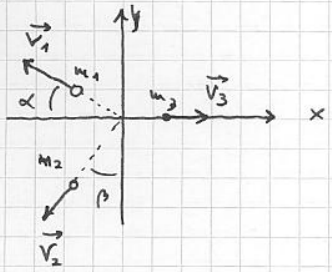
7.22



a) $\vec{P}_{totale\ i} = \vec{P}_{totale\ f} = \vec{0}$

• $P_{totale\ f\ x} = 0$ / composante x :

$$-V_1 m_1 \cos\alpha - V_2 m_2 \sin\beta + m_3 V_3 = 0 \quad (1)$$

• composante y ; $P_{totale\ f\ y} = 0$

$$V_1 m_1 \sin\alpha - V_2 m_2 \cos\beta = 0 \quad (2)$$

Inconnues : m_1, m_2.

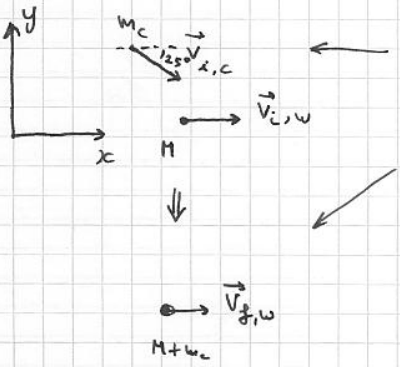
de (2) : $m_2 = \dfrac{V_1 m_1 \sin\alpha}{V_2 \cos\beta}$ $\Rightarrow$ dans (1) : $-V_1 m_1 \cos\alpha - V_2 \cdot \dfrac{V_1 m_1 \sin\alpha \sin\beta}{V_2 \cos\beta} = -m_3 V_3$

$$m_1 \left(-V_1 \cos\alpha - V_1 \frac{\sin\alpha \sin\beta}{\cos\beta} \right) = -m_3 V_3$$

$$\Rightarrow m_1 = \frac{-m_2 V_3}{-V_1 \cos\alpha - V_1 \frac{\sin\alpha}{\cos\beta}\sin\beta} = \frac{m_3 V_3}{V_1 \left(\cos\alpha + \frac{\sin\alpha}{\cos\beta}\sin\beta \right)} \approx \underline{0{,}120\ kg} \quad (A)$$

b). $m_2 = \dfrac{V_1 m_1 \sin\alpha}{V_2 \cos\beta} = \underline{0{,}200\ kg}$

7.23



Avant : $\vec{P}_{totale\ i} = m_c \vec{V}_{i,c} + M \vec{V}_{i,w}$

Après : $\vec{P}_{totale\ f} = (M + m_c) \vec{V}_{f,w}$

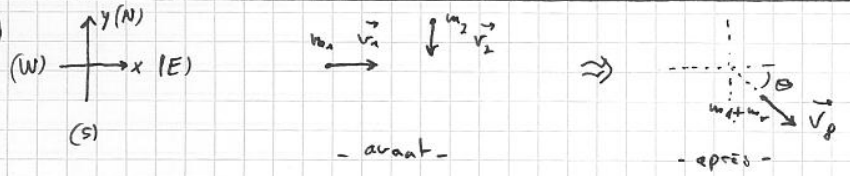
• La quantité de mouvement est conservée sur la composante x, mais pas sur la composante y, car durant le choc une force $\vec{F}_N$ agit sur le chariot et le chariot.

• $P_{i\,x} = P_{f\,x}$

$$m_c V_{i,c} \cos 25 + M V_{i,w} = (M + m_c) V_{f,w}$$

$$\Rightarrow V_{f,w} = \frac{m_c V_{i,c} \cos 25° + M V_{i,w}}{M + m} = \frac{150 \cdot 0{,}8 \cdot \cos 25° + 440 \cdot 0{,}5}{590} \approx \underline{0{,}56\ m/s}$$

7.24



La quantité de mouvement est conservée

$P_{i\,x} = P_{f\,x}$

$P_{i\,y} = P_{f\,y}$

$$\begin{cases} P_{i\,x} = m_1 v_1 & P_{f\,x} = (m_1 + m_2) v_f \cos\theta \\ P_{i\,y} = -m_2 v_2 & P_{f\,y} = (m_1 + m_2) v_f \sin\theta \end{cases} \Rightarrow \begin{cases} m_1 v_1 = (m_1 + m_2) v_f \cos\theta & (1) \\ -m_2 v_2 = (m_1 + m_2) v_f \sin\theta & (2) \end{cases}$$

$\dfrac{(2)}{(1)}$: $-\dfrac{m_2 v_2}{m_1 v_1} = \operatorname{tg}\theta \Rightarrow \theta = \operatorname{Arctg}\left(-\dfrac{m_2 v_2}{m_1 v_1} \right) = \operatorname{Arctg}\left(-\dfrac{70 \cdot 7}{50 \cdot 3} \right) \approx \underline{-73°}$ (sto A)

$$v_f = \frac{m_1 v_1}{m_1 + m_2} \cdot \frac{1}{\cos\theta} = \underline{\quad\quad}\ m/s$$