ARITMETICA - ALGEBRA

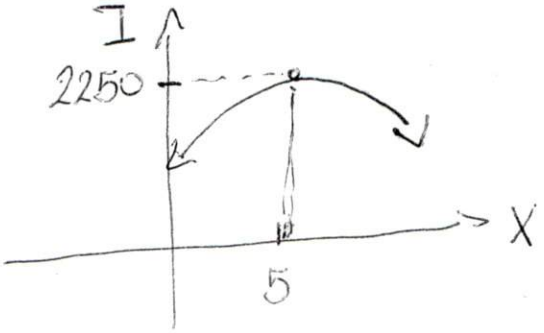
F1

① **A1**

$$I = (20-x)(100+10x) = 2000 + 100x - 10x^2$$

$$I = (-10x^2 + 100x) + 2000 = -10(x^2 - 10x + 25 - 25) + 2000$$

$$I = -10(x-5)^2 + 250 + 2000 = -10(x-5)^2 + 2250$$



Cuando $x = 5 \Rightarrow$ Ingreso Máximo

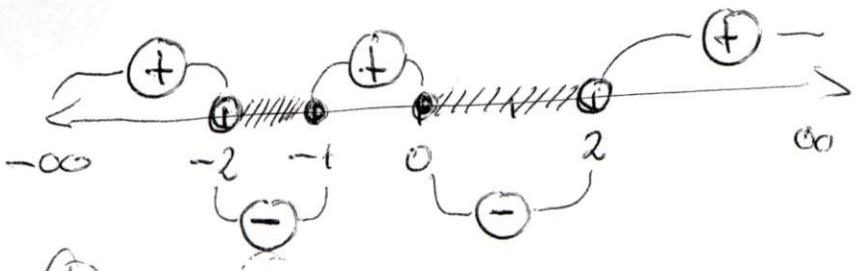
Precio $= 20 - 5 = 15$ Sol. (D) F1

$I_{MAX.} = 2250$.

① **A2**

Se Busca $f(x) \leq 0$ (Negativo o cero)

$$f(x) = \frac{x^2+x}{x^2-4} = \frac{x(x+1)}{(x+2)(x-2)} \Rightarrow \text{Puntos críticos} \begin{cases} x=0,\ x=-1 \ (f(x)=0) \\ x=-2,\ x=2 \ (f(x) \exists \text{ Indet.}) \end{cases}$$



Sol. $(-2;-1] \cup [0;2)$

(B) F1

① **A3**

P.A.: 9; 11; 13, ... $a = 9$; $d = 2$ $S_n = \frac{n}{2}[2a + (n-1)d]$

P.G: 3; −6; 12; −24; ... $a = 3$; $r = -2$ $S_q = \frac{a(r^n - 1)}{r-1}$

$$S_n = S_q \Rightarrow \frac{n}{2}[\cancel{18} + (n-1)2] = \frac{3[(-2)^9 - 1]}{(-2)-1} = \frac{3(-513)}{-3} = 513$$

$$9n + n^2 - n = 513 \Rightarrow n^2 + 8n - 513 = 0$$

$$\Rightarrow \boxed{n = 19} \text{ o } n \neq \cancel{-27}$$

(F1) Sol. C

F1

A4

$$\log_2(\log_5 2^{x^2}) - \log_2(\log_5 2) = 6$$

$$\log_2\left[\frac{x^2 \cdot \cancel{\log_5(2)}}{\cancel{\log_5(2)}}\right] = 6$$

$$\log_2 x^2 = 6$$

$$x^2 = 2^6 \Rightarrow x^2 - 64 = 0$$

$$(x+8)(x-8) = 0$$

$$\boxed{x_1 = -8 \text{ o } x_2 = 8}$$

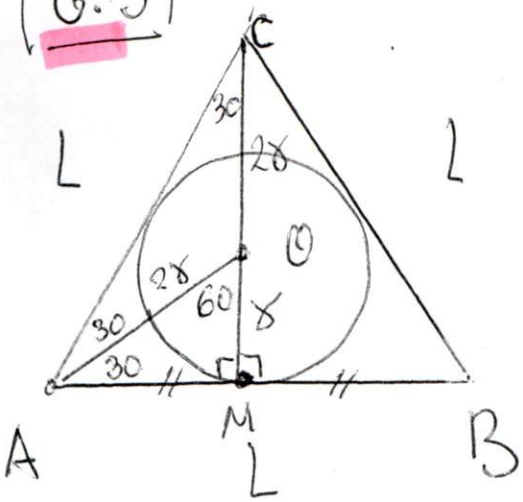
$$\Rightarrow \underline{x_1 + x_2 = 0} \;/$$

Sol. B

F1

GEOMETRIA – TRIGONOMETRIA

(1) G.5



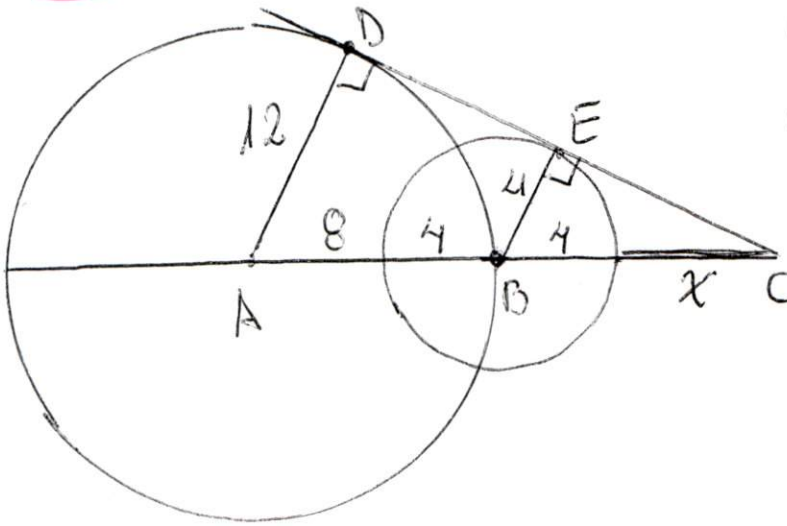
$\triangle ABC$ equilátero. (Dato)

1) trazamos $\overline{OA}$ y $\overline{OL}$ y $\overline{OC}$
2) $\overline{OL}$ y $\overline{OC}$ son colineales $(\overline{OL} = \gamma)$
3) $\overline{OL} \perp \overline{AB}$ (radio-tangente)
4) $\overline{OA}$ bisectriz. $\hat{A} = 60°$
5) $\triangle ALO$ es $\triangle$ especial $30°-60°-90°$
6) $\overline{OA} = 2\gamma$ y $\overline{AM} = \sqrt{3}\gamma$ (Relación Métrica)
7) $\overline{AB} = L = 2\sqrt{3}R$
8) $\triangle AOC$ Isósceles $\Rightarrow \overline{OA} = \overline{OC} = 2\gamma \Rightarrow \overline{CM} = 3\gamma$ (altura)
9) $A_{ABC} = \dfrac{(2\sqrt{3}\gamma)(3\gamma)}{\gamma} = 3\sqrt{3}\gamma^2$

Sol. (C)

F1

(1) G6



① $\overline{AD} \perp \overline{DC}$ y $\overline{BE} \perp \overline{DC}$ (radio-tan)
② $\hat{D} = \hat{E} = 90°$
③ $\hat{C}$ común
④ $\triangle ADC \sim \triangle BEC$ (A.A.)

$$\frac{12}{4} = \frac{8+4+4+x}{4+x}$$

$$3 = \frac{16+x}{4+x}$$

$$12+3x = 16+x$$

$$2x = 4$$

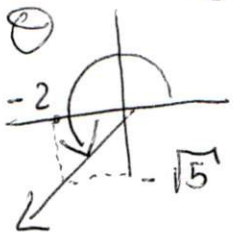
$$x = 2$$

Sol. (D)

F1

F1

F① 6.7



$\tan\theta = \frac{\sqrt{5}}{2}$ y $\cos\theta < 0 \Rightarrow \theta \in$ III C

$\Rightarrow r^2 = (-2)^2 + (-\sqrt{5})^2 = 4+5 = 9$

$\Rightarrow \boxed{r = +3}$

$\Rightarrow \cos\frac{\theta}{2} = \pm\sqrt{\frac{1+\cos\theta}{2}} = -\sqrt{\frac{1+(-2/3)}{2}} = -\sqrt{\frac{3-2}{6}} = -\sqrt{\frac{1}{6}} = -\frac{\sqrt{6}}{6}$

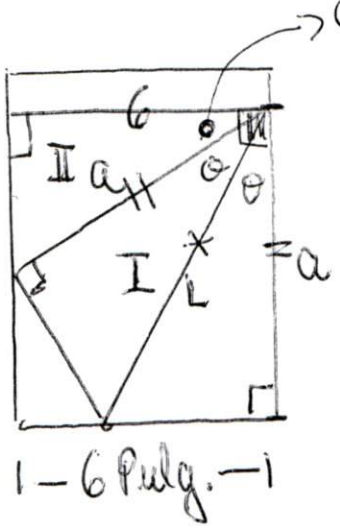
$= -1/\sqrt{6}$

↳ $\theta/2 \in$ II C

Sol. (D)

F1

F① 6.8



En ΔI: $\cos\theta = \frac{a}{\ell}$

↳ $a = \ell\cos\theta$ ①

En ΔII: $\cos(90°-2\theta) = \frac{6}{a}$

$a = \frac{6}{\cos(90°-2\theta)}$ ②

De ① y ②

$\ell\cos\theta = \frac{6}{\cos(90°-2\theta)} \Rightarrow \ell = \frac{6}{\cos\theta\,\underbrace{\cos(90°-2\theta)}_{\sin 2\theta}}$

$\ell = \frac{6}{\cos\theta\sin 2\theta} = \frac{6}{\cos\theta \cdot 2\sin\theta\cos\theta} = \frac{3}{\sin\theta\cos^2\theta}$ //

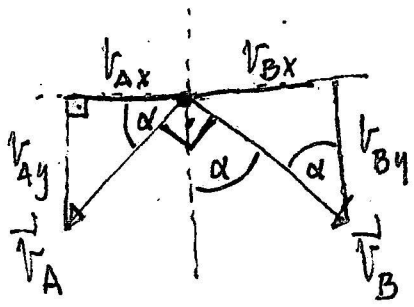
F1 ↳ Sol. (A)

Fila 1

#9 Las magnitudes:

$A \to x_A = 20t \to y_A = \frac{g}{2}t^2 \Rightarrow \begin{cases} v_{Ax} = 20 \\ v_{Ay} = gt \end{cases}$

$B \to x_B = 30t \to y_B = \frac{g}{2}t^2 \Rightarrow \begin{cases} v_{Bx} = 30 \\ v_{By} = gt \end{cases}$



$$\tan\alpha = \frac{v_{Ay}}{v_{Ax}} = \frac{v_{Bx}}{v_{By}} \Rightarrow \frac{gt}{20} = \frac{30}{gt} \Rightarrow t = \sqrt{6} \Rightarrow d = x_A + x_B$$

$$\boxed{d = 50\sqrt{6}\,[m]} \quad (a)$$

#10 $y = 320 + v_0(10) - \frac{g}{2}(10)^2 \to \boxed{v_0 = 18\left[\frac{m}{s}\right]}$ (b)

#11

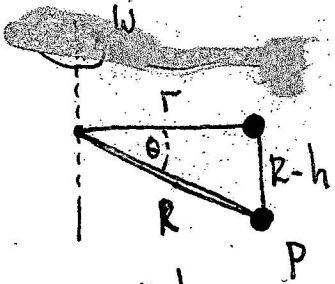
$y = h - \frac{g}{2}t^2$

$t = \frac{1}{5}[s]$

$\Rightarrow$ El hueco debe dar almenos una vuelta

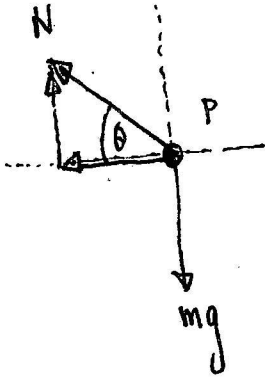
$\theta = \theta_0 + wt \Rightarrow \boxed{w = 10\pi\left[\frac{rad}{s}\right]}$ (c)

#12



$\operatorname{Sen}\theta = \frac{R-h}{R}$

$\operatorname{Cos}\theta = \frac{r}{R} \to r = R\operatorname{Cos}\theta$



$N\operatorname{Sen}\theta - mg = 0 \to N = \frac{mg}{\operatorname{Sen}\theta}$

$N\operatorname{Cos}\theta = mrw^2$

$\frac{mg}{\operatorname{Sen}\theta}\operatorname{Cos}\theta = mrw^2$

$\frac{g\operatorname{Cos}\theta}{\operatorname{Sen}\theta} = R\operatorname{Cos}\theta w^2$

$\frac{g}{\frac{R-h}{R}} = Rw^2 \Rightarrow h = R - \frac{g}{w^2}$

$h = 1 - \frac{1}{10}$

$\boxed{h = 0{,}9\,[m]}$ (a)

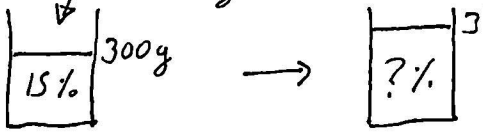
Q13.- $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(g)}$

4g 32g 36g

(D)

$5\,g\,H_2 \cdot \frac{36\,g\,H_2O}{4\,g\,H_2} \cdot \frac{80\% \cdot R}{100\% \cdot R} = \boxed{36\,g\,H_2O}$ ¡En exceso está el O_2!

Q.14.- 18,75 g



$m_{i\,C_6H_{12}O_6} = 300\,g \cdot 0,15 = 45\,g$

$m_{F\,C_6H_{12}O_6} = 45 + 18,75 = 63,75\,g$

$\% C_6H_{12}O_6 = \frac{m_s}{m_{sol.}} \cdot 100 = \frac{63,75}{318,75} \cdot 100 = \boxed{20\%\ C_6H_{12}O_6}$ (B)

(A)

Q.15.- a) $\bar{O}=\dot{N}=\bar{O}$ b) $\bar{O}=C=\bar{O}$ c) $\bar{O}\leftarrow S=\bar{O}$ d) $Li^+ \; [:\bar{O}:]^{-2} \; Li^+$

Q.16.- a) $50\,l\,C_2H_6 \frac{2\,at\text{-}g\,C}{22,4\,l\,C_2H_6} \cdot \frac{6,023 \cdot 10^{23}\,at.C}{1\,at\text{-}g\,C} = 2,688 \cdot 10^{24}$ átomos C

b) $3\,mol\,C_2H_6 \frac{2\,at\text{-}g\,C}{1\,mol\,C_2H_6} \cdot \frac{6,023 \cdot 10^{23}}{1\,at\text{-}g\,C} = 3,613 \cdot 10^{24}$ átomos C

c) $6\,g\,C_2H_6 \frac{2\,at\text{-}g\,C}{30\,g\,C_2H_6} \cdot \frac{6,023 \cdot 10^{23}}{1\,at\text{-}g\,C} = \boxed{2,4092 \cdot 10^{23}\ \text{átomos C}}$ (C)

d) $0,5\,Kg\,C_2H_6 \frac{1000\,g}{1\,Kg} \cdot \frac{2\,at\text{-}g\,C}{30\,g\,C_2H_6} \cdot \frac{6,023 \cdot 10^{23}\,at.}{1\,at\text{-}g\,C} = 2 \cdot 10^{25}$ átomos C