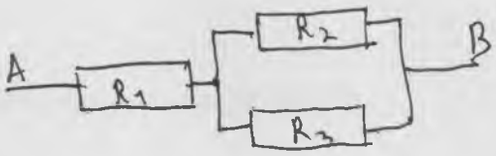
5) Дано:

$R_1 = R_2 = R$

$R_3 = 3R$

$Q_1 = 160$ Дж

$Q_3 - ?$



R_2; R_3 – параллельно

$$\frac{1}{R_{2,3}} = \frac{1}{R_2} + \frac{1}{R_3}$$

$$R_{2,3} = \frac{R_2 \cdot R_3}{R_2 + R_3} = \frac{R \cdot 3R}{R + 3R} = \frac{3R^2}{4R} = \frac{3}{4} R$$

$$Q_1 = I^2 R_1 t_{15} = I^2 R t_{15}$$

$$Q = I^2 R t_{15} = 160 \quad (1)$$

$$Q_{2,3} = I^2 R_{2,3} t_{15} = \frac{3}{4} Q_1$$

$$\frac{3}{4} Q_1 = Q_2 + Q_3$$

$$\frac{3}{4} Q_1 = I_2^2 R t_{15} + I_3^2 3R t_{15}$$

$$I = \frac{U}{R} = I_2 + I_3$$

$$I_2 = \frac{U}{R}; \quad I_3 = \frac{U}{3R}$$

$$I_2 = 3 I_3$$

$$I_3 + I_2 = I$$

$$I_3 + 3I_3 = I$$

$$4 I_3 = I$$

$$\frac{3}{4} Q_1 = \underbrace{\left(\frac{3}{4} I\right)^2 R t_{15}}_{Q_2} + \underbrace{\left(\frac{1}{4} I\right)^2 3R t_{15}}_{Q_3} =$$

$$= \frac{9}{16} I^2 R t_{15} + \frac{3}{16} I^2 R t_{15}$$

(1)

$$\frac{3}{16} \cdot 160 = 160 - \frac{9}{16} \cdot 160$$

$15 \cdot 4 = 60$

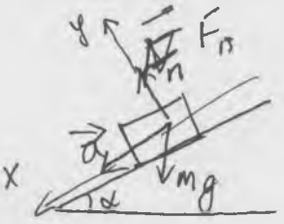
$$Q_3 = \frac{3}{16} I^2 R t_{15} = 30 \cdot 4 = 120 \text{ Дж}$$

10 б

5) На тело действуют силы $F_т$, $F_п$ и F_c

$$F_п = \frac{F_т}{\cos\alpha} = \frac{mg}{\cos\alpha}$$

$$F_c = F_п \cdot \sin\alpha = \frac{mg}{\cos\alpha} \cdot \sin\alpha = mg\,tg\alpha$$



$$F_c = \frac{mV^2}{R}, \text{ т.к. } g = \frac{V^2}{R}$$

$$mg\,tg\alpha = \frac{mV^2}{R}$$

$$R = \frac{mV^2}{mg\,tg\alpha} = \frac{V^2}{g\,tg\alpha}$$

8 б

Ответ: $\frac{V^2}{g\,tg\alpha}$

2) $M = 0{,}5$ кг
$m = 0{,}15$ кг
$\ell = 0{,}26$ м
v_1 – ?

$$0 = m v_1 \cos\alpha - (M+m) v_c$$

$$v_c = \frac{m v_1 \cos\alpha}{M+m}$$

$$\ell = (v_1 \cos\alpha + v_c)\,t$$

$$\ell = \left(v_1 \cos\alpha + \frac{m v_1 \cos\alpha}{M+m}\right) t$$

$$t = \frac{2 v_1 \sin\alpha}{g}$$

$$\ell = v_1 \cos\alpha \left(1 + \frac{m}{M+m}\right) \frac{2 v_1 \sin\alpha}{g}$$

$$\ell = \frac{v^2 2 \cos\alpha \sin\alpha \left(1 + \frac{m}{M+m}\right)}{g}$$

$$\ell = \frac{v^2 \sin 2\alpha \left(1 + \frac{m}{M+m}\right)}{g}$$

$$v = \sqrt{\frac{\ell g}{\sin 2\alpha \left(1 + \frac{m}{M+m}\right)}}$$

наименьшая скорость будет при $\alpha = 45°$, $\Rightarrow \sin 2 \cdot 45 = 1$

$$v = \sqrt{\frac{0{,}23 \cdot 10}{1 + \frac{0{,}15}{0{,}5+0{,}15}}} = 1{,}45 \frac{м}{с}$$

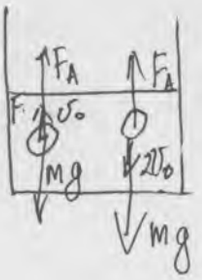
10 б

Ответ: $1{,}45 \frac{м}{с}$

1) $F_A - m_1 g = F_{C_1} = k v_0$

m a

$\rho_в g V_1 - \rho_т V_1 g = k v_0$



2б