PROPIEDADES ARITMÉTICAS

ASOCIATIVA	$a(bc) = (ab)c$
CONMUTATIVA	$a + b = b + a \quad y \quad ab = ba$
DISTRIBUTIVA	$a(b + c) = ab + ac$

LEY DE SIGNOS

MULTIPLICACIÓN	DIVISIÓN
$(+) \times (+) = (+)$	$(+) \div (+) = (+)$
$(-) \times (-) = (+)$	$(-) \div (-) = (+)$
$(+) \times (-) = (-)$	$(+) \div (-) = (-)$
$(-) \times (+) = (-)$	$(-) \div (+) = (-)$

EJEMPLOS DE OPERACIONES ARITMÉTICAS

$ab + ac = a(b + c)$	$\dfrac{a}{b} - \dfrac{c}{d} = \dfrac{ad - bc}{bd}$
$a\left(\dfrac{b}{c}\right) = \dfrac{ab}{c}$	$\dfrac{a - b}{c - d} = \dfrac{b - a}{d - c}$
$\dfrac{\left(\dfrac{a}{b}\right)}{c} = \dfrac{a}{bc}$	$\dfrac{a + b}{c} = \dfrac{a}{c} + \dfrac{b}{c}$
$\dfrac{a}{\left(\dfrac{b}{c}\right)} = \dfrac{ac}{b}$	$\dfrac{ab + ac}{a} = b + c, \ a \neq 0$
$\dfrac{a}{b} + \dfrac{c}{d} = \dfrac{ad + bc}{bd}$	$\dfrac{\left(\dfrac{a}{b}\right)}{\left(\dfrac{c}{d}\right)} = \dfrac{ad}{bc}$

ECUACIÓN CUADRÁTICA

$$ax^2 + bx + c = 0 \quad \rightarrow \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

CURSO DE ÁLGEBRA

Si quieres aprender un poco más de álgebra, dale un vistazo a nuestro curso gratuito en YouTube, con cientos de ejercicios resueltos.

RADICALES

$\sqrt[n]{a} = b \leftrightarrow a = b^n$	$\sqrt[n]{a} = a^{\frac{1}{n}}$
$\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$	$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$
$\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$	$\sqrt[m]{\dfrac{a^x}{b^y}} = \dfrac{\sqrt[m]{a^x}}{\sqrt[m]{b^y}}$
$\sqrt[n]{a^n} = a, si \ n \ es \ impar$	$\sqrt[n]{a^n} = |a|, si \ n \ es \ par$

LEYES DE EXPONENTES

$$P = a^m = \underbrace{a \cdot a \cdot a \cdot \ldots \cdot a}_{m \ factores}$$

exponente — base — potencia

$a^0 = 1; \ a \neq 0$	$a^{-m} = \dfrac{1}{a^m}; \ a \neq 0$
$a^m \cdot a^n = a^{m+n}$	$\dfrac{a^m}{a^n} = a^{m-n}$
$(a^m)^n = a^{m \cdot n} = a^{n \cdot m} = (a^n)^m$	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

$$(a^m \cdot b^n \cdot c^p)^x = a^{mx} \cdot b^{nx} \cdot c^{px}$$

$\left(\dfrac{a^m}{b^n}\right)^x = \dfrac{a^{m \cdot x}}{b^{n \cdot x}}$	$\left(\dfrac{a}{b}\right)^{-m} = \left(\dfrac{b}{a}\right)^m$

PRODUCTOS NOTABLES

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

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$$
$$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$
$$(a - b)^3 = a^3 - b^3 - 3ab(a - b)$$
$$a^2 - b^2 = (a + b)(a - b)$$
$$(x + a)(x + b) = x^2 + (a + b)x + ab$$
$$(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$$
$$(a + b)^2 - (a - b)^2 = 4ab$$
$$(a + b)(a^2 - ab + b^2) = a^3 + b^3$$
$$(a - b)(a^2 + ab + b^2) = a^3 - b^3$$
$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$$
$$(a^2 + ab + b^2)(a^2 - ab + b^2) = a^4 + a^2b^2 + a^4$$
$$(a + b + c)^3 = a^3 + b^3 + c^3 + 3(a + b)(a + c)(b + c)$$

FACTORIZACIÓN

$$a^{2m} + 2a^m b^n + b^{2n} = (a^m + b^n)^2$$
$$a^{2m} - 2a^m b^n + b^{2n} = (a^m - b^n)^2$$
$$a^{2m} - b^{2n} = (a^m + b^n)(a^m - b^n)$$
$$a^{3m} + b^{3n} = (a^m + b^n)(a^{2m} - a^m b^n + b^{2n})$$
$$a^{3m} - b^{3n} = (a^m - b^n)(a^{2m} + a^m b^n + b^{2n})$$
$$x^2 + (a + b)x + ab = (x + a)(x + b)$$
$$ax^{2m} + bx^m y^n + cy^n = (a_1 x^m + c_1 y^n)(a_2 x^m + c_2 y^n)$$

$a_1 x^m \quad \quad c_1 y^n \Rightarrow a_2 c_1 x^m y^n$
$a_2 x^m \quad \quad c_2 y^n \Rightarrow a_1 c_2 x^m y^n \quad \downarrow (+)$
$$bx^m y^n$$

DESIGUALDADES

$Si \ a < b \rightarrow a + c < b + c \quad y \quad a - c < b - c$
$Si \ a < b \ y \ c > 0 \rightarrow ac < bc \quad y \quad a/c < b/c$
$Si \ a < b \ y \ c < 0 \rightarrow ac > bc \quad y \quad a/c > b/c$

FACTORIAL Y NÚMERO COMBINATORIO

$$n! = 1 \times 2 \times 3 \times 4 \times \cdots \times (n-1) \times n \,;\ n \in \mathbb{N};\ n > 1$$

$1! = 1$	$0! = 1$

$$C_k^n = \binom{n}{k} = \frac{n!}{(n-k)!\,k!}$$

$C_0^n = 1$	$C_1^n = n$	$C_n^n = 1$

NÚMEROS COMPLEJOS

$i = \sqrt{-1}$	$i^2 = -1$	$i^3 = -i$	$i^4 = 1$

$$\sqrt{-a} = i\sqrt{a}, \quad a \geq 0$$

$$(a + bi) + (c + di) = a + c + (b + d)i$$

$$(a + bi) - (c + di) = a - c + (b - d)i$$

$$(a + bi)(c + di) = ac - bd + (ad + bc)i$$

$$(a + bi)(a - bi) = a^2 + b^2$$

$|a + bi| = \sqrt{a^2 + b^2}$	$\overline{(a + bi)} = a - bi$

$$\overline{(a + bi)}(a + bi) = |a + bi|^2$$

$$\frac{1}{a + bi} = \frac{a - bi}{(a + bi)(a - bi)} = \frac{a - bi}{a^2 + b^2}$$

VALOR ABSOLUTO

$|a| = \begin{cases} a; & si\ a \geq 0 \\ -a; & si\ a < 0 \end{cases}$	$|a| = |-a|$
$|a| \geq 0$	$|ab| = |a||b|$
$\left|\dfrac{a}{b}\right| = \dfrac{|a|}{|b|}$	$|a + b| \leq |a| + |b|$

PROPIEDADES DE LOS LOGARITMOS

$$Si\ log_b a = x\ \rightarrow a = b^x;\ a > 0;\ b > 0;\ b \neq 1$$

$log_{10} a = log\, a$	$log_e a = ln\, a$
$log_b b = 1$	$log_b 1 = 0$
$log_b(x^r) = r\, log_b x$	$log_b b^x = x$
$b^{log_b x} = x$	$log_a b \cdot log_b c \cdot log_c d = log_a d$
$log_a x = \dfrac{log_b x}{log_b a}$	$\dfrac{log_b x}{log_a x} = log_b a$
$log_b(xy) = log_b x + log_b y$	$log_b\left(\dfrac{x}{y}\right) = log_b x - log_b y$

$$colog_b x = log_b\left(\frac{1}{x}\right) = log_b(1) - log_b x = -log_b x$$