UNIVERSIDAD NACIONAL DE ROSARIO
Instituto Politécnico Superior "General San Martín"

Examen de Ingreso "Ciclo Terciario 2012"

Asignatura: Física Fecha: 29/02/12

Problema Nº 1:

$\bar{a} = (-2 ; 3)$

$\bar{b} = (-5 ; -3)$ $\bar{v} = \bar{a} - \bar{b} + 2.\bar{c} = ?$

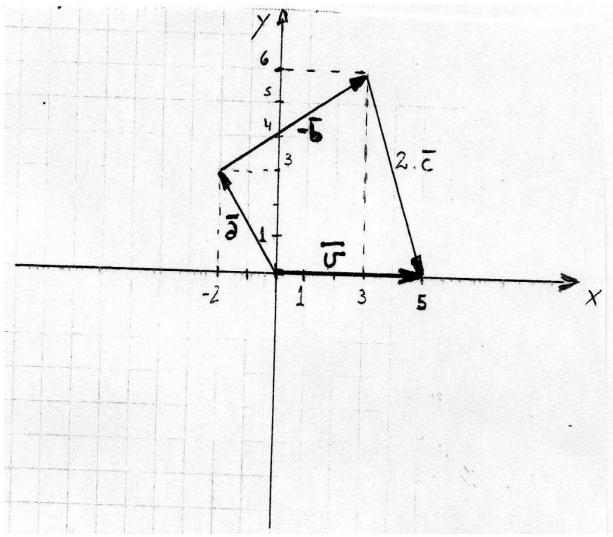
$\bar{c} = (1 ; -3)$

a) Resolución Analítica:

$\bar{a} = (-2; 3)$
+
$-\bar{b} = (5 ; 3)$
+
$2.\bar{c} = (2 ; -6)$

$\bar{v} = (5 ; 0)$

b) Resolución Gráfica:



Problema Nº 2:

Móvil (1) $\begin{cases} x_i = 0 \text{ (Rosario)} \\ t_i = 9 \text{ hs.} \\ V_1 = 80 \text{ Km/h} = \text{cte} \end{cases}$

Móvil (2) $\begin{cases} x_i = 400\,km\,(Córdoba) \\ t_i = 8\,hs. \\ V_1 = -80\,Km/h = cte \end{cases}$

$\Delta x_1 = (x_f - x_i) = v_1 \,.\, \Delta t_1$

$(x_f - x_i) = v_1 \,.\, (t_f - t_i)$

$(x_f - 0) = 80 \text{ km} / \text{h} \,.\, (t_f - 9 \text{ h})$

$x_f = 80 \text{ km/h} \,.\, t_f - 720 \text{ km}$

$\Delta x_2 = v_2 \,.\, \Delta t_2$

$(x_f - x_i) = v_2 \,.\, (t_f - t_i)$

$(x_f - 400 \text{ km}) = -80 \text{ km/h} \,(t_f - 8 \text{ h})$

$x_f = -80\, t_f + 640 \text{ km} + 400 \text{ km}$

a) Igualando $\mathbf{x_f}$ (Posición final) para ambos vehículos:

$80 \text{ km/h} \,.\, t_f - 720 \text{ km} = -80\, t_f + 640 \text{ km} + 400 \text{ km}$

$160 \text{ km/h} \,.\, t_f = 720 \text{ km} + 640 \text{ km} + 400 \text{ km}$

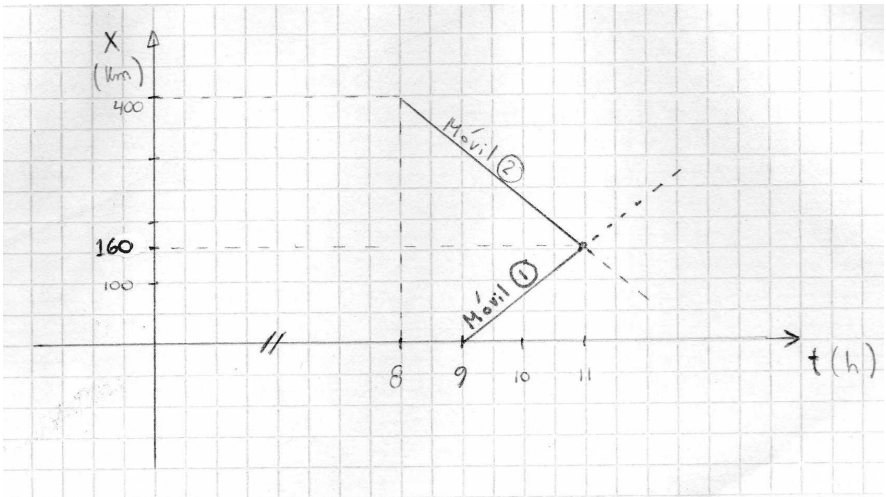
$$t_f = \frac{1760}{160} \text{ h}$$

$$\boxed{t_f = 11 \text{ h}}$$

b) $x_f = 80 \text{ km/h} \,.\, 11 \text{ h} - 720 \text{ km}$

$$\boxed{x_f = 160 \text{ km}}$$

c)



Problema Nº 3:

$v_0 = 30$ m/s

a) $v_f^2 = v_i^2 - 2 \cdot g \cdot \Delta y$ $\qquad v_f = 0$

$$0 = v_i^2 - 2 \cdot g \cdot \Delta y$$

$$\Delta y = \frac{v_i^2}{2.g} = \frac{(30 m/s)^2}{2 \cdot 9{,}8 m/s^2} \Rightarrow \boxed{\Delta y = 45,91 \text{ m}}$$

b) $v_f = v_0 - g \cdot \Delta t$

$$\frac{v_f - v_0}{-g} = \boxed{\Delta t = \frac{-30 m/s - 30 m/s}{-9{,}8 m/s^2} = 6{,}12 \text{ s}}$$

c) $y = v_0 \cdot t - \frac{1}{2} g t^2$

$$0 = \frac{1}{2} \cdot g \cdot t^2 - v_0 \cdot t + y$$

$$0 = \underbrace{4{,}9 t^2}_{a} \underbrace{-30}_{b} \cdot t \underbrace{+20}_{c}$$

$a = +\ 4{,}9$

$b = -\ 30$

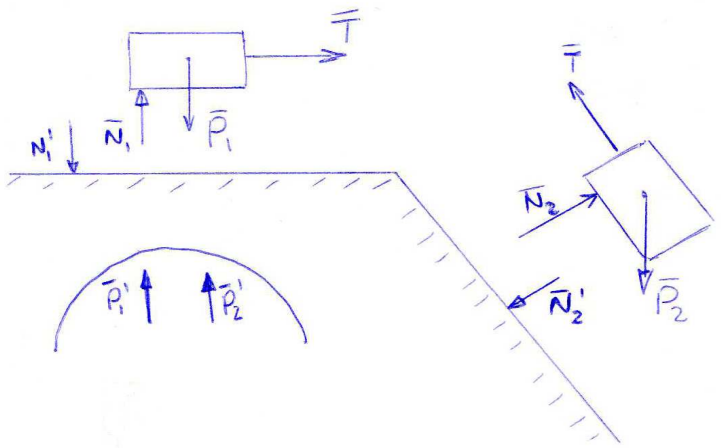
$c = +\ 20$

$$t_1, t_2 = \frac{-b \pm \sqrt{b^2 - 4\,a.c}}{2a} = \frac{30 \pm \sqrt{30^2 - 4.4{,}9.20}}{2.4{,}9} = \frac{30 \pm 22{,}54}{9{,}8}$$

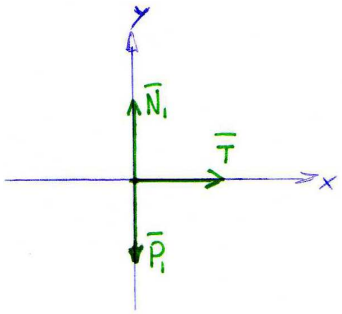
$t_1 = 0{,}76$ s	$t_2 = 5{,}36$ s

Problema Nº 4:

a)

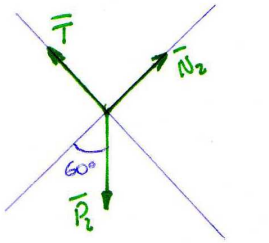


b)



$\Sigma f_x = m_1 . a$

$t = m_1 . a$



$\Sigma f_x = m_2 . a$

$P_2 . \text{sen } 60^\circ - T = m_2 . a$

$P_2 \text{ sen } 60^\circ - m_1 = m_2 . a$

$P_2 . \text{sen } 60^\circ = a\,(m_1 + m_2)$

$$a = \frac{m_2 . g . sen\ 60^\circ}{m_1 + m_2} \Rightarrow a = \frac{2\,kg . 9{,}8 \frac{m}{s^2} . sen 60^\circ}{12\,kg}$$

$$\boxed{a = 1{,}41\ m/s^2}$$

Problema Nº 5:

m = 2 kg

a)

Δ Emec = 0

$Emec_1 = Emec_2$

$m.g.y_1 = \frac{1}{2}.m \cdot v_2^2 = Ecin_2$

$Ec_2 = 196\ J$

b)

$Ec_2 = \frac{1}{2} \cdot m \cdot v_2^2$ $\qquad$ $v_2 = \sqrt{\frac{196J}{\frac{1}{2}.2kg}} = 14\frac{m}{s}$

c)

$W_{fr} = \Delta Emec = E_3 - E_2$ $\qquad$ $f_r = M.\ N$ $\qquad$ $N = m.g$

$f_r . \Delta\ x \cdot \cos 180 = E_3 - E_2$ $\qquad$ $f_r = 0{,}1 \cdot 2\ kg. \cdot 9{,}8\ m/s^2 = 1{,}96\ N$

$-1{,}96\ N \cdot 50\ m + 196\ J = E_3$

$E_3 = 98\ J$

$E_3 = E_4 = m \cdot g \cdot y_4$

$m\ g\ y_4 = 98\ J$ $\qquad$ $\left[y_4 = \frac{98J}{2kg.\ 9{,}8m/s^2} = 5m\right]$