FORMULAS

$$F = ma, \quad W = Fdcos\alpha, \quad P = \frac{W}{t}, \quad P = \frac{E}{t}, \quad P = \frac{Q}{t} \quad E_{pe} = 0.5k(\Delta l)^2, \quad E_{pg} = mgh, \quad E_k = 0.5mv^2$$

$$Q = mc\Delta T \quad E_k = \frac{3}{2}kT, \quad \Delta U = \pm Q \pm W \quad kN_A = R, \quad pV = nRT, \quad n = \frac{m}{M}, \quad \frac{pV}{T} = const.$$

$$F_f = \mu F_{N,} \quad F_N = mg\cos\alpha, \quad F_r = \frac{mv^2}{r}, \qquad \vec{\tau} = \vec{r} \times \vec{F}$$

$$s = vt, \quad s = s_0 + v_0 t + 0.5at^2, \quad x = Asin\omega t$$

$$a = \frac{\Delta v}{\Delta t}, \quad a = \frac{v^2}{r}$$

$$v = v_0 + at, \quad v^2 = v_0^2 + 2as, \quad v = A\omega cos\omega t$$

$$F = k\Delta l, \qquad PE_{el.} = \frac{1}{2}kx^2, \qquad \frac{F}{A} = E\frac{\Delta l}{l_0}, \quad \sigma = E\varepsilon$$

$$\omega = \frac{\Delta\alpha}{\Delta t}, \quad v = \omega r, \quad \omega = 2\pi f, \quad f = \frac{1}{T}, \quad \omega = \sqrt{\frac{k}{m}}$$

$$p = \frac{F}{A}, \quad p = dgh, \quad d = \frac{m}{V}, \quad F_B = dVg$$

$$A_1 v_1 = A_2 v_2 = const. \quad Q = \frac{\Delta V}{\Delta t}, \quad Q = \frac{\pi r^4}{8\eta l}\Delta p, \quad F = \eta S\frac{\Delta v}{\Delta x}$$

$$F_{el} = k\frac{q_1 q_2}{r^2}, \quad E = \frac{F}{q}, \quad V = \frac{E_p}{q} = k\frac{Q}{r}$$

$$I = \frac{Q}{t} \quad I = \frac{V}{R}, \quad R = \rho\frac{l}{A}, \quad \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots, \quad R = R_1 + R_2 + \ldots, \quad E = QV, \quad P = VI$$

$$B = \mu_0\frac{nI}{l}, \quad B = \mu_0\frac{I}{2\pi r}, \qquad F = BIl\sin(\vec{B}\vec{I}) \quad F = QvB\sin(\vec{v},\vec{B})$$

$$emf = -n\frac{\Delta\emptyset}{\Delta t}, \quad \emptyset = BAcos(\vec{B},\vec{S})$$

$$P = \frac{1}{f}, \quad P = \frac{1}{d_o} + \frac{1}{d_i}, \quad P = (n_{lens} - n_{env.})\left(\frac{1}{r_1} - \frac{1}{r_2}\right), \quad n_1 sin\alpha = n_2 sin\beta, \quad P = P_1 + P_2 - d \cdot P_1 \cdot P_2$$

$$\nu = \frac{c}{\lambda} \quad n = \frac{c}{v} \qquad I = I_0 cos^2\alpha, \quad tg\theta = n, \quad E = mc^2, \quad E = h\frac{c}{\lambda} = h\nu, \quad E_n = -\frac{E_1}{n^2}, \quad \lambda = \frac{h}{p}$$

$$SIL = 10\log_{10}\frac{I}{I_0}, \qquad I = \frac{P}{4\pi r^2} \ldots\ldots f = \frac{v}{\lambda}$$

$$N = N_0 e^{-\lambda t}, \quad \lambda = \frac{ln2}{T_{\frac{1}{2}}} \qquad h\upsilon = E_k + E_B$$

CONSTANTS

Planck's constant $h = 6.6 \times 10^{-34}$ Js,
Universal gas constant $R = 8.31$ J/(K·mol)
Avogadro's number $N_A = 6.02\times10^{23}$ particles/mol,
Electron rest mass $m_e = 9.1093897 \times 10^{-31}$kg
density of water $d = 1000\frac{kg}{m^3}$
Coulomb constant $k = 8.99..\times 10^9 \mathrm{Nm^2C^{-2}}$
Boltzmann constant $k = 1.38 \times 10^{-23}$ $\mathrm{m^2kg\,s^{-2}K^{-1}}$

magnetic constant (permeability of free space)
$\mu_0 = 4\pi\times10^{-7}\mathrm{N/A^2}$
speed of light in vacuum: $3.0 \times 10^8 \frac{\mathrm{m}}{\mathrm{s}}$
acceleration due to gravity $g = 10\frac{\mathrm{m}}{\mathrm{s^2}}$
threshold of hearing at 1 kHz: $I_0 = 10^{-12}\frac{W}{m^2}$
$A = \pi r^2 \quad S = 4\pi r^2 \quad V = \frac{4}{3}\pi r^3$
$n_{air} = 1.00, \ n_{water} = 1.333$