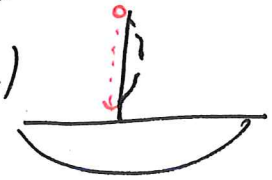
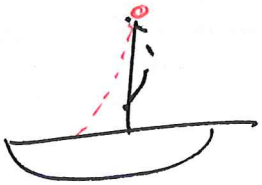
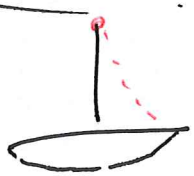
Freier Fall

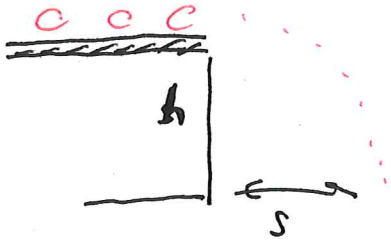
① a) identisch wie wenn Flasche in Zug fallen würde: freier Fall : ↓

b) waagrechte Wurf : ⇢

c) v des Zuges

② a)  b)  c) 

③ Text evtl. unklar ... gefragt: Höhe



Geg: $v = 2\ m/s$
$s = 1.35\ m$, $g = 9.81\ m/s^2$

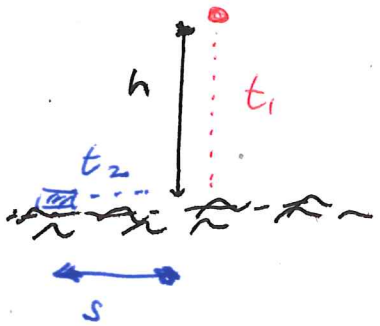
Ges: h

L: Kugel wird nicht abgebremst
$v \rightarrow$ bleibt gleich, ist gleichförmig

$v = \frac{s}{t} \rightarrow t = \frac{s}{v} = \frac{1.35}{2} = 0.675\ s$

$h = \frac{1}{2} \cdot g \cdot t^2 = \frac{1}{2} \cdot 9.81\ m/s^2 \cdot (0.675)^2$

$= 2.23\ m$

④ 

Geg: $v(Flug) = 4\ m/s$
$h = 12\ m$, $g = 9.81\ m/s^2$

Ges: s

L: gleiche Zeiten! $t_1 = t_2 = t$

$v(Flug) = \frac{s}{t} \rightarrow t = \frac{s}{v(Flug)}$

$h = \frac{1}{2} g t^2 \rightarrow t = \sqrt{\frac{2h}{g}}$

$s = \sqrt{\frac{2h}{g}} \cdot v = \sqrt{\frac{2 \cdot 12}{9.81}} \cdot 4 = 6.26\ m$

⑤ Geg: $v(2\text{-}g) = 72\ \text{km/h} \hat{=} 20\ \text{m/s}$

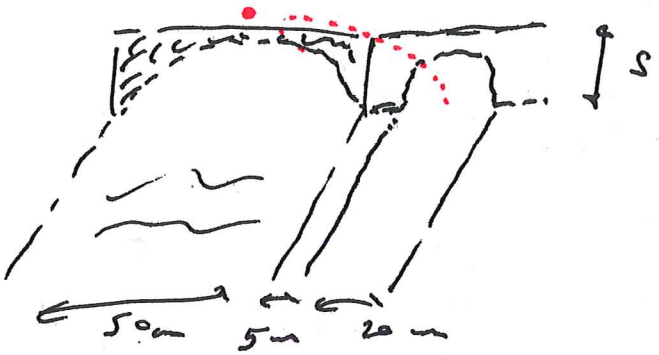
$h = 19.6\,\text{m}$

$s(\text{Fluss}) = 50\,\text{m}$; $s(\text{Straße}) = 20\,\text{m}$, $s = 5\,\text{m}$

Ges: t,

L.:

a)



$s = 19.6\,\text{m} = \frac{1}{2} g t^2$

$\rightarrow t = \sqrt{\frac{2 \cdot s}{g}} = \sqrt{\frac{2 \cdot 19.6}{9.81}} = \underline{\underline{2\,\text{s}}}$

$v = \frac{s}{t} \rightarrow s = v \cdot t$

$= 20\ \text{m/s} \cdot 2 = 40\,\text{m}$

50 — 5 → ← 20

25m 5 10 = 40m → Straßenmitte

b) ohne Luftreibung! → v bleibt gleich!

→ 0m

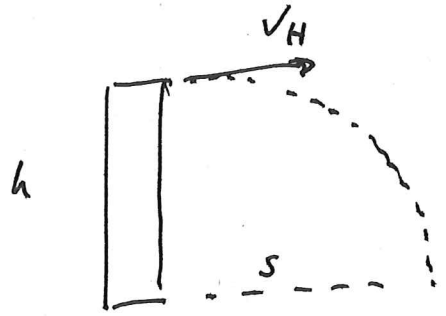
(6)

Geg: $h = 45\,m$

$v = 10\,m/s$ ($\rightarrow$ "v_H")

Ges: s, t, v ($\downarrow v_v$)

L:



$h = \frac{1}{2} g t^2$

$\rightarrow t = \sqrt{\frac{2 \cdot h}{g}} = \sqrt{\frac{2 \cdot 45}{9.81}}$

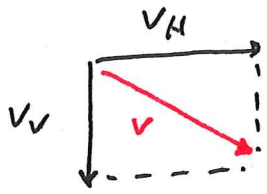
$= 3.03\,s$

$v_H = \frac{s}{t} \rightarrow s = v_H \cdot t$

$= 10 \cdot 3.03 = 30.3\,m$

$v_{vertikal} = g \cdot t = 9.81 \cdot 3.03 = 29.72\,m/s$

Resultierende v ist eine vektorielle Größe



$v = \sqrt{(v_H)^2 + (v_V)^2}$

$= \sqrt{10^2 + 29.72^2}$

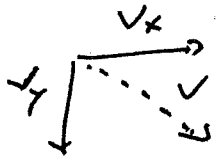
$= 31.35\,m/s$

(7)

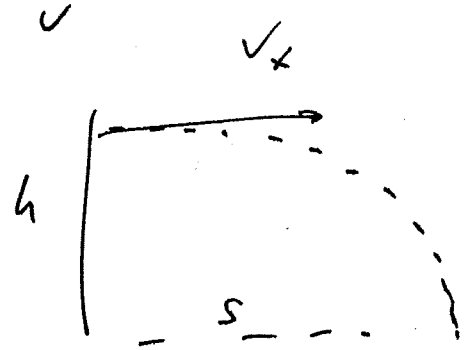
Gy: $h = 0.6\ m$

$s = 1.1\ m$

Gs: v



L.:



$$h = \frac{1}{2} g t^2 \rightarrow t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 0.6}{9.81}}$$

$$= 0.35 s$$

$$v_x = \frac{s}{t} = \frac{1.1}{0.35} = 3.15 \frac{m}{s}$$

$$v_y = g \cdot t = 9.81 \cdot 0.35 = 3.43 \frac{m}{s}$$

$$v = \sqrt{v_x^2 + v_y^2} = \sqrt{3.15^2 + 3.43^2}$$

$$= 4.66 \frac{m}{s}$$