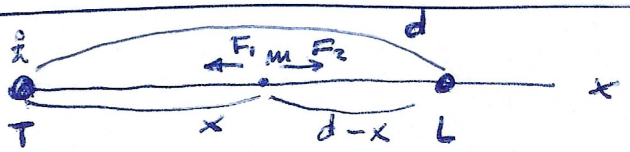
D1 $V = 8300 Km/s$ $P = 5400 seg$ $h = 200000 Km$

a) $V = \frac{2\pi R}{P} \rightarrow R = \frac{V \cdot P}{2\pi} = 7133 Km \rightarrow \boxed{R_P = R - h = 6933 Km}$

b) $V = \sqrt{\frac{GM}{R}} \rightarrow M = \frac{V^2 R}{G} = \boxed{7{,}36 \times 10^{24} Kg}$

c) $g_P = \frac{GM}{R_P^2} \simeq 10{,}2 \, m/s^2$

D2 $d = 60 R_T$ $M_T = 81 M_L$



$F_1 = F_2$

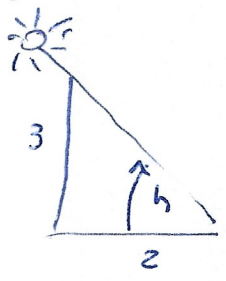
$\frac{G M_T m}{x^2} = \frac{G M_L m}{(d-x)^2}$

$\rightarrow (d-x)^2 M_T = x^2 M_L \rightarrow (d-x)^2 81 M_L = x^2 M_L$

TOMANDO LA SOLUCION Q' TIENE SENTIDO $\rightarrow (d-x) 9 = x$

$\rightarrow 9d = 10x \rightarrow x = \frac{9}{10} d = \boxed{54 R_T}$

D3 a) SOLSTICIO DE JUNIO $\delta_\odot \simeq 23{,}5°$ $\alpha_\odot = 6^h$



b) $tg(h) = \frac{3}{2} \rightarrow h = 56{,}3°$ (ALTURA)

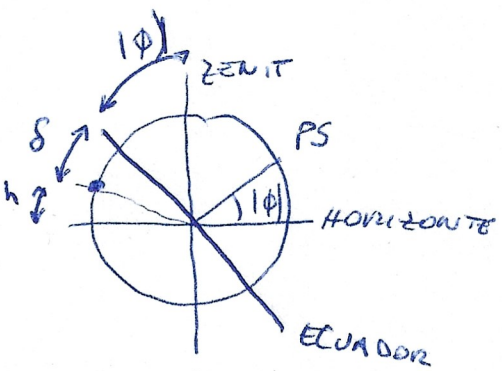
$A = 180°$ (AZIMUT – CONVENIO SONE)

c) $H = 0^h$

d) $TS = H + \alpha = 6^h$

e) $h + \delta + |\phi| = 90°$

$\rightarrow \boxed{\phi = 10°{,}19 \, S}$



D4

5 estrellas $m = 4$
3 " " $m = 3{,}5$
1 " " $m = 3$

$r = 60\,pc$

a) $M_T = -2{,}5 \log\left[5 \times 10^{\frac{4}{-2{,}5}} + 3 \times 10^{\frac{3{,}5}{-2{,}5}} + 1 \times 10^{3/-2{,}5}\right]$

$= \boxed{1{,}2781925}$

b) $M = m + 5 - 5\lg(r) \rightarrow M = -2{,}6125\ldots$

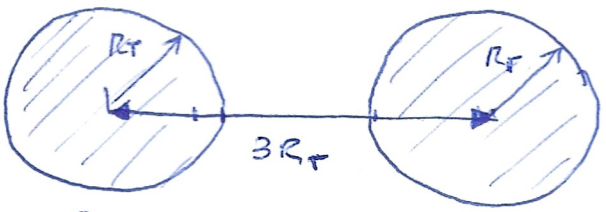
c) 1 año ——— $2{,}5 \times 10^{-5}\,pc$

40000 años ——— 1 pc → $r_1 =$ 61 pc

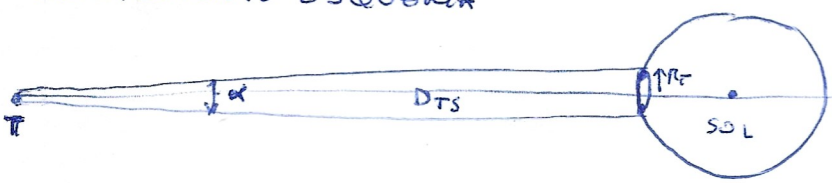
$m = M - 5 + 5\lg(r) \rightarrow \boxed{m = 1{,}31408}$

SECCIÓN D - NIVEL 2 - EX. FINAL - 11 DE NOVIEMBRE DE 2021

D1



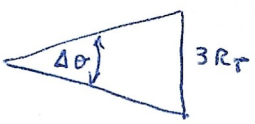
a) ASUMIENDO EL SIGUIENTE ESQUEMA



$R_S << D_{TS}$
$R_T << D_{TS}$

$\tg\left(\frac{\alpha}{2}\right) \simeq \frac{R_T}{D_{TS}} = \frac{6400\,km}{150 \times 10^6\,km} \rightarrow \alpha = 4{,}88 \times 10^{-3}{}^\circ \simeq \boxed{17{,}6''}$

b) $\lambda = 550\,nm \rightarrow \Delta\theta = 1{,}22\frac{\lambda}{D} \simeq \frac{3R_T}{D_{TS}}$



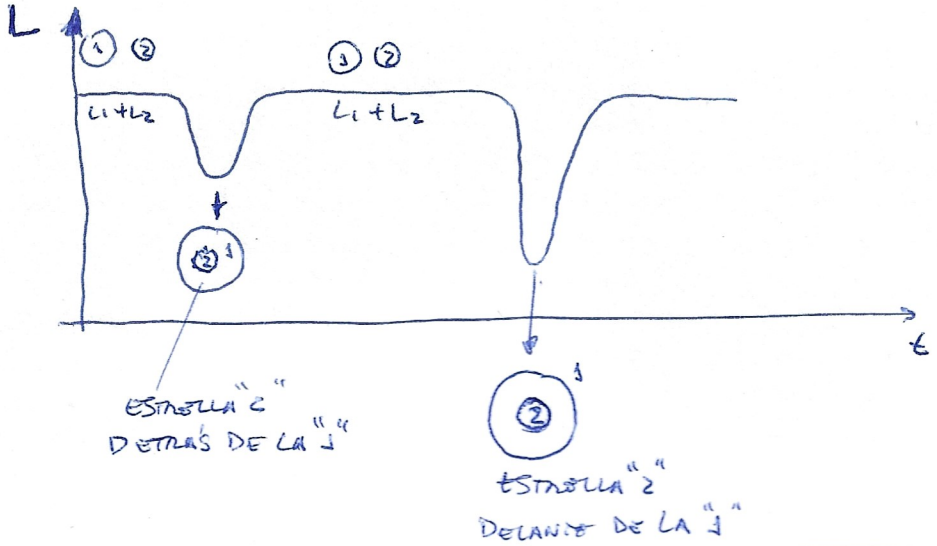
$\Rightarrow \boxed{D = 5{,}24 \times 10^{-3}\,m = 5{,}24\,mm}$

D.2 $m_1 = 2$ $m_2 = 4$ $r = 80\,pc$

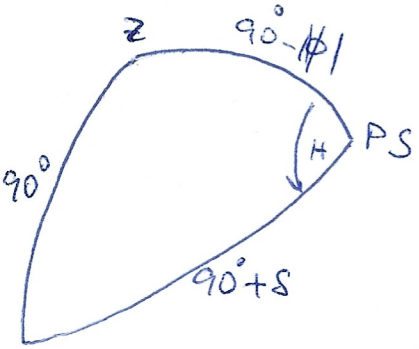
a) $m - M = -5 + 5\lg(r) \rightarrow \begin{cases} M_1 = -2{,}5154 \\ M_2 = -0{,}5154 \end{cases}$

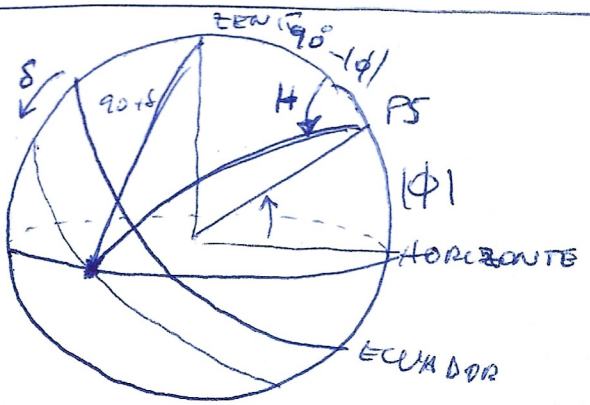
b) $M_T = -2{,}5 \log\left[10^{\frac{2}{-2{,}5}} + 10^{\frac{4}{-2{,}5}}\right] = \boxed{1{,}84026}$

c) ASUMIENDO $R_1 > R_2$ Y ADEMÁS $L_1 > L_2$ TENEMOS



D.3 ESQUEMA REALIZADO PARA EL HEMISFERIO SUR





$\rightarrow \cos(90°) = \cos(90°+\delta)\cos(90°-|\phi|) + \operatorname{sen}(90°+\delta)\operatorname{sen}(90°-|\phi|)\cos H$

$0 = (-\operatorname{sen}\delta)\operatorname{sen}|\phi| + \cos(\delta)\cos|\phi|\cos H$

$\rightarrow \cos H = \operatorname{tg}(\delta)\operatorname{tg}(|\phi|)$ para $\phi = -|\phi| \rightarrow$

$\rightarrow \boxed{\cos H = -\operatorname{tg}(\delta)\operatorname{tg}(\phi)}$

b) $\delta \simeq -23{,}5°$ $\phi = 0°$ $\rightarrow$ $\Delta t = 2H = 12h$

c) $\delta \simeq -23{,}5°$ $\phi = -23{,}5° \rightarrow \Delta t \simeq 13{,}45h$

d) $\delta \simeq -23{,}5°$ $\phi = 23{,}5° \rightarrow \Delta t \simeq 10{,}54h$

D.4 $h = 1500\,Km$ $\quad R_M = 2440\,Km$ $\quad M_M = 3{,}3 \times 10^{23}\,Kg$

a) $V_A = \sqrt{\dfrac{GM_M}{(R_M + h)}} = 2363{,}6\ M/S$

b) $\dfrac{1}{2} V_A'^2 - \dfrac{GM_M}{(R_M+h)} = -\dfrac{GM_M}{2A}$ $\quad \leftrightarrow$ A = SEMIEJE MAYOR DE LA ÓRBITA ELÍPTICA DE TRANSFERENCIA

$A = \dfrac{R_A + R_B}{2} = 3190\ Km$

$\rightarrow V_A' = 2067{,}1\ M/S$

c) $\dfrac{1}{2} V_B'^2 - \dfrac{GM_M}{R_M} = -\dfrac{GM_M}{2A}$ $\quad \rightarrow V_B' = 3338{,}9\ M/S$

d) EL TIEMPO SERÁ LA MITAD DEL PERÍODO

KEPLER $\rightarrow \left(\dfrac{2\pi}{P}\right)^2 \cdot A^3 = GM$

$\rightarrow$ $\boxed{\Delta t = \dfrac{P}{2} = 3815{,}2\ SEG}$