
$c = 3.0 \times 10^8$ m/s $\quad G = 6.67 \times 10^{-11}$Nm^2/kg^2 $\quad N_A = 6.02 \times 10^{23}$

$R = 8.315 \frac{\text{J}}{\text{mol} \cdot \text{K}}$ $\quad k = 1.38 \times 10^{-23} \frac{\text{J}}{\text{K}}$ $\quad \sigma = 5.67 \times 10^{-8} \frac{\text{W}}{\text{m}^2 \cdot \text{K}^4}$

1 ft = 12 in $\quad$ 1 in = 2.54 cm $\quad$ 1 lb = 0.454 kg $\quad$ 1 mi = 1.6 km

$I_o = 10 \times 10^{-12} \frac{\text{W}}{\text{m}^2}$ $\quad$ 1 atm = 1.013×10^5Pa $\quad$ 1 m^3 = 10^3 L = 10^6 cm^3

1 Cal = 1 kcal = 4186 J $\quad$ 1 $u = 1.6605 \times 10^{-27}$kg

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$a = const \quad v = v_0 + at \quad x = x_0 + v_0 t + \frac{at^2}{2} \quad v^2 - v_0^2 = 2a(x - x_0)$

$a = \frac{v^2}{r} \quad F_{fr} = \mu_k F_N \quad F_{fr} \le \mu_s F_N$

$\left(\frac{T_1}{T_2}\right)^2 = \left(\frac{a_1}{a_2}\right)^3 \quad F = G\frac{m_1 m_2}{r^2} \quad U = -G\frac{m_1 m_2}{r}$

$F = -kx \quad U = \frac{kx^2}{2} \quad P = \frac{dW}{dt} = \frac{dE}{dt} \quad P = \overrightarrow{F} \cdot \overrightarrow{v}$

$W = \int \overrightarrow{F} \cdot d\overrightarrow{s} \quad U = -\int \overrightarrow{F} \cdot d\overrightarrow{s} \quad F_x = -\frac{\partial U}{\partial x}$

$\sum \overrightarrow{F} = \frac{d\overrightarrow{p}}{dt} \quad \overrightarrow{J} = \int \overrightarrow{F}\, dt \quad \overrightarrow{r}_{C.M.} = \frac{\sum m_i \overrightarrow{r}_i}{\sum m_i} \quad \overrightarrow{r}_{C.M.} = \frac{\int dm\, \overrightarrow{r}_i}{\int dm}$

$\alpha = const \quad \omega = \omega_o + \alpha t \quad \theta = \theta_o + \omega_o t + \frac{\alpha t^2}{2} \quad \omega^2 - \omega_o^2 = 2\alpha(\theta - \theta_o)$

$\overrightarrow{\tau} = I\overrightarrow{\alpha} \quad I = \sum m_i r_i^2 \quad I = \int dm\, r^2 \quad I_z = I_x + I_y \quad I = I_{C.M.} + mh^2$

$\sum \overrightarrow{\tau} = \frac{d\overrightarrow{L}}{dt} \quad \overrightarrow{L} = I\overrightarrow{\omega} \quad \overrightarrow{\tau} = \overrightarrow{r} \times \overrightarrow{F} \quad \overrightarrow{L} = \overrightarrow{r} \times \overrightarrow{p} \quad W = \int \overrightarrow{\tau} \cdot d\overrightarrow{\theta}$

$\overrightarrow{dl} = d\overrightarrow{\theta} \times \overrightarrow{r} \quad \overrightarrow{v} = \overrightarrow{\omega} \times \overrightarrow{r} \quad \overrightarrow{a} = \overrightarrow{\alpha} \times \overrightarrow{r} \quad K = \frac{I\omega^2}{2} \quad \triangle L = \frac{1}{E}\frac{L_o}{A}F$

$I_{soid\,cylinder} = \frac{1}{2}MR^2 \quad I_{solid\,sphere} = \frac{2}{5}MR^2 \quad I_{rod\,through\,CM} = \frac{1}{12}MR^2$

$P = P_o + \rho g y \quad F_b = \rho V g \quad A_1 v_1 = A_2 v_2 \quad P + \rho g y + \frac{\rho v_2^2}{2} = const.$

$m\frac{d^2x}{dt^2} + kx = 0 \quad x = A\cos(\omega t + \phi) \quad \omega^2 = \frac{k}{m} \quad T = \frac{2\pi}{\omega} \quad \omega = 2\pi f$

$L\frac{d^2x}{dt^2} + gx = 0 \quad T = 2\pi\sqrt{\frac{L}{g}} \quad I\frac{d^2\overrightarrow{\theta}}{dt^2} + mgh\overrightarrow{\theta} = 0 \quad T = 2\pi\sqrt{\frac{I}{mgh}}$

$m\frac{d^2x}{dt^2} + b\frac{dx}{dt} + kx = 0 \quad x = Ae^{-\alpha t}\cos(\omega' t + \phi) \quad \alpha = \frac{b}{2m} \quad \omega' = \sqrt{\omega_o^2 - \frac{b^2}{4m^2}}$

$n = \frac{N}{N_A} = \frac{m}{\mu} = \frac{V}{V_\mu} \quad T(°\text{C}) = \frac{5}{9}(T(°\text{F}) - 32) \quad T(°\text{F}) = \frac{9}{5}T(°\text{C}) + 32$

$\triangle L = \alpha L_o \triangle T \quad \triangle V = \beta V_o \triangle T$

$PV = nRT \quad PV = NkT \quad \left(P + \frac{a}{\frac{V}{n^2}}\right)\left(\frac{V}{n} - b\right) = RT$

$\left\langle KE \right\rangle = \frac{1}{2}m\langle v^2 \rangle = \frac{1}{2}mv_{rms}^2 = \frac{3}{2}kT \quad f(v)dv = 4\pi N\left(\frac{m}{2\pi kT}\right)^{\frac{3}{2}} v^2 e^{-\frac{mv^2}{2kT}} dv$

$U = \frac{3}{2}nRT \quad Q = mc\triangle T \quad Q = mL \quad dW = pdV \quad dU = \delta Q - \delta W$

$c_v = \frac{i}{2}R \quad c_p = \frac{i+2}{2}R \quad \gamma = \frac{c_p}{c_v} \quad PV^\gamma = const. \quad S = \frac{Q}{T}$

$\frac{dQ}{dt} = -kA\frac{dT}{dx} \quad \frac{dQ}{dt} = e\sigma AT^4 \quad e = \frac{|W|}{|Q_H|} = \frac{|Q_H| - |Q_L|}{|Q_H|} \quad e = 1 - \frac{T_L}{T_H}$
