Ph. Tutor
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x, v, a

$v = \text{const}$

$x(t) = v_0 \cdot t + x_0 \qquad (1)$

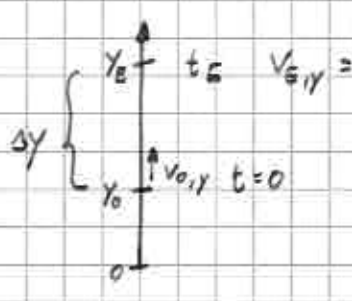
gl. beschl. Bew.

$v(t) = a_0 \cdot t + v_0 \qquad (2)$

$x(t) = x_0 + v_0 t + \frac{1}{2} a t^2 \qquad (3)$

Blatt 1 A1:

Geg: $v_{0,y} = 14,7 \frac{m}{s}$, $a_y = -g = -9,81 \frac{m}{s^2}$



a) Ges: t

$v_y(t) = v_{0,y} + a_y \cdot t$

$0 = v_{0,y} - g \cdot t$

$t = \frac{v_{0,y}}{g} = 1,5\,s$

b) 1. Mögl.

$\Delta y = \langle v_y \rangle \cdot t = \frac{1}{2} \cdot (v_{0,y} + \overbrace{v_y(t)}^{=0}) \cdot t = 11\,m$

2. Mögl.

$\Delta y = v_{0,y} \cdot t + \frac{1}{2} \cdot a \cdot t^2 = v_{0,y} \cdot t - \frac{1}{2} \cdot g \cdot t^2 = 11\,m$

c) 1. Mögl.

$$\Delta y = v_{0,y} \cdot t + \frac{1}{2} a_y t^2$$

$$\Delta y = 0$$

$$0 = v_{0,y} \cdot t + \frac{1}{2} a_y t^2$$

$$0 = \left(v_{0,y} + \frac{1}{2} a_y t\right) \cdot t$$

$t = 0$ nicht gesucht

$$\Rightarrow \quad t = \frac{2 v_{0,y}}{g} = \underline{3\,s}$$

2. Mögl.

$$\Delta y_1 = 11\,m \qquad t_1 = 1{,}5\,s$$

$$y = 2\Delta y = \Delta y_1 + \Delta y_2$$

$$t_{ges} = t_1 + t_2$$

$$\Delta y_2 = \Delta y_1 = 11\,m$$

$$\Delta y_2 = \frac{1}{2} g t^2 \qquad t = \sqrt{\frac{2 \cdot \Delta y_2}{g}} = 1{,}5\,s$$

$$t_{ges} = t_1 + t_2 = 3\,s$$

Aufg. 2)

$$v_A = 25 \frac{m}{s} =$$

$$a_p = 5 \frac{m}{s^2}$$

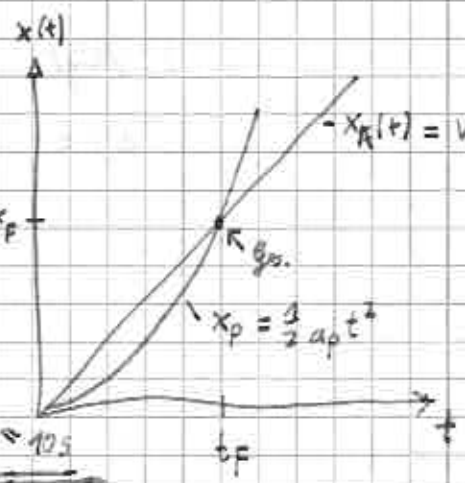
a) $v_A = 25 \frac{m}{s} = 90 \frac{km}{h}$

$$x_A(t) = v_A \cdot t$$

$$x_p(t) = \frac{1}{2} a_p \cdot t^2 \quad \Big\} \; x_A(t_F) = x_p(t_F)$$

$$v_A \cdot t_F = \frac{1}{2} a_p \cdot t_F^2$$

$$v_A = \frac{1}{2} a_p \cdot t_F \Rightarrow t_F = \frac{2 \cdot v_A}{a_p} = 10\,s$$



c) Ges: $v_p(t_F)$

$$v_p(t) = a_p \cdot t + \underbrace{v_{0,x}}_{=0}$$

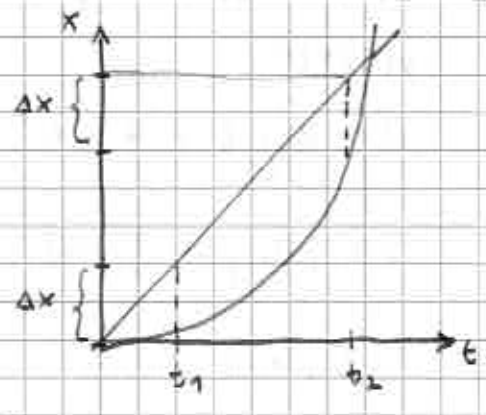
$$v_p(t_F) = a_p \cdot t_F = 50 \frac{m}{s} = 180 \frac{km}{h}$$

d)

A = R

$$x_R(t) = v_R \cdot t \quad (1)$$

$$x_p(t) = \frac{1}{2} a_p t^2 \quad (2)$$



$$(1) - (2) = 25\,m$$

$$v_R \cdot t - \frac{1}{2} a_p t^2 = 25\,m$$

$$-\frac{1}{2} a_p t^2 + v_R \cdot t - 25\,m = 0$$

$$t_{1/2} = \frac{-v_R \pm \sqrt{v_R^2 - 4 \cdot \frac{1}{2} a_p \, 25m}}{-2 \cdot \frac{1}{2} a_p}$$

$$t_1 = \frac{v_R - \sqrt{v_R^2 - 50m \cdot a_p}}{a_p} = 1,73\,s$$

$$t_2 = \frac{v_R + \sqrt{v_R^2 - 50m \cdot a_p}}{a_p} = 8,78\,s$$

$$v_{p,1}(t) = a_p \cdot t_1 = 5,64 \frac{m}{s} = 20,2 \frac{km}{h}$$

$$v_{p,2}(t) = a_p \cdot t_2 = 44,4 \frac{m}{s} = 160 \frac{km}{h}$$

$$x(t) = v_0 t + x_0 \quad (1)$$

$$v(t) = a_0 \cdot t + v_0 \quad (2)$$

$$x(t) = \frac{1}{2} a_0 t^2 + v_0 t + x_0 \quad (3)$$

Blatt 2 : A1

a) $y(t) = v_{0,y} \cdot t - \frac{1}{2} g t^2$

$y(t) = 0$

$0 = v_{0,y} \cdot t - \frac{1}{2} g t^2$

$0 = (v_{0,y} - \frac{1}{2} g t) \cdot t$

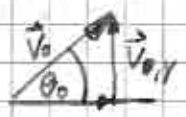
$t_1 = 0$

$t_2 = \frac{2 \cdot v_{0,y}}{g}$

$= \frac{2 \cdot v_0 \cdot \sin\theta_0}{g} = 3{,}00\ s$

Geg: $v_0 = 24{,}5 \frac{m}{s}$

$\theta_0 = 36{,}5°$



$\sin\theta_0 = \frac{v_{0,y}}{v_0}$

b)

$x(t) = v_{0,x} \cdot t_2 = \cos\theta_0 \cdot v_0 \cdot t_2 = 58{,}8\ m$