№1

$x = At$
$y = At(1+Bt)$

$y(x) - ?$
$\vec{r}(t) - ?$
$|\vec{v}(t)| - ?$
$|\vec{a}(t)| - ?$

$\left.\begin{array}{l} x = At \\ y = At(1+Bt) \end{array}\right\} \Rightarrow \left.\begin{array}{l} x = At \\ y = At\left(1+\frac{BtA}{A}\right) \end{array}\right\} \Rightarrow y = x\left(1+\frac{B}{A}x\right) = \frac{B}{A}x^2 + x$

$y(x) = \frac{B}{A}x^2 + x$

$\vec{r}(t) = x\vec{i} + y\vec{j} = At\vec{i} + At(1+Bt)\vec{j}$

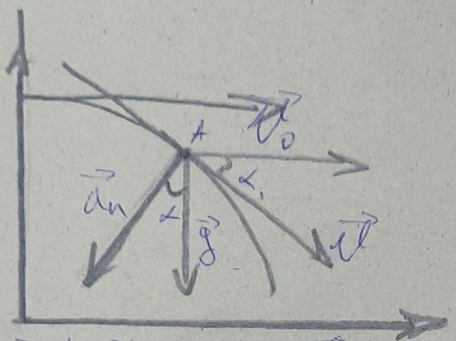
$\vec{v} = \frac{d\vec{r}}{dt} = A\vec{i} + (A + 2ABt)\vec{j}$ $\quad v = \sqrt{A^2 + (A+2ABt)^2} = A\sqrt{1 + (1+2Bt)^2}$

$\vec{a} = \frac{d\vec{v}}{dt} = 2AB\vec{j}$ $\quad a = 2AB$

№2

$v_0 = 15 \frac{м}{с}$
$t = 2 с$
$g = 10 \frac{м}{с^2}$

$R - ?$



1) $a_n = \frac{v^2}{R}$

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

2) т.к. $\vec{a}_n \perp \vec{v}$ и $\vec{g} \perp \vec{v_0}$

$\vec{a}_n, \vec{v}, \vec{g}, \vec{v_0} \in A \Rightarrow \alpha_1 = \alpha$

3) $\cos\alpha = \frac{v_0}{v} \Rightarrow$

$\begin{cases} v = \sqrt{v_x + v_y} \\ v_x = v_0 \\ v_y = v_{0y} - gt = -gt \end{cases} \Rightarrow v^2 = v_0^2 + g^2t^2$

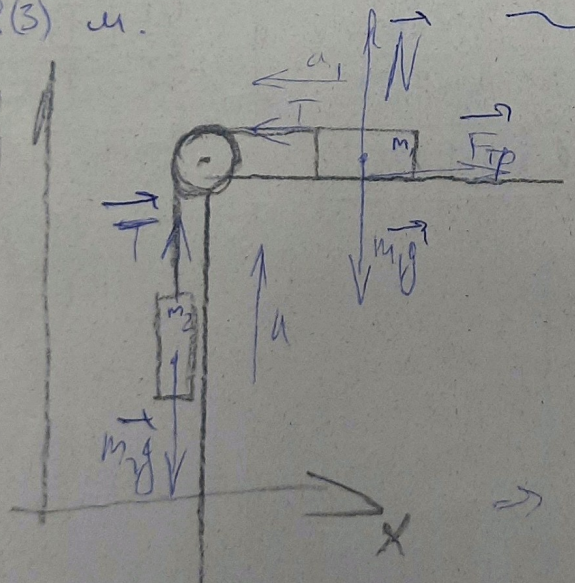
$\Rightarrow R = \frac{v^3}{gv_0} = \frac{(\sqrt{v_0^2 + g^2t^2})^3}{g v_0} = \frac{(15^2 + 10^2 \cdot 4)^{3/2}}{10 \cdot 15} =$

Ответ: $R = 0{,}8(3)$ м.

№3

$m_1 = 0{,}5 кг$
$m_2 = 0{,}6 кг$
$a = 4{,}9 \frac{м}{с^2}$
$g = 9{,}8 \frac{м}{с^2}$
$f = 0{,}1$

$T - ?$



Oy: $N - m_1 g = m_1 a$ (1)

$m_2(a_1 - a) = m_2 g - T$ (2)

Ox: $m_1 a_1 = T - F_{тр}$ (3)

$F_{тр} = fN$

$\Rightarrow \begin{cases} N - m_1 g = m_1 a \\ m_2(a_1 - a) = m_2 g - T \\ m_1 a_1 = T - fN \end{cases}$

у (1) и (3): $N = m_1(a+g)$

$m_1 a_1 = T - f m_1(a+g)$

$a_1 = \frac{T}{m_1} + f(a+g)$

$\Rightarrow m_2\left(\frac{T}{m_1} - f(a+g) - a\right) = m_2 g - T$

$\frac{m_2}{m_1}T - f m_2(a+g) - a m_2 = m_2 g + T \Rightarrow$

$\Rightarrow T = \frac{m_2(a+g)(1+f)}{1 + \frac{m_2}{m_1}}$ $\quad T = 4{,}41 Н$

у (2):

$m_2\left(\frac{T}{m_1} - f(a+g) - a\right) = m_2 g - T \Rightarrow$

№4

$\mathcal{E} = 2$ В

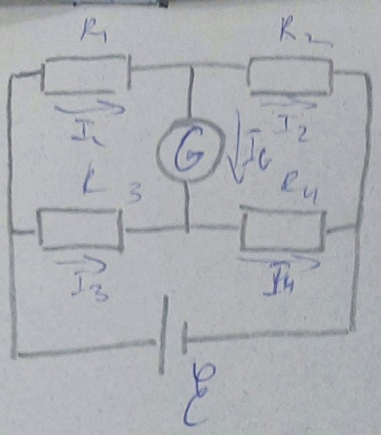
$R_1 = 60$ Ом

$R_2 = 40$ Ом

$R_3 = R_4 = 20$ Ом

$R_6 = 1000$ Ом

I_6 – ?



$$\begin{cases} I = I_1 + I_3 \\ I_1 = I_2 + I_6 \\ I_4 = I_3 + I_6 \\ I = I_2 + I_4 \end{cases} \Rightarrow \begin{cases} 6I_1 + 4I_2 = 0{,}2 \\ 2I_3 + 2I_4 = 0{,}2 \\ 6I_1 + 10I_6 + 2I_4 = 0{,}2 \end{cases}$$

$$\begin{cases} I_1 R_1 + I_2 R_2 = \mathcal{E} \\ I_3 R_3 + R_4 I_4 = \mathcal{E} \\ I_1 R_1 + I_6 R_6 + I_4 R_4 = \mathcal{E} \end{cases}$$

$$\Rightarrow \begin{cases} 6I_1 + 4(I_1 - I_6) = 0{,}2 \\ 2(I_4 - I_6) + 2I_4 = 0{,}2 \\ 6I_1 + 10I_6 + 2I_4 = 0{,}2 \end{cases} \Rightarrow \begin{cases} 10I_1 - 4I_6 = 0{,}2 \Rightarrow I_1 = \frac{0{,}2 + 4I_6}{10} \\ 4I_4 - 2I_6 = 0{,}2 \Rightarrow I_4 = \frac{0{,}2 + 2I_6}{4} \\ 6I_1 + 2I_4 + 10I_6 = 0{,}2 \end{cases}$$

$$\Rightarrow 6\left(\frac{0{,}2 + 4I_6}{10}\right) + 2\left(\frac{0{,}2 + 2I_6}{4}\right) + 10I_6 = 0{,}2 \quad | \cdot 10$$

$$1{,}2 + 13{,}4I_6 + 1 = 2 \Rightarrow I_6 = -1{,}49 \cdot 10^{-3}\ \text{А} \Rightarrow \text{ток мал.} \Rightarrow$$

$\Rightarrow$ Ответ: $I_6 = 1{,}49 \cdot 10^{-3}$ А мал из I_6 чер галванометр.

№5 Вариант 8 $\mathcal{E} = 6$ В, $r = 8$ Ом

$U = IR$ $\quad P = \mathcal{E}I = UI + I^2 r = P_n + P_0$

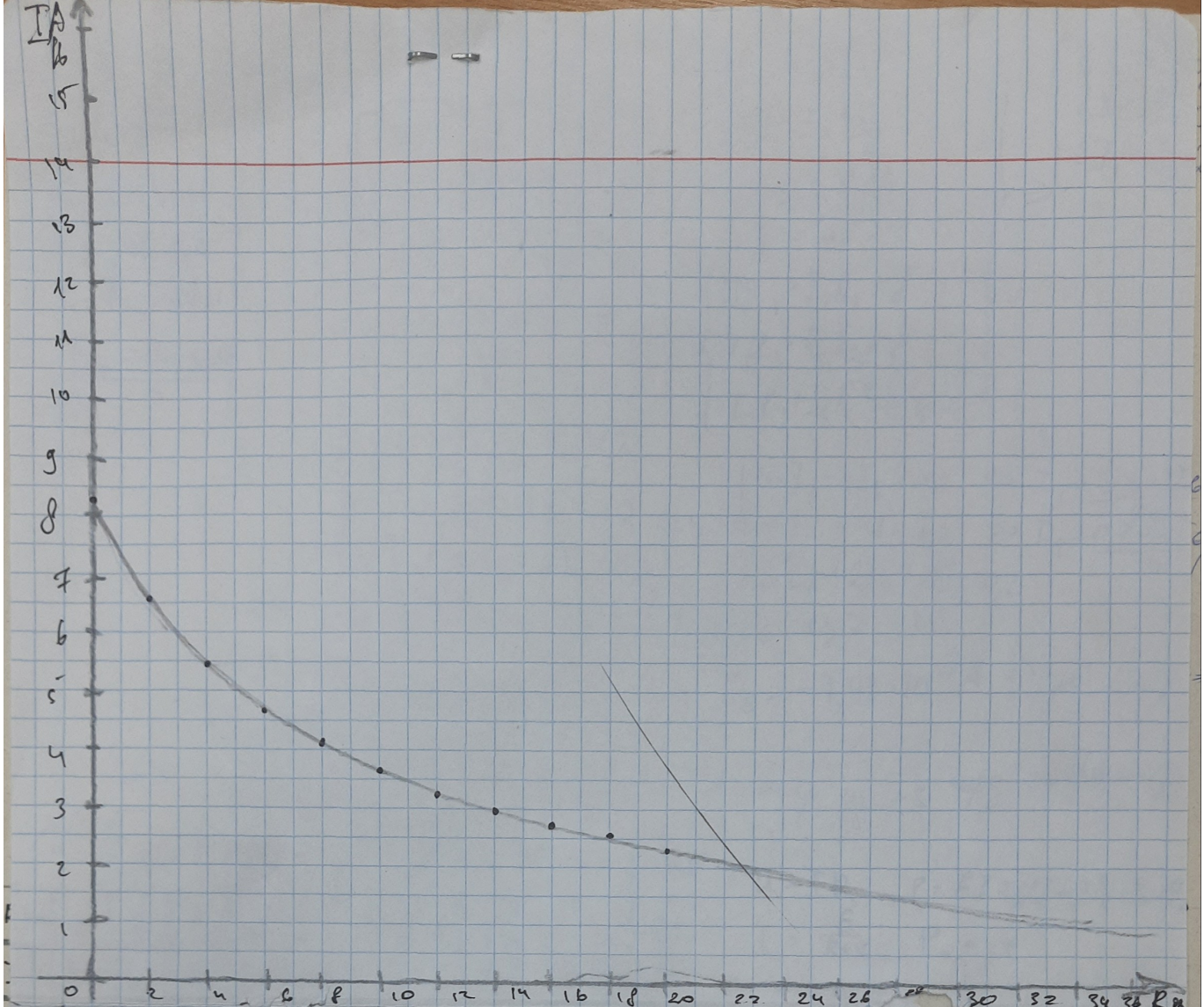
$I = \frac{\mathcal{E}}{R + r}$ $\quad P_n = UI$

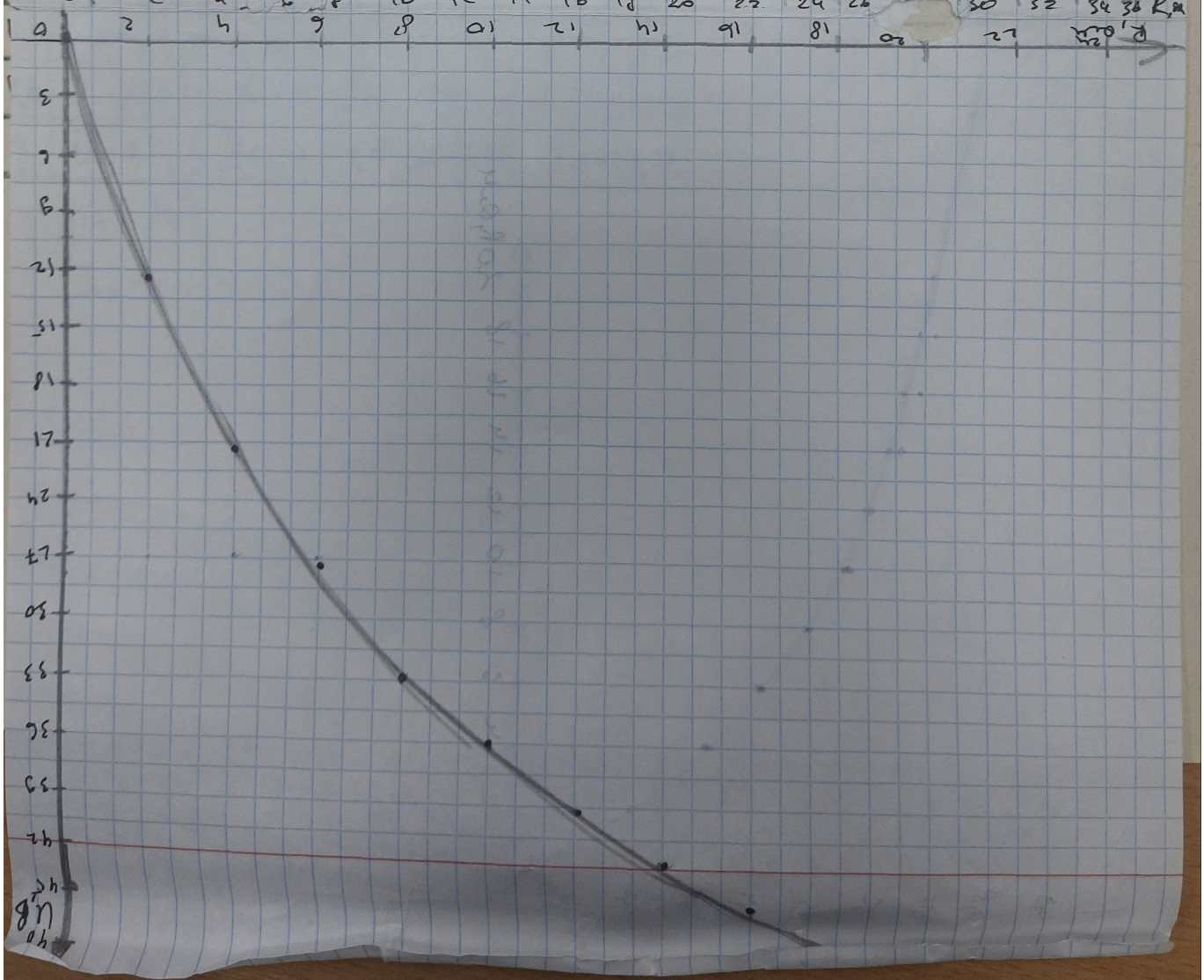
$$y = \frac{UI}{\mathcal{E}I} = \frac{P_n}{P}$$

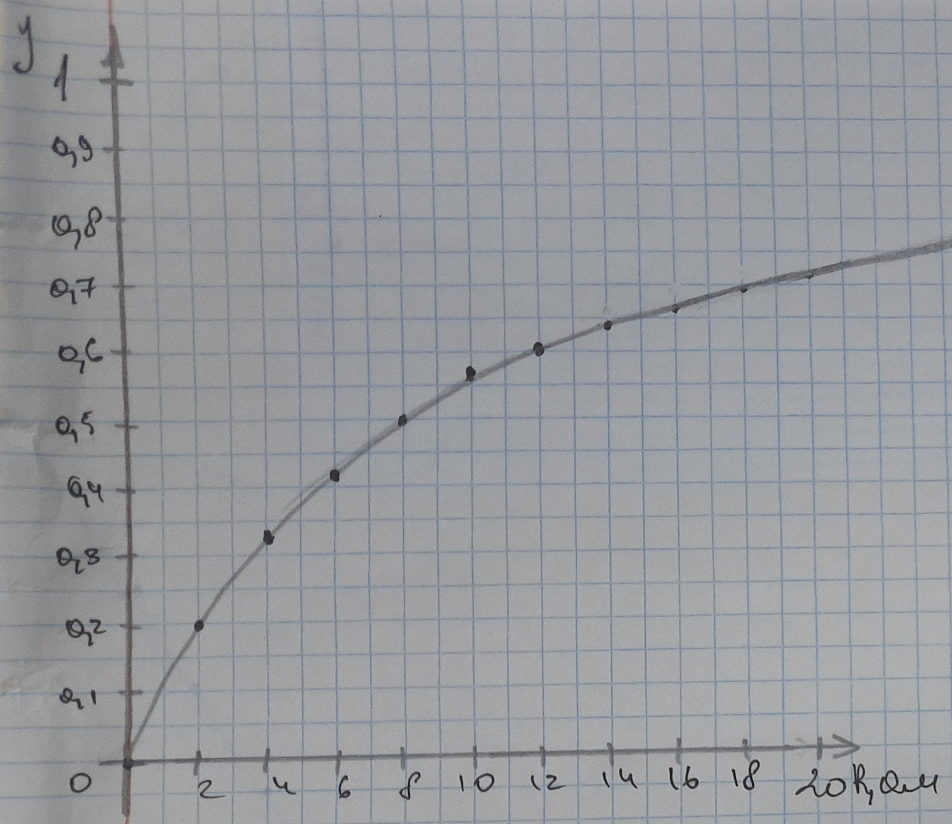
R, Ом	0	2	4	6	8	10	12	14	16	18	20
I, А	8,25	6,6	5,5	4,71	4,125	$3\frac{2}{3}$	3,3	3	2,75	2,5	2,36
U, В	0	13,2	22	28,26	33	$36\frac{2}{3}$	39,6	42	44	45,72	47,2
P_n, Вт	0	87,12	121	133,1	136,125	134,4	130,68	126	121	116,13	111,392
y	0	0,2	$\frac{1}{3}$	0,43	0,5	0,56	0,6	0,64	$\frac{2}{3}$	0,69	0,72

$y_{наг} = 0{,}5$

$I_{кр} = 2{,}25$


I A
0
2
4
6
8
10
12
14
16
18
20
22
24
26
30
32
34
36
R, Ом




y
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
2
4
6
8
10
12
14
16
18
20
R, Ом