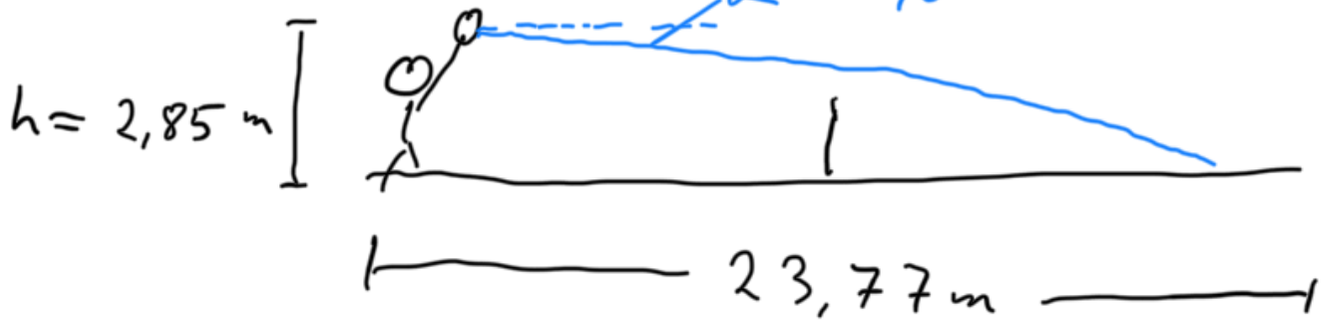
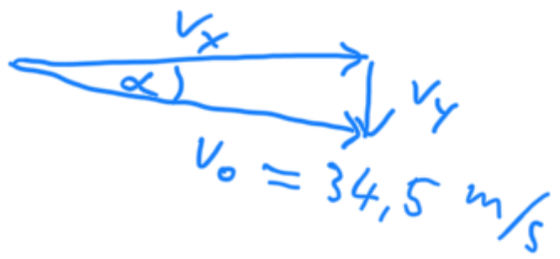
1.1.





1.2. $a_x = 0$ $\quad a_y = -g$

$v_x(t) = v_0 \cdot \cos\alpha \; (= 0,9998 \cdot v_0 \approx v_0)$ $\quad v_y(t) = v_0 \cdot \sin\alpha - g \cdot t$

$s_x(t) = v_x \cdot t$ $\quad s_y(t) = h + v_0 \sin\alpha \cdot t - \frac{1}{2} g t^2$

1.3. $t = 0,2\,s$ $\quad t = 0,6\,s$

$s_x(0,2s) = 6,89\,m$ $\quad s_x(0,6s) = 20,7\,m$

$s_y(0,2s) = 2,34\,m$ $\quad s_y(0,6s) = 0,15\,m$

1.4. t_H = Zeit, in der Ball bei $s_x = \frac{23,77}{2}\,m = 11,89\,m$

$\Rightarrow t_H = \frac{s_x(t_H)}{v_x} = \frac{11,89\,m}{34,5\,m/s \cdot \cos(-2,6)} = 0,345\,s$

$\Rightarrow s_y(0,345s) = 1,73\,m \quad \Rightarrow \Delta y = 1,73\,m - 1,06\,m$

$= 0,67\,m$

1.5. $s_x(t_E) = 23{,}77\,m$ (t_E = „Ende")

$= v_x \cdot t_E \Rightarrow t_E = \frac{23{,}77\,m}{34{,}5\,m/s \cdot \cos(-2{,}6°)} = 0{,}69\,s$

$\Rightarrow s_y(0{,}69\,s) = -0{,}57\,m$ $\Rightarrow$ Ball war im Feld

2.1. $s_w = \frac{v_0^2}{g} \sin(2\alpha)$ Wurfweite (max. s_x)

2α: 90°, dann sin = 1, also maximal

$\Rightarrow \alpha = 45°$

$= 1{,}11\,m$

2.2. $v_y(t) = v_{y0} - g \cdot t \overset{!}{=} 0$ nach der Steigzeit t_s

$\Rightarrow v_{y0} = g \cdot t_s \Leftrightarrow t_s = \frac{v_{y0}}{g} = \frac{1}{2} \begin{cases} 0{,}7\,s \\ 0{,}63\,s \end{cases}$

$\Rightarrow v_{y0} = \begin{cases} 3{,}68\,m/s \\ 3{,}1\,m/s \end{cases}$

$\Rightarrow s_y(t_s) = \frac{1}{2} g t_s^2 + v_{y0} \cdot t_s = \begin{cases} 69\,cm \\ 49\,cm \end{cases}$

3.1. $r = 2\,m$, $T = 0{,}5\,s$

$\Rightarrow \omega = \frac{2\pi}{T} = 12{,}6/s$ $\Rightarrow v = r\omega = \frac{2\pi r}{T} = 25{,}1\,m/s$

3.2. $r = 150\ \text{Mio km}$, $T = 365 \cdot 24 \cdot 60 \cdot 60\ \text{s}$

$\omega = 2 \cdot 10^{-7}\ /\text{s}$ $\Rightarrow$ $v = 30\ \text{km/s}$