



ALGEBRA

3th
SECONDARY

HELICOASESOR

IA

Tomo I



 **SACO OLIVEROS**

RESUMEN TEÓRICO



1

$$x^a \cdot x^b = x^{a+b}$$

2

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

3

$$(x^a)^b = x^{ab}$$

4

$$x^{-a} = \frac{1}{x^a}$$

5

$$x^{\frac{a}{b}} = \sqrt[b]{x^a}$$

6

$$\sqrt[m]{x^a} \cdot \sqrt[m]{x^b} = \sqrt[m]{x^{a+b}}$$

7

$$\sqrt[m]{x^a} \sqrt[n]{x^b} \sqrt[p]{x^c} = \sqrt[mnp]{x^{(an+b)p+c}}$$

8

$$\text{Si } x^a = x^b, \text{ entonces } a = b$$



1

Efectuar



$$P = \frac{\left(\frac{1}{5}\right)^{-2} + \left(\frac{1}{2}\right)^{-3} + \left(\frac{1}{3}\right)^{-2}}{\left(\frac{1}{24}\right)^{-1} - \left(\frac{1}{3}\right)^{-1}}$$

Recordemos:

$$\left(\frac{A}{B}\right)^{-n} = \left(\frac{B}{A}\right)^n$$

Resolución:

$$P = \frac{5^2 + 2^3 + 3^2}{24^1 - 3^1} = \frac{25 + 8 + 9}{24 - 3} = \frac{42}{21}$$

$$\therefore P = 2$$

2

Simplifique

$$T = \frac{81^{n+1} \cdot 27^{2n+3}}{243^{2n+2}}$$

Recordemos:

$$(a^m)^n = a^{m \cdot n}$$

Resolución:

Descomponiendo las bases:

$$T = \frac{(3^4)^{n+1} \cdot (3^3)^{2n+3}}{(3^5)^{2n+2}} = \frac{3^{4n+4} \cdot 3^{6n+9}}{3^{10n+10}} = \frac{3^{\cancel{10n}+13}}{3^{\cancel{10n}+10}} = 3^3$$

$$\therefore T = 27$$

3

Reduzca

$$W = \frac{5^{3m+2} + 5^{3m+1} + 5^{3m+3}}{5^{3m+1}}$$

Recordemos:

$$a^{m+n} = a^m \cdot a^n$$

Resolución:

$$W = \frac{5^{3m} \cdot 5^2 + 5^{3m} \cdot 5^1 + 5^{3m} \cdot 5^3}{5^{3m} \cdot 5^1} = \frac{\cancel{5^{3m}} (5^2 + 5^1 + 5^3)}{\cancel{5^{3m}} \cdot 5^1}$$

$$W = \frac{25 + 5 + 125}{5} = \frac{155}{5}$$

$$\therefore W = 31$$

4

Siendo $3^{-x} = \frac{1}{2}$

evalúe $Z = 27^x + 81^x - 9^x$

Resolución:

$$Z = 27^x + 81^x - 9^x$$

$$Z = (3^3)^x + (3^4)^x - (3^2)^x$$

$$Z = (3^x)^3 + (3^x)^4 - (3^x)^2$$

Reemplazando:

$$Z = 2^3 + 2^4 - 2^2$$

$$Z = 8 + 16 - 4$$

$$\therefore Z = 20$$

Recordemos:

$$(a^m)^n = (a^n)^m$$

$$a^{-n} = \frac{1}{a^n}$$

Del dato:

$$3^{-x} = \frac{1}{2}$$

$$\frac{1}{3^x} = \frac{1}{2} \quad \longrightarrow \quad 3^x = 2$$

5

El valor reducido de A representa la edad de Alonso



$$A = \sqrt[5^{m+1}]{\sqrt[5^{m+2}]{\sqrt[5^{m+3}]{2^{5^{3m+7}}}}}$$

¿Cuántos años tiene Alonso?

Resolución:

$$A = 5^{m+1} \cdot 5^{m+2} \cdot 5^{m+3} \sqrt[5^{3m+7}]{2^{5^{3m+7}}} = 5^{3m+6} \sqrt[5^{3m+7}]{2^{5^{3m+7}}}$$

$$A = 2^{\frac{5^{3m+7}}{5^{3m+6}}} = 2^{5^1} = 2^5$$

$$\therefore A = 32$$

Recordemos:

$$\sqrt[m]{\sqrt[n]{\sqrt[p]{a}}} = \sqrt[mnp]{a}$$

$$\sqrt[n]{a^m} = a^{\frac{m}{n}}$$



$$P = \frac{\sqrt[10]{\sqrt{5} \cdot \sqrt{5} \cdot \sqrt{5} \dots \sqrt{5} \text{ (50 factores)}}}{\sqrt[5]{\sqrt[5]{5} \cdot \sqrt[5]{5} \cdot \sqrt[5]{5} \dots \sqrt[5]{5} \text{ (25 factores)}}}$$

Resolución:

$$P = \frac{\sqrt[10]{\cancel{\sqrt{5}}^{50}}}{\sqrt[5]{\cancel{\sqrt[5]{5}}^{25}}} = \sqrt[10]{\frac{5^{25}}{5^5}} = \sqrt[10]{5^{20}} = 5^2$$

$$\therefore P = 25$$

Recordemos:

$$\underbrace{a \cdot a \cdot a \dots a}_{n \text{ factores}} = a^n$$



7

Determine el valor de “x”

$$3^{x+4} + 3^{x+3} + 3^{x+1} = 2997$$

Resolución:

$$3^x \cdot 3^4 + 3^x \cdot 3^3 + 3^x \cdot 3^1 = 2997$$

$$3^x(3^4 + 3^3 + 3^1) = 2997$$

$$3^x(81 + 27 + 3) = 2997$$

$$3^x(111) = 2997$$

Recordemos:

$$a^{m+n} = a^m \cdot a^n$$

$$3^x = \frac{2997}{111}$$

$$3^x = 27$$

$$3^x = 3^3$$

$$\therefore x = 3$$

Halle el valor de "x"

$$x^{x^{\frac{1}{3}}} = \frac{1}{3}$$

Resolución:

Elevando ambos miembros a la $\frac{1}{3}$

$$\left(x^{x^{\frac{1}{3}}}\right)^{\frac{1}{3}} = \left(\frac{1}{3}\right)^{\frac{1}{3}}$$

$$\left(x^{\frac{1}{3}}\right)^{x^{\frac{1}{3}}} = \left(\frac{1}{3}\right)^{\frac{1}{3}}$$

Recordemos:

$$(a^m)^n = (a^n)^m$$



$$x^{\frac{1}{3}} = \frac{1}{3}$$

$$x = \left(\frac{1}{3}\right)^3$$

$$\therefore x = \frac{1}{27}$$



$$W = 25^{8^{-27^{-3^{-1}}}}$$



Exponente de exponente

$$a^{b^c^d} = a^{(b^c)^d} = a^{b^{cd}} = a^n = p$$

Exponente fraccionario

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = \sqrt[n]{a}^m, m \in \mathbb{R} \wedge n \geq 2$$

Resolución:

$$W = 25^{\left(\frac{1}{8}\right)^{\left(\frac{1}{27}\right)^{\left(\frac{1}{3}\right)}}} \longrightarrow \left(\frac{1}{27}\right)^{\left(\frac{1}{3}\right)} = \sqrt[3]{\frac{1}{27}} = \frac{1}{3}$$

$$W = 25^{\left(\frac{1}{8}\right)^{\left(\frac{1}{3}\right)}} \longrightarrow \left(\frac{1}{8}\right)^{\left(\frac{1}{3}\right)} = \sqrt[3]{\frac{1}{8}} = \frac{1}{2}$$

$$W = 25^{\left(\frac{1}{2}\right)} \longrightarrow 25^{\left(\frac{1}{2}\right)} = \sqrt{25} = 5$$

$$\therefore W = 5$$

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Indique el exponente final de
“x”

$$P = \sqrt[3]{x^3 \cdot \sqrt{x^4 \cdot \sqrt{x} \cdot {}^{12}\sqrt{x^3}}}$$

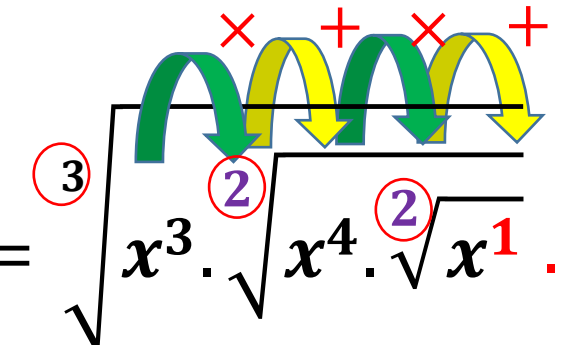
Resolución:

Recordemos:

RADICALES SUCESIVOS:



$$\sqrt[m]{x^a} \cdot \sqrt[n]{x^b} \cdot \sqrt[p]{x^c} = \sqrt[mnp]{x^{(an+b)p+c}}$$



$$P = \sqrt[3]{x^3 \cdot \sqrt{x^4 \cdot \sqrt{x^1 \cdot {}^{12}\sqrt{x^3}}}}$$

Reduciendo P:

$$P = \sqrt[3 \cdot 2 \cdot 2]{x^{(3 \cdot 2 + 4) \cdot 2 + 1} \cdot {}^{12}\sqrt{x^3}}$$

$$P = {}^{12}\sqrt{x^{21}} \cdot {}^{12}\sqrt{x^3}$$

$$P = {}^{12}\sqrt{x^{24}}$$

$$P = x^2$$

$$\therefore Exp = 2$$



 **SACO OLIVEROS**  **APEIRON**
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**GRACIAS POR SU
ATENCIÓN!!**