



Materiales Educativos GRATIS

ALGEBRA

SEGUNDO

PRODUCTOS NOTABLES AL CUBO

1. Binomio al cubo

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

$$(a - b)^3 = (a)^3 - (b)^3 - 3(a)(b)(a - b)$$

Ejemplos:

$$\begin{aligned} \diamond (x + 2)^3 &= (x)^3 + (2)^3 + 3(x)(2)(x + 2) \\ &= x^3 + 8 + 6x(x + 2) \\ &= x^3 + 8 + 6x^2 + 12x \\ &= x^3 + 6x^2 + 12x + 8 \end{aligned}$$

$$\begin{aligned} \diamond (x - 3)^3 &= (x)^3 - (3)^3 - 3(x)(3)(x - 3) \\ &= x^3 - 27 - 9x(x - 3) \\ &= x^3 - 27 - 9x^2 + 27x \\ &= x^3 - 9x^2 + 27x - 27 \end{aligned}$$

2. Binomio por trinomio

A. Suma de cubos

$$(a + b)(a^2 - ab + b^2) = a^3 + b^3$$

Ejemplos:

$$\begin{aligned} \diamond (x + 2)(x^2 - 2x + 4) &= x^3 + 2^3 \\ &= x^3 + 8 \end{aligned}$$

B. Diferencia de cubos

$$(a - b)(a^2 + ab + b^2) = a^3 - b^3$$

Ejemplos:

$$\begin{aligned} \diamond (x - 3)(x^2 + 3x + 9) &= (x)^3 - (3)^3 \\ &= x^3 - 27 \end{aligned}$$

3. Trinomio al cuadrado

$$(a + b + c)^2 = (a)^2 + (b)^2 + (c)^2 + 2(ab + bc + ac)$$

Ejemplos:

$$\begin{aligned} \diamond (x + y + 2)^2 &= (x)^2 + (y)^2 + (2)^2 + 2(xy + 2x + 2y) \\ &= x^2 + y^2 + 4 + 2xy + 4x + 4y \end{aligned}$$

4. Propiedades con condición

Si $a + b + c = 0$, entonces se cumple:

$$a^3 + b^3 + c^3 = 3abc$$

Nota:

$$\blacktriangleright (a + b)^3 \neq a^3 + b^3$$



Trabajando en clase

Integral

1. Efectúa:

$$A = (2x - 1)^3$$

2. Efectúa:

$$(2x + 5)(4x^2 - 10x + 25)$$

3. Reduce:

$$(3x + 4)(9x^2 - 12x + 16) - (27x^3 + 64)$$

PUCP

4. Reduce:

$$A = (3x - 1)(9x^2 + 3x + 1) + (3x + 1)(9x^2 - 3x + 1)$$

Resolución:

Por la propiedad de suma y diferencia de cubos.

$$A = (3x)^3 - (1)^3 + (3x)^3 + (1)^3$$

$$A = 27x^3 - 1 + 27x^3 + 1$$

$$A = 54x^3$$

5. Reduce:

$$A = (2x - 3)(4x^2 + 6x + 9) - (2x + 3)(4x^2 - 6x + 9)$$

6. Si $a + b + c = 0$

simplifica:

$$A = \frac{a^3 + b^3 + c^3}{6abc}$$

7. Efectúa:

$$(x + 1)^3 - (x + 1)(x^2 - x + 1)$$

UNMSM

8. Si $a + b = 4 \wedge ab = 2$, calcula « $a^3 + b^3$ »

Resolución

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

$$(4)^3 = a^3 + b^3 + 3(2)(4)$$

$$64 = a^3 + b^3 + 24$$

$$64 - 24 = a^3 + b^3$$

$$40 = a^3 + b^3$$

9. Si $a + b = 3 \wedge ab = 1$, calcula $a^3 + b^3$

10. Si $a - b = 5 \wedge ab = 2$, calcula $a^3 - b^3$

11. Efectúa:

$$A = (2x + y + 3)^2$$

UNI

12. Si $x + x^{-1} = 2$, calcula $x^3 + \frac{1}{x^3}$

Resolución:

$$(x + x^{-1})^3 = x^3 + x^{-3} + 3x \cdot x^{-1}(x + x^{-1})$$

$$(2)^3 = x^3 + x^{-3} + 3(1)(2)$$

$$8 = x^3 + x^{-3} + 6$$

$$8 - 6 = x^3 + x^{-3}$$

$$2 = x^3 + x^{-3}$$

$$\Rightarrow 2 = x^3 + \frac{1}{x^3}$$

13. Si $x - \frac{1}{x} = 3$, calcula $x^3 - x^{-3}$

14. Resuelve:

$$A = (\sqrt[3]{7} - \sqrt[3]{4}) (\sqrt[3]{49} + \sqrt[3]{28} + \sqrt[3]{16})$$

