UNIVERSIDAD MAYOR DE SAN SIMÓN — EXAMEN INGRESO 2-2019 (2ªOPCIÓN)
FACULTAD DE CIENCIAS Y TECNOLOGÍA — MARTES, 23 DE JULIO DE 2019

SOLUCIÓN

ARITMÉTICA – ÁLGEBRA

A1. $S = \overbrace{100 + 102 + 104 + \ldots + 300}^{\text{SUMA DE SUCESIÓN ARITMÉTICA CON d=2}} = \dfrac{n(100+300)}{2}$

Donde el término enesimo: $a_n = 100 + (n-1)2 = 300 \rightarrow\rightarrow n = 101$

$$S = \frac{101(100+300)}{2} = \frac{101(400)}{2} = 101(200) = 20200 \text{ (A)}$$

A2. $\left(\frac{3}{4}\right)^{x-1} \cdot \sqrt{\frac{4}{3}} = \frac{9}{16} \rightarrow\rightarrow \left(\frac{3}{4}\right)^{x-1} \cdot \left(\frac{3}{4}\right)^{-\frac{1}{2}} = \left(\frac{3}{4}\right)^{2} \rightarrow\rightarrow \left(\frac{3}{4}\right)^{x-3/2} = \left(\frac{3}{4}\right)^{2}$

$x - \frac{3}{2} = 2 \rightarrow\rightarrow x = \frac{7}{2}$ (B)

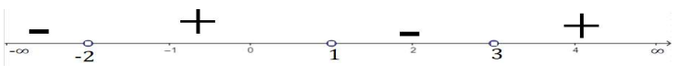
A3. $(4m-1)x^2 + 16x - 2m - 7 = 0$ y $x_2 = -\frac{1}{x_1} \rightarrow\rightarrow x_1 x_2 = -1$ y $x_1 x_2 = \frac{c}{a}$ (Propiedad de las raíces)

Donde: $a = 4m-1, b = 16, c = -2m-7 \rightarrow\rightarrow -1 = \frac{-2m-7}{4m-1} \rightarrow\rightarrow -4m+1 = -2m-7$

$\rightarrow\rightarrow -2m = -8 \rightarrow\rightarrow m = 4$ (B)

A4. $\frac{3x}{(x-1)(x-3)} - \frac{2}{(x-3)} < 0 \rightarrow \frac{(x+2)}{(x-1)(x-3)} < 0 \rightarrow$

Puntos críticos:
$x = -2$ cero de la función
$x = 1$ Indeterminación
$x = 3$ Indeterminación



$\rightarrow\rightarrow$SOLUCIÓN: $(-\infty,-2) \cup (1,3)$ (B)

GEOMETRÍA – TRIGONOMETRÍA

G5. $\frac{\cos x + \sin x}{\cos x - \sin x} - \frac{\cos x - \sin x}{\cos x + \sin x} = \frac{(\cos x + \sin x)^2 - (\cos x - \sin x)^2}{\cos^2 x - \sin^2 x} = \frac{4 \sin x \cos x}{\cos^2 x - \sin^2 x}$

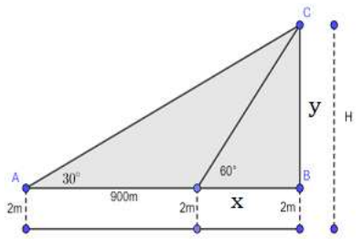
$= \frac{2(2 \sin x \cos x)}{(\cos^2 x - \sin^2 x)} = \frac{2(\sin 2x)}{(\cos 2x)} = 2 \tan 2x$ (C)

G6. $\tan 60° = \frac{y}{x}$ y $\tan 30° = \frac{y}{900+x}$

$\sqrt{3}\, x = y$ y $\frac{1}{\sqrt{3}}(900+x) = y$

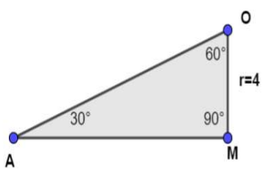
$\frac{1}{\sqrt{3}}(900+x) = \sqrt{3}\, x \rightarrow\rightarrow (900+x) = 3x$

$900 = 2x \rightarrow\rightarrow x = 450 \rightarrow\rightarrow y = 450\sqrt{3} \rightarrow\rightarrow H = 2 + 450\sqrt{3}$ (B)



G7. Radio OM perpendicular a tangente AM → Triángulo $\triangle AMO$ es especial

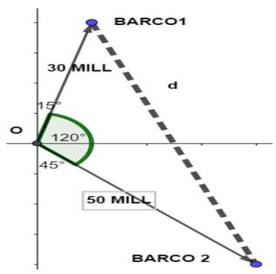
$r = 4 \rightarrow AO = 8, AM = 4\sqrt{3}$ (A)



G8. $d^2 = 30^2 + 50^2 - 2(30)(50)\cos 120°$ (ley de cosenos)

Donde el $\cos 120° = -\cos 60° = -1/2$

$d^2 = 900 + 2500 - 2(1500)(-\frac{1}{2}) = 4900 \rightarrow d = \sqrt{4900} = 70$ *millas* (D)



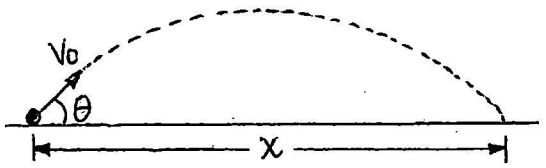
FÍSICA - FILA 2

F9 Datos:

$x = 40\,cm = 0{,}4\,m.$

$\theta = 45°$

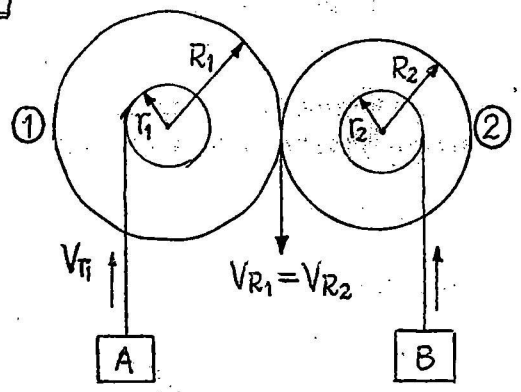
$g = 10\,m/s^2$



Alcance máximo: $x = \frac{V_0^2 \cdot \sin(2\theta)}{g} \Rightarrow 0{,}4 = \frac{V_0^2 \cdot \sin(2\times 45°)}{10} \Rightarrow 0{,}4(10) = V_0^2 \cdot \sin 90°$

$\Rightarrow V_0^2 = 4 \Rightarrow \boxed{V_0 = 2}\ [m/s]$ (c)

F10



Datos:

$r_1 = 5$ m.

$R_1 = 20$ m.

$r_2 = 5$ m.

$R_2 = 10$ m.

$V_{r_1} = 10$ m/s.

Para ① $w_{r_1} = w_{R_1}$

$\frac{V_{r_1}}{r_1} = \frac{V_{R_1}}{R_1}$

$\frac{10}{5} = \frac{V_{R_1}}{20} \Rightarrow V_{R_1} = 40\ [m/s]$

Para ② $w_{r_2} = w_{R_2}$

$\frac{V_{r_2}}{r_2} = \frac{V_{R_2}}{R_2}$

$\frac{V_{r_2}}{5} = \frac{40}{10} \Rightarrow \boxed{V_{r_2} = 20}\ [m/s]$

(c)

F11

$\Sigma F_y = 0$

$f_r - mg = 0 \Rightarrow f_r = mg$

$\Sigma F_N = m \cdot a_c$

$N = m \cdot w^2 R$, $f_r = \mu \cdot N \Rightarrow N = \frac{f_r}{\mu}$

$\frac{f_r}{\mu} = mw^2R \Rightarrow \frac{mg}{\mu} = mw^2R \Rightarrow w = \sqrt{\frac{g}{\mu R}} \Rightarrow \boxed{w = 10}\ [rad/s]$ (b)

F12

$\Sigma E_A = \Sigma E_C$

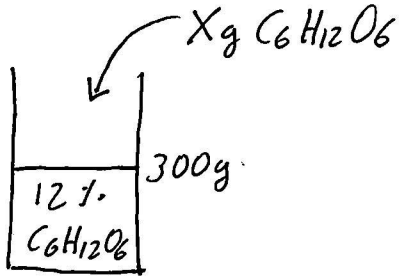
$mgh = \frac{1}{2}kx^2 + |Q_{fr}|$

$mgh = \frac{1}{2}kx^2 + mg\mu \cdot d$

$\Rightarrow \mu = \frac{mgh - \frac{1}{2}kx^2}{mgd} \Rightarrow \boxed{\mu = \frac{1}{3}}$ (c)

Fila 2

Q13.-



$m_S = 300g \cdot 0{,}12 = 36g\ C_6H_{12}O_6$

$20\% = \left(\frac{36+X}{300+X}\right) : 100$

$\boxed{X = 30\ g\ C_6H_{12}O_6} \Rightarrow (A)$

Q14.- $m_{H_2O(1)} = 480 - 450 = 30g$

$m_M = 6g$

$m_{H_2O(2)} = 483 - 6 - 450 = 27g$

$m_{H_2O(d)} = 30 - 27 = 3g$

$V_{H_2O(d)} = V_P = V_M = \frac{3g}{1\,g/cm^3}$

$\boxed{V_M = 3\,cm^3}$

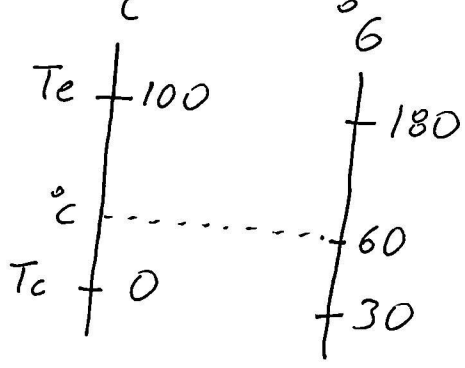
$\boxed{\rho_M = \frac{6g}{3\,cm^3} = 2\,g/cm^3} \Rightarrow (C)$

Q15.-

$V_2 = V_1 \cdot \frac{P_1}{P_2} \cdot \frac{T_2}{T_1} = 60\,\ell \cdot \frac{P_1}{2P_1} \cdot \frac{\frac{1}{2}T_1}{T_1}$

$\boxed{V_2 = 15\,\ell} \Rightarrow (D)$

Q16.-



$\frac{°C - 0}{100 - 0} = \frac{60 - 30}{180 - 30}$

$°C = 100 \cdot \frac{30}{150}$

$\boxed{°C = 20} \Rightarrow (B)$