Часть 1

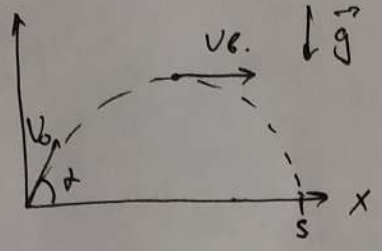
Олимпиада: **Физика, 10 класс (1 часть)**

Шифр: **21206085**

ID профиля: **283077**

Вариант 3

Класс 10. часть 1. Вариант 10-03. Письменник.

① 

$\vec{s} = \vec{v}_0 t + \frac{\vec{a}t^2}{2}$

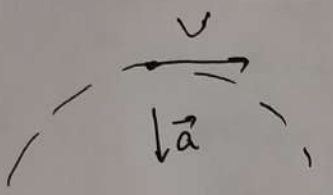
$ox: \; s = v_0 \cos\alpha \, t$

$oy: \; 0 = v_0 \sin\alpha \, t - \frac{gt^2}{2}$

$t = \frac{2v_0 \sin\alpha}{g}$

$s = v_0 \cos\alpha \cdot \frac{2v_0 \sin\alpha}{g} = \frac{v_0^2 \sin 2\alpha}{g}$

$v_0 = \sqrt{\frac{sg}{\sin 2\alpha}} = \sqrt{\frac{17 \cdot 10}{\sin 120^\circ}} \approx 14 \left(\frac{м}{с}\right)$



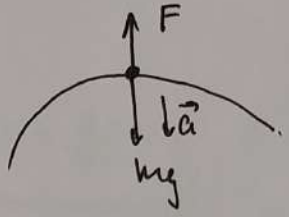
Найдем радиус кривизны траектории камня в верхней точке из полёта камня:

$g = \frac{v_в^2}{R} \qquad v_в = v_0 \cos\alpha$

$R = \frac{v_0^2 \cos^2\alpha}{g}$

$a = \frac{v^2}{R} = g \left(\frac{v}{v_0 \cos\alpha}\right)^2$

$a = g \left(\frac{1 \cdot 2}{4 \cdot 1}\right)^2 = \frac{1}{4} g$



$ma = mg - F$

$F = m(g - a) = \frac{3}{4} mg$

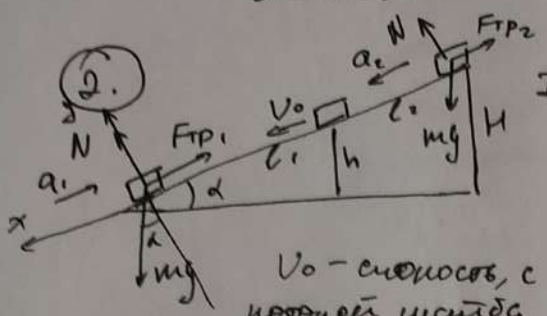
$F = \frac{3}{4} \cdot 1 \cdot 10 = 7{,}5 (Н)$

Ответ: 1) $v_0 = \sqrt{\frac{sg}{\sin 2\alpha}} = 14 \frac{м}{с}$.

2) $F = \frac{3}{4} mg = 7{,}5 Н$.

1 / 3

Числовик



V_0 – скорость, с которой шайба пересекает границу μ_1 и μ_2

$\sum \vec{F} = m\vec{a}$

I) ox: $-ma_1 = -F_{тр1} + mg\sin\alpha$

$ma_1 = F_{тр1} - mg\sin\alpha$

oy: $N = mg\cos\alpha$ $\quad F_{тр1} = \mu_1 N = \mu_1 mg\cos\alpha$

$ma_1 = \mu_1 mg\cos\alpha - mg\sin\alpha$

$a_1 = g(\mu_1\cos\alpha - \sin\alpha)$

($\mu_1\cos\alpha - \sin\alpha > 0 \Rightarrow a_1 > 0 \Rightarrow \vec{a}_1$ против оси ox)

II) ox: $ma_2 = mg\sin\alpha - F_{тр2}$

oy: $N = mg\cos\alpha$ $\quad F_{тр2} = \mu_2 N = \mu_2 mg\cos\alpha$

$ma_2 = mg\sin\alpha - \mu_2 mg\cos\alpha$

$a_2 = g(\sin\alpha - \mu_2\cos\alpha)$ ($\sin\alpha > \mu_2\cos\alpha \Rightarrow a_2 > 0 \Rightarrow \vec{a}_2$ по оси ox)

угасок горизонта – угасок с μ_1

$l_1 = \frac{h}{\sin\alpha}$

$\vec{S} = \vec{v}_0 t + \frac{\vec{a}t^2}{2}$

$\frac{h}{\sin\alpha} = V_0 T - \frac{a_1 T^2}{2}$

$V_0 = a_1 T$

т.к. остановилась

$\frac{h}{\sin\alpha} = \frac{a_1 T^2}{2}$

$T = \sqrt{\frac{2h}{a_1\sin\alpha}}$

$T = \sqrt{\frac{2h}{g(\mu_1\cos\alpha - \sin\alpha)\sin\alpha}}$

$T = \sqrt{\frac{2\cdot 2\cdot 2}{10\cdot(0{,}81\cdot\frac{\sqrt{3}}{2} - \frac{1}{2})}} \approx 2\,(c)$

$l_2 = \frac{H-h}{\sin\alpha}$

$V_0 T = \frac{2h}{\sin\alpha}$

$V_0 t = \frac{2(H-h)}{\sin\alpha}$

одинаково

$\frac{h}{\sin\alpha} = \frac{V_0^2}{2a_1}$ $\quad \frac{V_0^2}{2a_2} = \frac{H-h}{\sin\alpha}$

$a_1 h = a_2(H-h)$

$a_2 H = (a_1 + a_2)h$

$H = h\left(\frac{a_1 + a_2}{a_2}\right)$

$H = h\frac{(\cos\alpha\mu_1 - \sin\alpha + \sin\alpha - \mu_2\cos\alpha)g}{g(\sin\alpha - \mu_2\cos\alpha)}$

$H = h\frac{\cos\alpha(\mu_1 - \mu_2)}{\sin\alpha - \mu_2\cos\alpha}$

$H = 2\frac{\frac{\sqrt{3}}{2}(0{,}81 - 0{,}11)}{\frac{1}{2} - 0{,}11\cdot\frac{\sqrt{3}}{2}} \approx 3\,(м)$

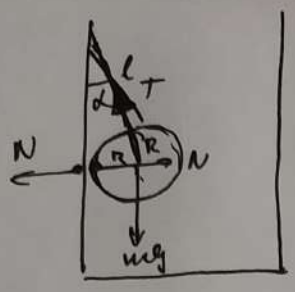
Ответ 1) $T = \sqrt{\frac{2h}{g(\mu_1\cos\alpha - \sin\alpha)\sin\alpha}} = 2$ с.

2) $H = h\frac{\cos\alpha(\mu_1 - \mu_2)}{\sin\alpha - \mu_2\cos\alpha} = 3$ м.

2 / 3

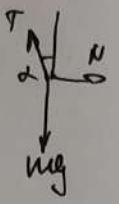
Чистовик

③



$\cos\alpha = \frac{R^2}{(l+R)^2}$

шар действует на стенку сосуда с силой $N \Leftrightarrow$ стенка действует на шар с силой N



$mg = T\cos\alpha$

$N = T\sin\alpha$

$N = \operatorname{tg}\alpha\, mg$

$\operatorname{tg}\alpha = \frac{R^2}{\sqrt{(l+R)^2 - R^2}}$

$$N = \frac{R^2 mg}{\sqrt{(l+R)^2 - R^2}} \approx 2{,}1\,(\text{Н})$$

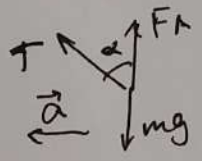
$a = \omega^2 L$

$ma = T\sin\alpha$

$F_A + T\cos\alpha = mg$

$T = \frac{mg - F_A}{\cos\alpha}$

$m\omega^2 L = \frac{mg - F_A}{\cos\alpha}\sin\alpha$



$F_A = \rho_в V_т g = \frac{4}{3}\pi R^3 \rho_в g$

$L = l\sin\alpha$

$m\omega^2 l\sin\alpha = g(m - \frac{4}{3}\pi R^3\rho_в)\operatorname{tg}\alpha$

$m\omega^2 l\cos\alpha = g(m - \frac{4}{3}\pi R^3\rho_в)$

$\rho_в = \frac{1}{1000}\ \frac{кг}{см^3}$

$\cos\alpha = \frac{g(m - \frac{4}{3}\pi R^3\rho_в)}{m\omega^2 l}$

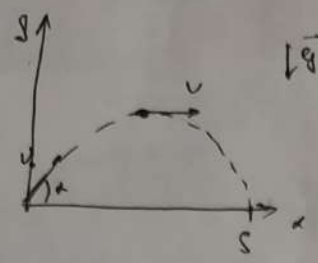
$\alpha = \arccos(\dots) \approx 80°$

Ответ: 1) $N = \frac{R^2}{\sqrt{(l+R)^2 - R^2}} mg \approx 2{,}1$ Н

2) $\alpha = \arccos\left(\frac{g(m - \frac{4}{3}\pi R^3\rho_в)}{m\omega^2 l}\right) = 80°$

3 / 3

Горизонт



$\vec{S} = \vec{v_0}t + \frac{\vec{a}t^2}{2}$

ox: $S = v_0 \cos\alpha \, t$

oy: $0 = v_0 \sin\alpha \, t - \frac{gt^2}{2}$

$v_0 \sin\alpha = \frac{gt}{2}$

$t = \frac{2v_0 \sin\alpha}{g}$

$S = v_0 \cos\alpha \cdot \frac{2v_0 \sin\alpha}{g} = \frac{2v_0^2 \sin\alpha \cos\alpha}{g} = \frac{v_0^2 \sin 2\alpha}{g}$

$\sin 30 = \sin 60 = \frac{\sqrt{3}}{2}$

$2 \cdot \frac{1}{2} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$

$\alpha + \frac{\pi}{3} + \frac{\pi}{3} = 1 \text{ sh} - 90°$

$v_0 \cos\alpha$ g R

$g = \frac{v_0^2 \cos^2\alpha}{R}$

$R = \frac{v_0^2 \cos^2\alpha}{g}$

$gS = \frac{v_0^2 \sin 2\alpha}{g}$

$[S] = \frac{м^2}{с^2 м}$

$v_0 = \sqrt{\frac{Sg}{\sin 2\alpha}} = \sqrt{\frac{17 \cdot 10}{\sin 120}} = \sqrt{\frac{17 \cdot 10 \cdot 2}{\sqrt{3}}} \approx \sqrt{196} \approx 14 \frac{м}{с}$

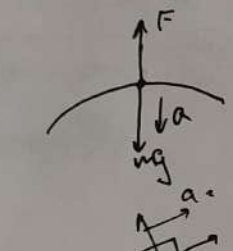
$[v_0] = \sqrt{\frac{м \cdot м/с^2}{}} = \sqrt{\frac{м^2}{с^2}} = \frac{м}{с}$

⑤ R

$a = \frac{v^2}{R}$

$a = \frac{v^2 g}{v_0^2 \cos^2\alpha} = g\left(\frac{v}{v_0 \cos\alpha}\right)^2 = g\left(\frac{v_0 \frac{1}{2}}{\frac{1}{4} v_0}\right)^2 = g\left(\frac{1}{2}\right)^2 = \frac{1}{4}g = 2{,}5 \frac{м}{с^2}$

$\left(\frac{м}{с^2} = \frac{м}{с^2}\right)$

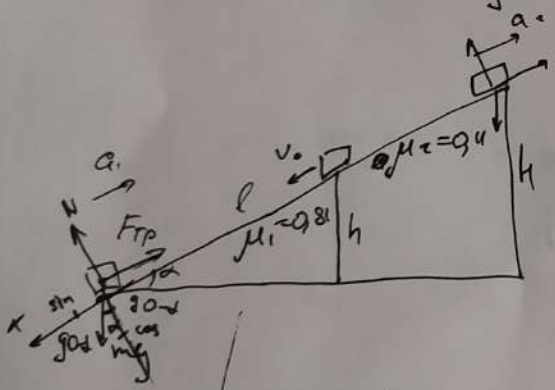


$ma = mg - F$

$m = 1$

$F = mg - ma$

$F = m(g-a) = mg\left(1 - \frac{1}{4}\right) = \frac{3}{4}mg = 7{,}5 \text{ Н}$



ox: $-ma = -F_{тр} + mg \sin\alpha$

$ma = F_{тр} - mg\sin\alpha$

oy: $N = mg\cos\alpha$ $\quad F_{тр} = \mu_1 N = \mu_1 mg\cos\alpha$

$ma = \mu_1 mg\cos\alpha - mg\sin\alpha$

$a_1 = g(\mu_1 \cos\alpha - \sin\alpha)$

$-a_2 = g(\mu_2 \cos\alpha - \sin\alpha)$

$\sin\alpha = \frac{h}{l_1}$

$h = l\sin\alpha$

$l = \frac{h}{\sin\alpha}$

$l_2 = L - l_1 = \frac{H}{\sin\alpha} - \frac{h}{\sin\alpha} = \frac{H-h}{\sin\alpha}$

$\vec{S} = \vec{v_0}t + \frac{\vec{a}t^2}{2}$

$\frac{h}{\sin\alpha} = v_0 t + \frac{a_1 t^2}{2}$ $\quad a = \frac{v_0}{t}$

$v_0 = a_1 t$ $\quad t = \frac{v_0}{a_1}$

$\frac{h}{\sin\alpha} = \frac{a_1 t^2}{2}$

$2h = a_1 t^2 \sin\alpha$

$t^2 = \frac{2h}{a_1 \sin\alpha}$

$T = t = \sqrt{\frac{2h}{a_1 \sin\alpha}} = \sqrt{\frac{2 \cdot 2 \cdot 2 \cdot (\cdot 2)}{10 \cdot (0{,}8 \cdot \frac{\sqrt{3}}{2} - \frac{1}{2})}}$ $\quad \sqrt{\frac{м}{м/с^2}} = \sqrt{с^2}$ $\quad 2 \text{ с}$

$\frac{H-h}{\sin\alpha} = v_0 t - \frac{a_2 t^2}{2}$

$\frac{H-h}{\sin\alpha} = v_0 t - \frac{v_0 t}{2}$

$\frac{H-h}{\sin\alpha} = \frac{v_0 t}{2}$

$\frac{2(H-h)}{\sin\alpha} = v_0 t$

$2(H-h) = v_0 t \sin\alpha$

$v_0 t = \frac{2(H-h)}{\sin\alpha}$

$\frac{H-h}{l} = \frac{v_0 t}{2}$

$H - h = \frac{v_0 t \sin\alpha}{2}$

$H = \frac{v_0 \sin\alpha \, t}{2} + h =$

$\frac{H-h}{l} = \frac{a_2 t^2}{2}$

$\frac{H-h}{l} = \frac{a_2 t^2}{2}$

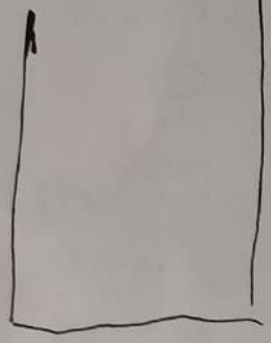
$2(H-h) = a_2 \sin\alpha \, t^2$

$t^2 = \frac{2(H-h)}{a_2 \sin\alpha}$

1/2

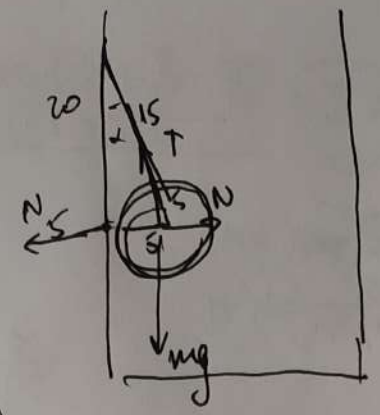
Черновик

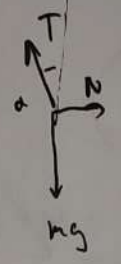
0,4047372055837



$\sin\alpha = \frac{h}{l}$

$\rho = 1\frac{г}{см^3} = \frac{1}{1000}\frac{кг}{см^3} = l\sin\alpha$





$mg = T\cos\alpha$

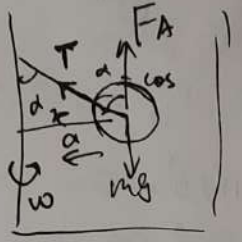
$N = T\sin\alpha$

$\frac{N}{mg} = tg\alpha$

$N = tg\alpha\, mg$

$tg\alpha = \frac{S}{\sqrt{20^2 - S^2}} \approx 0,258198889747161$

$N = 2,07 \approx 2,1$ Н



$a = \omega^2 R$

$ma = T\sin\alpha$

$F_A + T\cos\alpha = mg$

$T = \frac{mg - F_A}{\cos\alpha}$

$m\omega^2 R = \frac{mg - F_A}{\cos\alpha}\sin\alpha$

$m\omega^2 R = (mg - F_A)\,tg\alpha$

$F_A = \rho_в V_T g$

$\rho = \frac{1}{1000}\frac{кг}{см^3}$ $= 1\frac{г}{см^3}\frac{4}{3}\pi R^3 g$

$m\omega^2 l\sin\alpha = \left(mg - \frac{4}{3}\rho g\pi R^3\right)\frac{\sin\alpha}{\cos\alpha}$

$m\omega^2 l\cos\alpha = g\left(m - \frac{4}{3}\pi R^3\rho\right)$

$\cos\alpha = \frac{g\left(m - \frac{4}{3}\pi R^3\rho\right)}{m\omega^2 l}$

$\approx 80°$

$\frac{H}{кг}\left(кг - см^3 \cdot \frac{кг}{см^3}\right)$ $= \frac{\frac{H}{кг}\cdot кг}{кг \cdot \frac{м}{с^2}} = \frac{H}{\frac{кг\cdot м}{с^2}}$

$x° = \frac{\pi}{180°} \cdot x$

$30° = \frac{\pi}{6}$

$180° = \pi$

$1° = \frac{\pi}{180}$

$\frac{v_0^2}{2} = \frac{a_1 h}{\sin\alpha} = \frac{a_2(H-h)}{\sin\alpha}$

$a_1 h = a_2 H - a_2 h$

$a_2 H = a_1 h + a_2 h$

$H = h\frac{(a_1 + a_2)}{a_2} =$

$= h\frac{g(\mu_1\cos\alpha - \sin\alpha - \mu_2\cos\alpha + \sin\alpha)}{g(\sin\alpha - \mu_2\cos\alpha)}$

$H = h\frac{\cos\alpha(\mu_1 - \mu_2)}{\sin\alpha - \mu_2\cos\alpha} \approx 1,5h$

$= 3$ м

2/2

$t = \frac{2h}{a_1\sin\alpha}$

$v_0 t = \frac{2h}{\sin\alpha t}$

$v_0 t = \frac{2(H-h)}{\sin\alpha t}$

$\frac{2h}{\sin\alpha t} = \frac{2(H-h)}{\sin\alpha t}$

$\frac{h}{\sin\alpha} = \frac{a_1 v_0^2}{a_1^2 \cdot 2} = \frac{v_0^2}{2a_1}$

$\frac{h}{\sin\alpha} = \frac{v_0^2}{2a_1}$

$\frac{v_0^2}{2a_2} = \frac{H-h}{\sin\alpha}$

Часть 2

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

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Вариант 3

Класс 10. Вз 10-03 Часть II Чистовик

(4.) До начала кипения:

$Q_1 = cm(t_к - t_0)$ $\quad t_к = 100°C$

$Q_1 = 4180 \cdot 5{,}5 \cdot 10^{-3} \cdot (100 - 0) = 2299$ Дж $\approx 2{,}3$ кДж

для перведения всей воды в состояние пара:

$Q = r \cdot m r = 5{,}5 \cdot 10^{-3} \cdot 2{,}26 \cdot 10^6 = 12430$ Дж

$Q_2 > Q \Rightarrow$ испарилась вся вода

$Q_п = Q_2 - Q = 17430 - 12430 = 5000$ Дж

на нагревание пара

$Q_п = m c_p (t - t_к)$

$t - t_к = \frac{Q_п}{m c_p}$

$t = \frac{Q_п}{m c_p} + t_к = \frac{5 \cdot 10^3}{5{,}5 \cdot 10^{-3} \cdot 2200} + 100°C = 413 + 100 = 513°C$

$t = 513°C = 786$ K

После подведения Q_2 под поршнем содержался газ (пары воды) температуре $t = 786$ K

$PV = \nu RT \quad | \quad P_0 HS = \nu Rt$

$V = HS$

($P = P_0$ т.к. поршень легкий $\Rightarrow$ равновесие пара под поршнем и воздуха снаружи)

$\nu_п = \nu_в = \frac{m}{M} = \frac{5{,}5\text{ г}}{18\text{ г/моль}} \approx 0{,}3$ моль

$H = \frac{\nu R t}{P_0 S} = \frac{0{,}3 \cdot 786 \cdot 8{,}31}{0{,}05 \cdot 105} \approx 0{,}39$ м ≈ 40 см

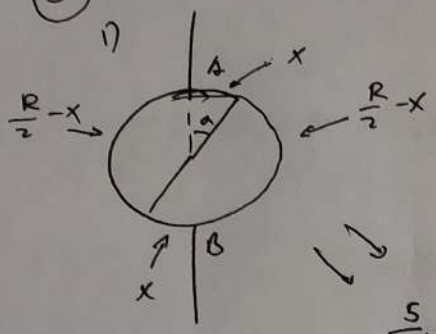
Ответ: 1) $Q_1 = cm(t_к - t_0) = 2{,}3$ кДж

2) $H \approx 40$ см

1 / 2

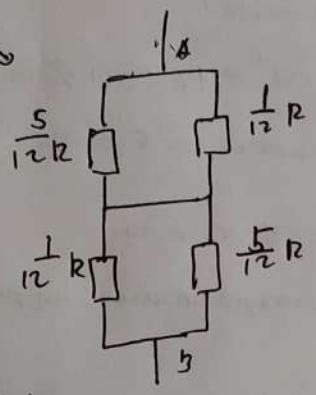
Чистовик

(5.)

1) 

$\frac{x}{R} = \frac{\alpha}{360^\circ}$ $\quad x = \frac{1}{12}R$

$\frac{R}{2} - x = \frac{R - \frac{1}{6}R}{2} = \frac{5}{12}R$

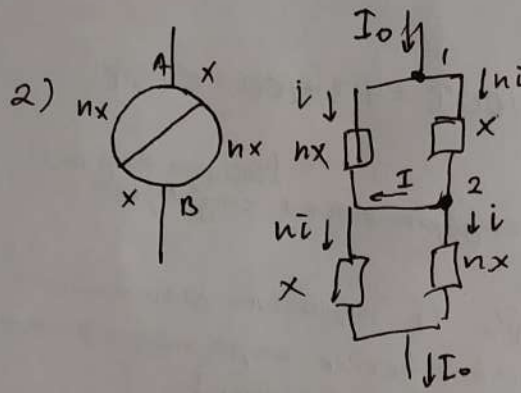


$R_0 = 2 \cdot \frac{\frac{1}{12}\cdot\frac{5}{12}}{\frac{1}{12}+\frac{5}{12}} = \frac{\frac{5}{12\cdot 6}}{\frac{6}{12}} = \frac{5}{36}R$

$P = IU \;\Big|\; I = \frac{U}{R_0} \Rightarrow P = \frac{U^2}{R_0}$

$P = \frac{U^2}{R_0} = \frac{U^2 \cdot 36}{5R}$ ч

$P = \frac{36\cdot 36}{5\cdot 24} = \frac{36\cdot 3}{10} = 10{,}8$ Вт

2) 

② $I = ni - i = i(n-1)$

① $I_0 = ni + i = i(n+1)$

$\frac{I_0}{I} = \frac{n+1}{n-1}$ $\quad I_0 = I\frac{n+1}{n-1}$

$I_0 = \frac{U}{R_{02}}$

$R_{02} = \frac{U}{I_0} = \frac{U(n-1)}{I(n+1)} = \frac{6\cdot 3\,(n-1)}{2\,(n+1)} = 9\frac{n-1}{n+1}$

$R_{02} = 2 \cdot \frac{nx\cdot x}{nx+x} = \frac{2nx\cdot x}{x(n+1)} = \frac{2nx}{n+1}$

$\frac{2nx}{n+1} = 9\frac{n-1}{n+1}$

$X + nx + x + nx = R = 24$

$2(nx+x) = 24 \longrightarrow \begin{cases} 2nx = 9(n-1) \\ x(n+1) = 12 \end{cases}$

$\frac{9(n^2-1)}{2n} = 12$

$3n^2 - 8n - 3 = 0$

$D = 64 + 36 = 100$ $\quad n = \frac{8+10}{6} = 3$ $\quad n = \frac{+8+10}{6} = -\frac{1}{3}$

$n > 1$ ч.у.

$n = 3 \Rightarrow x = \frac{12}{n+1} = \frac{12}{4} = 3$ (ом) $\Rightarrow R_{02} = \frac{2nx}{n+1} = \frac{2\cdot 9}{4} = 4{,}5$ (ом)

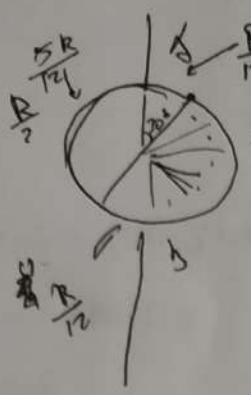
$P_2 = \frac{U^2}{R_{02}} = \frac{36\cdot 2}{9} = 8$ Вт.

Ответ: 1) $P = 10{,}8$ Вт при $\alpha = 30^\circ$

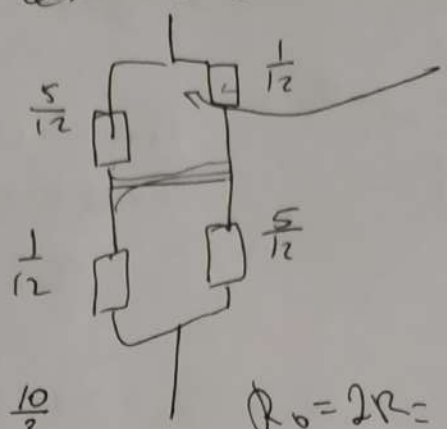
2) $n = 3$ при $I = \frac{2}{3}$ А через перемычку

3) $P_2 = 8$ Вт

2/2



Решение



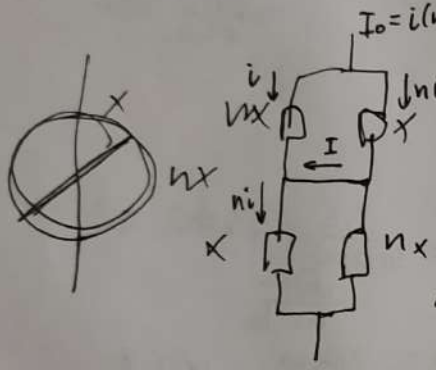
$$R = \frac{\frac{5}{12}\cdot\frac{1}{12}}{\frac{5}{12}+\frac{1}{12}} = \frac{\frac{5}{12\cdot 12}}{\frac{6}{12}} = \frac{5}{6\cdot 12} = \frac{5}{72}$$

$$R_0 = \frac{5}{36}\cdot 24 = \frac{5}{3\cdot 12}\cdot 2\cdot 12 = \frac{10}{3}$$

$$R_0 = 2R = \frac{5}{72} = \frac{10}{72} = \frac{5}{36}$$

$$P = IU = \frac{U^2}{R} = \frac{36\cdot 3}{10} = 10{,}8$$

$$I = \frac{U}{R}$$



$$I_0 = I\,\frac{n+1}{n-1}$$

$$R = 2\,\frac{nx\cdot x}{nx+x} = 2\,\frac{nx\cdot x}{x(n+1)} = 2\,\frac{nx}{n+1}$$

$$I = \frac{U}{R}$$

$$R = \frac{U}{I} = \frac{6\cdot 3}{2} = 9$$

$$R = \frac{U}{I}\,\frac{(n-1)}{(n+1)} = 9\,\frac{(n-1)}{(n+1)}$$

$$2(x+nx) = 24$$

$$x(n+1) = 12$$

$$\frac{2nx}{n+1} = 9\,\frac{(n-1)}{n+1}$$

$$x(n+1) = 12$$

$$2nx = 9n+9$$

$$x = \frac{9(n+1)}{2n}$$

$$\frac{9(n+1)^2}{2n} = 12$$

$$9(n+1)^2 = 24n$$

$$3(n+1)^2 = 8n$$

$$3n^2+3+6n = 8n$$

$$3n^2+3-2n = 0$$

$$3n^2-2n+3 = 0 \qquad D = 100-36 = 64$$

$$n = \frac{10+8}{6} = \frac{18}{6} = 3$$

$$n = \frac{10-8}{6} = \frac{1}{3}$$

$$x(n+1) = 12$$

$$2nx = 9(n+1)$$

$$x\,\frac{2nx}{9} = 12$$

$$nx^2 = 54$$

$$x^2 = \frac{54}{n}$$

$$\frac{54}{n}(n+1)^2 = 144$$

$$\frac{3}{8n}(n+1)^2 = 4$$

$$3(n+1)^2 = 8n$$

$$3(n^2+2n+1) = 8n$$

$$3n^2+8n+3 = 8n$$

$$3n^2+3 = 10n$$

$$x(n+1) = 12$$

$$2nx = 9(n-1)$$

$$x = \frac{9(n-1)}{2n}$$

$$\frac{9(n+1)(n-1)}{2n} = 12$$

$$9(n^2-1) = 24n$$

$$3n^2-3 = 8n$$

$$3n^2-8n-3 = 0$$

$$D = 64+36 = 100$$

$$n = \frac{8+10}{6} = 3$$

$$n = \frac{8-10}{6} = -\frac{1}{3}$$

$$\frac{1}{12}(5+1) = \frac{6}{12} = \frac{1}{2}$$

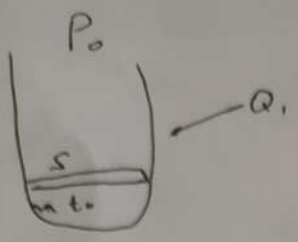
$$2(6) = 12$$

$$2\cdot\frac{5\cdot 2}{6} = \frac{10}{3}$$

$$\frac{4}{3}\cdot\frac{3}{2} = 4$$

$$\frac{4}{3}\cdot 6 = 8$$

Тепловые



$Q_1 = cm(t_к - t_0)$

$Q = 4180 \cdot \frac{5,5}{1000} (100°C - 0°C) = 4180 \cdot \frac{5,5}{1000} \cdot 100$

$\frac{Дж}{кг \cdot К}$ кг · К

$= 2299$ Дж

$Q_1 > Q_2 = m \times r = \frac{5,5}{1000} \cdot 2,26 \cdot 10^6 = 5,5 \cdot 2,26 \cdot 10^3$

кг · $\frac{Дж}{кг}$ $= 12430$ Дж

$m_{кип} = \frac{Q_2}{r} = \frac{17430}{2,26 \cdot 10^6} =$ 5000 Дж

$P = const$

$5000 = Q_{нагр} = m \cdot c_p = \frac{5,5}{1000} \cdot 2200 \, \Delta t$

Δt

кг $\frac{Дж}{кг \cdot К}$

$\Delta t = \frac{5000 \cdot 1000}{2200 \cdot 5,5} = 413°C$

$t = 0°C + 100 + 413 = 273 + 100 + 413$

$= 786,2$ К

$P_0 V_1 = \nu R T_1$

$P_0 V_2 = \nu R T_2$ $P_0 V = \nu R T$

$\frac{V_1}{V_2} = \frac{T_1}{T_2}$ $\nu = \frac{m}{M} = \frac{5,5г}{18г/моль}$

$\frac{H_1}{H_2} = \frac{T_1}{T_2} = \frac{873}{786}$

$PV = \nu RT$

$R = \frac{PV}{\nu T} = \frac{10^5 \cdot 10^{-3} \cdot 22,4}{1 \cdot 273}$

$8,31$ Дж

500 см²

500 (1/100)²

500/10000 м²

1/100 м²

0,05 м²

1/2