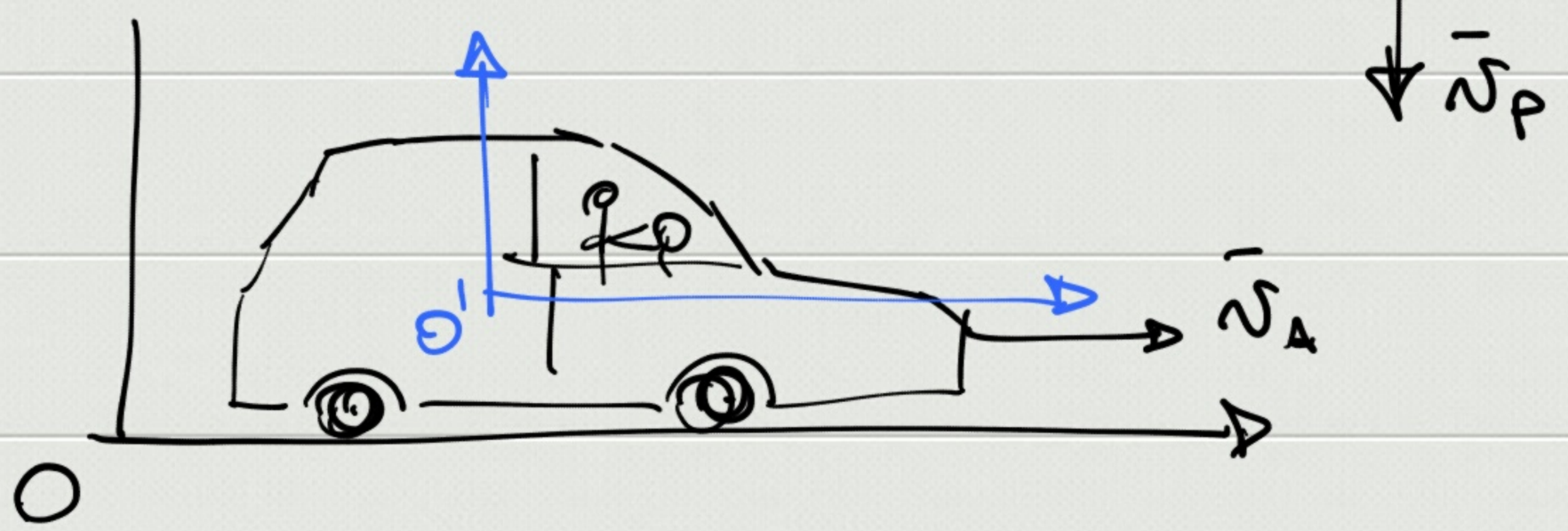
$v_A = 80$ km/h

$\vartheta_p = 80°$

$|\bar{v}_p| = ?$

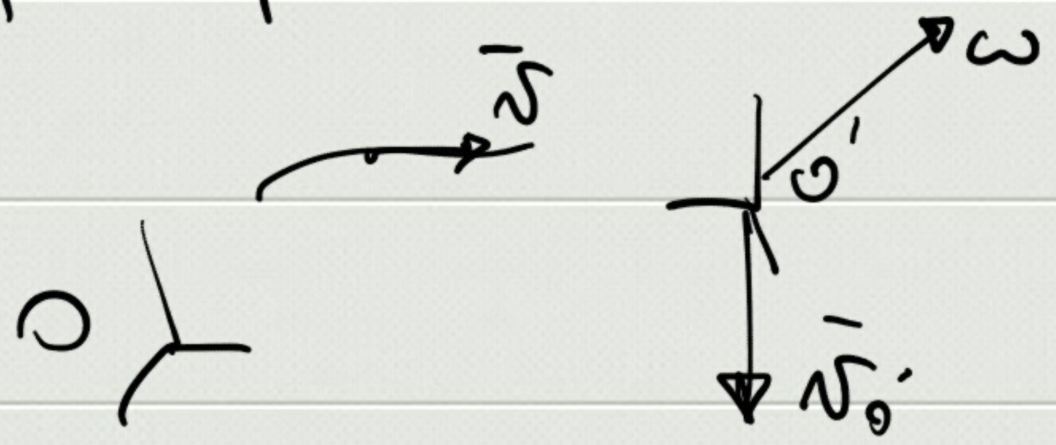


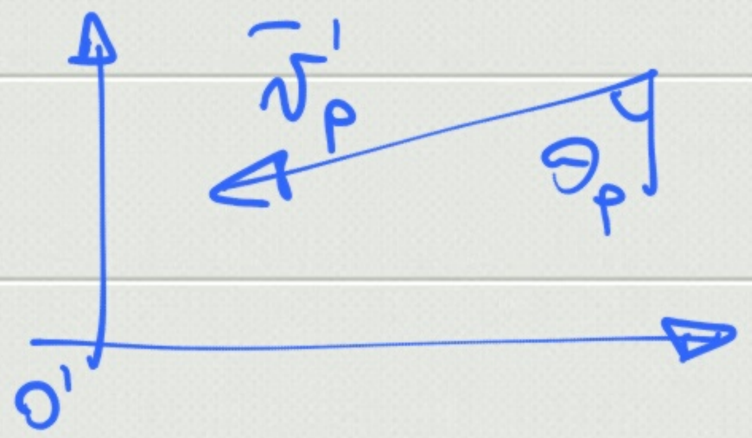
$\bar{v}_p = \bar{v}'_p + \bar{v}_A$

$\bar{v}_p = \bar{v}'_p + \bar{v}_A$ *

$\bar{v}'_p = \bar{v}_p - \bar{v}_A$

$v'_p = v_p - v_A$

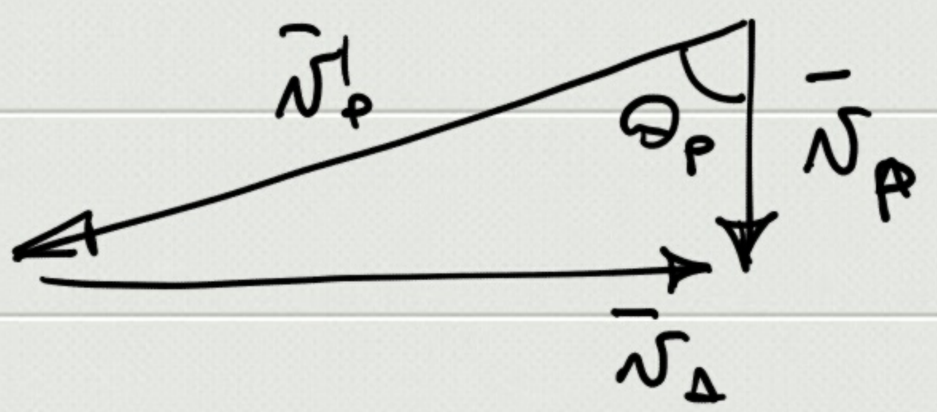




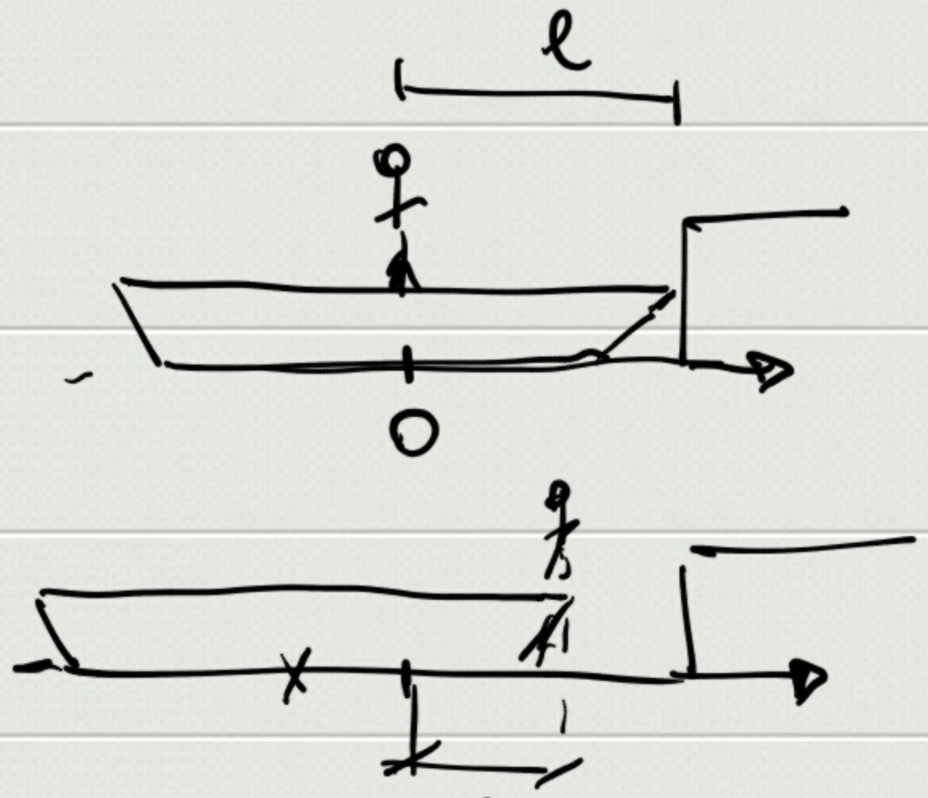
$$\bar{v} = \bar{v}' + \bar{v}_{O'} + \bar{\omega} \times \bar{r}'$$

$\bar{v}_p$ $\bar{v}'_p$ $\bar{v}_A$ $0 =$

$\Rightarrow \bar{v}_p = \bar{v}'_p + \bar{v}_A$



$v_p = v_A \operatorname{ctg} \vartheta_p = 14.1$ km/h



$m_c = 45\ kg \qquad v_{c,0} = 0$

$m_u = 90\ kg \qquad v_{u,0} = 0$

$l = 1.8\ m$

d

$d = ?$

$$\bar{R}^{ext} = 0 \Rightarrow \bar{P} = m_u \bar{v}_u + m_c \bar{v}_c = cost = 0 \Rightarrow v_{CM} = 0$$

$$\Rightarrow \bar{P} = m_{TOT} \bar{v}_{CM}$$

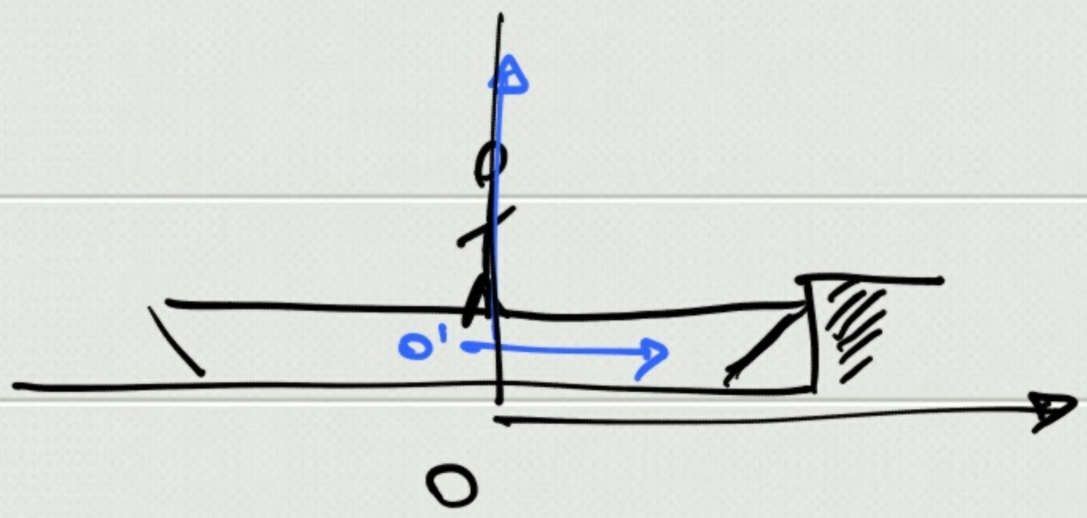
$$\Rightarrow x_{CM} = cost$$

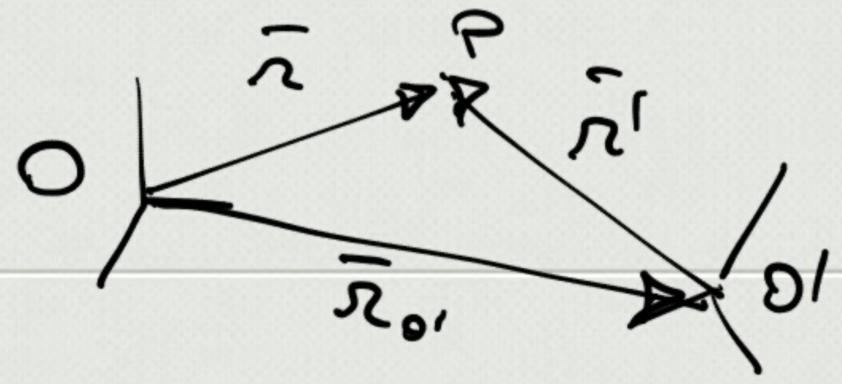
$$x_{CM}^{i} = \frac{m_u \cdot 0 + m_c \cdot 0}{m_u + m_c} = 0$$

$$x_{CM}^{f} = \frac{m_u d + m_c (d - l)}{m_u + m_c}$$

$$\Rightarrow (m_u + m_c) d = m_c l$$

$$\Rightarrow d = \frac{m_c}{m_u + m_c} l = 0.6\ m$$





$$\bar{R} = \bar{r}' + \bar{r}_{O'}$$

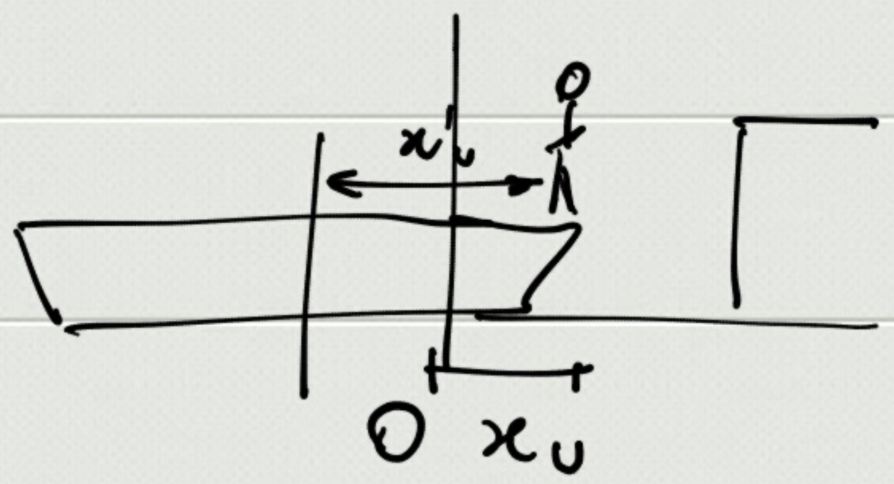
$$\bar{R}^{\varepsilon} = 0 \Rightarrow \bar{P} = \text{const} = 0 \Rightarrow x_{CM} = \text{const} = 0$$

$$= m_U x_U + m_C x_C$$

$$\begin{cases} m_U x_U + m_C x_C = 0 \\ x_U = x'_U + x_C \end{cases}$$

$$\downarrow$$

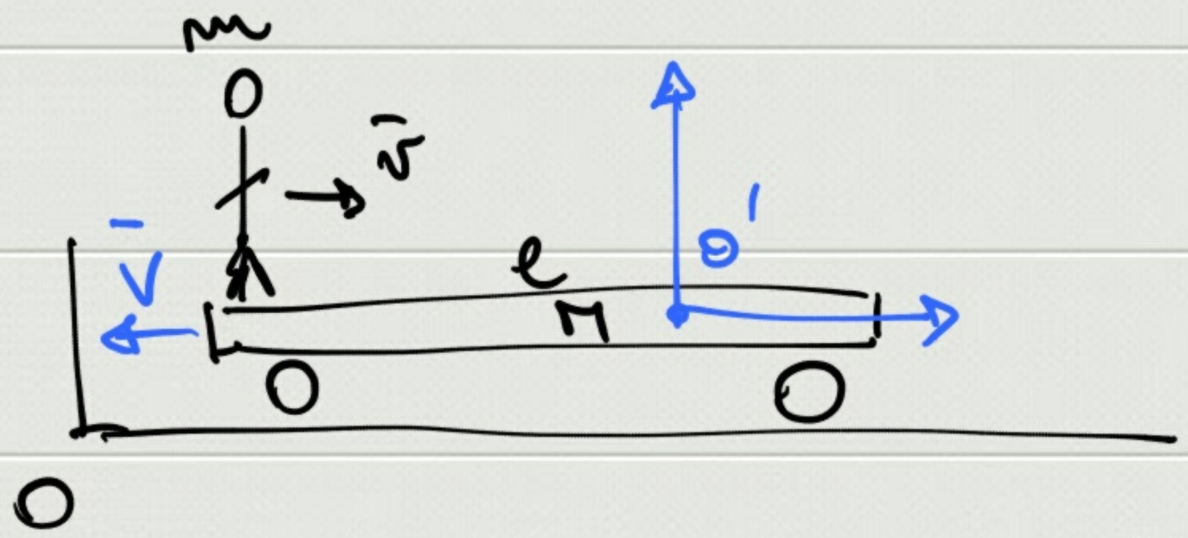
$$\ell$$



$$\Rightarrow x_C = -\frac{m_U}{m_C} x_U$$

$$\Rightarrow x_U = \ell - \frac{m_U}{m_C} x_U \Rightarrow x_U \left(1 + \frac{m_U}{m_C}\right) = \ell$$

$$\Rightarrow x_U = \frac{m_C}{m_C + m_U} \ell$$



m , $M = 9m$

$\ell = 4\,m$ ⇐

$v_0 = 0$

$a = 0.5\ m/s^2 \Rightarrow a'$

$V_f = ?$

$\vec{R}^{ext} = 0 \Rightarrow \vec{P} = cost = 0$

$= m\vec{v} + M\vec{V}$ $\Rightarrow$ $\boxed{\vec{v} = -\frac{M}{m}\vec{V}}$

$\vec{v} = \vec{v}' + \vec{V}$

SdR mobile : $v_f'^2 = \overset{0}{v_i'^2} + 2a'\ell'$ (a, ℓ) $\Rightarrow v_f' = \sqrt{2a'\ell'}$

$$\begin{cases} v = -\frac{M}{m}V \Rightarrow v_f = -\frac{M}{m}V_f \\ v_f = \sqrt{2a'\ell'} + V_f \end{cases} \Rightarrow$$

$$-\frac{M}{m}V_f = \sqrt{2a'\ell'} + V_f \Rightarrow V_f = -\frac{\sqrt{2a'\ell'}}{1+\frac{M}{m}}$$

$$\Rightarrow V_f = -\frac{m}{m+M}\sqrt{2a'\ell'} = -0.2\ m/s$$