POLYNOMIALS

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The greatest power (exponent) of the terms of a polynomial is called degree of the polynomial.

For example :

(a) In polynomial $5x^2 - 8x^7 + 3x$:

(i) The power of term $5x^2 = 2$

(ii) The power of term $-8x^7 = 7$

(iii) The power of $3x = 1$

Since, the greatest power is 7, therefore degree of the polynomial $5x^2 - 8x^7 + 3x$ is 7

(b) The degree of polynomial :

(i) $4y^3 - 3y + 8$ is 3

(ii) $7p + 2$ is $1(p = p^1)$

(iii) $2m - 7m^8 + m^{13}$ is 13 and so on.

Degree of a Polynomial in One Variable :

In case of a polynomial in one variable, the highest power of the variable is called the degree of the polynomial.

For example: the degree of $9x^3 + 8x^2 + x - 7$ is 3.

Degree of a Polynomial in Two or More Variables :

In case of polynomials in more than one variable, the sum of the powers of the variables in each term is taken up and the highest sum so obtained is called the degree of the polynomial.

For example:

the degree of $5x^3 + 6x^2y^2 + 12y^3$ is $2 + 2 = 4$. Because the power of the variables in first and third terms is 3 but the sum of power of variables in second term is 4 and $4 > 3$. Hence the degree is 4.

Additive Inverse of a Polynomial :

A polynomial Q is the additive inverse of a polynomial P if the sum of Q and P is zero, e.g. $3x^2 - 5x + 7$ is the additive inverse of $-3x^2 + 5x - 7$.

The additive inverse of a polynomial is obtained by reversing the sign of each of the coefficients of the polynomial.

Zero Degree Polynomial :

Any non-zero number is regarded as a polynomial of degree zero or zero degree polynomial. For example, $f(x) = a$, where $a \neq 0$ is a zero degree polynomial, since we can write $f(x) = a$ as $f(x) = ax^0$.

Constant Polynomial :

A polynomial of degree zero is called a constant polynomial.

For example, $f(x) = 7$.

Ex.1 Find which of the following algebraic expression is a polynomial.

(i) $3x^2 - 5x$ (ii) $x + \frac{1}{x}$

(iii) $\sqrt{y} - 8$ (iv) $z^5 - \sqrt[3]{z} + 8$

Sol. (i) $3x^2 - 5x = 3x^2 - 5x^1$

It is a polynomial.

(ii) $x + \frac{1}{x} = x^1 + x^{-1}$

It is not a polynomial.

(iii) $\sqrt{y} - 8 = y^{1/2} - 8$

Since, the power of the first term ($\sqrt{y}$) is $\frac{1}{2}$, which is not a whole number.

(iv) $z^5 - \sqrt[3]{z} + 8 = z^5 - z^{1/3} + 8$

Since, the exponent of the second term is

$1/3$, which in not a whole number. Therefore, the given expression is not a polynomial.