

# Равноускоренное движение. КОД:

N 3.1

$$x = -5 - 6t - 8t^2$$

равноускоренное движение  $x_0 = -5$  (м)

$$v_0 = -6 \frac{\text{м}}{\text{с}} \quad \vec{v} \parallel \vec{Ox}$$

$$a = -16 \frac{\text{м}}{\text{с}^2}$$

$$v_x = -6 - 16t$$

N 3.2

$$v_0 = 15 \frac{\text{м}}{\text{с}}$$

$$S = 500 \text{ м}$$

$$v = 0 \frac{\text{м}}{\text{с}}$$

$a = ? \quad t = ?$

$$S_x = \frac{v_x + v_{0x}}{2} t$$

$$t = \frac{2S}{v_0} = \frac{2 \cdot 500 \text{ м}}{15 \frac{\text{м}}{\text{с}}} = 67 \text{ (с)}$$

$$S_x = \frac{v_x^2 - v_{0x}^2}{2a_x}$$

$$S = \frac{-v_0^2}{-2a}$$

$$a = \frac{v_0^2}{2S} = \frac{(15 \frac{\text{м}}{\text{с}})^2}{2 \cdot 500 \text{ м}} = 0,225 \frac{\text{м}}{\text{с}^2}$$

N 3.3

$$v_0 = 2 \frac{\text{м}}{\text{с}}$$

$$t = 20 \text{ с}$$

$$S = 150 \text{ м}$$

$a = ? \quad v = ?$

$$S_x = v_{0x} t + \frac{a_x t^2}{2}$$

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

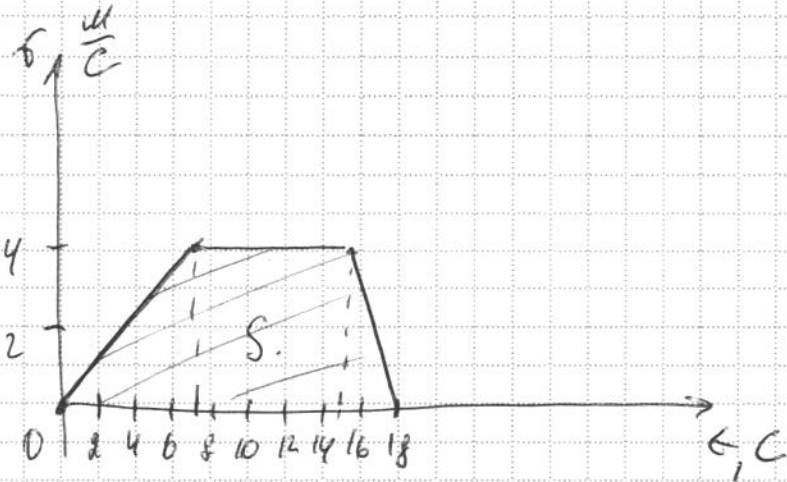
$$a = \frac{(S - v_0 t) \cdot 2}{t^2} = \frac{(150 \text{ м} - 2 \frac{\text{м}}{\text{с}} \cdot 20 \text{ с}) \cdot 2}{400 \text{ с}^2} = 0,55 \frac{\text{м}}{\text{с}^2}$$

$$v_x = v_{0x} + a_x t \quad v = v_0 + at$$

$$v = 2 \frac{\text{м}}{\text{с}} + 0,55 \frac{\text{м}}{\text{с}^2} \cdot 20 \text{ с} = 13 \frac{\text{м}}{\text{с}}$$

№3.5

- $v_1 = 4 \frac{м}{с}$
  - $t_1 = 7с$
  - $v_0 = 0 \frac{м}{с}$
  - $v_2 = 4 \frac{м}{с}$
  - $t_2 = 8с$
  - $t_3 = 3с$
  - $v_{03} = 4 \frac{м}{с}$
  - $v_3 = 0 \frac{м}{с}$
- 
- $S = ?$



$$S = \frac{18+8}{2} \cdot 4 = 52 (м)$$

№3.5

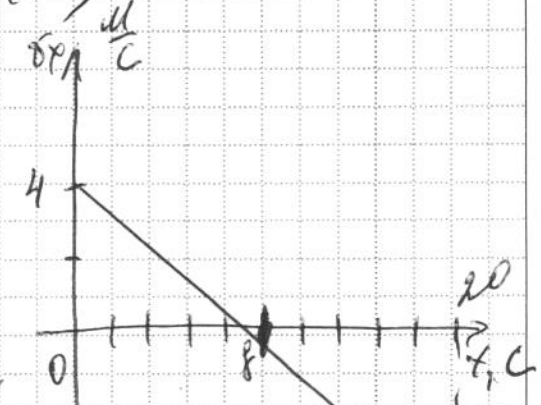
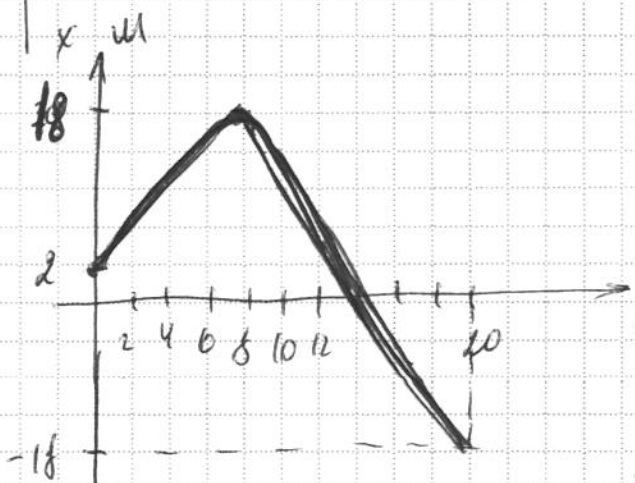
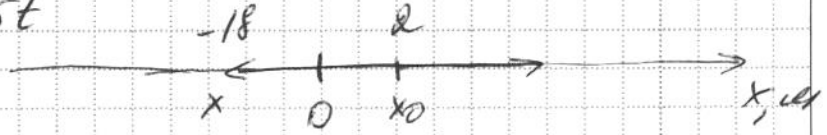
- $x_0 = 2м$
  - $v_0 = 4 \frac{м}{с}$
  - $a = 0,5 \frac{м}{с^2}$
  - $t = 20с$
- 
- $x(t) - ?$
  - $v_x(t) - ?$
  - $x - ?$
  - $S - ?$
  - $l - ?$

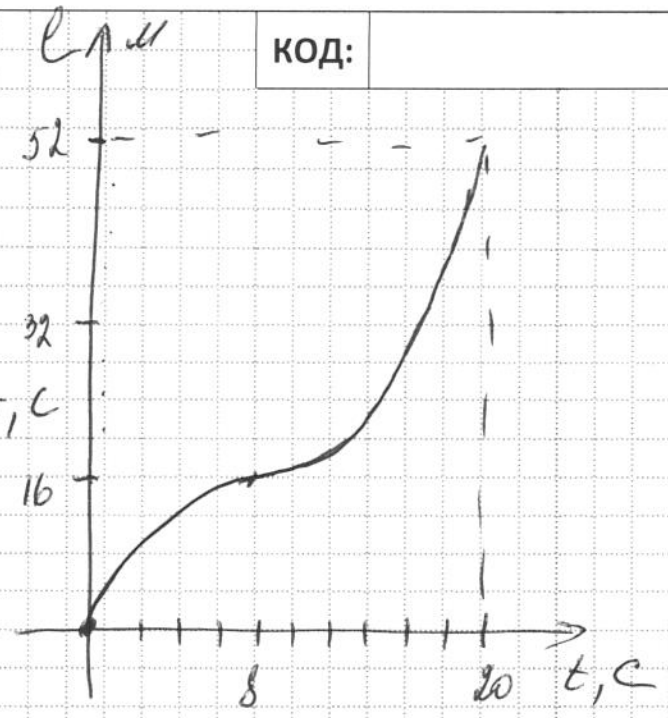
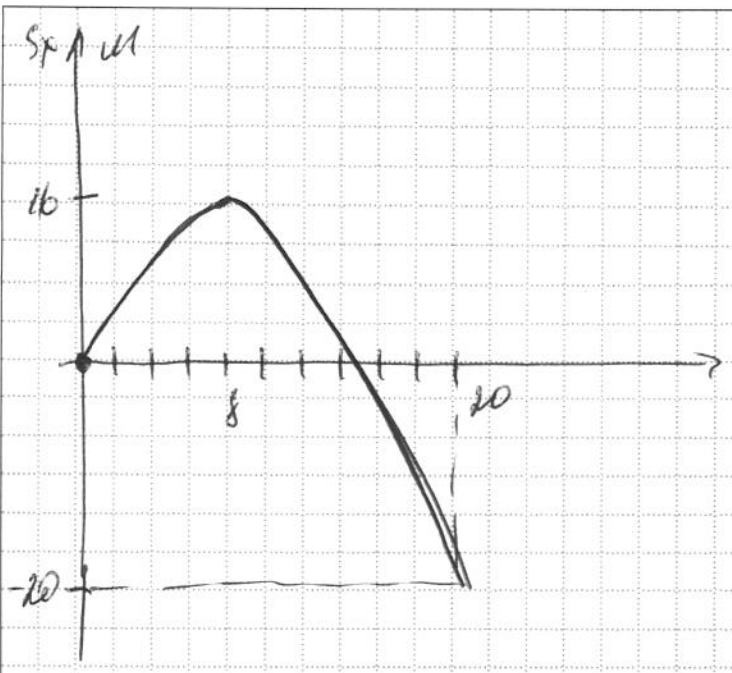
$$x = 2 + 4t - 0,25t^2$$

$$v_x = 4 - 0,5t$$

$$x = 2 + 4 \cdot 20 - 0,25 \cdot 400 = -18 (м) \quad S_x = 4t - 0,25t^2$$

$$|S| = 4 \cdot 20 - 0,25 \cdot 400 = 20 (м)$$





3.6  
 $v_0 = 0$   
 $t_1 = T_0$   
 $x_2 = 0$   
 $x_{02} = 0$   
 $t = ?$

$$x_1 = v_{01x} t + x_0 + \frac{a_x t^2}{2}$$

$$x_1 = x_0 + v_{01} t_1 + \frac{a t_1^2}{2}$$

$$x_1 = v_{01} T_0 + \frac{a T_0^2}{2} = \frac{a T_0^2}{2}$$

$$x_2 = x_{02} + v_{02x} t_2 + \frac{a_x t_2^2}{2}$$

$$x_{02} = x_1 \quad v_{02x} = v_0 + a T_0 \quad x_2 = 0$$

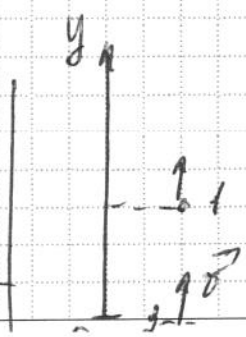
$$0 = v_{02x} \frac{a T_0^2}{2} + (v_0 + a T_0) t - \frac{a t^2}{2} = a \left( \frac{T_0^2}{2} + T_0 t - \frac{t^2}{2} \right)$$

$$\frac{T_0^2}{2} + T_0 t - \frac{t^2}{2} = 0$$

$$t = 2T_0 + T_0 \sqrt{2}$$

4.2.

$\Delta t$   
 $v_1 = v_2 = 0$   
 $y_1 = y_2$



$$y_1 = v t - \frac{g t^2}{2}$$

$$y_2 = v(t - \Delta t) - \frac{g(t - \Delta t)^2}{2}$$

$$y_1 = y_2$$

КОД: \_\_\_\_\_

$T$  - время до встречи.

$$\delta T - \frac{gT^2}{2} = \delta(\tau - \Delta t) - \frac{g(\tau - \Delta t)^2}{2}$$

↓

$$T = \frac{\delta}{g} + \frac{\Delta t}{2} \quad \text{время после вылета 1-го шарика}$$

$$t_{\text{выр}} = \frac{\delta}{g} - \frac{\Delta t}{2} \quad \text{время после вылета 2-го на } \Delta t \text{ меньше}$$

4.4

$$l = \frac{3}{4} H$$

$$\left. \begin{array}{l} y \\ y_0 = H \\ y = l \\ T \end{array} \right\}$$

$$y = y_0 + v_{0y} t + \frac{gt^2}{2}$$

$$l = H - \frac{gt^2}{2}$$

$$t = t_n - T$$

$$l = H - \frac{g(t_n - T)^2}{2}$$

$$\frac{3}{4} H = H - \frac{g(t_n - T)^2}{2}$$

если  $y = 0$ .  $0 = H - \frac{gt_n^2}{2}$

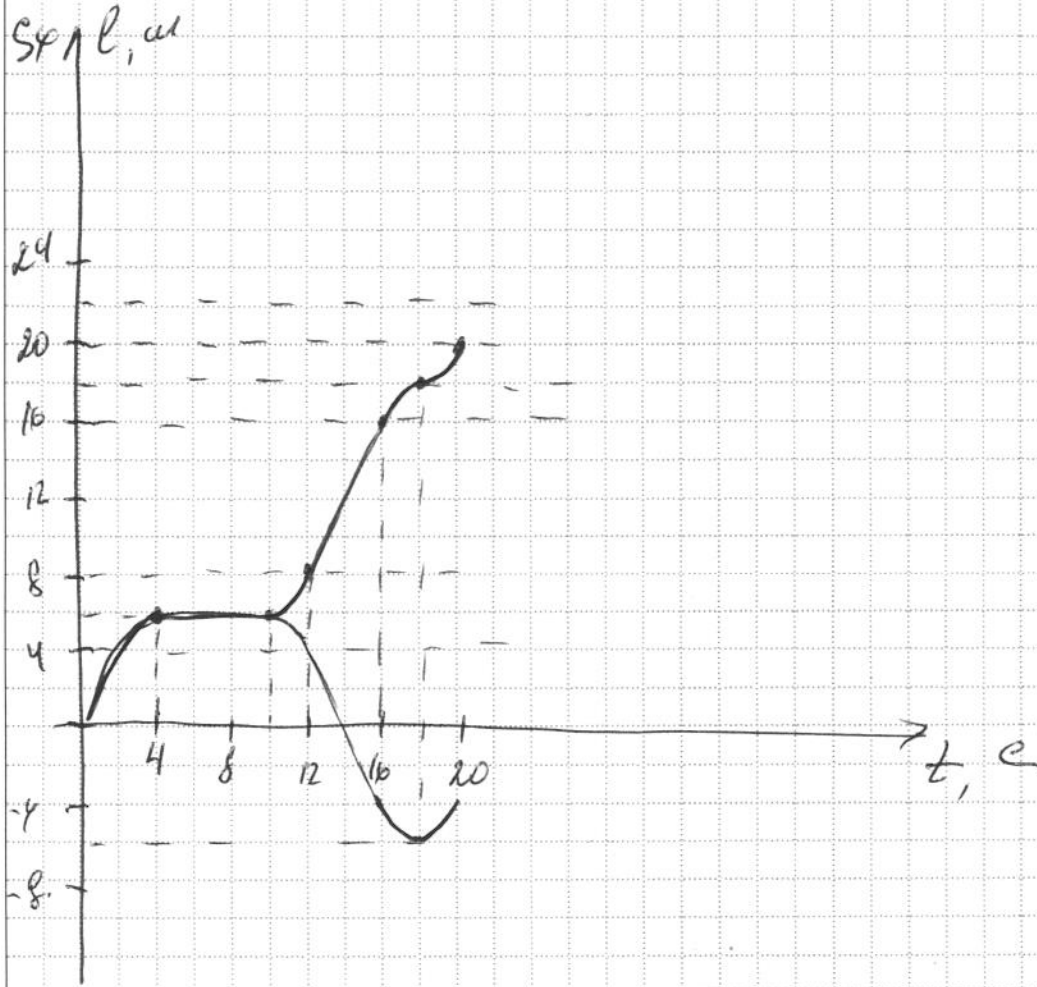
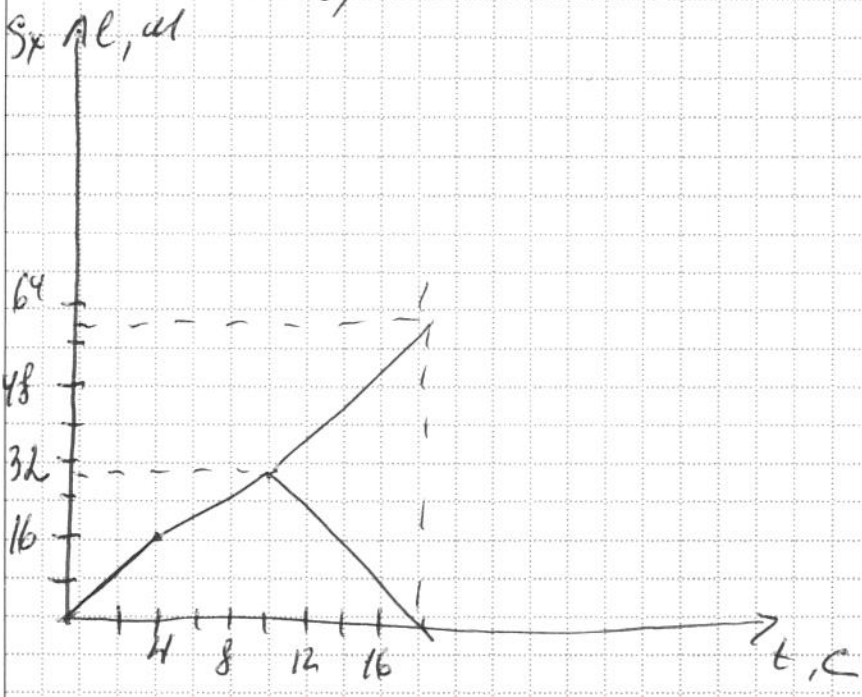
$$\left. \begin{array}{l} \frac{1}{4} H = \frac{g(t_n - T)^2}{2} \\ H = \frac{gt_n^2}{2} \end{array} \right\} \Rightarrow$$

$$t_1 = \frac{2}{3} t_n \quad \text{не учитывать } T$$

$$t_2 = 2t_n \Rightarrow$$

$$H = 19,6 \text{ м}$$

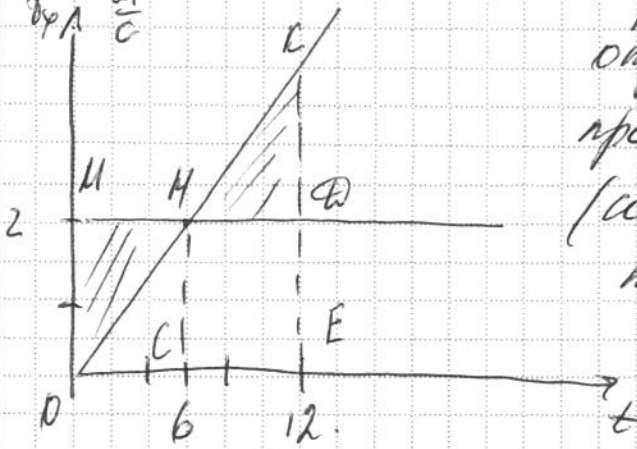
5.1. а)



5.3  
 $\delta_{\text{уд}}$   $\frac{\text{см}}{\text{с}}$

КОД:

Время врезки  
 определяется равенством  
 пройденных гнетущими путей  
 (совпадают с модулями  
 перемещений)



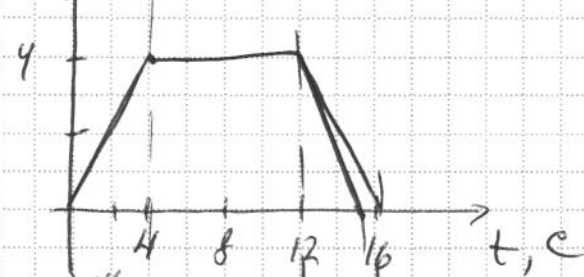
$$S_{OMN} = S_{ONQE} \Rightarrow$$

$$\Delta OMN = \Delta NQE \Rightarrow$$

$$t_{\text{врез}} = 12 \text{ с.}$$

$$l = 24 \text{ см.}$$

5.4  
 $\delta_{\text{уд}}$   $\frac{\text{см}}{\text{с}}$

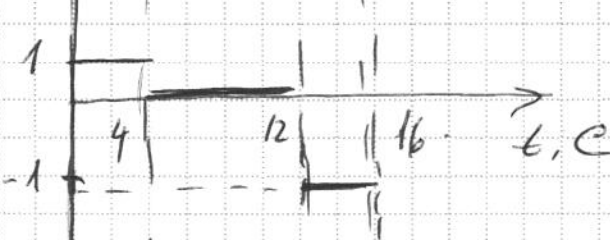


$$a_1 = \frac{4-0}{4} = 1 \frac{\text{см}}{\text{с}^2}$$

$$a_2 = 0.$$

$$a_3 = \frac{0-4}{3} = -1,3 \frac{\text{см}}{\text{с}^2}$$

$\delta_{\text{уд}}$   $\frac{\text{см}}{\text{с}^2}$



$\rho, S_x$   $\text{м}^4$

