



ALGEBRA

4th
SECONDARY

ASESORIA



 **SACO OLIVEROS**



PROBLEMA 1

Obtenga el grado absoluto del término del lugar 12

$$P(x) = (x^5 + x^8)^{18}$$

Resolución

$$t_{12} = t_{11+1} \Rightarrow \begin{matrix} k = 11 \\ n = 18 \end{matrix}$$

$$\begin{aligned} \Rightarrow t_{12} &= C_{11}^{18} (x^5)^7 \cdot (x^8)^{11} \\ &= C_{11}^{18} x^{35} \cdot x^{88} \end{aligned}$$

$$\text{GA} = 35 + 88$$

RPTA: GA= 123

Recordar
 $(a + b)^n$

$$\Rightarrow t_{k+1} = C_k^n a^{n-k} \cdot b^k$$

**PROBLEMA 2**

Indique el término del lugar 6 en el desarrollo : $N(x) = \left(x^3 + \frac{1}{x^2}\right)^{50}$

Resolución

$$t_6 = t_{5+1} \rightarrow \begin{cases} \bullet \quad k = 5 \\ \bullet \quad n = 50 \end{cases}$$

Entonces:

$$\rightarrow t_6 = C_5^{50} (x^3)^{45} \cdot \left(\frac{1}{x^2}\right)^5$$

$$= C_5^{50} x^{135} \cdot \left(\frac{1}{x^{10}}\right)$$

RPTA

$$t_6 = C_5^{50} x^{125}$$

Recordar

$$(a + b)^n$$

$$\rightarrow t_{k+1} = C_k^n a^{n-k} \cdot b^k$$



PROBLEMA 3

En la expansión $(a^4 + b^4)^{3n}$ los términos del lugar $n + 6$ y $n + 8$ equidistan de los extremos. Determine el exponente de a en el termino central

Resolución

$$t_{n+6} = t_{n+5+1} \Rightarrow \left\{ \begin{array}{l} \bullet \quad k = n+5 \end{array} \right.$$

$$\Rightarrow t_{n+6} = C_{n+5}^{3n} (a^4)^{3n-n-5} \cdot (b^4)^{n+5}$$

$$\Rightarrow t_{n+8} = C_{n+7}^{3n} (a^4)^{3n-n-7} \cdot (b^4)^{n+7}$$

$$\Rightarrow C_{n+5}^{3n} = C_{n+7}^{3n}$$

se cumple: $n + 5 = n + 7$ (F)

$$n+5 + n + 7 = 3n$$

$$2n + 12 = 3n$$

$$12 = n$$

$$\Rightarrow (a^4 + b^4)^{36}$$

Como n es par:

$$t_c = t_{\frac{n}{2}+1} = t_{18+1} = t_{19}$$

$$t_{19} = t_{18+1} = C_{18}^{36} (a^4)^{18} (b^4)^{18}$$

piden exponente de a : $(a^4)^{18}$

$$= a^{72}$$

Rpta $\Rightarrow 72$

**PROBLEMA 4**

Sabiendo que: $z = \frac{(1+i)^2}{(1-i)^2} + 10 \left(\frac{2+3i}{1-2i} \right)$ Calcular $t = \frac{\text{Im}(z)+2}{\text{Re}(z)+1}$

Resolución**Recordar:**

- $(1+i)^2 = 2i$
- $(1-i)^2 = -2i$
- $i^2 = -1$

$$Z = \frac{2i}{-2i} + 10 \frac{(2+3i)}{1-2i} \cdot \frac{(1+2i)}{1+2i}$$

$$Z = -1 + 10 \frac{(2+4i+3i+6i^2)}{1+2^2}$$

$$Z = -1 + 10 \frac{(-4+7i)}{5}$$

$$Z = -1 - 8 + 14i = -9 + 14i$$

$$Z = -9 + 14i$$

Reemplazando

$$t = \frac{14 + 2}{-9 + 1}$$

$$t = \frac{16}{-8}$$

RPTA

$$t = -2$$



De la Identidad: $(1 + i)^2 + (1 + i)^4 + (1 + i)^8 \equiv a + bi$
 Calcular $w = (a + b)^2$

Resolución

Recordar

- $(1 + i)^2 = 2i$
- $(1 - i)^2 = -2i$
- $i^2 = -1$

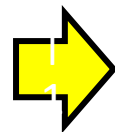
$$(1 + i)^2 + [(1 + i)^2]^2 + [(1 + i)^2]^4 \equiv a + bi$$

$$2i + (2i)^2 + (2i)^4 \equiv a + bi$$

$$2i + 2^2 \cdot i^2 + 2^4 \cdot i^4$$

$$2i + 4(-1) + 16(1) \equiv a + bi$$

$$12 + 2i \equiv a + bi$$



$$a = 12$$

$$b = 2$$

piden

$$= (12 + 2)^2$$

$$14^2$$

RPTA

$$= 196$$




PROBLEMA 6

Sabiendo que: $\sqrt{A + Bi} = x + yi$, Halle :

$$M = \frac{B^2}{y^2 A + y^4}$$

Resolución

ELEVANDO AL CUADRADO


 $(\sqrt{A + Bi})^2 = (x + yi)^2$
 $A + Bi = x^2 + 2xyi + (yi)^2$
 $A + Bi = x^2 - y^2 + 2xyi$
 $A = x^2 - y^2 \wedge B = 2xy$

REEMPLAZANDO

$$M = \frac{(2xy)^2}{y^2(A + y^2)}$$

$$= \frac{4x^2 y^2}{y^2(x^2 - y^2 + y^2)}$$

$$M = \frac{4x^2 y^2}{x^2 y^2} = 4$$

Rpta. $M = 4$

**PROBLEMA 7**

Halle el valor de x , si se cumple :

$$\frac{a+1}{x+b} - \frac{a-b}{a-x} = \frac{b+1}{x+b}$$

Resolución

$$\frac{a+1}{x+b} - \frac{b+1}{x+b} = \frac{a-b}{a-x}$$

$$\frac{a-b}{x+b} = \frac{a-b}{a-x}$$

$$a-x = x+b$$

$$a-b = 2x$$

RPTA

$$\frac{a-b}{2} = x$$

**PROBLEMA 8**

Determine el valor de x en la ecuación

$$M = \frac{x^2 + 14x + 50}{x^2 - 6x + 10} = \left(\frac{x - 3}{x + 7} \right)^{-2}$$

Resolución

$$M = \frac{x^2 + 14x + 50}{x^2 - 6x + 10} = \frac{(x + 7)^2}{(x - 3)^2}$$

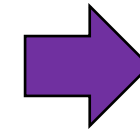
$$M = \frac{x^2 + 14x + 50}{x^2 - 6x + 10} = \frac{x^2 + 14x + 49}{x^2 - 6x + 9}$$

$$m = x^2 + 14x + 49$$

$$n = x^2 - 6x + 9$$

$$\frac{m + 1}{n + 1} = \frac{m}{n}$$

$$mn + n = mn + m$$



$$n = m$$

$$x^2 - 6x + 9 = x^2 + 14x + 49$$

$$-40 = 20x$$

RPTA

$$-2 = x$$



Si x_0 es solución de la ecuación lineal

$$\frac{x-2a-b}{b} + \frac{x}{a+b} = 3. \text{ Calcule el valor de } \frac{x_0}{a+b}; \text{ considere } a; b \in \mathbb{R}^+$$

Resolución

$$\rightarrow \frac{x-2a-b}{b} - 1 + \frac{x}{a+b} - 2 = 0$$

$$\rightarrow \frac{x-2a-2b}{b} + \frac{x-2a-2b}{a+b} = 0$$

$$(x-2a-2b) \underbrace{\left[\frac{1}{b} + \frac{1}{a+b} \right]}_{+} = 0$$

Entonces

$$x - 2a - 2b = 0$$

$$x = 2a + 2b$$

$$x = 2(a+b)$$

$$x = x_0$$

$$x_0 = 2(a+b)$$

Piden:

$$\frac{x_0}{a+b}$$

Remplazando

$$= \frac{2(a+b)}{a+b}$$

$$\rightarrow \text{Rpta: } 2$$

**PROBLEMA 10**

Paúl quiere regalar una laptop a su hija Anita para sus clases virtuales; si Paúl tiene ahorrado s/ 1000. ¿Cuánto dinero le falta? Si la laptop cuesta $10x$, soles donde x se obtiene al resolver

$$\sqrt[3]{14 + \sqrt{x}} + \sqrt[3]{14 - \sqrt{x}} = 4$$

Resolución**IDENTIDAD DE CAUCHY**

$$(a + b)^3 = a^3 + b^3 + 3(a + b)(ab)$$

Elevando al cubo:

$$\left(\sqrt[3]{14 + \sqrt{x}} + \sqrt[3]{14 - \sqrt{x}} \right)^3 = (4)^3$$

$$14 + \sqrt{x} + 14 - \sqrt{x} + 3(\sqrt[3]{14^2 - x})(4) = 64$$

$$28 + 3(\sqrt[3]{14^2 - x})(4) = 64$$

$$12(\sqrt[3]{14^2 - x}) = 36$$

$$(\sqrt[3]{14^2 - x}) = 3$$

Elevando al cubo: $14^2 - x = 27$

$$196 - 27 = x$$

$$169 = x$$

reemplazando:

$$\text{laptop } 10(169)$$

$$= 1690$$

$$1690 - 1000 = 690$$

RPTA

**Le falta:
s/690**