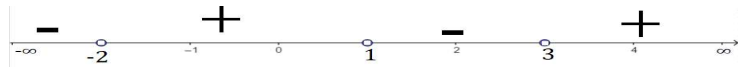## SOLUCIÓN

ARITMÉTICA – ÁLGEBRA

A1. $(4m - 1)x^2 + 16x - 2m - 7 = 0$ y $x_2 = -\dfrac{1}{x_1} \to\to x_1 x_2 = -1$ y $x_1 x_2 = \dfrac{c}{a}$ (Propiedad de las raíces)

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

$\to\to\to -2m = -8 \to\to\to\to m = 4$ (A)

A2. $\dfrac{3x}{(x - 1)(x - 3)} - \dfrac{2}{(x - 3)} < 0 \to \dfrac{(x + 2)}{(x - 1)(x - 3)} < 0 \to$

Puntos críticos:

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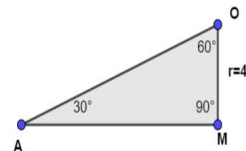$x = 1$ Indeterminación
$x = 3$ Indeterminación

$\to\to$SOLUCIÓN: $(-\infty, -2) \cup (1, 3)$ (C)

A3. $S = \overset{\text{SUMA DE SUCESIÓN ARITMÉTICA CON } d=2}{\underset{}{100 + 102 + 104 + \ldots + 300}} = \dfrac{n(100 + 300)}{2}$

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

$S = \dfrac{101(100 + 300)}{2} = \dfrac{101(400)}{2} = 101(200) = 20200$ (C)
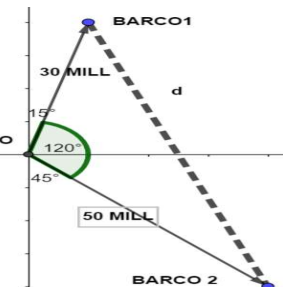
A4. $\left(\dfrac{3}{4}\right)^{x-1} \cdot \sqrt{\dfrac{4}{3}} = \dfrac{9}{16} \to\to \left(\dfrac{3}{4}\right)^{x-1} \cdot \left(\dfrac{3}{4}\right)^{-\frac{1}{2}} = \left(\dfrac{3}{4}\right)^2 \to\to \left(\dfrac{3}{4}\right)^{x - 3/2} = \left(\dfrac{3}{4}\right)^2$

$x - \dfrac{3}{2} = 2 \to\to x = \dfrac{7}{2}$ (C)

GEOMETRÍA – TRIGONOMETRÍA

G5. Radio OM perpendicular a tangente AM $\to$ Triángulo $\triangle AMO$ es especial
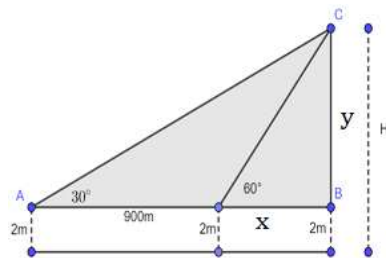
$r = 4 \to AO = 8, AM = 4\sqrt{3}$ (C)

G6. $d^2 = 30^2 + 50^2 - 2(30)(50) \cos 120°$ (ley de cosenos)

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

$d^2 = 900 + 2500 - 2(1500)(-\dfrac{1}{2}) = 4900 \to d = \sqrt{4900} = 70$ millas (A)

G7. $\dfrac{\cos x + \sin x}{\cos x - \sin x} - \dfrac{\cos x - \sin x}{\cos x + \sin x} = \dfrac{(\cos x + \sin x)^2 - (\cos x - \sin x)^2}{\cos^2 x - \sin^2 x} = \dfrac{4 \sin x \cos x}{\cos^2 x - \sin^2 x}$

$= \dfrac{2(2 \sin x \cos x)}{(\cos^2 x - \sin^2 x)} = \dfrac{2(\sin 2x)}{(\cos 2x)} = 2 \tan 2x$ (B)

G8. $\tan 60° = \dfrac{y}{x}$ y $\tan 30° = \dfrac{y}{900 + x}$

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

$\dfrac{1}{\sqrt{3}}(900 + x) = \sqrt{3}\, x \to\to (900 + x) = 3x$

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

F9 Datos:

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

$\theta = 45°$

$g = 10\,m/s^2$
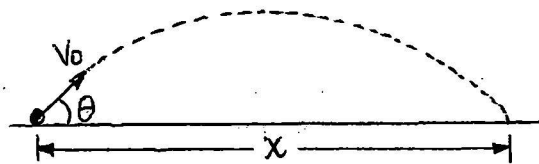
Alcance máximo: $\chi = \dfrac{V_0^2 \cdot \sin(2\theta)}{g} \Rightarrow 0{,}4 = \dfrac{V_0^2 \cdot \sin(2\times 45°)}{10} \Rightarrow 0{,}4(10) = V_0^2 \cdot \sin 90°{}^1$

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

F10

V_{T_1} ↑

$V_{R_1} = V_{R_2}$

A   B
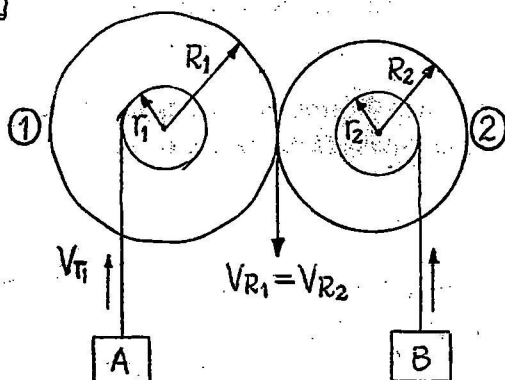
Datos:

$r_1 = 5\,m.$

$R_1 = 20\,m.$

$r_2 = 5\,m.$

$R_2 = 10\,m.$

$V_{T_1} = 10\,m/s.$

Para ① $\quad W_{T_1} = W_{R_1}$

$\dfrac{V_{T_1}}{r_1} = \dfrac{V_{R_1}}{R_1}$

$\dfrac{10}{5} = \dfrac{V_{R_1}}{20} \Rightarrow V_{R_1} = 40\ (m/s.)$

Para ② $\quad W_{T_2} = W_{R_2}$

$\dfrac{V_{T_2}}{r_2} = \dfrac{V_{R_2}}{R_2}$

$\dfrac{V_{T_2}}{5} = \dfrac{40}{10} \Rightarrow \boxed{V_{T_2} = 20}\ (m/s)$

ⓓ

F11 $\quad \Sigma F_y = 0$

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

$\Sigma F_N = m \cdot a_c$

$N = m \cdot W^2 R\ ,\quad f_r = \mu \cdot N \Rightarrow N = \dfrac{f_r}{\mu}$

$\dfrac{f_r}{\mu} = m W^2 R \Rightarrow \dfrac{mg}{\mu} = m W^2 R \Rightarrow W = \sqrt{\dfrac{g}{\mu R}} \Rightarrow \boxed{W = 10}\ (rad/s)$ ⓒ

F12 $\quad \Sigma E_A = \Sigma E_c$

$mgh = \tfrac{1}{2} K x^2 + |Q_{fr}|$

$mgh = \tfrac{1}{2} K x^2 + mg\mu \cdot d$

$\Rightarrow \mu = \dfrac{mgh - \tfrac{1}{2} K x^2}{mg\,d} \Rightarrow \boxed{\mu = \dfrac{1}{3}}$ ⓑ

Fila 1

Q13.- $m_{H_2O_{(1)}} = 330 - 315 = 15\,g$ $\qquad$ $m_{H_2O_{(d)}} = 15 - 13 = 2\,g$

$\qquad m_M = 3\,g$

$\qquad m_{H_2O_{(2)}} = 331 - 3 - 315 = 13\,g$ $\qquad \left[V_{H_2O_{(d)}} = V_P = V_M = \dfrac{2g}{1\,g/cm^3} = 2\,cm^3 \right]$

$$\left[\rho_M = \dfrac{3g}{2\,cm^3} = 1.5\ g/cm^3 \right] \Rightarrow \boxed{B}$$

Q14.-

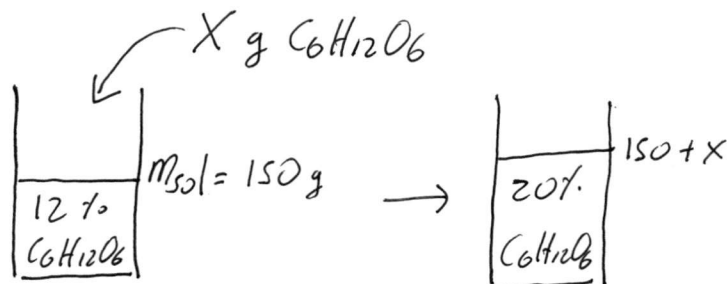$$\dfrac{100 - 0}{^\circ C - 0} = \dfrac{140 - 20}{80 - 20}$$

$$\left[^\circ C = \dfrac{60}{120} \cdot 100 = 50 \right] \Rightarrow \boxed{D}$$

Q15.-

$$V_2 = V_1 \cdot \dfrac{P_1}{P_2} \cdot \dfrac{T_2}{T_1} = 5\,l \cdot \dfrac{P_1}{\frac{1}{3}P_1} \cdot \dfrac{2\,T_1}{T_1}$$

$$\left[V_2 = 30\,l \right] \Rightarrow \boxed{A}$$

Q16.-

$X\ g\ C_6H_{12}O_6$

$12\%\ C_6H_{12}O_6$ $\quad m_{sol} = 150\,g \longrightarrow$ $20\%\ C_6H_{12}O_6$ $\quad 150 + X$

$m_S = 150g \cdot 0.12 = 18\,g\ C_6H_{12}O_6$

$$20\% = \left(\dfrac{18 + X}{150 + X} \right) \cdot 100$$

$$\left[X = 15\ g\ C_6H_{12}O_6 \right] \Rightarrow \boxed{C}$$