

(14/2)

$$m = 1500 \text{ kg}$$

$$v = 100 \text{ km/h} = 27,8 \text{ m/s}$$

$$\frac{1000}{60 \cdot 60} = \frac{1}{3,6}$$

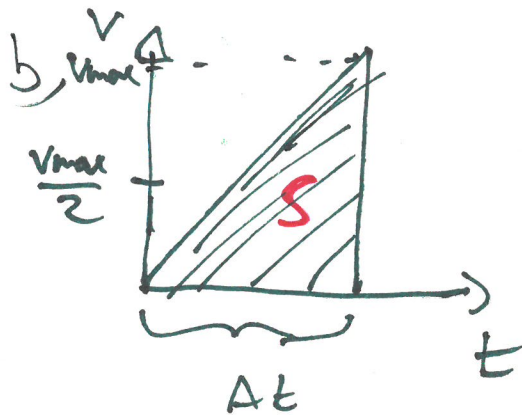
$$\Delta t = 3,1 \text{ s}$$

$$a) F = m \cdot a$$

$$a = ?$$

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

$$F = 1500 \text{ kg} \cdot 8,97 \text{ m/s}^2 = 13452 \text{ N} \approx \underline{\underline{13,5 \text{ kN}}}$$



$$S = \frac{v_{\max}}{2} \cdot \Delta t = \bar{v} \cdot \Delta t =$$

$$= \frac{27,8 \text{ m/s}}{2} \cdot 3,1 \text{ s} = \underline{\underline{43,1 \text{ m}}}$$

1V/5.

$$F_{\text{hire}} = 105 \text{ N}$$

$$m = 25 \text{ kg}$$

$$F_{\text{sirol}} = 15 \text{ N}$$

$$\Delta t = 5 \text{ s}$$

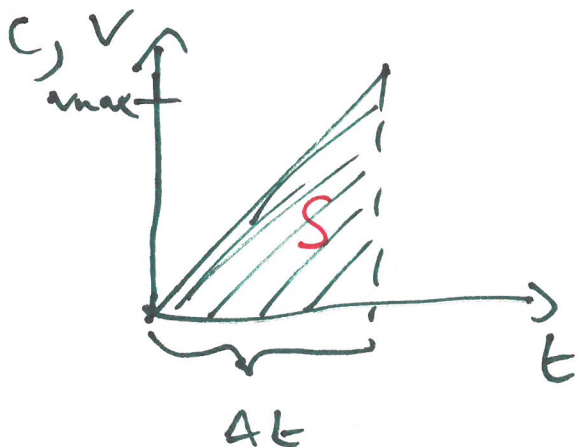
$$a, \quad \Sigma F = F_{\text{hire}} - F_{\text{sirol}} = 105 \text{ N} - 15 \text{ N} = 90 \text{ N}$$

$$\Sigma F = m \cdot a$$

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

$$b, \quad a = \frac{\Delta v}{\Delta t} = \frac{v_{\text{max}}}{\Delta t}$$

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



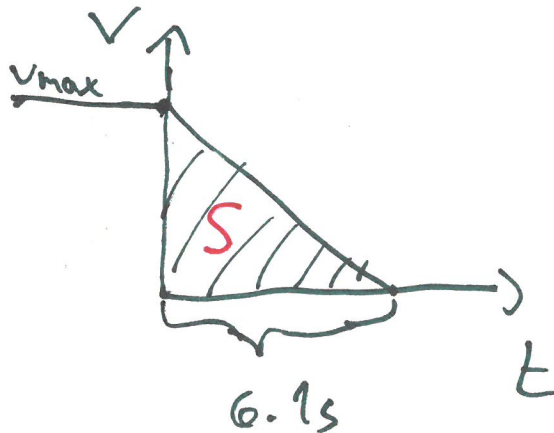
$$S = \frac{v_{\text{max}}}{2} \cdot \Delta t = \frac{18 \text{ m/s}}{2} \cdot 5 \text{ s} = \underline{\underline{45 \text{ m}}}$$

IV/6.

$$m = 20 \text{ kg}$$

$$\Delta t = 6.1 \text{ s}$$

$$s = 9.2 \text{ m}$$



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

$$v_{\max} = \frac{2 \cdot s}{\Delta t} = \frac{2 \cdot 9.2 \text{ m}}{6.1 \text{ s}} = 3.02 \text{ m/s}$$

$$b, a = \frac{\Delta v}{\Delta t} = \frac{-3.02 \text{ m/s}}{6.1 \text{ s}} = -0.495 \text{ m/s}^2$$

$$c, F_{\text{sch}} = m \cdot a = 20 \text{ kg} \cdot (-0.495 \text{ m/s}^2) = -9.9 \text{ N}$$

IV/8.

$$m_1 = 200\,000\,t = 200\,000\,000\,kg = 2 \cdot 10^8\,kg$$

$$1\,t = 1000\,kg$$

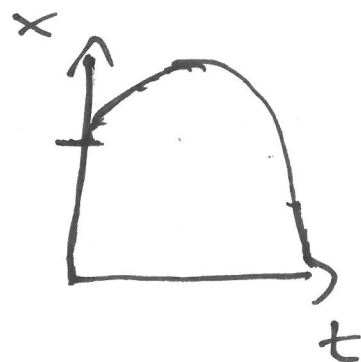
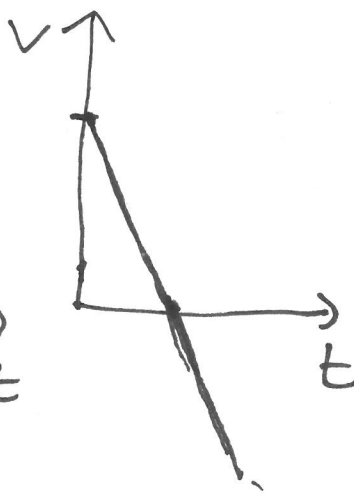
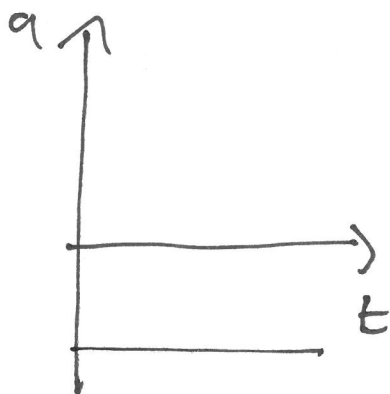
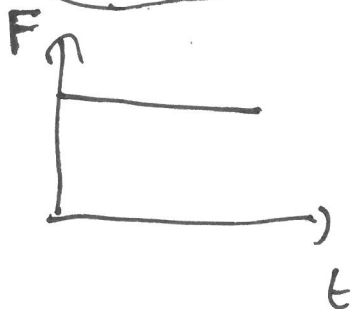
$$m_2 = 300\,000\,t = 3 \cdot 10^8\,kg$$

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

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

$$\frac{kg \cdot m}{s^2} = N = 1\,N$$

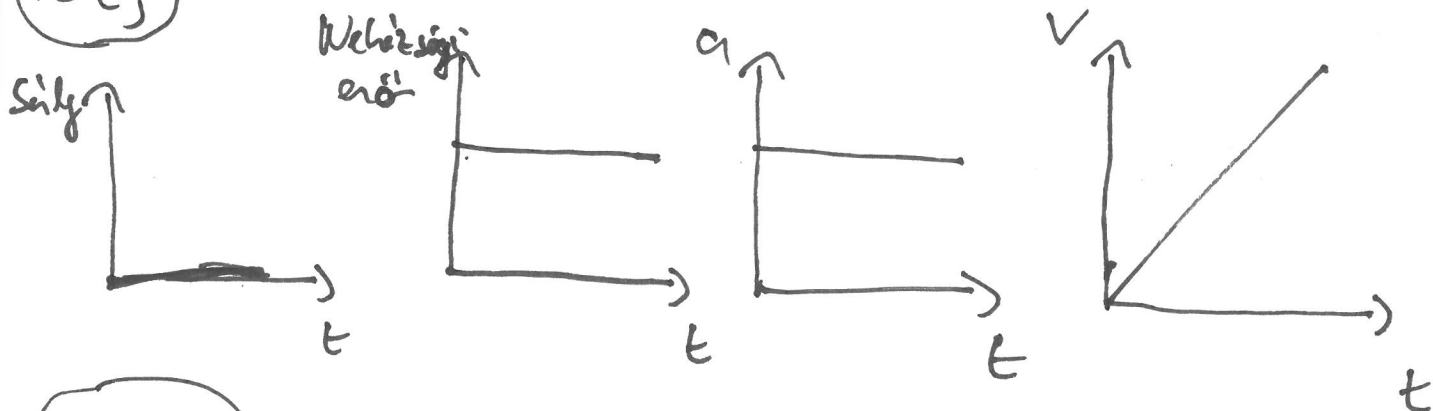
IV/13a)



$$mg + m \cdot a$$

$$mg - m \cdot a$$

(13c)



IV/11.

$$x = 25 \text{ cm} = 0.25 \text{ m}$$

$$m = 2 \text{ kg}$$

$$\text{egyensúly: } \sum F = 0$$

$$\sum F = F_{\text{rugó}} - m \cdot g = 0$$

$$F_{\text{rugó}} = m \cdot g = 2 \text{ kg} \cdot 9.81 \text{ m/s}^2 = 19.62 \text{ N}$$

$$D = \frac{\Delta F_{\text{ext}}}{\Delta x} = \frac{19.62 \text{ N}}{0.25 \text{ m}} = 78.5 \text{ N/m}$$

IV/12.

nagyobb $D \rightarrow$ kisebb x

10% azkar a legkisebb, ha A