UNIT 3. POLYNOMIALS (4º ESO)

HISTORY

The first steps: rhetorical algebra

Algebraic problemas of a particular nature were present in all ancient civilisations. They were concerned with activities such as distribution, inheritances and calculatin áreas.

The ancient Mesopotamians and the Egyptians practised a 'rhetorical' algebra, using everyday language. We can see evidence of this in ancient texts. Egyptians called the unknown quantity in algebra 'Aha'.

The first symbols: syncopated algebra

In the 3rd century, Diophantus of Alexandria, sometimes called 'the father of mathematics', was one of the first mathematicians to use symbols for common operations and to represent unknown values. This system was called 'syncopated algebra'. Although the symbols were rudimentary, improving them and systemizing algebraic techniques significantly advanced the language of algebra.

The arrival of 'symbolic algebra'

Algebra developed at different rates throughout Europe. There were some notable algebraists in Italy during the 16th century. Towards the end of the 16th century, François Viète, a French mathematician, developed the use of letters in equations. This formed the base of the modern algebra that we use today.

The French philosopher Descartes expanded on this work in the 17th century.

HOW APPEARED THE X IN MATHS?

Al – Khwarizmi, the Persian mathematician

In the 9th century, Al-Khawarizmi wrote a manual that had great influence on the entire civilised world.

He called the unknown quantity in algebra *shay,* which was the Arabic word for *thing.* When his work was translated to Spanish it was translated to *xay*. This word eventually became abbreviated as *x*, which is now the universal symbol for the unknown quantity.

VOCABULARY & EXPRESSIONS

Monomial: monomio

Coefficiente: coeficiente

Literal part: parte literal

Degree: grado

Variables: variables

Similar: semejantes

Opposite: opuesto

Polynomial: polinomio

Fully simplified: Reducido

Term: término

Independent term: término independiente

Principal term: término principal

Opposite of a polynomial: polinomio opuesto

Numerical value: valor numérico

Root of a polynomial: raíz del polinomio

Taking out a common factor: extraer factor común

Notable identities: identidades notables

Square of a sum: el cuadrado de una suma

Square of a difference: el cuadrado de una diferencia

Sum times a difference: suma por diferencia

Divisor: divisor

Factorising a polynomial: factorizar un polinomio

PARTS OF MONOMIALS

Identify the parts of $24x^3y^5t^8$

Coefficient: 24
Literal Part: $x^3y^5t^8$
Degree: 3 + 5 + 8 = 16

Practise with the students and they have to explain you the different parts:

$8x^4y^6$; $-25xyt^3$; $x^4y^7z^2$

OPERATIONS WITH MONOMIALS

Addition and subtraction: $2x^2y + 3xy^2 - 5x^2y + xy^2 = -3x^2y + 4xy^2$

Product: $-3x^3y^2t \cdot (-7x^4yt^3) = 21x^7y^3t^4$

Quotient: $12x^7y^5z^3 : 2x^2y^4z = 6x^5yz^2$

The students can practice the vocabulary explaining you these operations:

$\boldsymbol{a)\ -7x^3 + 6x^3}$ $\quad$ $\boldsymbol{b)\ 3xy^3 + 9y^2 - 7xy^3 + 10y^2}$ $\quad$ $\boldsymbol{c)\ 14x^3y^7 \cdot (-2xyt)}$

$\boldsymbol{d)\ 35x^4y^7 : 7xy^2}$ $\quad$ $\boldsymbol{e)\ 40x^2y - 5x^3y^4 \cdot x^3y^2 : 5x^4y^5}$

POLYNOMIALS

Identify, with the pupils, the different parts of a polynomial:

Polynomial	Principal Term	Independent Term	Degree
$-6x^2 + 3x - 11$	$-6x^2$	-11	2
$3x + 5x^3 - 4 + x^4$	$5x^3$	-4	4
$15x^7 + 3x^2$	$15x^7$	0	7
$-x^3 + 5x - 1$	$-x^3$	-1	3

OPERATIONS WITH POLYNOMIALS

Addition: $(6x^4 + 3x^2 + 1) + (x^5 - x^3 + 2x^2 - 3) = 6x^4 + 3x^2 + 1 + x^5 - x^3 + 2x^2 - 3 =$
$x^5 + 6x^4 - x^3 + 5x^2 - 2$

Subtraction: $(6x^4 + 3x^2 + 1) - (x^5 - x^3 + 2x^2 - 3) = 6x^4 + 3x^2 + 1 - x^5 + x^3 - 2x^2 + 3 =$
$-x^5 + 6x^4 + x^3 + x^2 + 4$

Product: $(x^2 - 3) \cdot (4x^5 - 3x^2) = 4x^7 - 3x^4 - 12x^5 + 9x^2 = 4x^7 - 3x^4 - 12x^5 + 9x^2$

The students can practice the vocabulary explaining you these operations:

$\boldsymbol{a)\ (3x^2 - 4x + 1) + (2x + 5)}$ $\quad$ $\boldsymbol{b)\ (3x^2 - 4x + 1) + (2x + 5)}$ $\quad$ $\boldsymbol{c)\ (2x^2 - x + 5) \cdot (x^2 - 1)}$

$\boldsymbol{d)\ (3x - 4) \cdot (4x^2 + 2x - 1)}$ $\quad$ $\boldsymbol{e)\ 3x \cdot (x^3 + 2x - 1) + 4x^4 - 3x}$

RIDDLE

Think a number: x

Multiply it by 5: 5x

Add 1: 5x + 1

Multiply it by 2: 2(5x+1) = 10x + 2

Subtract 12: 10x + 2 – 12 = 10x - 10

Divide it by 10: (10x-10):10 = x -1

Subtract the initial number: x – 1 – x = -1

The result is: - 1