

Momentum

Engineering Fluid Mechanics

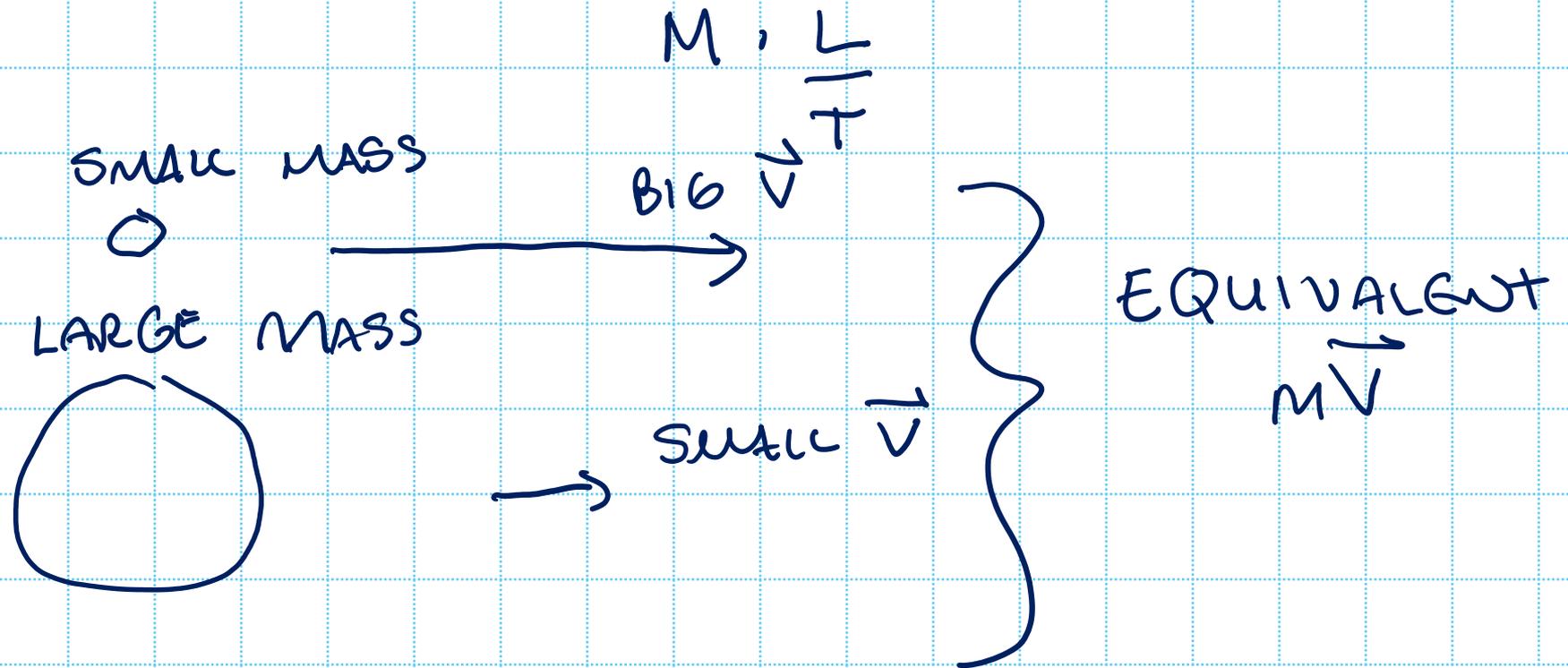
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LINEAR
MOMENTUM $M = m \cdot \vec{v}$



Momentum



$$\sum \vec{F} = m\vec{a} = m \cdot \frac{d\vec{v}}{dt} = \frac{d}{dt}(m\vec{v})$$

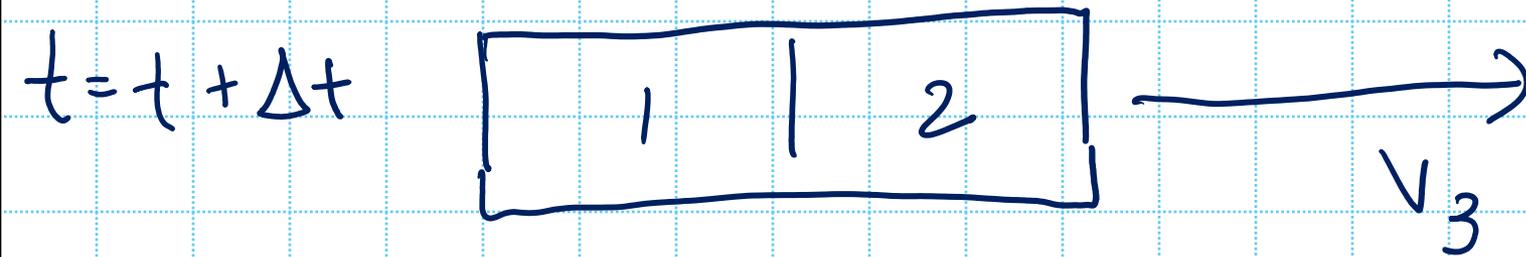
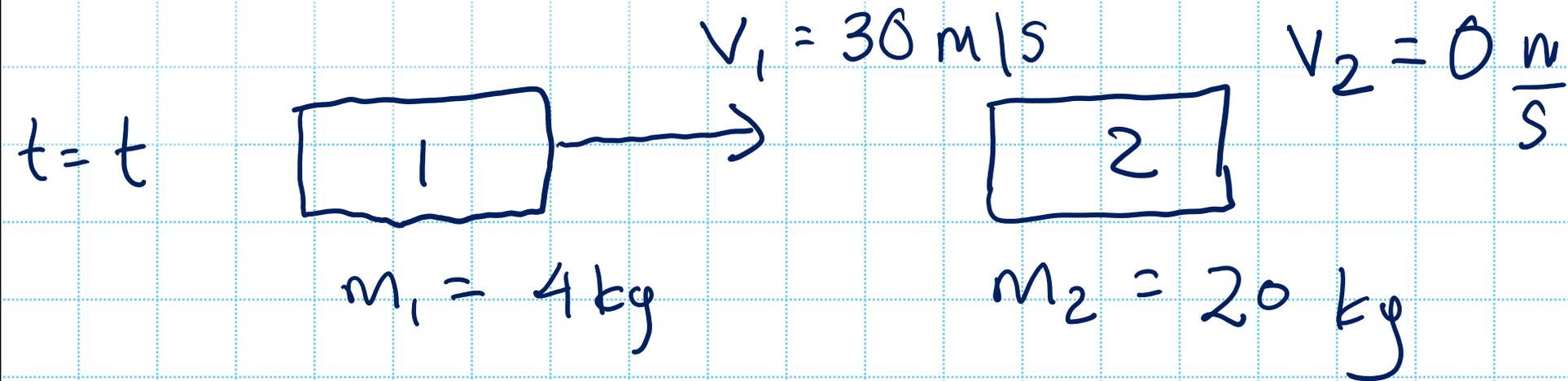
↑
SUM OF
EXTERNAL
FORCE

RATE OF
CHANGE OF
MOMENTUM

WHEN $\sum \vec{F} = 0$ MOMENTUM IS
NOT CHANGING

Momentum





Momentum example in a closed system (no external forces)



WHEN $\sum \vec{F} = 0$, MOMENTUM IS
CONSTANT

MOMENTUM @ $t = t$ = MOMENTUM @ $t = t + \Delta t$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v_3$$

$$v_3 = \frac{(m_1 v_1 + m_2 v_2)}{(m_1 + m_2)} = \frac{(4 \text{ kg} \cdot 30 \text{ m/s} + 20 \text{ kg} \cdot 0 \frac{\text{m}}{\text{s}})}{(4 \text{ kg} + 20 \text{ kg})}$$

$$\underline{v_3 = 5 \text{ m/s}}$$

Momentum example in a closed system (no external forces)





Acknowledgement

This material is based upon work partially supported by the National Science Foundation under Grant# 2335802. Any opinions, findings, and conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.





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THE END



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