Кинематика
$S = \vartheta t; \vartheta = \frac{S}{t}; t = \frac{S}{\vartheta};$
$x = x_0 \pm vt \; ;$
$\vartheta_{\text{opt}} = \frac{\sum S}{\sum t}$;
$S_1 = S_2$ болғанда:
$ \theta_{\mathrm{opt}} = \frac{2\vartheta_1\vartheta_2}{\vartheta_1 + \vartheta_2} $
$t_1=t_2$ болғанда:
$\theta_{\mathrm{opt}} = \frac{\theta_1 + \theta_2}{2};$
$S = \theta_0 t \pm \frac{at^2}{2};$
$S = \frac{\vartheta^2 - \vartheta_0^2}{\pm 2a}; a = \frac{\vartheta - \vartheta_0}{t};$
$a = \frac{\vartheta^2 - \vartheta_0^2}{2S}; t = \frac{\vartheta - \vartheta_0}{+a};$
$\vartheta = \vartheta_0 \pm at$
$x = x_0 + \vartheta_0 t \pm \frac{at^2}{2}$
$g = 9.8 \mathrm{M/_{C^2}}; H = v_0 t \pm \frac{g t^2}{2};$
$H = \frac{\vartheta^2 - \vartheta_0^2}{\pm 2g}; \vartheta = \vartheta_0 \pm gt$
$t = \frac{\vartheta - \vartheta_0}{\pm g};$
$T = \frac{t}{N}$ [c]
$T = \frac{t}{N} [c]$ $\vartheta = \frac{2\pi R}{T} [M/c] \vartheta = \omega R;$
$\omega = \frac{2\pi}{T}; \nu = \frac{1}{T} [\Gamma_{\text{II}}]$
$\omega = 2\pi v; a_{ii} = \frac{\theta^2}{R}; a_{ii} = \omega^2 R;$
Горизонтқа бұрыш жасай лақ-н:
Ұшу алыстығы:
$l = \frac{\vartheta_0^2 \sin 2\alpha}{a}$
Максимал биіктігі:
$H_{max} = \frac{\vartheta_0^2 \sin^2 \alpha}{1 + \alpha}$

$$H_{max} = \frac{\vartheta_0^2 \sin^2 \alpha}{2g}$$

Ұшу уақыты: $t = \frac{2\vartheta_0 sin\alpha}{g}$;

Горизонтал лақ-н дене қозғ-сы:

Құлау биіктігі: $H=rac{gt^2}{2}$

Ұшу алыстығы: $l = \vartheta_0 t$

Құлау уақыты: $t = \sqrt{\frac{2H}{a}}$

Динамика

Ньютон зандары:

$$\begin{split} &1. \sum_{r} \vec{F} = 0; \quad 2. \sum_{r} \vec{F} = ma; \\ &3. \overrightarrow{F_1} = -\overrightarrow{F_2} \\ &\overrightarrow{F_a} = mg; \\ &\vec{F} = G \frac{Mm}{R^2}; \quad \vec{F} = G \frac{Mm}{(R+h)^2} \\ &G = 6,67 \cdot 10^{-11} \quad \frac{\text{H} \cdot \text{M}^2}{\text{K}\Gamma^2} \\ &g = G \frac{M}{R^2}; \quad g = G \frac{M}{(R+h)^2} \\ &\overrightarrow{F_{\text{Y}\Bar{\text{\'{i}}}}} = \mu N; \quad \overrightarrow{F_{\text{Y}\Bar{\text{\'{i}}}}} = \mu mg; \\ &\overrightarrow{F_{\text{Y}\Bar{\text{\'{i}}}}} = \mu mg cos \alpha; \\ &\overrightarrow{F_{\text{cep}}} = -kx \\ &\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \dots + \frac{1}{k_n} - \text{тізбектей} \end{split}$$

 $k = k_1 + k_2 + \dots + k_n$ - пар-ль Архимед күші: $\overrightarrow{F_A} = \rho_c g V_{6.6}$

Күш моменті: M = Fl [H·м]

$$\begin{split} P &= mv \quad P = Ft \; [\mathbf{H} \cdot c] \\ Ft &= m\vartheta - m\vartheta_0 \\ \sum \overrightarrow{P_6} &= \sum \overrightarrow{P_c} \; ; \quad \sum \overrightarrow{P} = const \end{split}$$

Жұмыс. Энергия

$$A = \vec{F} \cdot \vec{S}; \quad A = \vec{F} \cdot \vec{S} \cos \alpha$$

$$A = mgh; \quad E_{\kappa} = \frac{mv^{2}}{2};$$

$$E_{\Pi} = mgh; \quad E_{\Pi} = \frac{kx^{2}}{2}$$

$$\Delta E_{\kappa} = E_{\kappa_{2}} - E_{\kappa_{1}};$$

$$N = \frac{A}{t}; \quad N = Fv;$$

$$\eta = \frac{A_{\Pi}}{A_{T}} \cdot 100\%$$

 $T = \frac{t}{N}$ [c]; $v = \frac{1}{T}$;

$$\omega = \frac{m}{T}; \omega = 2\pi v;$$

$$T = 2\pi \sqrt{\frac{l}{g}}; \quad v = \frac{1}{2\pi \sqrt{\frac{l}{g}}} [\Gamma \mathbf{u}]$$

$$\omega = \sqrt{\frac{g}{l}}; \quad [\text{pad/c}], \quad [\text{c}^{-1}]$$

$$T = 2\pi \sqrt{\frac{m}{k}}; \quad v = \frac{1}{2\pi \sqrt{\frac{m}{k}}} [\Gamma \mathbf{u}]$$

$$\omega = \sqrt{\frac{k}{m}}, \quad [\text{pad/c}], \quad [\text{c}^{-1}]$$

$$x = x_m \sin(\omega t + \varphi_0)$$

$$x = x_m \cos\omega t$$

$$\vartheta_m = x_m \omega; \quad a_m = x_m \omega^2$$

Механикалық толқындар

$$\lambda = \vartheta T; \quad \lambda = \frac{\vartheta}{\nu}$$

$$\vartheta = \frac{\lambda}{T}; \quad \nu = \frac{1}{T}; \quad \nu = \frac{\vartheta}{\lambda}$$

Гидростатика

$$egin{aligned} P &= rac{F}{S}\,; & P &=
ho gh \ Sartheta &= const; & S_1artheta_1 &= S_2artheta_2 \ rac{F_1}{S_1} &= rac{F_2}{S_2}; & F_1h_1 &= F_2h_2 \end{aligned}$$
 Қысым күші: $F = p \cdot S$

Изопроцесстер

T=const: PV = const - Бойль-Мариотт заңы;

 $P_1V_1 = P_2V_2$

P=const:

 $\frac{V}{T} = const$ - Гей-Люссак заңы; $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

 $\frac{P}{T} = const$ - Шарль заңы;

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

Молекулалық физика

$$P = mv \quad P = Ft \ [H \cdot c]$$
 $Ft = m\vartheta - m\vartheta_0$
 $\sum \overrightarrow{P_c} = \sum \overrightarrow{P_c} \cdot \sum \overrightarrow{P} = const$

Импульс

Жұмыс. Энергия

$$= \vec{F} \cdot \vec{S}; \quad A = \vec{F} \cdot \vec{S} \cos \alpha$$
 $= mgh; \quad E_{\kappa} = \frac{mv^2}{2};$
 $I_{\pi} = mgh; \quad E_{\pi} = \frac{kx^2}{2}$
 $I_{\pi} = mgh; \quad E_{\pi} = \frac{k}{2}$
 $I_{\pi} = \frac{k}{2}$
 $I_{\pi} = \frac{A}{2}$
 $I_{\pi} = \frac{A}{2}$

Механикалық тербелістер

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

$$T = 2\pi\sqrt{\frac{l}{g}}; \quad \nu = \frac{1}{2\pi\sqrt{\frac{l}{g}}} \ [\Gamma \mathbf{u}]$$

$$\omega = \sqrt{\frac{g}{l}}; \quad [\text{pam/c}], \quad [\mathbf{c}^{-1}]$$

$$T = 2\pi\sqrt{\frac{m}{k}}; \quad \nu = \frac{1}{2\pi\sqrt{\frac{m}{k}}} \quad [\Gamma \mathbf{u}]$$

$$\omega = \sqrt{\frac{k}{m}}, \quad [\text{pam/c}], \quad [\mathbf{c}^{-1}]$$

$$x = x_m \sin(\omega t + \varphi_0)$$

$$x = x_m \cos(\omega t + \varphi_0)$$

$A = \frac{m}{M} R \Delta T; \quad A = \nu R \Delta T$

 $\Delta U = Q + A; \ \Delta U = Q - A'$ Адиабаталық пр-с: Q = 0. $A = Q_1 - Q_2;$

 $\eta = \frac{Q_1 - Q_2}{Q_1} \cdot 100\%;$ $\eta = \frac{A}{Q_1} \cdot 100\%;$

 $\eta = \frac{T_1 - T_2}{T_1} \cdot 100\%$

 $Q = cm(t_2 - t_1)$ $Q = \lambda m; \quad Q = rm;$ $Q = Lm; \quad Q = qm'$

 $\varphi = \frac{P_{\Pi}}{P_{K}} 100\%; \ \varphi = \frac{\rho_{\Pi}}{\rho_{K}} \cdot 100\%$

$v = \frac{m}{M}; \quad v = \frac{N}{N_A}$

 $N_A = 6 \cdot 10^{23} \text{ моль}^{-1}$ $m_0 = \frac{m}{N}; \quad m_0 = \frac{M}{N}$

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

 $n = \frac{N}{V} [M^{-3}] \rho = \frac{m}{V} [K\Gamma/M^3]$

Қалыпты жағдайда:

 $P=10^5$ Πa; t=0 °C;

1 мольдің көлемі: V=22,4л.

 $P = \frac{1}{3}m_0n\theta^2; \quad P = \frac{1}{3}\rho\theta^2.$

 $T = t^{\circ} + 273$

 $E = \frac{3}{2}kT;$ $P = \frac{2}{3}nE_{\kappa}; \quad P = nkT;$

 $k = 1.38 \cdot 10^{-23} \frac{\mu}{\kappa}$

 $\bar{\vartheta} = \sqrt{\frac{3RT}{M}}; \quad \bar{\vartheta} = \sqrt{\frac{3kT}{m_0}}$

 $R = 8.31 \frac{Дж}{K \cdot моль}$

 $PV = \frac{m}{M}RT$; $PV = \nu RT$;

Термодинамика

 $U = \frac{i m}{2 M} RT; \quad U = \frac{3 m}{2 M} RT;$ $U = \frac{5 m}{2 M} RT; \quad U = \frac{6 m}{2 M} RT;$

 $\Delta U = \frac{3}{2} \frac{m}{M} R \Delta T; \ \Delta U = \frac{5}{2} \frac{m}{M} R \Delta T;$

 $\frac{PV}{T} = const;$

Электр өрісі

$$e = 1.6 \cdot 10^{-19} \text{ Km}$$

 $N = \frac{q}{e}; \quad F = \frac{k|q_1||q_2|}{\varepsilon r^2} \text{ H}]$

$$k = 9 \cdot 10^9 \, \frac{\text{M}^2 \text{H}}{\text{K} \pi^2}$$

$$\varepsilon_0 = 8.85 \cdot 10^{-12} \frac{\text{K} \pi^2}{\text{M}^2 \text{H}}$$

$$\varepsilon = \frac{F_{\text{K(BaK)}}}{F_{\text{K(OpTa)}}}; \quad \varepsilon = \frac{E_{\text{BaK}}}{E_{\text{OpTa}}}$$

 $\vec{E} = \frac{\vec{F}}{q}; \quad \vec{E} = \frac{kq_0}{\varepsilon r^2} \quad \left[\frac{B}{M}\right], \left[\frac{H}{K\pi}\right]$ $\vec{E} = \frac{\sigma}{2\varepsilon\varepsilon_0}; \quad \sigma = \frac{q}{s} \begin{bmatrix} \kappa_{\pi} \\ \kappa^{2} \end{bmatrix}$

 $A = qE\Delta d$ [Дж]

 $U = \varphi_1 - \varphi_2$; $\Delta \varphi = \varphi_2 - \varphi_1$ A = qU; $U = E\Delta d$ [B]

 $eU = \frac{m\vartheta^2}{2} - \frac{m\vartheta_0^2}{2}$

 $\vec{E} = \overrightarrow{E_1} + \overrightarrow{E_2} + \dots + \overrightarrow{E_n}$ W = qEd; $W = k \frac{qq_0}{sr}$ [Дж]

 $\varphi = \frac{W}{a}$; [B]

 $\varphi = Ed; \ \varphi = k \frac{q_0}{\varepsilon r} \ [B]$

 $\varphi = \varphi_1 + \varphi_2 + \ldots + \varphi_n$

Электр сыйымдылығы

$$\begin{split} C &= \frac{q}{U} \; ; \quad C = 4\pi\varepsilon\varepsilon_0 R \quad [\Phi]; \\ C &= \frac{\varepsilon\varepsilon_0 S}{d} \quad [\Phi]; \quad E = \frac{\delta}{\varepsilon\varepsilon_0} \quad [\frac{\mathrm{B}}{\mathrm{M}}]; \\ W &= \frac{CU^2}{2}; \quad W = \frac{q^2}{2C} \left[\mathrm{J}\mathrm{J}\mathrm{J}\mathrm{K} \right]; \end{split}$$

Тізбектей қосылғанда:

 $\begin{aligned} &\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \dots + \frac{1}{C_n} ;\\ &q = q_1 = q_2; \quad U = U_1 + U_2; \end{aligned}$

Параллель қосылғанда: $C=C_1+C_2;$

 $q = q_1 + q_2; \ U = U_1 = U_2;$ $\omega = \frac{\varepsilon \varepsilon_0 E^2}{2} [Дж/м^3]$

Тұрақты ток

 $I = \frac{q}{4}$; $I = q_0 n \vartheta S$; [A] $I = \frac{U}{R}; \quad E = \frac{U}{l};$ $R = \rho \frac{l}{s}$ [OM]; $R = R_0(1 + \alpha \Delta t);$ A = UIt; [Дж] $A = I^2 Rt \; ; \quad A = \frac{U^2}{R}t \; ;$

 $P = UI; [B_T]$ $P = I^2 R$; $P = \frac{U^2}{R}$; [BT]

Тізбектей қосылғанда: $R_{\mathsf{x}} = R_1 + R_2 + \dots + R_n;$

 $I_{\text{x}} = I_1 = I_2; \quad U_{\text{x}} = U_1 + U_2$ Параллель қосылғанда:

 $\begin{array}{l} \frac{1}{R_{\rm m}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}; \\ I_{\rm m} = I_1 + I_2; \quad U_{\rm m} = U_1 + U_2 \end{array}$

 $\varepsilon = \frac{A_6}{q}$ [B]; $I = \frac{\varepsilon}{R+r}$ [A]

 $U = \varepsilon - Ir$ [B]; $I_{\kappa, T} = \frac{\varepsilon}{r}$

 $\eta = \frac{R}{R+r} \cdot 100\%$

 $m=kq; \qquad m=kIt \ k=rac{\mathit{M}}{\mathit{F}\cdot\mathit{n}}; \qquad \mathit{F=96500}\;\mathit{K}\mathit{п/моль}$ Altyn Bilim