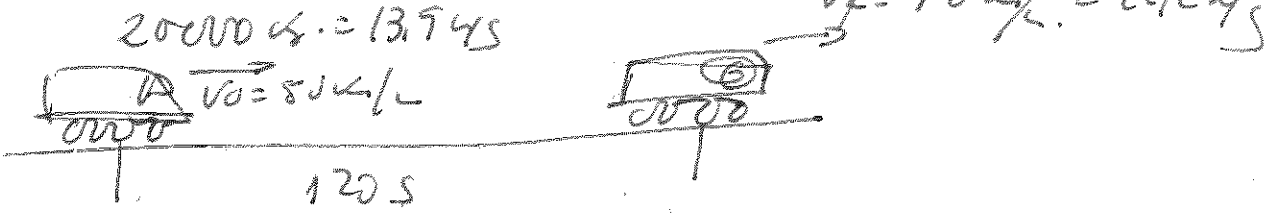
Control 3ª Evaluación

1)



a) $\Delta\vec{p} = \vec{p_f} - \vec{p_0}$

Al ser un eje x puedo hacer el cálculo escalar.

$\Delta p = p_f - p_0 = mv_f - mv_0 =$

$= 20000\,(22,2 - 13,9)$ kg·m/s

$= 166.000$ kg m/s

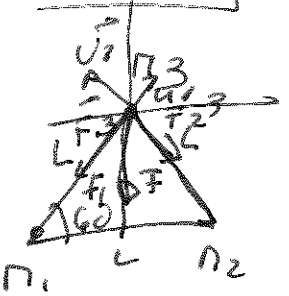
b) $I = \Delta p = 166.000$ kg·m/s

c) $I = F \cdot \Delta t \Rightarrow F = \frac{I}{\Delta t} = \frac{166.000\ \text{kg m/s}}{120\ \text{s}} =$

$= \boxed{1383\ N}$

2)

b)



$m_1 = m_2 = m_3 = 10$ m

$L = 1$ m.

$\vec{F} = \vec{F_{13}} + \vec{F_{23}} = -G\frac{m_1 \cdot m_3}{(d_{13})^2}\vec{u_1} - G\frac{m_2 m_3}{(d_{23})^2}\vec{u_2}$

$\vec{u_1} = \cos 60\, i + \sin 60\, j$

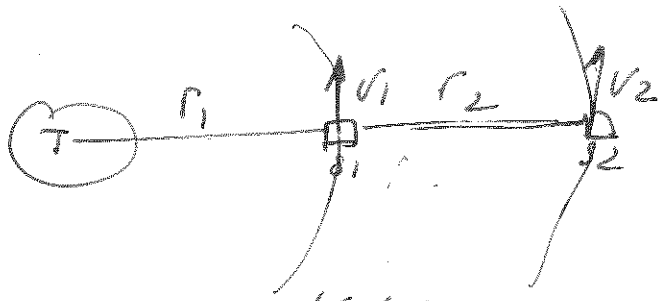
$\vec{u_2} = -\cos 60\, i + \sin 60\, j$

$F = -Gm_1 \cdot m_2 \left(\cos 60\, i + \sin 60\, i - \cos 60\, j + \sin 60\, j\right)$

$= -6,67 \cdot 10^{-11} \cdot \frac{10 \cdot 10 \cdot 2 \cdot \sin 60\, j}{1^2}$ (N)

$= \boxed{1,16 \cdot 10^{-8}\, j\ N}$

3/



a) 2ª lei de Kepler

$$\frac{T_1^2}{T_2^2} = \frac{r_1^3}{r_2^3} = \frac{(10.r_2)^3}{(2.10^{\cancel{9}})^3}$$

$$\frac{T_1^2}{T_2^2} = \frac{1}{2^3}$$

$$\frac{T_1^2}{T_2} = \sqrt{\frac{1}{2^3}} = \frac{1}{2^{3/2}}$$

$$T_2 = \cdots \cdot 2\sqrt{2}\, T_1$$

b) $$\frac{v_1}{v_2} = \frac{\frac{2\pi r_1}{T_1}}{\frac{2\pi r_2}{T_2}} = \frac{r_1}{r_2} \cdot \frac{T_2}{T_1} = \frac{1}{2} \cdot 2\sqrt{2} = \sqrt{2}$$

$$v_1 = \sqrt{2}\, v_2$$