Physik, TBM 4E, 27.3.2012

→ 1) und 5): $F = \frac{dp}{dt}$

$dp = F \cdot dt$

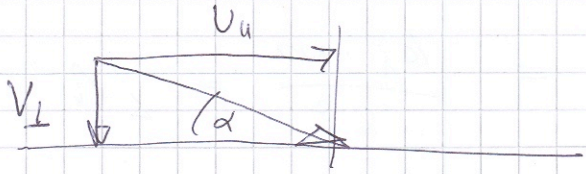
(1) • horizontale Geschw. nimmt ab
⇒ Kraft F wirkt
$p = F \cdot t$ ($F = \frac{\Delta p}{\Delta t}$)
→ Kraftstoss

(2) $m_1 = 60\,kg$, $m_2 = 5\,kg$, $v_2 = 20\,km/h = 5.\overline{5}\,m/s$

$m_1 v_1 = m_2 v_2$

$v_1 = \frac{m_2}{m_1} \cdot v_2 = \underline{0.463\,m/s = 1.\overline{6}\,km/h}$

(3)



$v_\perp = v \cdot \sin\alpha$

$\Delta p = 2mv \cdot \sin\alpha = \underline{4.834\,kg\,m/s}$

(4) $m = 0.15\,kg$, $v_1 = 16\,m/s$, $M = 4\,kg$

a) $mv_1 = (m+M)v_2 \Rightarrow v_2 = \frac{m}{M+m} v_1$

$= \underline{0.361\,m/s}$

b) $E_{kin,vorher} = \frac{1}{2} m v_1^2 = 7.5\,J.$

$E_{kin,nachher} = \frac{1}{2}(m+M)\left(\frac{m}{M+m} v_1\right)^2$

$= \frac{1}{2} \frac{m^2}{M+m} v_1^2 = 0.2711\,J.$

c) 96.39 %

(5) $M = 38 \cdot 10^6 kg$, $m = 1000 kg$, $v = 1400 m/s$

$$\Delta v = \frac{mv}{M} = \frac{1000 \cdot 1400}{38 \cdot 10^6} = 3.68 \; cm/s$$

$$0.0368 \; m/s$$

b) $\Delta p = 100 m \cdot v$

$$\Delta p = \frac{100 \cdot m \cdot v}{60 s} = 2'333'333 \frac{kg \, m/s}{s}$$

$$= \underline{\underline{2.\bar{3} \; MN}} \quad \text{resp.}$$

c) $[p] = \frac{kg \cdot m}{s}$

$[t] = s$

$$\left[\frac{p}{t}\right] = \frac{kg \cdot m}{s^2} = [N]$$

↳ kraft (Newton)