SOLUCIÓN ②: ARITMÉTICA-ÁLGEBRA

A1

$x^3+mx^2+nx+7=0$ y $x_1=1-2\sqrt{2}$; $x_2=1+2\sqrt{2}$; $x_3=¿?$

$\Rightarrow x_1x_2x_3=-\frac{7}{1} \Rightarrow (-7)x_3=-7 \Rightarrow \underline{x_3=1}$

$\Rightarrow x_1+x_2+x_3=-\frac{m}{1} \Rightarrow 2+x_3=-m \Rightarrow \underline{m=-3}$

$\Rightarrow x_1x_2+x_1x_3+x_2+x_3=+\frac{n}{1} \Rightarrow (-7)+(2)(1)=n \Rightarrow \underline{n=-5}$

$\Rightarrow \boxed{m+n=-8}$ (A).

A2

$\underbrace{85, 90, 95, \ldots, 715}_{\text{Sucesión Aritmética}} \Rightarrow a_1=85 ; d=5 \Rightarrow a_n=a_1+(n-1)d$

$715=85+(n-1)d \to 5$

$\frac{630}{5}=n-1 \Rightarrow \boxed{n=127}$

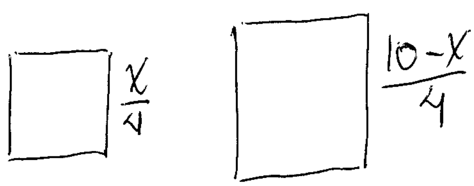
$S_{127}=\frac{127(85+715)}{2}=\underline{50800}$ (D.)

A3

$e^x+12e^{-x}-7=0 \Rightarrow e^{2x}-7e^x+12=0 \Rightarrow (e^x-3)(e^x-4)=0$ (B).

$e^x=3$; $e^x=4 \Rightarrow x_1=\ln 3$; $x_2=\ln 4 \Rightarrow x_1+x_2=\ln 3+\ln 4=\underline{\ln 12}$

A4



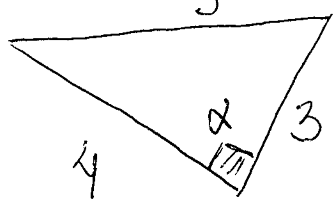
$\Rightarrow \left(\frac{x}{4}\right)^2+\left(\frac{10-x}{4}\right)^2=A$

$\Rightarrow A=\frac{x^2}{16}+\frac{100-20x+x^2}{16}=\frac{x^2-10x+50}{8}$

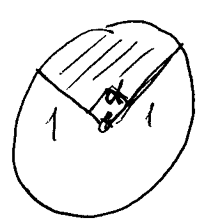
$A=\frac{(x^2-10x+25)+25}{8}=\frac{(x-5)^2+25}{8}$

$A=\frac{1}{8}(x-5)^2+\frac{25}{8}$ (D.)

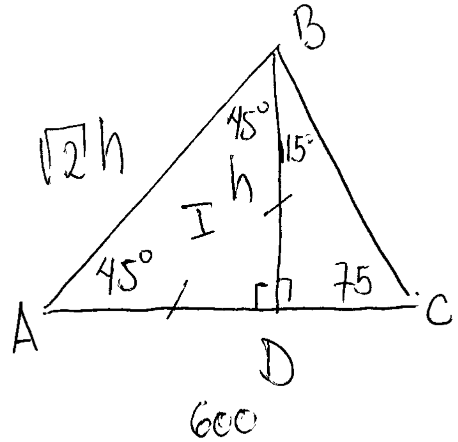
Solución ②: Geometría y Trigonometría.

65. 

Se forma un Δ rectángulo (verificar con Pitágoras)

$\Rightarrow$ 

$\Rightarrow A = \dfrac{\pi(1)^2}{4} = \dfrac{\pi}{4}$ // (A).

66. 

En Δ I: $\overline{AD} = \overline{BD} = h$ y $\overline{AB} = \sqrt{2}h$.

En ΔABC: $\measuredangle ABC = 60°$ y por la ley de Senos:

$$\frac{\operatorname{sen} 60°}{600} = \frac{\operatorname{sen} 75°}{\sqrt{2}h} \Rightarrow h = \frac{600 \operatorname{sen} 75°}{\sqrt{2}\operatorname{sen} 60°}$$

$$\operatorname{sen} 75° = \operatorname{sen}(30°+45°) = \operatorname{sen} 30° \cos 45° + \operatorname{sen} 45° \cos 30°$$

$$= \frac{1}{2}\cdot\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}\frac{\sqrt{3}}{2} = \frac{\sqrt{2}+\sqrt{6}}{4}$$

$$\Rightarrow h = \frac{600\cdot\frac{(\sqrt{2}+\sqrt{6})}{4}}{\sqrt{2}\ \frac{\sqrt{3}}{2}}$$

$$\Rightarrow h = \frac{150\cdot\cancel{\sqrt{2}}(1+\sqrt{3})}{\cancel{\sqrt{2}}\cdot\frac{\sqrt{3}}{2}}$$

$$\Rightarrow h = 100(3+\sqrt{3})$$ (C.)

67. $\Delta ABC \sim \Delta DEC$ (A.A) ; $\measuredangle ACB = \measuredangle ECD$ (O.V.) y $\measuredangle ABC = \measuredangle CED$ (altitud)

$\dfrac{13}{52} = \dfrac{\overline{AC}}{60} \Rightarrow \underline{\overline{AC} = 15};$ ⇒ En Δ AFC (rectángulo) $\Rightarrow \overline{FC}^2 = 15^2 - 12^2$

$\Rightarrow \overline{FC} = \sqrt{81} = 9$ // y Δ BFC (rectángulos $\Rightarrow \overline{BF}^2 = 13^2 - 12^2$

$\Rightarrow \overline{BF} = \sqrt{25} = 5$ // ⇒ Perímetro ΔABC = 13+15+14

= 42 // (B.)

68. $\tan\left(\frac{x}{2}\right) - \operatorname{sen} x = 0 \Rightarrow \dfrac{1-\cos x}{\operatorname{sen} x} - \operatorname{sen} x = 0 \Rightarrow 1 - \cos x - \operatorname{sen}^2 x = 0$

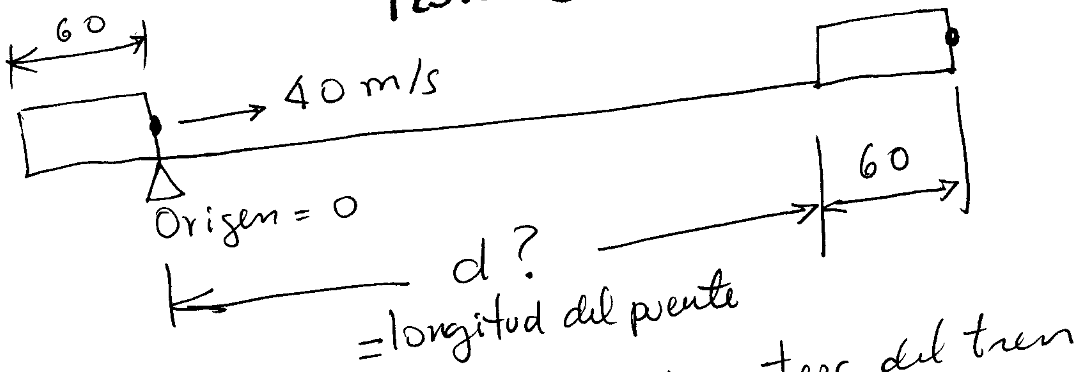
$\Rightarrow \cancel{1} - \cos x - \cancel{1} + \cos^2 x = 0 \Rightarrow \cos^2 x - \cos x = 0 \Rightarrow \cos x(\cos x - 1) = 0$

$\Rightarrow \cos x = 0 \Rightarrow \boxed{x = \frac{\pi}{2};\ \frac{3\pi}{2}}$ y $\cos x = 1 \Rightarrow x = 0$

(A) ⇒ En el intervalo $0 < x < 2\pi$

Física B

F9



Fijándonos en la parte delantera del tren

$$d + 60 = 40t \quad (1)$$

$$d + 60 = 80(t-1) \quad (2)$$

↳ doble de rapidez

Desarrollando (2) $\quad d + 60 = 80t - 80$ } restando m.a.m

Copiando (1) $\quad d + 60 = 40t$

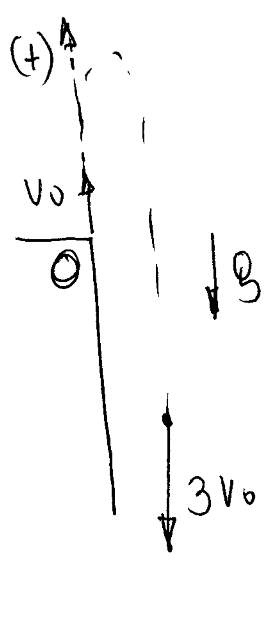
$$0 = 40t - 80$$

$$\Rightarrow t = \frac{8\cancel{0}}{4\cancel{0}} = 2\,(s)$$

Despejando d de (1) $\quad d = 40t - 60$

Reemplazando $t = 2\,s$ $\Rightarrow$ $d = 20\ m$ // (B)

F10



La ec. de velocidad es $V = V_0 - gt$

Como $V_f = -3V_0$ (hacia arriba positivo)

tenemos

$$-3V_0 = V_0 - 10t \quad y \quad t = 5\,s$$

$$\Rightarrow 4V_0 = 50$$

o sea $V_0 = 12.5\ \frac{m}{s}$ // (B)

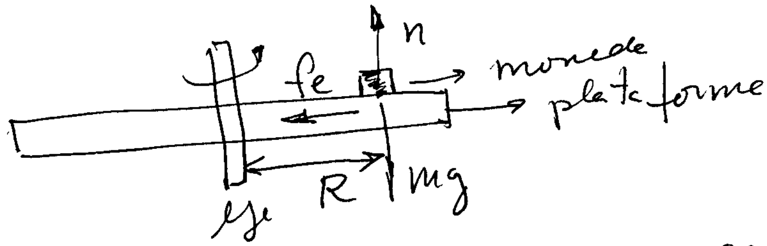
F11 Ponemos la velocidad angular en $\frac{rad}{s}$ **Física B**

$$\omega = 30 \frac{\cancel{rev}}{\cancel{min}} \times 1 \frac{\cancel{min}}{60 s} \times \frac{2\pi rad}{1 \cancel{rev}} = \pi \frac{rad}{s}$$

$R = 0.15 m$

DCL de la moneda

vista de perfil



Del equilibrio vertical $n = mg$. Para que μ_e sea mínimo debemos hacer que f_e sea máximo, esto es, $f_{e,max} = \mu_e n$ o sea, $f_{e,max} = \mu_e mg$

Por la 2ª Ley de Newton $\mu_e \cancel{m} g = \cancel{m} a$

Recordando que $a = \omega^2 R$ (aceleración centrípeta)

$$\mu_e g = \omega^2 R \Rightarrow \mu_e = \frac{\omega^2 R}{g}$$

$$\mu = \frac{\cancel{\pi^2} R}{\cancel{\pi^2}} = 0.15 \quad \text{//} \qquad \text{A}$$

F12

$$F = ma = 3 \times 2 = 6 [N]$$

Como parte del reposo $s = \frac{1}{2} a t^2 = \frac{1}{2} \times 2 \times 10^2 = 100 m$

Como F y s tienen la misma dirección $\Rightarrow W = Fs$

$$W = 6 \times 100 = 600 [J] \quad \text{//} \qquad \text{C}$$

Q13:- $C_1 = 1,81 \frac{g}{cm^3} \cdot \frac{98\,g\,H_2SO_4}{100\,g\,sol} \cdot \frac{1\,mol\,H_2SO_4}{98\,g\,H_2SO_4} \cdot \frac{2\,Eq\,H_2SO_4}{1\,mol\,H_2SO_4} \cdot \frac{1000\,cm^3}{1\,l}$

$$\boxed{C_1 = 36,2\ Eq/l}$$

$$\boxed{V_1 = V_2 \cdot \frac{C_2}{C_1} = 2000\,cm^3 \cdot \frac{3,62\,N}{36,2\,N} = 200\,cm^3} \Rightarrow B$$

Q14:- $2\,KMnO_4 + \underline{\underline{5}}\,H_2C_2O_4 + 3\,H_2SO_4 \longrightarrow K_2SO_4 + 2\,MnSO_4 + 10\,CO_2 + 8\,H_2O$

$$MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{+2} + 4\,H_2O \quad |2| \Rightarrow D$$

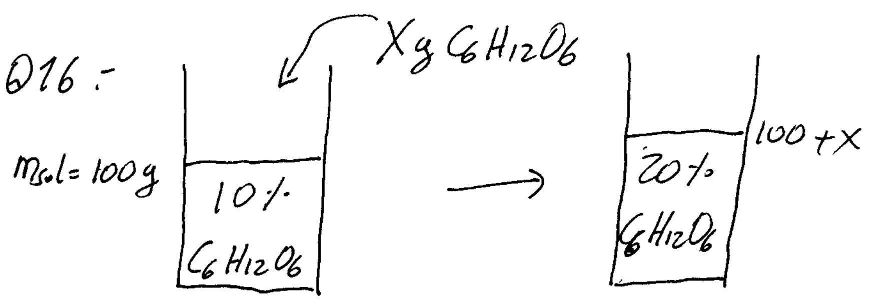
$$H_2C_2O_4 \longrightarrow 2CO_2 + 2H^+ + 2e^- \quad |5|$$

$$2MnO_4^- + \underset{6}{\cancel{16}}H^+ + 5\,H_2C_2O_4 \longrightarrow 2Mn^{+2} + 10\,CO_2 + \cancel{10H^+} + 8\,H_2O$$

Q15.- $\Delta Te = Ke \cdot M_o = 0,52 \frac{°C}{molal} \cdot \left(\frac{48\,g}{58\,g/mol \cdot 0,6\,Kg}\right) = 0,72\,°C$

$$\boxed{Te_{sol} = 100 + 0,72 = 100,72\,°C} \Rightarrow C$$

Q16:-



$$m_1 = \left(\frac{\%}{100}\right) \cdot m_{sol} = \left(\frac{10}{100}\right) \cdot 100 = 10\,g\ C_6H_{12}O_6$$

$$20\% = \left(\frac{10+X}{100+X}\right) \cdot 100 \Rightarrow \boxed{X = 12,5\,g\ C_6H_{12}O_6} \Rightarrow \cancel{C}$$

C