$E_{Pot} = m \cdot g \cdot h$ $\qquad c = 790 \ J/kg \cdot K$ $\qquad$ Modelling ... L1

$E_{kin} = \frac{1}{2} m \cdot v^2$

$\Delta U_{int} = m \cdot c \, \Delta T$

$$\frac{\Delta U_{int}}{m} = 790 \ J/kg$$

$$\frac{E_{kin}}{m} = \frac{1}{2} v^2 = 790 \Rightarrow v = 39,7 \ m/s = 144 \ km/h$$

$$\frac{E_{pot}}{m} = g \cdot h = 790 \Rightarrow h = 80,4 m$$

2.b energy balance:

$$cV\rho \, \dot{T}_2(t) = \frac{d(c_{cv} M_{cv} \, T_{cv}(t))}{dt} = P_{ext}(t) + c m_{in}(t) T_{in}(t) - c m_{out}(t) T_{out}(t) \quad , P_L(t) = K[T_2(t) - T_0(t)]$$

$$= P(t) - P_L(t) + c m(t) T_1(t) - c m(t) T_2(t)$$

2C. if m is constant do Laplace:

$$cV\rho \, s T_2(s) = P(s) - K T_2(s) + K T_0(s) + c m T_1(s) - c m T_2(s)$$

Transfer func:

$$T_2(s)(cV\rho s + K + cm) = P(s) + K T_0(s) + c m T_1(s)$$

$$T_2(s) = [P(s) + K T_0(s) + c m T_1(s)] \cdot 1/(cV\rho s + K + cm)$$