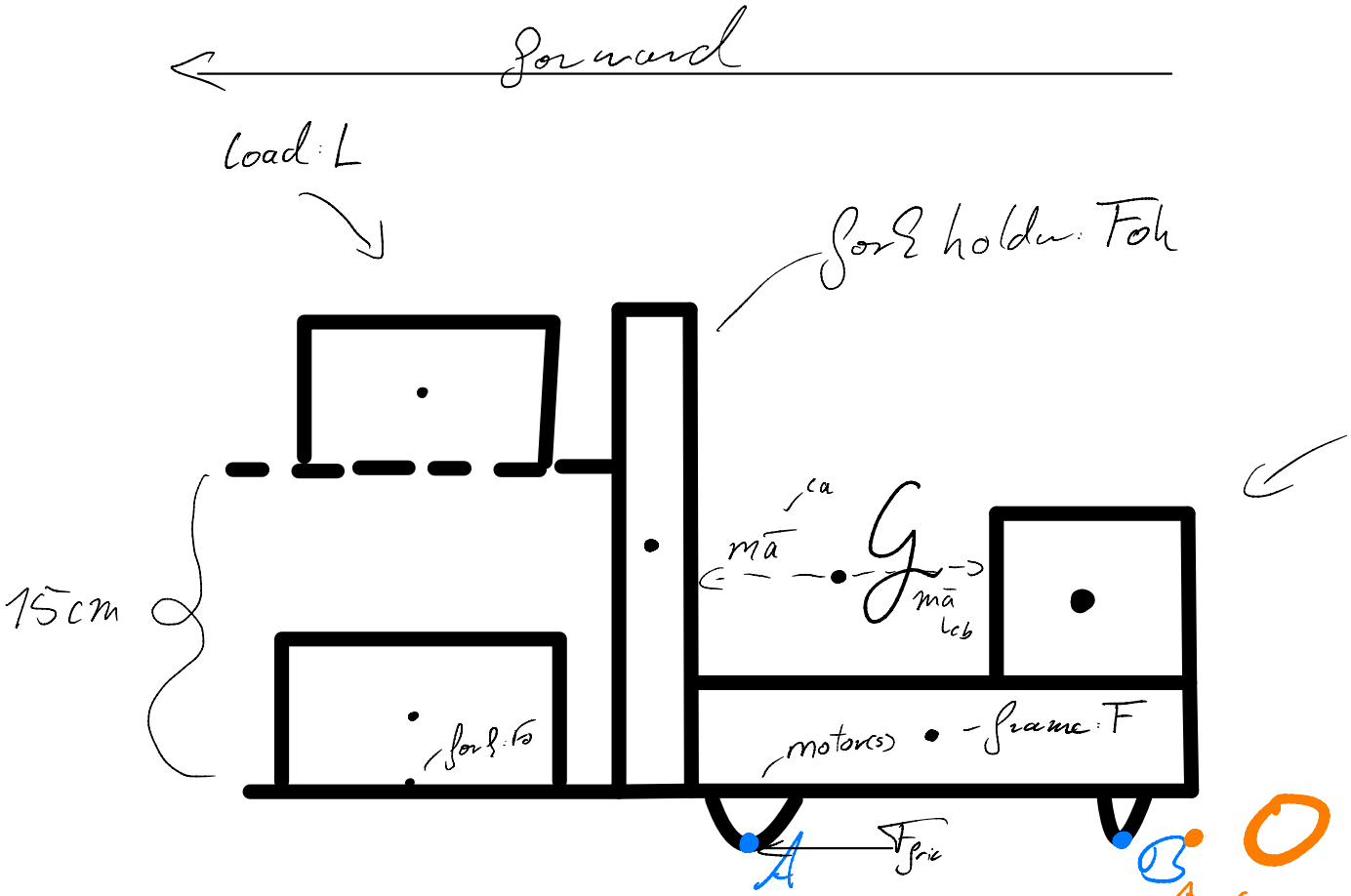
2 cases: fork up & fork down



Finding common center of gravity case 1

- reference Point: O

$$\sum M_{x\text{-axis}}(\text{combined body}) = \sum M_{x\text{axis}}(\text{separate bodies})$$

$$(m_L + m_{Fo} + m_F + m_c) \cdot g \cdot y = m_L \cdot g \cdot y_L + m_{Fo} \cdot g \cdot y_{Fo} + m_F \cdot g \cdot y_F + m_c \cdot g \cdot y_c + m_{Foh} \cdot g \cdot y_{Foh}$$

$$\Leftrightarrow \quad y = \frac{m_L y_L + m_{Fo} y_{Fo} + m_F y_F + m_c y_c + m_{Foh} y_{Foh}}{(m_L + m_{Fo} + m_F + m_c + m_{Foh})}$$

$$\sum M_{y\text{-axis}}(\text{combined body}) = \sum M_{y\text{axis}}(\text{separate bodies})$$

$$(m_L + m_{Fo} + m_F + m_c) \cdot g \cdot x = m_L \cdot g \cdot x_L + m_{Fo} \cdot g \cdot x_{Fo} + m_F \cdot g \cdot x_F + m_c g x_c + m_{Foh} g x_{Foh}$$

$$\Leftrightarrow \quad x = \frac{m_L x_L + m_{Fo} x_{Fo} + m_F x_F + m_c x_c + m_{Foh} x_{Foh}}{(m_L + m_{Fo} + m_F + m_c + m_{Foh})}$$

Combined x & y grip center of gravity of Fork with respect to point O