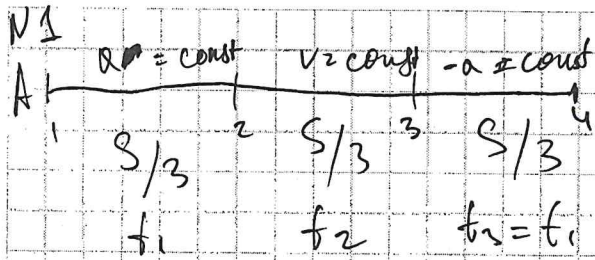


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650		Червошская АС	Мер
Шифр			041077



A: 1-2; $\frac{S}{3} = \frac{at_1^2}{2} \Rightarrow t_1 = \sqrt{\frac{2S}{3a}}$

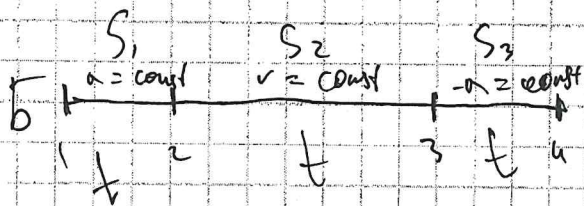
2-3: $\frac{S}{3} = vt_2$; $v = at_1$

$\frac{S}{3} = at_1 t_2$

$t_2 = \frac{S}{3at_1} = \frac{S\sqrt{3a}}{3a\sqrt{2S}}$

$\frac{t_2}{t_1} = \frac{1}{2} \Rightarrow t_2 = \frac{\sqrt{S}}{\sqrt{6a}}$
 $T_A = 5t_2$

$T_A = 2t_1 + t_2 = 2 \cdot \sqrt{\frac{2S}{3a}} + \sqrt{\frac{S}{6a}} =$
 $= \frac{4\sqrt{S} + \sqrt{S}}{\sqrt{6a}} = \frac{5\sqrt{S}}{\sqrt{6a}}$



B: 1-2; $S_1 = S_3 = \frac{at^2}{2} \Rightarrow t = \sqrt{\frac{2S_1}{a}}$

2-3: $S_2 = vt$; $v = at$

$S_2 = at^3$

$\frac{S_2}{S_1} = 2 \Rightarrow 2S_1 = S_2$

$\frac{S}{4} = S_1 = S_3$; $S_2 = \frac{S}{2} \Rightarrow$

$t = \sqrt{\frac{S}{2a}}$

$T_B = 3t = \frac{3\sqrt{S}}{\sqrt{2a}}$

$\frac{T_A}{T_B} = \frac{5\sqrt{S}/\sqrt{6a}}{3\sqrt{S}/\sqrt{2a}} = \frac{5}{3\sqrt{3}} \approx 0.96$

В1. В: $\Delta t = T_B - T_A = \frac{3\sqrt{S}}{\sqrt{2a}} - \frac{5\sqrt{S}}{\sqrt{6a}} = \frac{3\sqrt{3} - 5\sqrt{S}}{\sqrt{6a}}$

$\Delta t = T_B - T_A = \frac{3\sqrt{S}}{\sqrt{2a}} - \frac{5\sqrt{S}}{\sqrt{6a}} = \frac{3\sqrt{3} - 5\sqrt{S}}{\sqrt{6a}}$

$v = at$, B: $S_2 = vt$

$\frac{S}{2} = vt \Rightarrow S = 2vt$

$v = at$

$t = \frac{S}{2v}$

A: $\frac{S}{3} = \frac{at^2}{2}$

$t_2 = \frac{S}{3v}$

$\Delta t = T_B - T_A = \left| \frac{3\sqrt{S}}{2v} - \frac{5\sqrt{S}}{3v} \right| = \frac{4\sqrt{S}}{6v} = \frac{2\sqrt{S}}{3v}$

A быстрее B

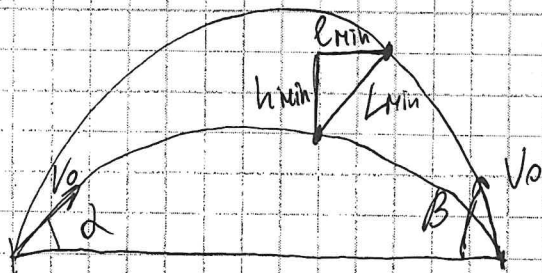
т.к. $\frac{5\sqrt{S}}{3v} > \frac{3\sqrt{S}}{2v}$

Ответ: А быстрее
 $\Delta t = \frac{2\sqrt{S}}{3v}$

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чтобы L_{min} того $\frac{L_{min}}{h_{min}} = 1$
 $h_{min} = H_p - h_a$
 $K = \frac{V_0^2 \sin^2 \alpha}{2g}$

$$L_{min} = S - V_0 \cos \beta t - V_0 \cos \alpha t$$

$$h_{min} = \frac{V_0^2}{2g} (\cos^2 \alpha - \cos^2 \beta)$$

$$H_p = V_0 \sin \beta t - \frac{gt^2}{2} = V_0 \sin \beta t - \frac{3gt^2}{2}$$

$$V_0 \sin \beta = gt = V$$

$$h_a = V_0 \sin \alpha t - \frac{3gt^2}{2}$$

$$h_{min} = V_0 \sin \beta t - V_0 \sin \alpha t = V_0 t (\sin \beta - \sin \alpha)$$

$$S_1 = V_0 \cos \beta t \quad S_2 = V_0 \cos \alpha t \quad S = 2V_0^2 \cos \alpha \sin \alpha / g$$

$$L_{min} = S - V_0 \cos \beta t - V_0 \cos \alpha t$$

$$\frac{S - V_0 \cos \beta t - V_0 \cos \alpha t}{V_0 t (\sin \beta - \sin \alpha)} = 1$$

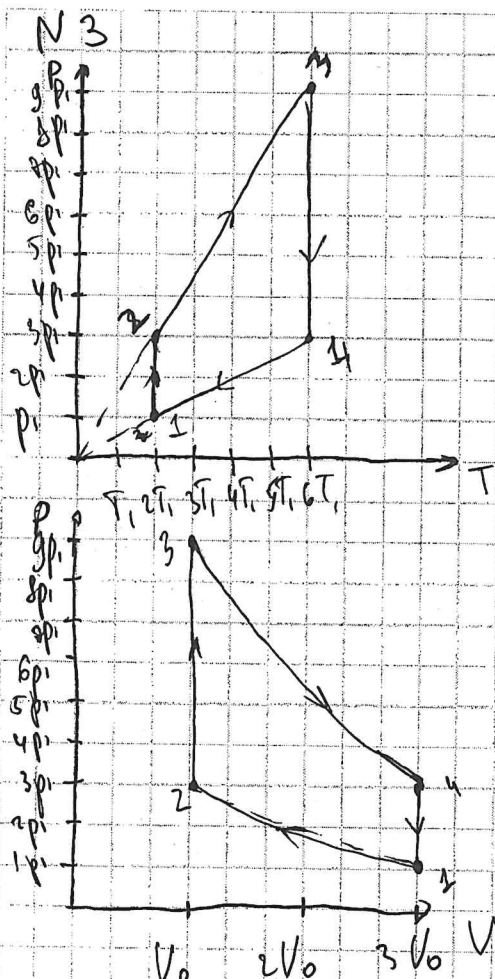
$$t = \frac{S}{V_0 (\cos \beta + \cos \alpha + \sin \beta - \sin \alpha)}$$

$$L_{min} = \sqrt{\left(S - V_0 \frac{S}{V_0 (\cos \beta + \cos \alpha + \sin \beta - \sin \alpha)} (\cos \beta + \cos \alpha) \right)^2 + \frac{V_0^2 S^2 (\sin \beta - \sin \alpha)^2}{V_0^2 (\cos \beta + \cos \alpha + \sin \beta - \sin \alpha)^2}}$$

$$L_{min} = S \sqrt{1 - \frac{2(\cos \beta + \cos \alpha)}{(\cos \beta + \cos \alpha + \sin \beta - \sin \alpha)} + \frac{(\cos \beta + \cos \alpha)^2}{(\cos \beta + \cos \alpha + \sin \beta - \sin \alpha)^2} + \frac{(\sin \beta - \sin \alpha)^2}{(\cos \beta + \cos \alpha + \sin \beta - \sin \alpha)^2}}$$

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$$1-2: \left. \begin{aligned} p_1 V_1 &= 2 \nu R T_1 \\ 3 p_1 V_2 &= 2 \nu R T_1 \end{aligned} \right\} \Rightarrow 3 V_2 = V_1; V_2 = \frac{V_1}{3}$$

$$2-3: \frac{3 p_1 V_1}{3} \neq 2 \nu R T_1 \text{ т.к. прямая } 2-3 \text{ уходит в } 0, \text{ то это изохора } V_2 = V_3 = \frac{V_1}{3}$$

$$3-4: \left. \begin{aligned} 3 p_1 V_1 &= 6 \nu R T_1 \\ 3 p_1 V_4 &= 6 \nu R T_1 \end{aligned} \right\} \Rightarrow V_1 = V_4$$

$$V_2 = V_0$$

$$A + \Delta U = Q$$

$$\eta = \frac{Q_+ - |Q_-|}{Q_+}$$

$$Q_+ = Q_{23} + Q_{34}$$

$$Q_- = Q_{41} + Q_{12}$$

$$Q_{12} = A_{12} + \Delta U_{12}$$

$$\Delta U_{12} = 0 \text{ т.к. } \Delta T_{12} = 0; A_{12} = \int p_2 dV$$

$$A_{12} = 2 \nu R T_1 \ln \left(\frac{V_2}{V_1} \right) = 2 \nu R T_1 \ln \left(\frac{1}{3} \right) = -2 \nu R T_1 \ln 3$$

$$Q_{23} = A_{23} + \Delta U_{23}$$

$$A_{23} = 0 \text{ т.к. } \Delta U_{23} = 0; \Delta U_{23} = \frac{3}{2} \nu R (T_3 - T_2) = \frac{3}{2} \nu R 4 T_1 = 6 \nu R T_1$$

$$Q_{34} = \Delta U_{34} + A_{34}$$

$$\Delta U_{34} = 0 \text{ т.к. } \Delta T_{34} = 0; A_{34} = \int p_1 dV = 6 \nu R T_1 \ln \frac{V_4}{V_3} = 6 \nu R T_1 \ln 3$$

$$Q_{41} = A_{41} + \Delta U_{41}; A_{41} = 0 \text{ т.к. } \Delta V_{41} = 0$$

$$\Delta U_{41} = \frac{3}{2} \nu R \Delta T_{41} = -\frac{3}{2} \nu R 4 T_1 = -6 \nu R T_1$$

$$\eta = \frac{6 \nu R T_1 + 6 \nu R T_1 \ln(3) - 6 \nu R T_1 - 2 \nu R T_1 \ln(3)}{6 \nu R T_1 + 6 \nu R T_1 \ln(3)} = \frac{4 \nu R T_1 \ln(3)}{6 \nu R T_1 (1 + \ln(3))}$$

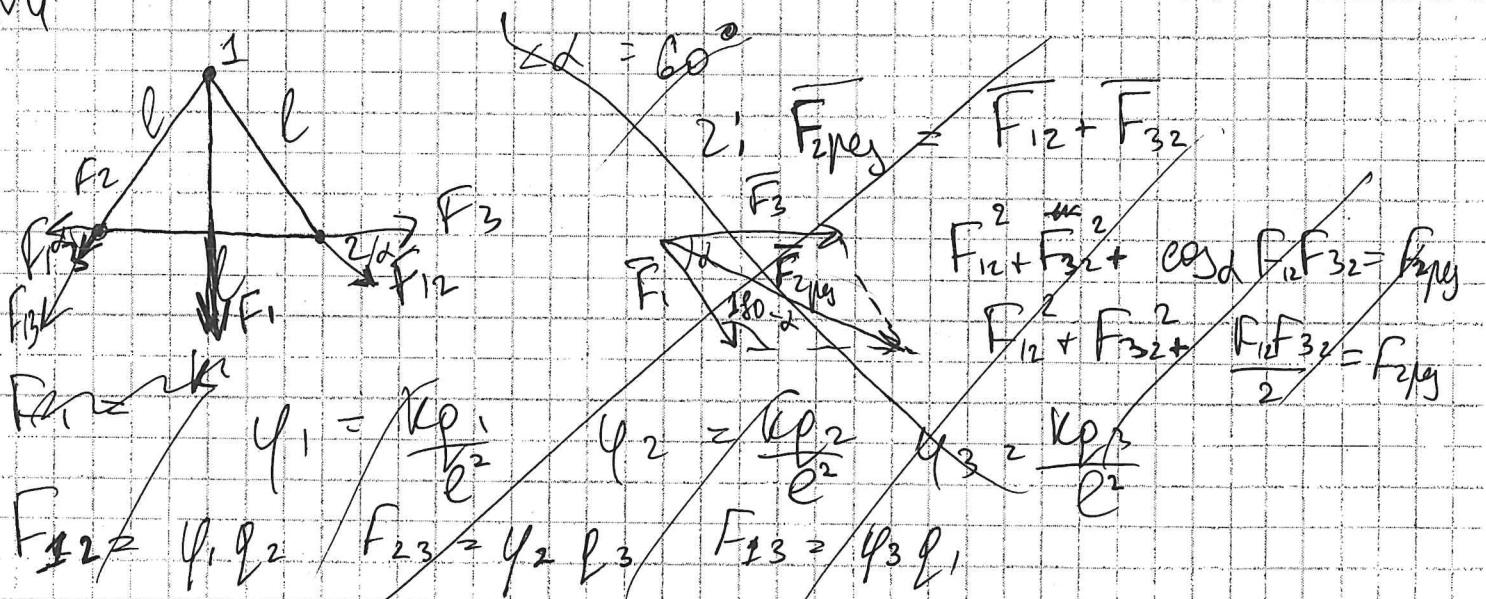
$$= \frac{2 \ln(3)}{3(1 + \ln(3))} \approx 0,35 \quad \eta \cdot 100\% \approx 35\%$$

Ответ: 35

100

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М4



$\angle \alpha = 60^\circ$ $F_{12} = \frac{\varphi_1 \varphi_2 l^2}{\kappa}$ $F_{13} = \frac{\varphi_1 \varphi_3 l^2}{\kappa}$

$F_1^2 + F_2^2 + \cos \alpha F_2 F_3 = F_1$
 $\frac{\varphi_1^2 \varphi_2^2 l^4}{\kappa^2} + \frac{\varphi_1^2 \varphi_3^2 l^4}{\kappa^2} + \frac{\varphi_1^2 \varphi_2 \varphi_3 l^4}{2\kappa^2} = F_1$

$\frac{l^4 \varphi_1^2 (\varphi_2^2 + \varphi_3^2 + \frac{\varphi_2 \varphi_3}{2})}{\kappa^2} = F_1$

$$F_1 = \frac{\varphi_1^2 l^4}{\kappa^2} \left(\varphi_2^2 + \varphi_3^2 + \frac{\varphi_2 \varphi_3}{2} \right)$$

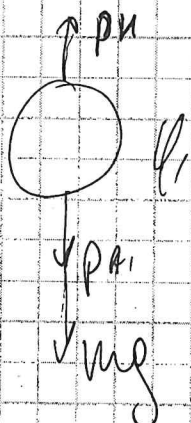
Ответ: $\frac{\varphi_1^2 l^4}{\kappa} \left(\varphi_2^2 + \varphi_3^2 + \frac{\varphi_2 \varphi_3}{2} \right)$ 148

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1)



$$\varphi_1 = \frac{P_{1A1}}{P_{1A2}} \cdot 100\%$$

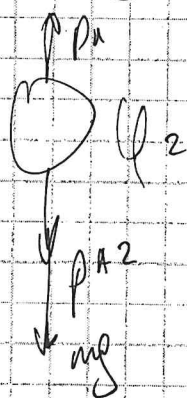
$$\textcircled{1} P_{1K} = P_{1A1} + mg$$

$$V = \frac{4}{3} \pi R^3$$

$$S = \pi R^2$$

$$S = \sqrt[3]{\frac{9V^2\pi^2}{16}}$$

2)



$$P_{2K} < P_{2A2} + mg$$

$$\varphi_2 = \frac{P_{2A1}}{P_{2A2}} \cdot 100\%$$

$$P_{2K} = P_{2A2} + (m + \Delta m)g$$

$$\textcircled{2} P_{2K} = \frac{P_{2K1} \cdot 100\%}{\varphi_2} + mg - \Delta mg$$

$$\textcircled{1} - \textcircled{2}: 0 = P_{2A1} - \frac{P_{2K1} \cdot 100\%}{\varphi_2} + \Delta mg$$

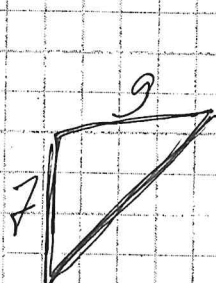
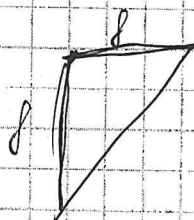
$$\Delta m = \frac{P_{2K1} \cdot 100\%}{\varphi_2} - P_{2A1} \quad P_{2A2} = 10000 \text{ N}$$

$$\Delta m = \frac{3000 \cdot 100\%}{80\%} - 10000 = 10000 \text{ N} \quad \Delta m = \frac{10000 - 10000}{10} = 0 \text{ kg}$$

$$\Delta m = 517,57 \text{ kg}$$

0 + 517,57 кг

85



81 + 49