

## 6. Newtonin I ja II laki

NI: jatkovuoden laki

jos kappaleeseen vaikuttavien ulkoisten voimien summa =  $\vec{0}$ ,  
kappale jatkaa liikelähtönsä (joko paikallaan tai  $\vec{v}$  vakiolla)

Voima aiheuttaa kiihtyvyyden:

$$\sum \vec{F} = m\vec{a}$$

NEWTONIN II LAKI

(DYNAMIIKAN PERUSLAKI)

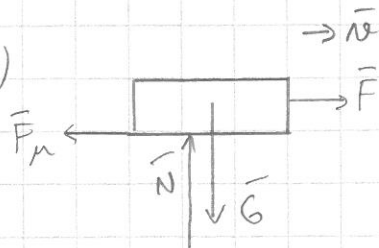
$$[F] = [m][a] = \text{kg} \frac{\text{m}}{\text{s}^2} = \text{N (newton)}$$

6.6 a) i)



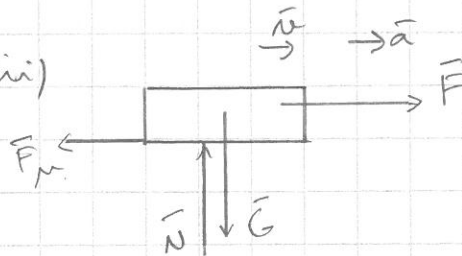
$\vec{G}$ : paino

ii)

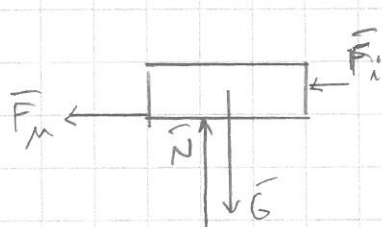


$\vec{F}_\mu$ : liukusilta

iii)

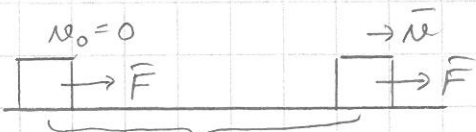


le)



$\vec{a}$   
 $\leftarrow$

6.11



$s$  avaruus

$$v = 120 \frac{\text{km}}{\text{h}}, s = 140 \text{ m}$$

$$m = 1390 \text{ kg}$$

$$v_b = \frac{\Delta v}{t} = \frac{v_0 + v}{2} = \frac{v}{2} \quad (\Rightarrow) t = \frac{2s}{v} = \frac{2 \cdot 140 \text{ m}}{\frac{120 \text{ km}}{3.6 \text{ s}}} = 8.4 \text{ s}$$

$$a = \frac{\Delta v}{\Delta t} = \frac{v - v_0}{t} = \frac{\frac{120 \text{ m}}{3.6 \text{ s}} - 0 \frac{\text{m}}{\text{s}}}{8.4 \text{ s}} = 3.96825 \frac{\text{m}}{\text{s}^2}$$

$$\text{NII: } \sum \vec{F} = m\vec{a} \Rightarrow F = ma = 1390 \text{ kg} \cdot 3.96825 \frac{\text{m}}{\text{s}^2} = 5515.87 \text{ N} = 5.5 \text{ kN}$$

(nopeuden summaa)