IV|2

$m = 1500\,kg$

$\Delta t = 3{,}1\,s$

$v = 100\,km/h$ ↓ m/s

$27{,}8$

$\frac{km}{h} \rightarrow \frac{m}{s} \quad \frac{1000}{60 \cdot 60} = \frac{1000}{3600} = \frac{1}{3{,}6}$

---

a.) $F = m \cdot a$

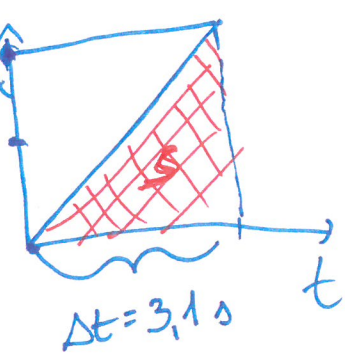
$a = \frac{\Delta v}{\Delta t} = \frac{27{,}8\,m/s}{3{,}1\,s} = 8{,}97\,m/s^2$

$F = 1500\,kg \cdot 8{,}97\,m/s^2 = 13452\,\frac{k \cdot m}{s^2}\,[N]$

↓

$13{,}452\,kN$

b.)



$s = \frac{v_{max}}{2} \cdot \Delta t = \frac{27{,}8\,m/s}{2} \cdot 3{,}1\,s =$

$\bar{v}$

$43{,}1\,m$

IV/5 $F_{húzó} = 105N$

$F_{súrl} = 15N$

$m = 25kg$

$\Delta t = 5s$

a.) $a = ?$

$\Sigma F = F_{húzó} - F_{súrl} = 105N - 15N = \underline{90N}$

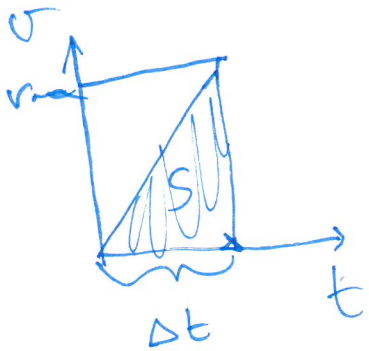
$\Sigma F = m \cdot a \quad \frac{kg \cdot m}{s^2}$

$a = \frac{\Sigma F}{m} = \frac{90N}{25kg} = \underline{3,6 \frac{m}{s^2}}$

b.) $a = \frac{\Delta v}{\Delta t} = \frac{v_{max}}{\Delta t}$

$v_{max} = a \cdot \Delta t = 3,6 m/s^2 \cdot 5s = \underline{18 m/s}$

c.)



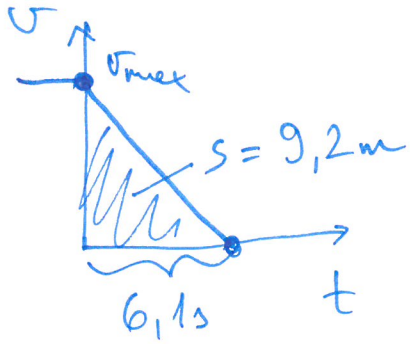
$s = \frac{v_{max}}{2} \cdot \Delta t = \frac{18 \frac{m}{s}}{2} \cdot 5s = \underline{45m}$

IV|6

$m = 20\,kg$

$\Delta t = 6{,}1\,s$

$s = 9{,}2\,m$



a.) $s = \frac{v_{max}}{2} \cdot \Delta t$

$$v_{max} = \frac{2 \cdot s}{\Delta t} = \frac{2 \cdot 9{,}2\,m}{6{,}1\,s} = 3{,}02\,m/s$$

b.) $$a = \frac{\Delta v}{\Delta t} = -\frac{3{,}02\,m/s}{6{,}1\,s} = -0{,}495\,m/s^2$$ LASSULÁS!

c.) $$F_{\text{mu súrl}} = m \cdot a = 20\,kg \cdot (-0{,}495\,m/s^2) = \underline{\underline{-9{,}9\,N}}$$

↓ NEG!

IV/8 $m_1 = 200.000\,t = 2 \cdot 10^8\,kg$

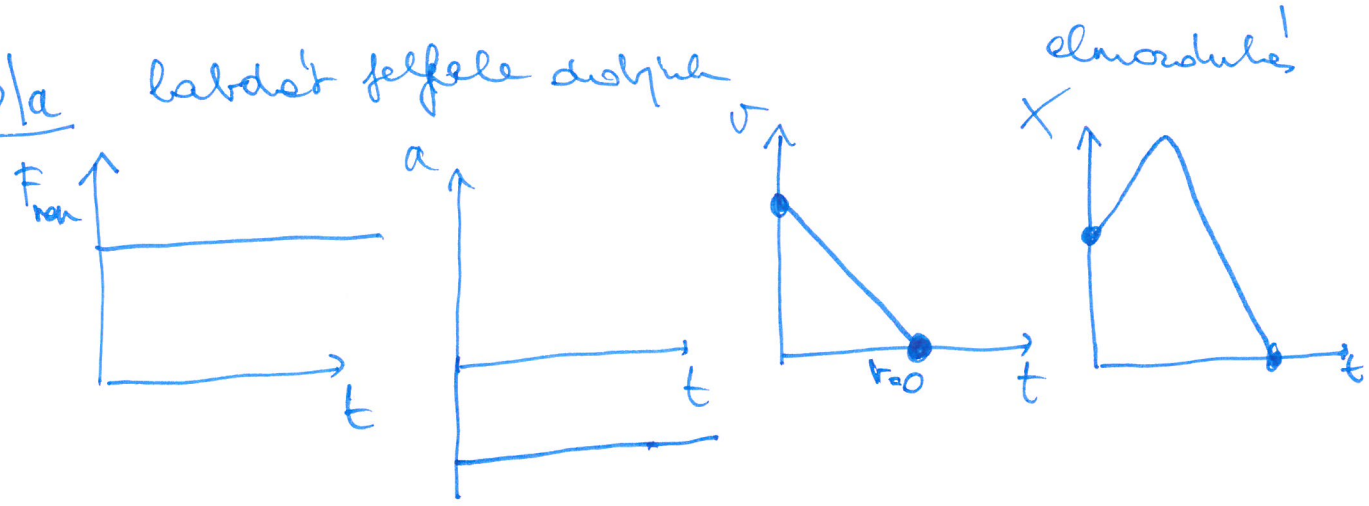
$m_2 = 300.000\,t = 3 \cdot 10^8\,kg$

$r = 2\,km = 2000\,m$

$$F = \gamma \frac{m_1 \cdot m_2}{r^2} = 6{,}67 \cdot 10^{-11} \frac{m^3}{kg \cdot s^2} \cdot \frac{2 \cdot 10^8\,kg \cdot 3 \cdot 10^8\,kg}{(2000\,m)^2} \approx \underline{1N}$$

$$\frac{kg \cdot m}{s^2} = [N]$$

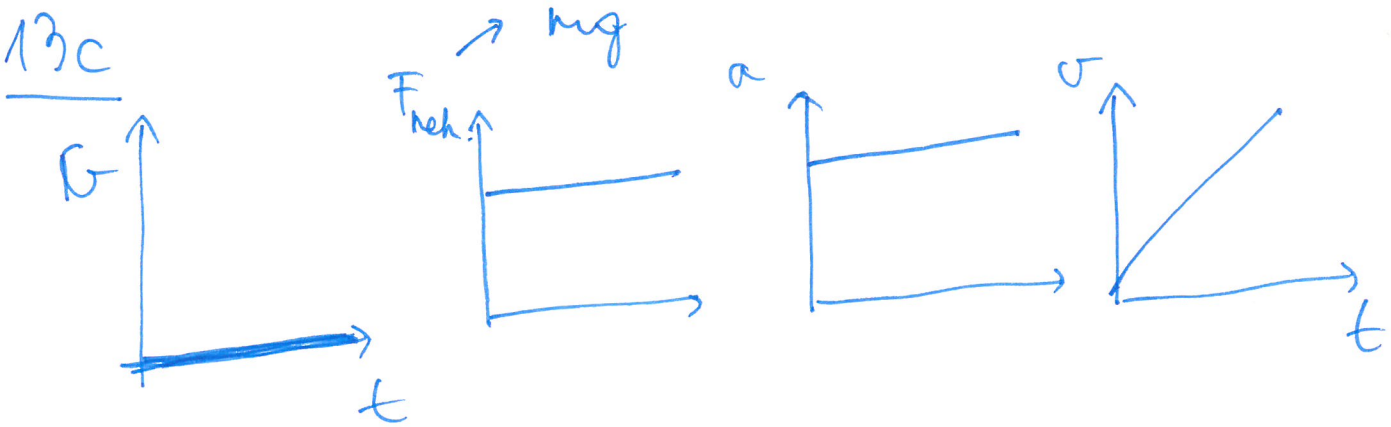
13/a labdát felfelé dobjuk



Liftes példa

↑ $mg + ma$ ↓ $mg - ma$

13c



IV/11

$m = 2\,kg$

$x = 25\,cm = 0{,}25\,m$

$\Sigma F = 0$

$\Sigma F = F_{rug.'} - m \cdot g = \emptyset$ $\quad kg \cdot \frac{m}{s^2}$

$F_{rug.'} = m \cdot g = 2\,kg \cdot 9{,}81\,m/s^2 = 19{,}62\,N$

$D = \frac{F}{x} = \frac{19{,}62\,N}{0{,}25\,m} = 78{,}5\,\frac{N}{m}$

nagyobb D → keményebb megnyúlás

10% → akkor a legkeményebb ha az eredeti rugóhossz is a legkisebb

$D = \frac{F}{x}$