{df}{dx} + f\frac{dg}{dx}$$
$$\frac{d}{dx}(f + g) = \frac{df}{dx} + \frac{dg}{dx}$$
$$\frac{d}{dx}\left(\frac{f}{g}\right) = \frac{g\frac{df}{dx} - f\frac{dg}{dx}}{g}$$
$$\frac{d}{dx}(\sin kx) = k\,cosx$$
$$\frac{d}{dx}x^n = n\,x^{n-1}$$
$$\frac{d}{dx}e^{ax} = a * e^{ax}$$
$$\frac{d}{dx}(\cos x) = -sinx$$
$$\frac{d}{dx}\ln|x| = \frac{1}{x}$$
$$\frac{d}{dx}\log_a x = \frac{\log_a e}{x}$$
$$\frac{d}{dx}tgx = \frac{1}{(cosx)^2}$$
$$\frac{d}{dx}x^{\frac{1}{n}} = \frac{1}{n}x^{\frac{1}{n}-1}$$