Часть 1

Олимпиада: **Физика, 10 класс (1 часть)**

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Вариант 1

$h_{max} = \frac{v_0^2}{2g}$ $t_2 = \frac{v_0}{g}$ $h_{max} = \frac{v_0^2}{g} - \frac{g}{2}\cdot\frac{v_0^2}{g^2} = \frac{v_0^2}{2g}$ Горловец

$h_{max} - H = \frac{gt_2^2}{2}$ $\frac{v_0^2}{2g} - H = \frac{gt_2^2}{2}$ $\frac{v_0^2}{g} - 2H = gt_2^2$

$\frac{v_0^2}{g^2} - \frac{2H}{g} = t_2^2 =$

ist

$t = \frac{v_0 + \sqrt{v_0^2 + 2gH}}{g}$

$\vec{v} = \vec{v_0} - \vec{g}t$

$= \frac{1}{g^2}\left(v_0^2 - 2gH\right) = t_2^2$

$\frac{v_0}{2g} = t_2$

$\frac{\sqrt{v_0^2 - 2gH}}{g} = \frac{v_0 + \sqrt{v_0^2 + 2gH}}{g}$

$\frac{v_0^2}{2g} - H = \frac{gt_2^2}{2}$

$\sqrt{v_0^2 - 2gH} = v_0 + \sqrt{v_0^2 + 2gH}$

$t_2^2 = \frac{1}{g^2}(v_0^2 - 2gH)$

$v_0^2 - 2gH + v_0^2 + 2gH - 2\sqrt{(v_0^2 - 2gH)(v_0^2 + 2gH)} = 0$

$\frac{v_0^2}{4g^2} = \frac{1}{g^2}(v_0^2 - 2gH)$

$v_0^2 = 2\sqrt{v_0^4 - 4g^2H^2}$

$v_0^2 = 4v_0^2 - 8gH$

$v_0^4 = 4(v_0^4 - 4g^2H^2)$ $-(\sqrt{v_0^2 + 2gH})$

$8gH = 3v_0^2$

$v_0^4 = 4v_0^4 - 16g^2H^2$

$v_0 = \sqrt{\frac{8}{3}gH}$

$16g^2H^2 = 3v_0^4$

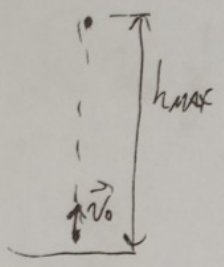
$\frac{16}{3}g^2H^2 = v_0^4$

$H = v_0 \cdot \frac{v_0}{2g} - \frac{g}{2}\cdot\frac{v_0^2}{4g^2} =$

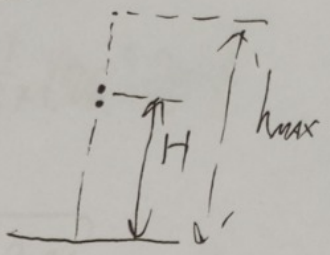
$v_0^2 = \frac{4}{\sqrt{3}}gH$

$= \frac{v_0^2}{2g} - \frac{v_0^2}{8g} = \frac{4v_0^2 - v_0^2}{8g} = \frac{3}{8}\frac{v_0^2}{g}$

черновик



1) t_2 - ?
2) v_0 - ?
3) S_1 - ?

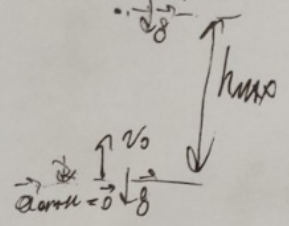


$S_1 = h_{max} + h_{max} - H =$

$= 2h_{max} - H =$

$= 2 \cdot \frac{v_0^2}{2g} - H =$

В С.О. первого мяча:



$h_{max} = \frac{v_0^2}{2g}$

$t_2 = \frac{h_{max}}{v_0} = \frac{v_0}{2g}$

~~$H = v_0 t - \frac{gt^2}{2}$~~

$t_2 = \sqrt{\frac{\frac{8}{3}8H}{4g^2}} = \sqrt{\frac{2}{3} \cdot \frac{H}{g}}$

~~$\frac{gt^2}{2} - v_0 t + H = 0$~~

~~$D = v_0^2 + 2gH$~~

~~$t = \frac{v_0 \pm \sqrt{v_0^2 + 2gH}}{g}$~~ $= \frac{v_0^2}{8} - H =$

$= \frac{\frac{8}{3}8H}{g} - H =$

$= \frac{5}{3}H$

~~$v_0^2 = v^2 + 2gH$~~

~~$v^2 = g$~~

$H = \frac{v^2 - v_0^2}{2g}$

$v^2 = v_0^2 - 2gH$

$v = v_0 - gt_2$

~~$H = \frac{v_0^2 - 2gH}{2g}$~~

$v^2 = v_0^2 + g^2 t_2^2 - 2v_0 g t_2$

~~$t_2 = h_{max} - H = \frac{v_0^2}{2g}$~~

$\frac{8}{3} - \frac{3}{3} = \frac{5}{3}$

$v_0^2 + g^2 t_2^2 - 2v_0 g t_2 = v_0^2 - 2gH$

$\frac{4v_0^2 - v_0^2}{4g} = 2H$

$g^2 t_2^2 - 2v_0 g t_2 = -2gH$

$\frac{3}{4} \frac{v_0^2}{g} = 2H$

$g^2 t_2^2 - 2v_0 g t_2 + 2gH = 0$

$h_{max} - H = \frac{gt_2^2}{2}$

$v_0^2 = 2H \cdot g \cdot \frac{4}{3}$

$\frac{v_0^2}{2g} - H = \frac{gt_2^2}{2}$

$v_0^2 = gH\frac{8}{3}$

$v_0 = \sqrt{\frac{8}{3}gH}$

$\begin{cases} \frac{v_0^2}{g} - 2H = gt_2^2 \\ t_2 = \frac{v_0}{2g} \end{cases}$

$t_2 = \frac{\sqrt{\frac{8}{3}gH}}{2g}$

~~$2gh_{max} = 2gH + v^2$~~

~~$2g\left(\frac{v_0^2}{2g} - H\right) = v^2$~~

~~$\frac{v_0^2}{2g} - H = \frac{v^2}{2g}$~~

$\frac{v_0^2}{g} - \frac{v_0^2}{4g} = 2H$

$\frac{v_0^2}{g} - 2H = g \cdot \frac{v_0^2}{4g^2}$

Горизонтальная

$$H = v_0 \cdot \frac{1}{g}\sqrt{v_0^2 - 2gH} - \frac{g}{2}\cdot\frac{1}{g^2}(v_0^2 - 2gH) =$$

$$= \frac{2v_0\sqrt{v_0^2-2gH}}{2g} - \frac{v_0^2-2gH}{2g} = H$$

$$2v_0\sqrt{v_0^2-2gH} - v_0^2 + 2gH = 2gH$$

$$2v_0\sqrt{v_0^2-2gH} = v_0^2$$

$$4v_0^2(v_0^2-2gH) = v_0^4$$

$$4v_0^2 - 8gH = v_0^2$$

$$t_2 = \frac{\sqrt{v_0^2-2gH}}{g} \qquad t_2 = \frac{\sqrt{\frac{2}{3}gH - 2gH}}{g} = \frac{\sqrt{-\frac{2}{3}gH}}{g} = \sqrt{\frac{\frac{2}{3}gH}{g^2}} = t_1 = \sqrt{\frac{2}{3}\frac{H}{g}}$$

$$H = v_0 t - \frac{g}{2}t^2$$

$$\frac{g}{2}t^2 - v_0 t - H = 0$$

$$gt^2 - 2v_0 t - 2H = 0$$

$$D = 4v_0^2 + 8gH = 4(v_0^2 + 2gH)$$

$$t = \frac{2v_0 + 2\sqrt{v_0^2+2gH}}{2g}$$

$$\frac{\sqrt{v_0^2-2gH}}{g} = \frac{v_0 + \sqrt{v_0^2+2gH}}{g}$$

$$v_0^2 - 2gH = v_0^2 + 2v_0\sqrt{v_0^2+2gH} + v_0^2 + 2gH$$

$$v_0^2 - 2gH = 2v_0^2 + 2gH + 2v_0\sqrt{v_0^2+2gH}$$

$$-4gH = 2v_0\sqrt{v_0^2+2gH}$$

$$16g^2H^2 = v_0^2(v_0^2+2gH)$$

$$16g^2H^2 = v_0^4 + 2gHv_0^2$$

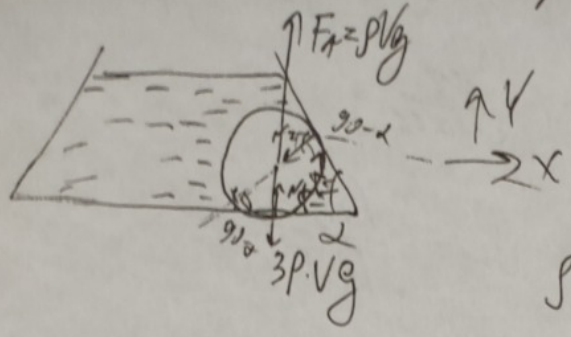
$$v_0^4 + 2gHv_0^2 - 16g^2H^2 = 0$$

$$v_0^2 = \frac{-2gH + \sqrt{4g^2H^2 + 64g^2H^2}}{2} = \frac{-2gH + 2\sqrt{17}gH}{2}$$

$$v_0^2 = gH(\sqrt{17}-1)$$

$$v_0 = \sqrt{gH(\sqrt{17}-1)}$$

1)



$$\rho Vg + N_1 = 3\rho Vg + N_2 \cos\alpha$$

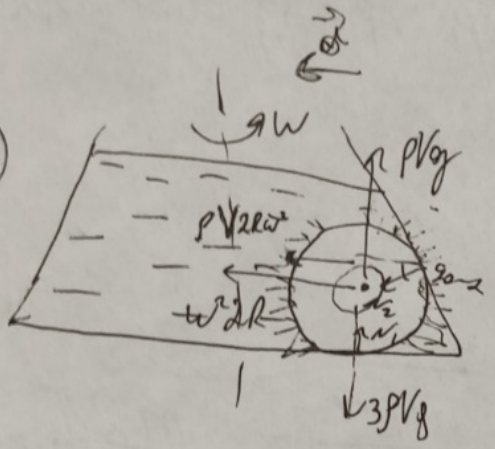
$$N_2 \sin\alpha = 0 \Rightarrow N_2 = 0$$

$$\rho Vg + N_1 = 3\rho Vg$$

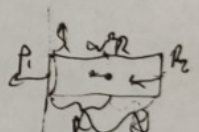
$$N_1 = 2\rho Vg = 2\rho \cdot \frac{4}{3}\pi R^3 g =$$

$$= \frac{8}{3}\rho\pi R^3 g$$

2)



$\rho V \cdot \omega^2 R = \Delta p$



$\rho \cdot a\omega^2 R = \Delta p$

$$OY: \rho Vg + N_1 = 3\rho Vg + N_2 \cos\alpha$$

$$OX: N_2 \sin\alpha + \rho V \cdot \omega^2 \cdot 2R = 3\rho V\omega^2 \cdot 2R$$

$$N_2 \sin\alpha = 2\rho V\omega^2 2R = 4\rho V\omega^2 R$$

$$N_2 \cos\alpha = N_1 - 2\rho Vg$$

$$tg\alpha = \frac{4\rho V\omega^2 R}{N_1 - 2\rho Vg}$$

$$N_1 tg\alpha - 2\rho Vg tg\alpha = 4\rho V\omega^2 R$$

$$N_1 tg\alpha = 2\rho V(2\omega R + g tg\alpha)$$

$$N_1 = \frac{2\rho V}{tg\alpha}(2\omega^2 R + g tg\alpha)$$

$$N_1 = \frac{2\rho\frac{4}{3}\pi R^3}{tg\alpha}(2\omega^2 R + g tg\alpha) = \frac{8}{3}\frac{\rho\pi R^3}{tg\alpha}(2\omega^2 R + g tg\alpha) =$$

$$= \frac{8}{3}\frac{\rho\pi R^3}{2}(2\omega^2 R + 2g) = \frac{8}{3}\rho\pi R^3(\omega^2 R + g)$$

$m = 3\,г$. $T = 354\,К = const$ $V_1 = 3{,}5 V_2$ $p_2 = 1{,}8 p_1$

$p_н = 0{,}5 \cdot 10^5\,Па$ $\mu = 18\,г/моль = 18 \cdot 10^{-3}\,\frac{кг}{моль}$

1) p_1 - ?
2) V_2 - ?

$$p_н = \frac{\rho_н}{\mu} RT \qquad \rho_н = \frac{p_н \mu}{RT}$$

$$p_1 V_1 = p_2 V_2$$

$$p_1 \cdot 3{,}5 V_2 = 1{,}8 p_1 V_2$$

$$p_2 = p_н \qquad p_н = 1{,}8 p_1 \qquad p_1 = \frac{p_н}{1{,}8} \approx 0{,}28 \cdot 10^5\,Па$$

$$p_1 V_1 = \frac{m}{\mu} RT$$

$$V_1 = \frac{mRT}{\mu p_1}$$

$$V_2 = \frac{V_1}{3{,}5} = \frac{mRT}{\mu p_1 \cdot 3{,}5} = \frac{mRT}{\mu \cdot \frac{p_н}{1{,}8} \cdot 3{,}5} =$$

$$= \frac{1{,}8}{3{,}5} \cdot \frac{mRT}{\mu p_н} = \frac{3 \cdot 10^{-3} \cdot 8{,}31 \cdot 354}{18 \cdot 10^{-3} \cdot 0{,}5 \cdot 10^5} \cdot \frac{1{,}8}{3{,}5} =$$

$$= \frac{8825{,}22}{9 \cdot 10^5} \cdot \frac{1{,}8}{3{,}5} \approx 504 \cdot 10^{-5}\,м^3 =$$

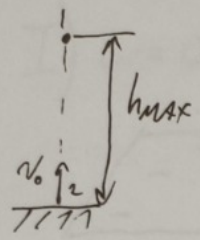
$$= 5{,}04 \cdot 10^{-3}\,м^3 \approx 5\,л$$

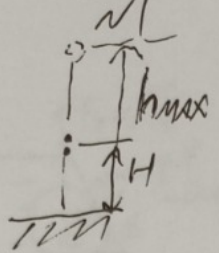
Листовик

физика, 10 класс
часть 1

Дано:
H

t-?
v_0-?
S-?





1) $h_{max} = \frac{v_0^2}{2g}$

$h_{max} - H = \frac{gt^2}{2} = \frac{v_0^2}{2g} - H$

В л.с.о. первого тела:

$\vec{a}_{отн_2} = \vec{0} \Rightarrow t = \frac{h_{max}}{v_0} = \frac{v_0}{2g}$

$$\begin{cases} t = \frac{v_0}{2g} \\ \frac{v_0^2}{2g} - H = \frac{gt^2}{2} \end{cases}$$

$\frac{v_0^2}{2g} = \frac{gt^2}{2} + H$

$\frac{v_0^2}{g} = gt^2 + 2H$

$v_0^2 = g^2t^2 + 2gH$

$t^2 = \frac{v_0^2}{4g^2} = \frac{g^2t^2 + 2gH}{4g^2} = \frac{t^2}{4} + \frac{1}{2} \cdot \frac{H}{g}$

$\frac{3}{4}t^2 = \frac{1}{2} \cdot \frac{H}{g}$

$t^2 = \frac{2}{3} \cdot \frac{H}{g}$

$t = \sqrt{\frac{2}{3} \cdot \frac{H}{g}}$

2) $\frac{v_0}{2g} = t = \sqrt{\frac{2}{3} \cdot \frac{H}{g}}$ $v_0 = 2g\sqrt{\frac{2}{3} \cdot \frac{H}{g}} = \sqrt{4g^2 \cdot \frac{2}{3} \cdot \frac{H}{g}} = \sqrt{\frac{8}{3}gH}$

3) $S = h_{max} + h_{max} - H = 2h_{max} - H = 2 \cdot \frac{v_0^2}{2g} - H = \frac{v_0^2}{g} - H = \frac{8}{3}H - H =$

$= \frac{5}{3}H$

Ответ: $t = \sqrt{\frac{2}{3} \cdot \frac{H}{g}}$; $v_0 = \sqrt{\frac{8}{3}gH}$; $S = \frac{5}{3} \cdot H$

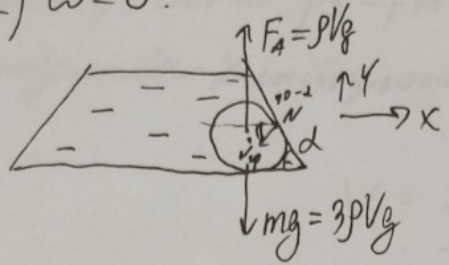
Учебник
№2

физика, 10 класс
часть 1

Дано:
$\rho_б = \rho$
$\rho_ш = 3\rho$
ω
$R = r_{шара}$
$r_{тележки} = 2R$
$tg\alpha = 2$

1) N_1 - ?
2) N_2 - ?

I) $\omega = 0$:



OX: $N\sin\alpha = 0$

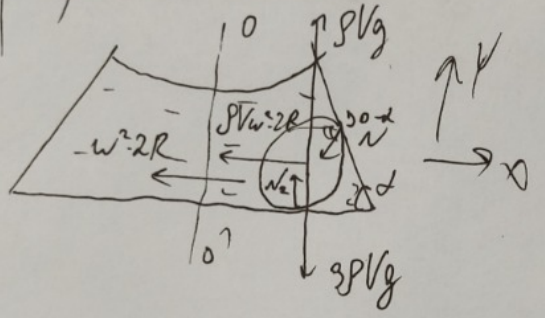
OY: $\rho V g + N_1 = 3\rho V g + N_2\cos\alpha$

$N\sin\alpha = 0 \Rightarrow N = 0$

$\rho V g + N_1 = 3\rho V g$

$N_1 = 2\rho V g = 2\rho \cdot \frac{4}{3}\pi R^3 g = \frac{8}{3}\rho\pi R^3 g$

II) $\omega \neq 0$:



OX: $N\sin\alpha + \rho V \cdot \omega^2 \cdot 2R = 3\rho V\omega^2 2R$

OY: $\rho V g + N_2 = 3\rho V g + N\cos\alpha$

$\begin{cases} N\cos\alpha = N_2 - 2\rho V g \\ N\sin\alpha = 4\rho V\omega^2 R \end{cases}$

$tg\alpha = \frac{4\rho V\omega^2 R}{N_2 - 2\rho V g}$

$N_2 = \frac{2\rho V}{tg\alpha}(2\omega^2 R + g\,tg\alpha) = \frac{8}{3}\cdot\frac{\rho\pi R^3}{2}(2\omega^2 R + 2g) =$

$= \frac{8}{3}\rho\pi R^3(\omega^2 R + g)$

Ответ: $N_1 = \frac{8}{3}\rho\pi R^3 g$; $N_2 = \frac{8}{3}\rho\pi R^3(\omega^2 R + g)$

№3

Дано:
$m = 3\cdot 10^{-2}$ кг
$T = 354$ К
$T = const$
$V_1 = 3{,}5 V_2$
$p_2 = 1{,}8 p_1$
$p_1 = 0{,}5\cdot 10^5$ Па
$\mu = 18\cdot 10^{-3}$ кг/моль
p_1 - ?
V_2 - ?

Если мы предположим, что в процессе изотермического сжатия пар не становится насыщенным, то должно выполняться:

$$p_1 V_1 = p_2 V_2 \qquad (2)$$

Но по условию это не так: $3{,}5 p_1 V_2 \neq 1{,}8 p_1 V_2$

Отсюда следует, что в процессе сжатия пар стал насыщенным и некоторая его масса превратилась в воду

Листовик №3 (продолжение) физика, 10 класс часть I

1) Т.к. сказано, что $p_2 = p_н$ $p_1 = \frac{p_2}{1,8} = \frac{p_н}{1,8} \approx 0,278 \cdot 10^5$ Па

2) из ур. Менделеева-Клапейрона: $p_1 V_1 = \frac{m}{\mu} RT$

$$V_1 = \frac{mRT}{\mu p_1} = 1,8 \frac{mRT}{\mu p_н}$$

$$V_2 = \frac{V_1}{3,5} = \frac{1,8}{3,5} \cdot \frac{mRT}{\mu \cdot p_н} \approx 5,04 \cdot 10^{-3} м^3 \approx 5 л$$

Ответ: $p_1 \approx 0,278 \cdot 10^5$ Па; $V_2 \approx 5 л$

(3)

Часть 2

Олимпиада: **Физика, 10 класс (2 часть)**

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Вариант 1

Чистовик

физика, 10 класс
тест 2

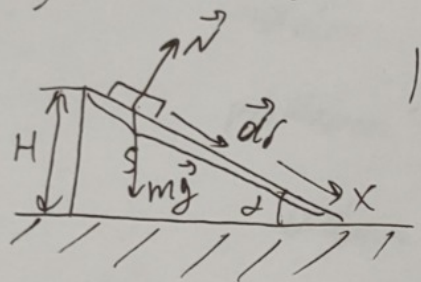
№4

Дано:
$\cos\alpha = \frac{4}{5}$
$m_б = m$
$m_к = 3m$
H; $F = 2mg$

1) t_1 - ?
2) $a_к$ - ?
3) t_2 - ?

$\sin\alpha = \sqrt{1-\cos^2\alpha} = \frac{3}{5}$

I) $a_к = 0$; $v_к = 0$:



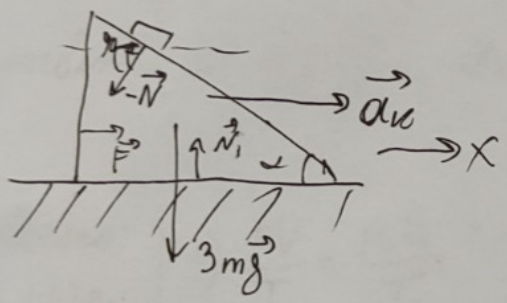
1) OX: $ma_б = mg\sin\alpha$

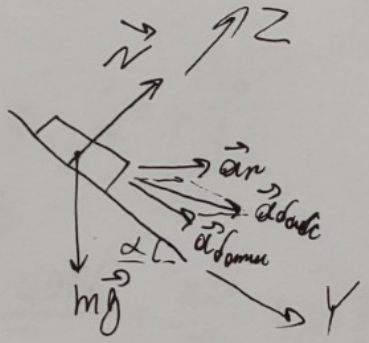
$a_б = g\sin\alpha$

$S = \frac{a_б t_1^2}{2} \Rightarrow t_1 = \sqrt{\frac{2S}{a_б}}$ *

$\sin\alpha = \frac{H}{S}$ $S = \frac{H}{\sin\alpha}$ $t_1 = \sqrt{\frac{2H}{g\sin^2\alpha}} = \frac{1}{\sin\alpha}\sqrt{\frac{2H}{g}} = \frac{5}{3}\sqrt{\frac{2H}{g}}$

II) $a_к \neq 0$:





2) OX: $F - N\sin\alpha = 3ma_к$ $3ma_к = 2mg - N\sin\alpha$

OZ (для брусса): $ma_к\sin\alpha = N - mg\cos\alpha$

$N = m(a_к\sin\alpha + g\cos\alpha)$

$3ma_к = 2mg - m\sin\alpha(a_к\sin\alpha + g\cos\alpha)$

$3a_к = 2g - a_к\sin^2\alpha - g\sin\alpha\cos\alpha$

$a_к(3+\sin^2\alpha) = g(2-\sin\alpha\cos\alpha)$ (1)

$a_к = g\frac{2-\cos\alpha\sin\alpha}{3+\sin^2\alpha} = g\frac{2-\frac{4}{5}\cdot\frac{3}{5}}{3+\frac{9}{25}} = \frac{19}{42}g$

№4 (продолжение)

3) ОУ (для бруска): $mg\sin\alpha = ma_{отн} + ma_к\cos\alpha$

$ma_{отн} = mg\sin\alpha - ma_к\cos\alpha$

$ma_{отн} = mg\sin\alpha - m\frac{19}{42}g\cos\alpha$

$a_{отн} = \frac{5}{21}g$

$S = \frac{a_{отн}t_2^2}{2} \Rightarrow t_2 = \sqrt{\frac{2S}{a_{отн}}} = \sqrt{\frac{2H}{\frac{5}{21}\cdot\sin\alpha g}} = \sqrt{\frac{2H\cdot\frac{7}{21}\cdot 8}{8\cdot 3g}} =$

$= \sqrt{\frac{14H}{g}}$

Ответ: $t_1 = \frac{5}{3}\sqrt{\frac{2H}{g}}$; $a_к = \frac{19}{42}g$; $t_2 = \sqrt{\frac{14H}{g}}$

№5

Дано:
$p = 1{,}02p_0$
$V = 0{,}99V_0$
$\frac{\Delta p}{p} << 1$
$\frac{\Delta V}{V} << 1$
$\frac{\Delta T}{T} << 1$

1) $\Delta T - ?$
2) $\frac{Q}{A} - ?$

1) $\frac{pV}{T} = \frac{p_0V_0}{T_0}$ $\quad \frac{1{,}02p_0\cdot 0{,}99V_0}{T} = \frac{p_0V_0}{T_0} \Rightarrow T = 1{,}0098T_0$

$\Delta T = 0{,}98\%$ – температура увеличилась на 0,98%

2) $Q = A + \Delta U$ т.к. $\frac{\Delta p}{p} << 1$, то изменением давления можно пренебречь.

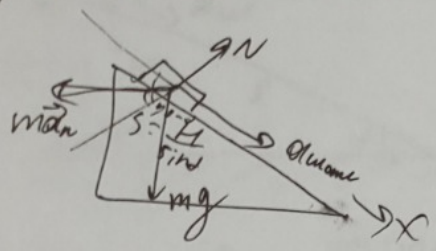
Тогда $A = p\Delta V$ $\quad \Delta U = \frac{3}{2}\nu R\Delta T = \frac{3}{2}p\Delta V$ $\quad Q = \frac{5}{2}p\Delta V$

$\frac{Q}{A} = \frac{\frac{5}{2}p\Delta V}{p\Delta V} = \frac{5}{2}$

Ответ: T увеличится на 0,98%; $\frac{Q}{A} = \frac{5}{2}$

Термодин

3) В. Х.С.О клина:



$\frac{50-n}{25} = \frac{38}{25}$

ox: $ma_{клина} = mg\sin\alpha - ma\cos\alpha =$

$= mg\sin\alpha - m\cdot\frac{19}{42}g\cos\alpha\,\frac{25+9}{26} = \frac{34}{25}$

$a_{клина} = \frac{3}{5}g - \frac{38}{105}g = \frac{63-38}{105}g =$

$= \frac{25}{105}g = \frac{5}{21}g$

$\frac{38}{25}\cdot\frac{25}{84} = \frac{19}{42}$

$\frac{19}{42}\cdot\frac{4}{5} = \frac{76}{210} = \frac{38}{105}$

$\frac{63}{38}$

$\frac{21}{105}$

$t_2 = \sqrt{\frac{2S}{a}} = \sqrt{\frac{2H}{\frac{5}{21}g\sin\alpha}} =$

$= \sqrt{\frac{2\cdot 7\cdot 2\cdot 5}{5g\cdot B_1}} = \sqrt{14\cdot\frac{H}{g}} = \sqrt{\frac{4H}{3}}$

3

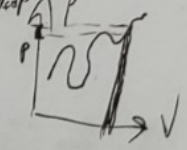
$\frac{5}{2}pdV : pdV = \frac{5}{2}$

$\frac{3}{2}pdV$ ~~$= \frac{3}{2}p\cdot\frac{5}{3}pdV = \frac{5}{2}$~~

~~$p = p_0$~~

~~$N5$~~

~~$dA = pdV$~~



~~$p = 1,02p_0$~~ ~~$V = 0,99V_0$~~ Q_1 $p = 1,02p_0$ $V = 0,99V_0$

~~$\frac{p_0}{V_0} = \frac{1}{T_0}$~~

если $V = const$

1) $\frac{PV}{T} = \frac{P_0V_0}{T_0}$

$\Delta p \ll p$

$p+\Delta p \approx p$

$\frac{1,02p_0\cdot 0,99V_0}{T} = \frac{p_0V_0}{T_0}$

$\frac{\Delta p}{p} : \frac{\Delta V}{V} \frac{\Delta T}{T} \ll 1$

$T = 1,0098T_0$

T ↑ на 0,98%

$\delta Q = dA + dU$ ~~$dA = pdV$~~ $dA = pdV$

~~$dA = pdV$~~ $dU = \frac{3}{2}\nu R dT = \frac{3}{2}(pV - p_0V_0) = \frac{3}{2}pdV$

$\alpha dA = dA + dU$

$dA(\alpha - 1) = dU$

$\alpha - 1 = \frac{dU}{dA}$

$\alpha = \frac{dU}{dA} + 1$

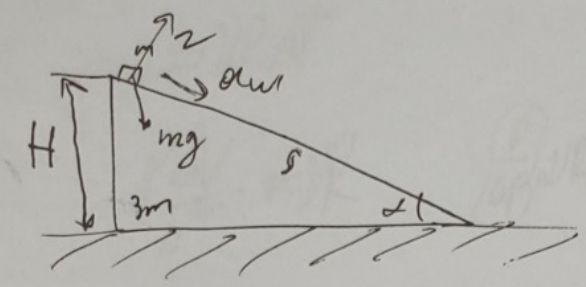
$\frac{\delta Q}{dA} = \alpha$

$\delta Q = \alpha\cdot dA$

$\delta Q = \frac{5}{2}pdV$

Терновик

Всі шарики!



$\cos\alpha = \frac{4}{5}$

$\sin\alpha = \sqrt{1-\frac{16}{25}} = \sqrt{\frac{25-16}{25}} = \sqrt{\frac{9}{25}} = \frac{3}{5}$

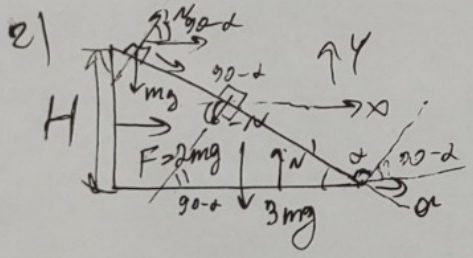
1) $a_ш = \frac{F}{m} = \frac{mg\sin\alpha}{m} = g\sin\alpha$

$\sin\alpha = \frac{H}{S} \Rightarrow S = \frac{H}{\sin\alpha}$ $\quad V_{0ш} = 0 \Rightarrow S = \frac{at^2}{2}$

$\frac{2S}{a} = t^2$ $\quad t_1 = \sqrt{\frac{2S}{a}} =$

$= \sqrt{\frac{2H}{g\sin^2\alpha}} = \frac{1}{\sin\alpha}\sqrt{\frac{2H}{g}} = \frac{5}{3}\sqrt{\frac{2H}{g}}$

2)

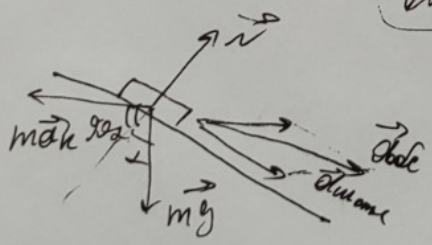


$OX: \quad F - N\sin\alpha = 3ma_к = 2mg - N\sin\alpha$

~~$OY: 3mg + N\cos\alpha = N$~~

$\frac{50}{25} - \frac{12}{25} = \frac{38}{25}$

~~$a_к = mg\cos\alpha$~~ ~~$N = mg\cos\alpha$~~ $= \frac{50}{12}\ \frac{75}{25} + \frac{9}{25} = \frac{84}{25}$



$N = mg\cos\alpha + ma_к\sin\alpha$ $\quad \frac{+75}{84}$

$3ma_к = 2mg - mg\cos\alpha\sin\alpha - ma_к\sin^2\alpha$

$\frac{13}{38}$ $\times\frac{2}{38}$

$ma_к(3+\sin^2\alpha) = 2mg(2-\cos\alpha\sin\alpha)$

$a_к = g\frac{2-\cos\alpha\sin\alpha}{3+\sin^2\alpha} = g\frac{2-\frac{4}{5}\cdot\frac{3}{5}}{3+\frac{9}{25}} =$

$= g\frac{2-\frac{12}{25}}{3+\frac{9}{25}} = g\cdot\frac{38}{25}\cdot\frac{25}{84} = \frac{19}{42}g$

Терновик

$pV \approx \nu R T$

$\frac{pV}{T} \approx \nu R$

$\left(\frac{p}{\Delta p}\right) \Delta \nu R \approx \nu R$

$p V_0 = \nu R T_0$

$pV = \nu R T$

$\Delta p \Delta V = \Delta \nu R \Delta T$

$\frac{\Delta V}{\Delta T} = \frac{\Delta \nu R}{\Delta p}$

$\frac{\Delta p}{p} \cdot \frac{\Delta V}{V} = \frac{\Delta \nu R}{\nu R} \cdot \frac{\Delta T}{T}$

$\frac{\Delta p}{p} \cdot \frac{\Delta V}{V} = \frac{\Delta V}{V} R \cdot \frac{\Delta T}{T}$

$\frac{\Delta T}{T} \to 0$

$\frac{\Delta p}{p} \cdot \frac{\Delta V}{V} \to 0$