Vigrar:

$$\mathbf{A} \cdot \mathbf{B} = AB\cos\theta = A_xB_x + A_yB_y + A_zB_z$$

$$\mathbf{A} \times \mathbf{B} = \begin{vmatrix} \hat{\mathbf{i}} & \hat{\mathbf{j}} & \hat{\mathbf{k}} \\ A_x & A_y & A_z \\ B_x & B_y & B_z \end{vmatrix}$$

$$|\mathbf{A} \times \mathbf{B}| = AB\sin\theta$$

Hornafræði:

$$C^2 = A^2 + B^2 - 2AB\cos\gamma$$

$$\frac{\sin\alpha}{A} = \frac{\sin\beta}{B} = \frac{\sin\gamma}{C}$$

$$\sin(x+y) = \sin x\cos y + cosx\sin y$$

$$\cos(x+y) = \cos x\cos y - \sin x\sin y$$

$$\sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$\cos x + \cos y = 2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$\sin(-x) = -\sin x$$

$$\cos(-x) = \cos x$$

Hreyfilýsing:

$$\mathbf{v} = \mathbf{v}_0 + \mathbf{a}t$$

$$\mathbf{r} = \mathbf{r}_0 + \frac{1}{2}(\mathbf{v}_0 + \mathbf{v})t$$

$$\mathbf{r} = \mathbf{r}_0 + \mathbf{v}_0 t + \frac{1}{2}\mathbf{a}t^2$$

$$v^2 = v_0^2 + 2\mathbf{a}\cdot\Delta\mathbf{r}$$

$$\mathbf{v} = \boldsymbol{\omega} \times \mathbf{r}$$

$$\mathbf{a} = \boldsymbol{\omega} \times \mathbf{v}$$

$$\mathbf{a}_{\text{rad}} = -\frac{v^2}{r}\hat{\mathbf{r}}$$

$$\mathbf{a}_{\text{tan}} = \frac{dv}{dt}\hat{\theta}$$

$$\omega = 2\pi f$$

$$f = \frac{1}{T}$$

$$\omega = \omega_0 + \alpha t$$

$$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$$

$$\omega^2 = \omega_0^2 + 2\alpha\Delta\theta$$

$$\mathbf{r}' = \mathbf{r} - \mathbf{u}t$$

$$\mathbf{v}' = \mathbf{v} - \mathbf{u}$$

$$\mathbf{a}' = \mathbf{a}$$

Hreyfifræði:

$$\mathbf{F} = m\mathbf{a}$$

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

$$\mathbf{w} = m\mathbf{g}$$

$$F = -kx$$

$$f_s \leq f_{s,\text{max}} = \mu_s n$$

$$f_k = \mu_k n$$

$$W_{A\to B} = \int_a^B \mathbf{F} \cdot d\mathbf{s}$$

$$K = \frac{1}{2}mv^2$$

$$W_{\text{tot}} = \Delta K$$

$$P = \mathbf{F} \cdot \mathbf{v}$$

$$\Delta U = U_B - U_A = -\int_A^B \mathbf{F}_{\text{cons.}} \cdot d\mathbf{s}$$

$$U_{\text{grav}} = mgy$$

$$U_{\text{el}} = \frac{1}{2}kx^2$$

$$E = K + U$$

$$\mathbf{F} = -\nabla U$$

$$U(r) = -\frac{GmM}{r}$$

$$\mathbf{p} = m\mathbf{v}$$

$$\sum \mathbf{F} = \frac{d\mathbf{p}}{dt}$$

$$\mathbf{J} = \int \sum \mathbf{F} dt = \Delta \mathbf{p}$$

$$M = \sum m_i$$

$$\mathbf{r}_{\text{cm}} = \frac{1}{M} \sum m_i \mathbf{r}_i$$

$$\mathbf{r}_{\text{cm}} = \frac{1}{M} \int \mathbf{r} dm$$

$$\mathbf{P} = \sum \mathbf{p}_i = M\mathbf{v}_{\text{cm}}$$

$$\frac{d\mathbf{P}}{dt} = \sum \mathbf{F}_{\text{ext}} = M\mathbf{a}_{\text{cm}}$$

$$K = \frac{1}{2}Mv_{\text{cm}}^2 + \frac{1}{2}I_{\text{cm}}\omega^2$$

Snúningur:

$$I = \sum m_i r_i^2$$

$$I = \int r^2 dm$$

$$I = I_{\text{cm}} + Md^2$$

$$K = \frac{1}{2} I\omega^2$$

$$\boldsymbol{\tau} = \mathbf{r} \times \mathbf{F}$$

$$\sum \tau_z = I\alpha_z$$

$$P = \tau_z \omega_z$$

$$\mathbf{L} = \mathbf{r} \times \mathbf{p}$$

$$\mathbf{L} = \sum \mathbf{L}_i = \sum (\mathbf{r}_i \times \mathbf{p}_i)$$

$$\mathbf{L} = I\omega$$

$$\sum \tau = \frac{d\mathbf{L}}{dt}$$

Þyngdarafl:

$$F = -\frac{Gm_1 m_2}{r^2}\,\hat{\mathbf{r}}$$

$$\mathbf{g} = -\frac{GM_r}{r^2}\,\hat{\mathbf{r}}$$

$$T = \frac{2\pi a^{3/2}}{\sqrt{GM}}$$

$$E = \frac{1}{2}mv^2 - \frac{GMm}{r} = -\frac{GMm}{2a}$$

$$U = -\frac{Gm_E m}{r}$$

Fjaðrandi efni og vökvar:

$$Y = \frac{F_\perp / A}{\Delta l / l_0}$$

$$S = \frac{F_\parallel / A}{x/h}$$

$$B = -\frac{\Delta p}{\Delta V / V_0}$$

$$p = \frac{F_\perp}{A}$$

$$\frac{dp}{dy} = -\rho g$$

$$p_2 - p_1 = -\rho g (y_2 - y_1)$$

$$p = p_0 + \rho g h$$

$$F_B = \rho V g$$

$$\rho A v = \text{fasti}$$

$$p + \rho g h + \frac{1}{2}\rho v^2 = \text{fasti}$$

Sveiflur og bylgjur:

$$x(t) = A\cos(\omega t + \phi)$$

$$\frac{d^2x}{dt^2} + \omega^2 x = 0$$

$$\omega_0 = \sqrt{\frac{k}{m}}$$

$$T_0 = \frac{2\pi}{\omega_0} = \frac{1}{f}$$

$$T_0 = 2\pi\sqrt{\frac{L}{g}}$$

$$T_0 = 2\pi\sqrt{\frac{I}{mgd}}$$

$$T_0 = 2\pi\sqrt{\frac{I}{\kappa}}$$

$$x(t) = A_0 e^{-bt/2m}\cos(\omega' t + \phi)$$

$$\omega' = \sqrt{\omega_0^2 - \left(\frac{b}{2m}\right)^2}$$

$$x(t) = A\cos(\omega_d t + \delta)$$

$$A(\omega_d) = \frac{F_{\text{max}}/m}{\sqrt{(\omega_0^2 - \omega_d^2)^2 + (\frac{b\omega_d}{m})^2}}$$

$$v = \sqrt{\frac{F}{\mu}}$$

$$v = \lambda f$$

$$k = \frac{2\pi}{\lambda}$$

$$v = \frac{\omega}{k}$$

$$y(x,t) = A\cos(kx - \omega t + \phi)$$

$$\lambda_n = \frac{2L}{n}$$

$$\frac{\partial^2 y}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 y}{\partial t^2}$$

$$P = P_{\text{max}}\sin^2(kx - \omega t + \phi)$$

$$P_{\text{max}} = \mu\omega^2 A^2 v$$

$$P_{\text{av}} = \frac{1}{2}P_{\text{max}}$$

$$v = \sqrt{\frac{Y}{\rho}}$$

$$v = \sqrt{\frac{B}{\rho}}$$

$$v = \sqrt{\frac{\gamma RT}{M}}$$

$$f_n = \frac{nv}{2L} \quad (n = 1, 2, 3, \dots)$$

$$f_n = \frac{nv}{4L} \quad (n = 1, 3, 5, \dots)$$

$$f_{\text{beat}} = f_a - f_b$$

$$f_L = \frac{v + v_L}{v + v_S} f_S$$

$$I = \frac{1}{2}\sqrt{\rho B}\omega^2 A^2 = \frac{p_{\text{max}}^2}{2\sqrt{\rho B}}$$

$$\beta = 10 \log \frac{I}{I_0}$$

Varmafræði:

$$T_C = \frac{5}{9}(T_F - 32)$$

$$T_K = 273.15 + T_C$$

$$pV = NkT$$

$$pV = nRT$$

$$R = kN_A$$

$$\Delta L = \alpha L_0 \Delta T$$

$$\Delta V = \beta V_0 \Delta T$$

$$\frac{F}{A} = -Y\alpha\Delta T$$

$$\Delta Q = mc\Delta T$$

$$\Delta Q = nC\Delta T$$

$$\Delta Q = mL$$

$$dW = pdV$$

$$\Delta U = Q - W$$

$$dQ = dW + dU$$

$$\Delta U = nC_V \Delta T$$

$$C_p - C_V = R$$

$$pV^\gamma = \text{fasti}$$

$$\gamma = \frac{C_p}{C_V}$$

$$\frac{dQ}{dt} = kA\,\frac{T_H - T_C}{L}$$

$$R = \frac{L}{k}$$

$$H = Ae\sigma T^4$$

$$v_{\text{rms}} = \sqrt{(v^2)_{\text{av}}} = \sqrt{\frac{3kT}{m}}$$

$$k = \frac{R}{N_A}$$

$$\frac{1}{2}m(v_x^2)_{\text{av}} = \frac{1}{2}kT$$

$$K_{\text{tr}} = \frac{3}{2}nRT$$

$$C_V = \frac{3}{2}R$$

$$C_V = \frac{5}{2}R$$

$$C_V = \frac{7}{2}R$$

$$C_V = 3R$$

$$f(v) = 4\pi\left(\frac{m}{2\pi kT}\right)^{3/2} v^2 e^{-mv^2/2kT}$$

$$v_{\text{av}} = \sqrt{\frac{8kT}{\pi m}}$$

$$v_{\text{mp}} = \sqrt{\frac{2kT}{m}}$$

$$\left(p + a\left(\frac{n}{V}\right)^2\right)(V - nb) = nRT$$

$$e = \frac{W}{|Q_H|} = 1 - \frac{|Q_C|}{|Q_H|}$$

$$K = \frac{|Q_C|}{W}$$

$$e_{\text{Carnot}} = 1 - \frac{T_C}{T_H}$$

$$r = \frac{V_f}{V_i}$$

$$e = 1 - \frac{1}{r^{(\gamma-1)}}$$

$$dS = \frac{dQ}{T}$$

$$\Delta S = \int_1^2 \frac{dQ}{T}$$

$$\Delta S = nC_V \ln\frac{T_2}{T_1} + nR\ln\frac{V_2}{V_1}$$

$$S = k\ln w$$

$$\Delta S \geq 0$$