Механика

кинематика

$x = x_0 + v_{0x} t + \frac{a_x t^2}{2}$ равноуск. движение

$v_x = v_{0x} + a_x t$; $v_x = x'(t)$

$s_x = \frac{v_x^2 - v_{0x}^2}{2 a_x}$ равноуск. движение

$v_{ср} = \frac{s_{об}}{t_{об}}$

равноуск. движение
$r = r_0 + vt + \frac{at^2}{2}$
$s = vt + \frac{at^2}{2}$

$T = \frac{t}{n} = \frac{1}{\nu}$; $\nu = \frac{n}{t} = \frac{1}{T}$

$\omega = 2\pi\nu$; $\omega = \frac{2\pi}{T}$

$v = \frac{2\pi R}{T} = \omega R$

$a_{цс} = \frac{v^2}{R} = \omega^2 R$

$x = x_m \cos \omega t$

$v_x = x'(t)$; $v_m = x_m \omega$

$a_x = v_x'(t)$; $a_m = x_m \omega^2$

динамика

I З.Н. $\Sigma \vec{F} = \vec{0}$; $a = 0$; $v = const$

II З.Н. $\Sigma \vec{F} = m\vec{a}$

III З.Н. $\vec{F}_{12} = -\vec{F}_{21}$

ЗВТ: $F = G \frac{m_1 m_2}{R^2}$

$F_т = mg$

$F_y = k\Delta x$; $k = \frac{ES}{l_0}$

$F_{тр} = \mu N$

$F_{Apx} = \rho_{ж} g V_{погр.ч.}$

$P_{a\uparrow} = m(g + a)$

$P_{a\downarrow} = m(g - a)$

$M = F \cdot \ell$

$\Sigma M_{пр. час.} = \Sigma M_{по час.}$

$T = 2\pi\sqrt{\frac{\ell}{g}}$; $T = 2\pi\sqrt{\frac{m}{k}}$

работа, энергия, зак. сохран.

$A = Fs \cdot \cos\alpha$

$N = \frac{A}{t} = F \cdot v \cdot \cos\alpha$

$E_к = \frac{mv^2}{2}$

$E_p = mgh$; $E_p = \frac{k\Delta x^2}{2}$

$A = \Delta E_к = -\Delta E_p$

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

$\Delta\vec{p} = \vec{p}_2 - \vec{p}_1$

$F t = \Delta p$

$\vec{p}_1 + \vec{p}_2 + \ldots = \vec{p}_1' + \vec{p}_2'$

$v = \lambda\nu$; $\lambda = vT$

локация $s = \frac{vt}{2}$

Молекулярная физика

$m_0 = \frac{m}{N} = \frac{M}{N_A}$

$\nu = \frac{m}{M} = \frac{N}{N_A}$

$n = \frac{N}{V}$

$\rho = \frac{m}{V}$

$v = \sqrt{\frac{3kT}{m_0}} = \sqrt{\frac{3RT}{M}}$

$p = \frac{1}{3} n m_0 \bar{v}^2$

$p = \frac{1}{3} \rho \bar{v}^2$

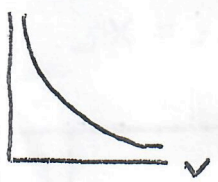
$p = \frac{2}{3} n \bar{E}_к$

$p = nkT$

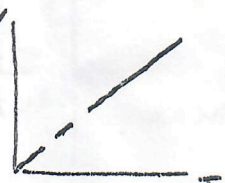
$\bar{E} = \frac{3}{2} kT$

$\frac{pV}{T} = \frac{m}{M} R$; $\frac{pV}{T} = const$ — уравнение

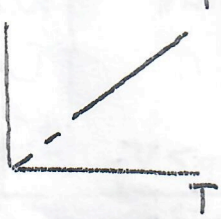
$T = const$ — изотерма
$pV = const$
$p \sim \frac{1}{V}$



$p = const$ — изобара
$\frac{V}{T} = const$
$p \sim V$



$V = const$ — изохора
$\frac{p}{T} = const$
$p \sim T$



$\varphi = \frac{\rho}{\rho_{н.п}} \cdot 100\%$

$p_{н.п.}$ при $100^\circ = p_{атм} = 10^5$ Па

Термодинамика

$U = \frac{i}{2} \frac{m}{M} RT$

$\Delta U = \frac{i}{2} \frac{m}{M} R \Delta T$

$A' = p\Delta V$; $A' = -A$

I З Т-Д $\Delta U = Q + A$

$Q = \Delta U + A'$

$T = c$; $\Delta U = 0 \Rightarrow Q = A'$

$V = c$; $A = 0 \Rightarrow Q = \Delta U$

$Q = 0 \Rightarrow \Delta U = A$

$\eta = \frac{Q_н - Q_х}{Q_н} = 1 - \frac{Q_х}{Q_н}$

$\eta_{ид} = \frac{T_н - T_х}{T_н} = 1 - \frac{T_х}{T_н}$

$Q = cm\Delta T$ нагр-ние
$Q = \lambda m$ плавл-крист.
$Q = Lm$ парообр-конд.
$Q = qm$ сгор. топл.