Solución - ARITMÉTICA - ÁLGEBRA : 1

A_1: $85, 90, 95, \ldots, 715$ sucesión aritmética: $a_1 = 85$ y $a_n = 715$

$\Rightarrow$ Si $a_n = 715 \Rightarrow a_1 + (n-1)d = 715 \Rightarrow 85 + (n-1)5 = 715$

$\Rightarrow n - 1 = \dfrac{630}{5} \Rightarrow \boxed{n = 127} \Rightarrow S_n = \dfrac{n(a_1 + a_n)}{2} = \dfrac{127(85+715)}{2}$

$\Rightarrow \boxed{S_{127} = 50800}$ C.

A_2: $x^3 + mx^2 + nx + 7 = 0$ y $x_1 = 1 - 2\sqrt{2} \Rightarrow x_2 = 1 + 2\sqrt{2}$ y $x_3 = ¿?$

$\Rightarrow x_1 + x_2 + x_3 = -\dfrac{b}{a} \Rightarrow 1 - \cancel{2\sqrt{2}} + 1 + \cancel{2\sqrt{2}} + x_3 = -\dfrac{m}{1} \Rightarrow 2 + x_3 = -m$ (1)

$\Rightarrow x_1x_2 + x_1x_3 + x_2x_3 = \dfrac{c}{a} \Rightarrow (-7) + (1-2\sqrt{2})x_3 + (1+2\sqrt{2})x_3 = \dfrac{n}{1}$ (2)

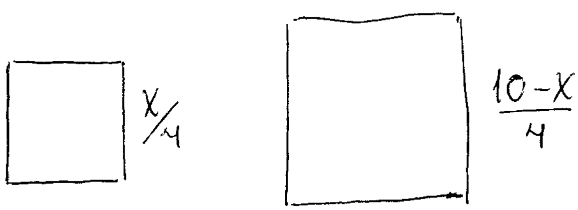
$\Rightarrow x_1x_2x_3 = -\dfrac{d}{a} \Rightarrow (-7)x_3 = -\dfrac{7}{1} \Rightarrow x_3 = 1$ (3)

(3) en (1) y (2) $\Rightarrow 2 + 1 = -m \Rightarrow \boxed{m = -3}$

$-7 + (1-2\sqrt{2})(1) + (1+2\sqrt{2})(1) = n \Rightarrow \boxed{n = -5}$

$\Rightarrow \boxed{m + n = -8}$ C.

A_3:



$\Rightarrow A = \left(\dfrac{x}{4}\right)^2 + \left(\dfrac{10-x}{4}\right)^2 = \dfrac{x^2}{16} + \dfrac{100 - 20x + x^2}{16}$

$\Rightarrow A = \dfrac{x^2 - 10x + 50}{8} = \dfrac{(x^2 - 10x + 25) + 25}{8}$

$\Rightarrow A = \dfrac{1}{8}(x-5)^2 + \dfrac{25}{8}$ C.

A_4: $e^x + 12e^{-x} - 7 = 0 \Rightarrow e^{2x} - 7e^x + 12 = 0 \Rightarrow (e^x - 3)(e^x - 4) = 0$

$\Rightarrow e^x = 3$ y $e^x = 4$

$\Rightarrow x_1 = \ln 3 \quad x_2 = \ln 4 \Rightarrow x_1 + x_2 = \ln 3 + \ln 4$

$= \ln(3 \cdot 4) = \ln 12$ D

Solución · Geometría - trigonometría

65. $\Delta ABC \sim \Delta CDE$ (A.A.) $\Rightarrow \dfrac{13}{52} = \dfrac{\overline{AC}}{60} \Rightarrow \boxed{\overline{AC} = 15}$

($\hat{B} = \hat{E}$ alt. int., $\measuredangle BCA = \measuredangle DCE$ o.v.)

$\Rightarrow \overline{BF} = \sqrt{13^2 - 12^2} = 5$

$\Rightarrow \overline{FC} = \sqrt{15^2 - 12^2} = 9$

$\Rightarrow \overline{BC} = \overline{BF} + \overline{FC} = 14$

$\Rightarrow$ Perímetro $= 13 + 15 + 14 = \underline{\underline{42}}$ (A).

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

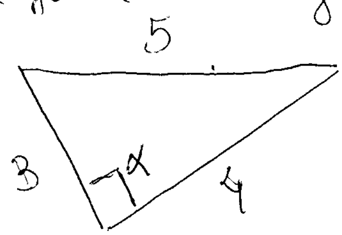
$\Rightarrow \cancel{1} - \cos x - \cancel{1} + \cos^2 x = 0 \Rightarrow \cos^2 x - \cos x = 0 \Rightarrow \cos x(\cos x - 1) = 0$

$\cos x = 0$ y $\cos x = 1$

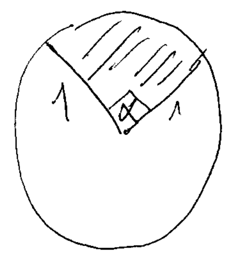
$\hookrightarrow x = \frac{\pi}{2}, \frac{3\pi}{2}$ $\hookrightarrow x = 0$; $\Rightarrow$ En el intervalo $0 < x < 2\pi$

Se escogen: $\boxed{\frac{\pi}{2}; \frac{3\pi}{2}}$ $\Rightarrow$ Soluciones. (C).

67. Se forma un triángulo rectángulo (Verificable con pitágoras)

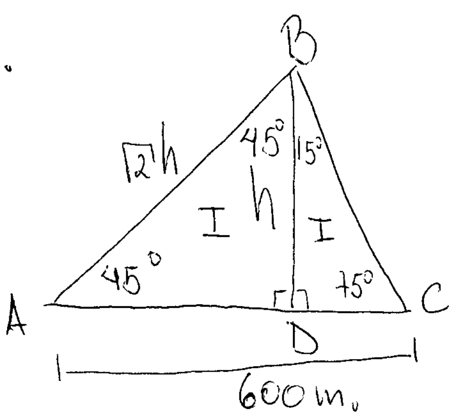


$\Rightarrow$



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

68.



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

En ΔABC: $\measuredangle ABC = 60° \Rightarrow$ Por la Ley de Senos:

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

$$\Rightarrow h = \frac{600 \cdot \left(\frac{\sqrt{2}+\sqrt{6}}{4}\right)}{\sqrt{2} \cdot \frac{\sqrt{3}}{2}} = \frac{300(\sqrt{2}+\sqrt{6})}{\sqrt{6}}$$

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

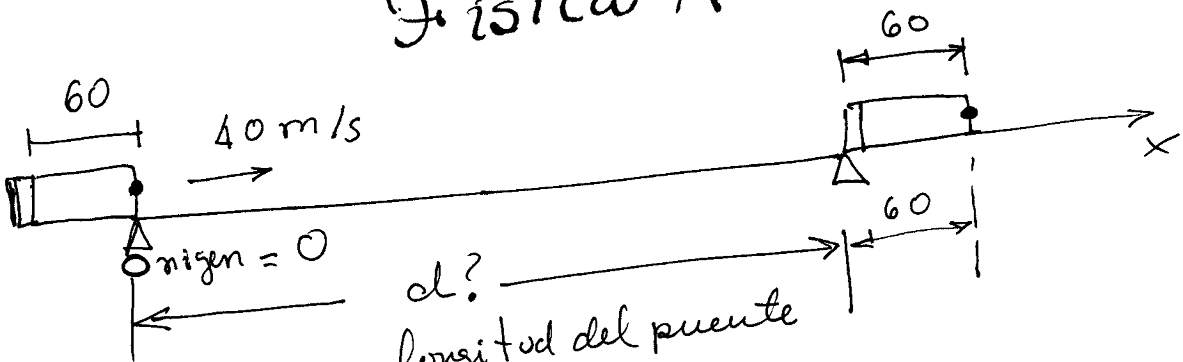
$= \operatorname{sen} 30° \cos 45 + \operatorname{sen} 45° \cos 30° = \frac{1}{2}\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}\frac{\sqrt{3}}{2} = \frac{\sqrt{2}+\sqrt{6}}{4}$

$\underline{\underline{h = 100(\sqrt{3}+3)}}$

(B).

Física A

F9



= longitud del puente

Fijandonos en la parte delantera del tren

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

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

↳ doble de rapidez

Desarrollando (2) $\quad d+60 = 80t - 160$ } restando m.a.m

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

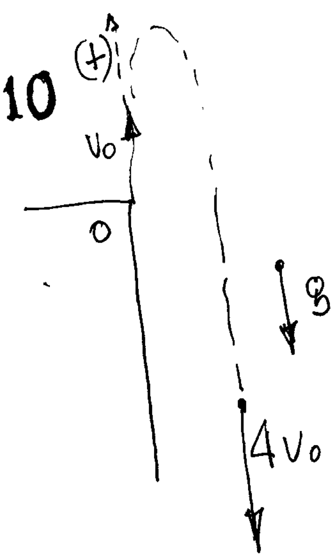
$$0 = 40t - 160$$

$$\Rightarrow t = \frac{16\cancel{0}}{4\cancel{0}} = 4\,(s)$$

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

reemplazando $t = 4\,s \Rightarrow d = 100\,m$

F10



La ecuación de la velocidad $V = V_0 - gt$

hacia arriba consideramos positivo

$\Rightarrow V_f = -4V_0$; Como $t = 5\,s$

$$-4V_0 = V_0 - 10t$$

$$5V_0 = 50$$

$$\Rightarrow V_0 = 10\,\frac{m}{s} \quad (B)$$

Física A

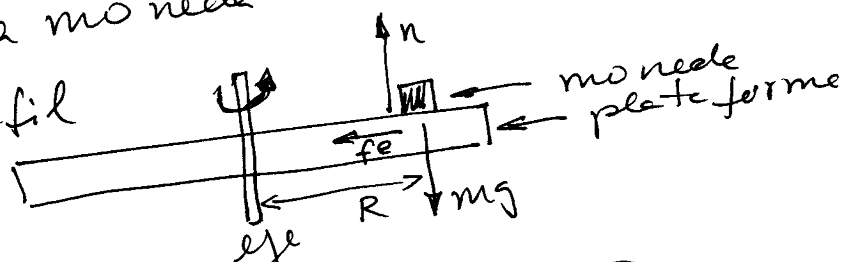
F11 Ponemos la velocidad angular en rad/s

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

$R = 0.15\,m$

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 2da ley de Newton $\mu_e \cancel{m} g = \cancel{m} a$.

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

$$\mu_e g = \omega^2 R$$

$$\Rightarrow \mu_e = \frac{\omega^2 R}{g} = \frac{(2\pi)^2 \times 0.15}{\pi^2}$$

$$\mu_e = \frac{4\cancel{\pi^2} \times 0.15}{\cancel{\pi^2}} = \underline{0.60} \quad \text{D}$$

F12. $F = ma = 4 \times 2 = 8\,N$

Como parte del reposo $s = \frac{1}{2} a t^2 = \frac{1}{2} \times 2 \times 10^2$ o sea $s = 100\,m$. Como F y s tienen la misma dirección $W = Fs = 8 \times 100$

$$\underline{W = 800\,[J]} \quad \text{D}$$

Q13.-

$$C_1 = 1{,}81 \cdot \frac{g}{cm^3} \cdot \frac{98\,g\,H_2SO_4}{100\,g\,Sol} \cdot \frac{1\,mol\,H_2SO_4}{98\,g\,H_2SO_4} \cdot \frac{2\,Eq\,H_2SO_4}{1\,mol\,H_2SO_4} \cdot \frac{1000\,cm^3}{1\,\ell} = 36{,}2\ Eq/\ell$$

$$V_1 = V_2 \cdot \frac{C_2}{C_1} = 1000\,cm^3 \cdot \frac{3{,}62\,N}{36{,}2\,N} = 100\,cm^3 \Rightarrow \text{C}$$

Q14.-

$$K_2Cr_2O_7 + \underline{\underline{3}}\ H_2C_2O_4 + 4\ H_2SO_4 \longrightarrow K_2SO_4 + Cr_2(SO_4)_3 + 6\,CO_2 + 7\,H_2O$$

$$Cr_2O_7^{=} + 14H^+ + 6e^- \longrightarrow 2Cr^{+3} + 7H_2O \quad |1$$

$$H_2C_2O_4 \longrightarrow 2CO_2 + 2H^+ + 2e^- \quad |3$$

$$\Rightarrow \text{B}$$

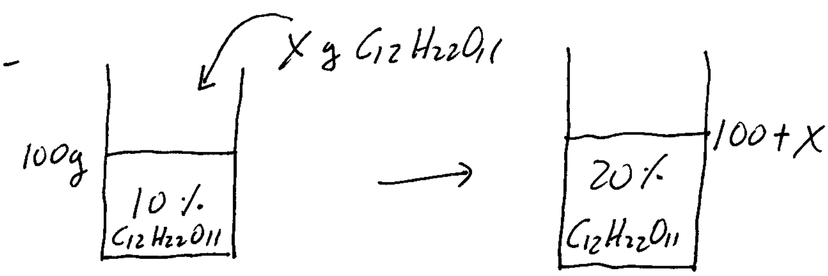
$$Cr_2O_7^{=} + 3H_2C_2O_4 + \underset{8}{\cancel{14}}H^+ \longrightarrow 2Cr^{+3} + 6\,CO_2 + \cancel{6H^+} + 7H_2O$$

Q15.-

$$\Delta T_e = K_e \cdot m_o = 0{,}52\,\frac{°C}{molal} \cdot \left(\frac{24\,g}{58\,g/mol \cdot 0{,}6\,kg}\right) = 0{,}36\,°C$$

$$T_{e\,sol} = 100 + 0{,}36 = 100{,}36\,°C \Rightarrow \text{D}$$

Q16.-



$$m_1 = \left(\frac{\%}{100}\right) \cdot m_{sol} = \left(\frac{10}{100}\right) \cdot 100 = 10\,g\ C_{12}H_{22}O_{11}$$

$$20\% = \left(\frac{10+X}{100+X}\right) \cdot 100 \Rightarrow X = 12{,}5\,g\ C_{12}H_{22}O_{11} \Rightarrow \text{A}$$