3. $A_x = \sum A_i \cos\theta_i \quad en \quad A_y = \sum A_i \sin\theta_i \quad tg\theta = \frac{A_y}{A_x} \quad en \quad A = \sqrt{A_x^2 + A_y^2}$

3. $v = v_0 + at \quad x - x_0 = v_0 t + \frac{1}{2} at^2 \quad v^2 = v_0^2 + 2a(x - x_0)$

3. $y = x\tan\theta_0 - \frac{g}{2v_0^2 \cos^2\theta_0} x^2 \quad en \quad x = \frac{v_0^2}{g}\sin(2\theta_0)$

4. $\vec{F}_{net} = \frac{d\vec{p}}{dt} = m\vec{a} \quad met \quad \vec{p} = m\vec{v}$ 5. $f_s \le \mu_s n \quad en \quad f_k = \mu_k n$

6. $W = \int_{\vec{r}_1}^{\vec{r}_2} \vec{F} \cdot d\vec{r} \qquad P = \frac{dW}{dt} = \vec{F}.\frac{d\vec{r}}{dt} = \vec{F}.\vec{v}$

$1\,calorie = 4{,}184\,J \;;\; 1\,elektronvolt = 1eV = 1{,}602\,10^{-19}\,J \;;\; 1\,kWh = 3{,}6\,10^6\,J$

7. $\Delta U_{AB} = -\int_A^B \vec{F} \cdot d\vec{r}$ $K_2 + U_2 = K_1 + U_1 + W_{n-con}$ $U = \frac{1}{2}kx^2$

$\Delta U = mg\,\Delta y$

9. $\vec{r}_{cm} = \frac{\sum m_i \vec{r}_i}{M} \quad of \quad \vec{r}_{cm} = \frac{\int \vec{r}\, dm}{M} \qquad \vec{P} = \sum m_i \vec{v}_i = M\vec{v}_{MM} \quad en \quad \vec{F}_{net\ extern} = \frac{d\vec{P}}{dt}$

9. $v_{1i} - v_{2i} = -(v_{1f} - v_{2f})$ $v_{1f} = \frac{m_1 - m_2}{m_1 + m_2} v_{1i} + \frac{2m_2}{m_1 + m_2} v_{2i}$ $v_{2f} = \frac{2m_1}{m_1 + m_2} v_{1i} + \frac{m_2 - m_1}{m_1 + m_2} v_{2i}$

13. $m\frac{d^2x}{dt^2} = -kx \quad x(t) = A\cos(\omega t + \phi) \quad \omega = \sqrt{k/m} \quad \omega = \sqrt{mgL/I}$

13. $m\frac{d^2x}{dt^2} = -kx - b\frac{dx}{dt} \quad x(t) = Ae^{-bt/2m}\cos(\omega t + \phi) \quad \omega = \sqrt{\omega_0^2 - (b/2m)^2}$

13. $m\frac{d^2x}{dt^2} = -kx - b\frac{dx}{dt} + F_0\cos\omega_d t \quad x(t) = A\cos(\omega_d t - \delta)$

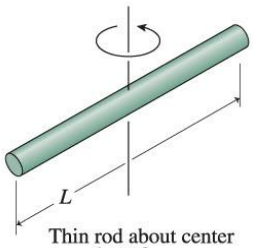
$A = A(\omega_d) = \frac{F_0}{m\sqrt{(\omega_d^2 - \omega_0^2)^2 + b^2\omega_d^2/m^2}} \quad \mathrm{tg}\,\delta = \frac{b\omega_d}{m(\omega_d^2 - \omega_0^2)}$

$Q = \omega_0 \frac{E_{tot}}{\bar{P}} = \frac{m\omega_0}{b} = \frac{\omega_0}{\Delta\omega}$ $\frac{mec.\ \ x\ \ v\ \ m\ \ b\ \ k}{elek.\ \ q\ \ I\ \ L\ \ R\ \ 1/C}$

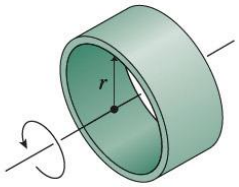
14. $\frac{\partial^2 y}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 y}{\partial t^2} \quad y(x,t) = A\cos(kx \mp \omega t) \quad k = \frac{2\pi}{\lambda} \quad \omega = \frac{2\pi}{T} \quad v = \lambda f = \frac{\lambda}{T} = \frac{\omega}{k}$

14. $v = \sqrt{\frac{F}{\mu}} \quad v = \sqrt{\frac{\gamma p}{\rho}} \quad f' = f\left(\frac{v + u_W}{v - u_B}\right) \quad f' = f\sqrt{\frac{c+u}{c-u}} \approx f(1 + \frac{u}{c})$

Table 10.2 Rotational Inertias

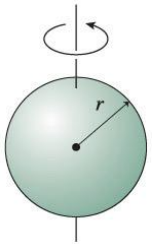


Thin rod about center
$I = \frac{1}{12}ML^2$

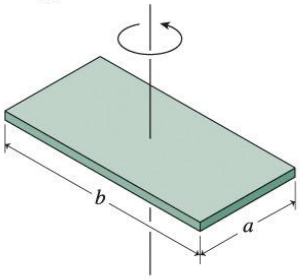


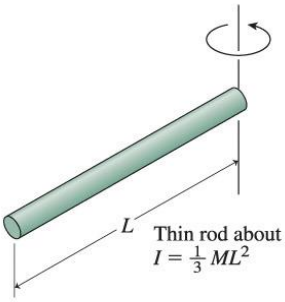
Thin ring or hollow cylinder about its axis
$I = MR^2$

Solid sphere about diameter
$I = \frac{2}{5}MR^2$

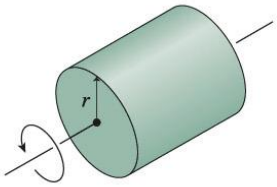


Flat plate about perpendicular axis
$I = \frac{1}{12}M(a^2 + b^2)$



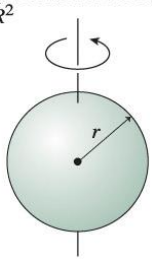


Thin rod about end
$I = \frac{1}{3}ML^2$

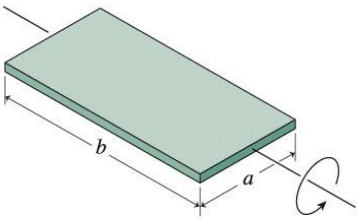


Disk or solid cylinder about its axis
$I = \frac{1}{2}MR^2$

Hollow spherical shell about diameter
$I = \frac{2}{3}MR^2$



Flat plate about central axis
$I = \frac{1}{12}Ma^2$



Samenvatting

Linear Quantity or Equation	Angular Quantity or Equation	Relation Between Linear and Angular Quantities
Position x	Angular position θ	
Speed $v = dx/dt$	Angular speed $\omega = d\theta/dt$	$v = \omega r$
Acceleration a	Angular acceleration α	$a_t = \alpha r$
Mass m	Rotational inertia I	$I = \int r^2\,dm$
Force F	Torque τ	$\tau = rF\sin\theta$
Kinetic energy $K_{trans} = \frac{1}{2}mv^2$	Kinetic energy $K_{rot} = \frac{1}{2}I\omega^2$	
Newton's second law (constant mass or rotational inertia): $F = ma$	$\tau = I\alpha$	$I = I_{cm} + Md^2$

$\vec{p} = m\vec{v}$ $\quad \vec{L} = I\vec{\omega}$ $\quad \vec{L} = \vec{r} \times \vec{p}$

$\vec{F}_{net} = \frac{d\vec{p}}{dt}$ $\quad \vec{\tau} = \frac{d\vec{L}}{dt}$ $\quad \vec{\tau} = \vec{r} \times \vec{F}$

$\vec{p} = m\vec{v} = cte$ als $\vec{F}_{net} = 0$ $\quad \vec{L} = I\vec{\omega} = c^{te}$ als $\vec{\tau}_{net} = 0$

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29. $\vec{E}(x,t) = E_p \sin(kx - \omega t)\hat{j}$ $\quad \vec{B}(x,t) = B_p \sin(kx - \omega t)\hat{k}$

$\frac{\partial^2 E}{\partial x^2} = \varepsilon_0 \mu_0 \frac{\partial^2 E}{\partial t^2}$ $\quad v = \frac{1}{\sqrt{\varepsilon_0 \mu_0}} = \frac{\omega}{k} = \lambda f$ $\quad E = cB$ $\quad \vec{v} = \frac{\vec{E} \times \vec{B}}{B^2}$

$v = \frac{1}{\sqrt{\varepsilon\mu}} = \frac{1}{\sqrt{\varepsilon_r \mu_r}}c$ $\quad of \quad \frac{c}{v} = \sqrt{\varepsilon_r \mu_r} = n$ $\quad S_{uit} = S_0 \cos^2\alpha$

30. $n_1 \sin\theta_1 = n_2 \sin\theta_2 \quad \tan\theta_p = \frac{n_2}{n_1} \quad \sin\theta_c = \frac{n_2}{n_1} \quad n = A + \frac{B}{\lambda^2} \quad \frac{\tau}{L} = \frac{t_{\max} - t_{\min}}{L} = \frac{n_k}{c}\left(\frac{n_k}{n_r} - 1\right)$

31. $\frac{1}{s} + \frac{1}{s'} = \frac{1}{f} \quad M = \frac{h'}{h} = -\frac{s'}{s} \quad f = \frac{R}{2} \quad \frac{1}{f} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} \quad P = \frac{1}{f} \quad m = \frac{\beta}{\alpha} \quad m \approx -\frac{L}{f_o}\left(\frac{25\text{ cm}}{f_e}\right) \quad m = \frac{fo}{fe}$

32. $\Delta\phi = k\Delta x = \frac{2\pi}{\lambda}\Delta x = \frac{2\pi}{\lambda_{vacuum}}(n\Delta x) \quad \lambda = vT = \frac{c}{n}T = \frac{\lambda_{vacuum}}{n}$

32. Meerdere spleten, breedte a, onderlinge afstand d

$\overline{S} = \overline{S_0}\left[\frac{\sin(\phi/2)}{\phi/2}\right]^2\left(\frac{\sin\frac{N\Delta\phi}{2}}{\sin\frac{\Delta\phi}{2}}\right)^2 \quad \phi = \frac{2\pi}{\lambda}a\sin\theta \quad \Delta\phi = \frac{2\pi}{\lambda}d\sin\theta$

Interferentie : hoofdmax : $d\sin\theta = m\lambda$ minima : $d\sin\theta' = \frac{m'}{N}\lambda$

Diffractie : minima : $a\sin\theta = m\lambda$

$\frac{\lambda}{\Delta\lambda} = mN$: Rayleighcriterium en "resolutie"

33. $x' = \gamma(x - vt) \quad t' = \gamma(t - vx/c^2) \quad u = \frac{u' + v}{1 + uv/c^2} \quad \gamma = \frac{1}{\sqrt{1 - u^2/c^2}}$

33. $E = mc^2 = \frac{m_0 c^2}{\sqrt{1 - u^2/c^2}} = \gamma m_0 c^2$

34. $R(\lambda,T) = \frac{2\pi hc^2}{\lambda^5(e^{hc/\lambda kT} - 1)} \quad P_{\text{blackbody}} = \sigma A T^4 \quad \lambda_{\text{peak}} T = 2{,}898\text{ mm}\cdot\text{K}$

34. $K_{\max} = hf - \phi = hf - hf_0 = eU_s \qquad p = hf/c = h/\lambda$

34. $E_n = -\frac{ke^2}{2a_0}\left(\frac{1}{n^2}\right) = -\frac{13{,}6\text{ eV}}{n^2} \quad \frac{1}{\lambda} = R_H\left(\frac{1}{n_2^2} - \frac{1}{n_1^2}\right) \quad R_H = \frac{ke^2}{2a_0 hc} = 1{,}097 \times 10^7\,\text{m}^{-1}$

$a_0 = \frac{\hbar^2}{mke^2} = 0{,}0529\text{ nm} \qquad$ 38. $N = N_0 e^{-\lambda t}$

38. ${}^A_Z X + E_b \rightarrow Z\,{}^1_1 p + (A - Z)\,{}^1_0 n \quad E_b = \{[Z m_p + (A - Z)m_n] - m_X\}c^2 = \Delta mc^2$

Symbool	Omschrijving	Waarde
e	Elementaire lading	1,60218 10^{-19} C
c	Lichtsnelheid in vacuum	2,99792458 10^{8} m/s
G	Gravitatieconstante	6,6720 10^{-11} Nm^2/kg^2
h	Constante van Planck	6,6261 10^{-34} Js
N_A	Getal van Avogadro	6,02214 10^{23} mol^{-1}
R	Universele gasconstante	8,31441 J/(molK)
k_B	Constante van Boltzmann	1,38054 10^{-23} J/K
σ	Constante van Stefan-Boltzmann	5,67 10^{-8} W/m^2K^4
b	Constante van Wien	2,9 10^{-3} mK
$m_{0,e}$	Rustmassa van het elektron	9,1094 10^{-31} kg = 0,00055 u
$m_{0,n}$	Rustmassa van het neutron	1,67493 10^{-27} kg = 1,0086 u
$m_{0,p}$	Rustmassa van het proton	1,67262 10^{-27} kg = 1,0073 u
alfa deeltje	Rustmassa van het alfa deeltje	6,6443 10^{-27} kg = 4,0015 u
u	Atomaire massaeenheid	1,6605 10^{-27} kg = 1 u
H 1,1	Rustmassa van waterstof-1 atoom	1,6734 10^{-27} kg = 1,0078 u
He 4,2	Rustmassa van Helium-4 atoom	6,6461 10^{-27} kg = 4,0026 u
R_∞	Rydbergconstante	1,0974 10^{7} m^{-1}
ε_0	Permittiviteit van het luchtledige	8,854188 10^{-12} $C^2/(Nm^2)$
μ_0	Permeabiliteit van het luchtledige	4π 10^{-7} Tm/A

Werken met de TI30A:

$27^{2/3}$: 27 y^x (2/3) = $9^{½}$ of $9^{0,5}$: 9 2nd y^x 2 = Bgsin 0,5 : 0,5 2nd sin

6,7 10^{8} : 6.7 EE 8 6,7 10^{-8} : 6.7 EE 8± -6,7 10^{-8} : 6.7± EE 8±