Formelblatt Physik

Mechanik

$$\vec{s} = \frac{1}{2}\vec{a}t^2 + \vec{v}_0 t + \vec{s}_0$$
$$s = vt + s_0$$
$$\vec{v} = \vec{a}t + \vec{v}_0$$
$$\vec{F} = m\vec{a},\ [F] = N = kg\frac{m}{s^2}$$
$$360° \mathrel{\hat{=}} 2\pi\,rad$$
$$F_{Feder} = -\kappa s$$
$$F_{H,R} = \mu F_N$$
$$E_{kin} = \frac{1}{2}mv^2,\ [E] = J$$
$$E_{pot} = mgh$$
$$E_{Feder} = \frac{1}{2}\kappa h^2$$
$$W = \vec{F}\vec{s},\ [W] = J = Ws = Nm$$
$$\overline{P} = \frac{W_{ges}}{t_{ges}}$$
$$P = \vec{F}\vec{v},\ [P] = \frac{J}{s} = W = \frac{Nm}{s}$$
$$\vec{p} = m\vec{v}$$
$$\vec{p}_1 + \vec{p}_2 = \vec{p}\,'_1 + \vec{p}\,'_2$$
$$E_{kin_1} + E_{kin_2} = E'_{kin_1} + E'_{kin_2}$$
$$E_{kin_1} + E_{kin_2} = E'_{kin_1} + W_{Verlust}$$
$$\omega = \frac{2\pi}{T} = 2\pi f$$
$$v_R = \omega r$$
$$a_R = \frac{v^2}{r}$$
$$\vec{F}_{ZP} = ma_R$$
$$\vec{M} = I\vec{\alpha}$$
$$\vec{M} = \vec{r}\times\vec{F}$$
$$\omega_0 = \sqrt{\frac{\kappa}{m}}$$
$$s(t) = s_0 \sin(\omega_0 t + \varphi_0)$$
$$T = 2\pi\sqrt{\frac{l}{g}}$$
$$s(t) = s_0 e^{-\delta t}\sin(\omega t + \varphi_0),\ \omega = \sqrt{\omega_0^2 - \delta^2}$$
$$c = \lambda f,\ \text{(auch Optik)}$$
$$s(x,t) = s_0 \sin(\omega_0 t - kx + \varphi_0),\ k = \frac{2\pi}{\lambda}$$
$$s(x,t) = 2s_0 \cos(kx)\sin(\omega t),\ L = \frac{\lambda}{2}$$
$$f_1 = \frac{f_0}{1 \mp \frac{v_{Sender}}{c}}$$
$$F = \gamma\frac{m_1 m_2}{r^2}$$

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$$\tan(\alpha) = \frac{GK}{AK} \qquad g \approx 9{,}81\ \frac{m}{s^2}$$
$$\sin(\alpha) = \frac{GK}{H} \qquad 1\,kWh = 3{,}6\,MJ$$
$$\cos(\alpha) = \frac{AK}{H} \qquad 1\,PS \approx 0{,}73\,kW$$
$$I_{Kugel} = \frac{2}{5}mr_0^2,\ I_{Kreisscheibe} = \frac{1}{2}mr_0^2$$
$$\gamma \approx 6{,}67\cdot 10^{-11}\ \frac{m^3}{kg\cdot s^2}$$

Elektrizität

$$\vec{F} = q\vec{E},\ [q] = C = As,\ [E] = \frac{V}{m} = \frac{N}{C}$$
$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$
$$E = \frac{U}{d}$$
$$C = \varepsilon_0\frac{A}{d},\ [C] = F = \frac{As}{V} = \frac{C}{V}$$
$$Q = CU$$
$$E_{El} = \frac{1}{2}CU^2,\ [E_{El}] = J = Ws$$
$$I = \frac{dQ}{dt}$$
$$U = RI$$
$$R_{Ges} = R_1 + R_2 + ... + R_n$$
$$\frac{1}{R_{Ges}} = \frac{1}{R_1} + \frac{1}{R_2} + ... + \frac{1}{R_n}$$
$$P_{El} = UI,\ [P] = \frac{J}{s} = W$$
$$\vec{F}_L = q\vec{v}\times\vec{B},\ [B] = T = \frac{N}{Am} = \frac{Vs}{m^2}$$
$$\Rightarrow F_L = qvB\sin\alpha$$
$$L = \frac{N^2 A\mu_0}{l},\ [L] = H = \frac{Tm^2}{A}$$
$$U_{ind} = -BLv$$
$$U_{ind} = -L\dot{I}$$

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$$\varepsilon_0 \approx 8{,}85\cdot 10^{-12}\frac{As}{Vm},\ ([\varepsilon_0] = \frac{C^2}{Nm^2})$$
$$q \approx 1{,}602\cdot 10^{-19}\,C$$
$$m_e \approx 9{,}11\cdot 10^{-31}\,kg,\ m_p \approx 1{,}67\cdot 10^{-27}\,kg$$
$$1\,eV \approx 1{,}602\cdot 10^{-19}\,J$$
$$\mu_0 = 4\pi\cdot 10^{-7}\ \frac{H}{m},\ [\mu_0] = \frac{Vs}{Am}$$

Optik

$$n_1 \sin\alpha = n_2 \sin\beta$$
$$n = \frac{c_0}{c}$$
$$\frac{1}{g} + \frac{1}{b} = \frac{1}{f}$$
$$\frac{B}{G} = -\frac{b}{g}$$
$$\frac{G}{s_0} = \tan\alpha_0 \approx \alpha_0,\ \ \frac{G}{f} = \tan\alpha_1 \approx \alpha_1$$
$$V_{Mikroskop} = V_{obj}\cdot V_{oku} = \frac{t}{f_{obj}}\cdot\frac{s_0}{f_{oku}}$$
$$V_{Fernrohr} = \frac{f_{obj}}{f_{oku}}$$
$$\lambda' = \frac{1}{n}\lambda$$
$$\Delta s = m\lambda' \quad \text{oder} \quad \Delta s = (2m-1)\frac{\lambda'}{2},\ m = 1,2,3,...$$

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$$n_{Wasser} = 1{,}33,\ n_{Luft} \approx 1$$
$$n_{Quarzglas} = 1{,}46$$
$$c_0 \approx 3\cdot 10^8\ \frac{m}{s}$$