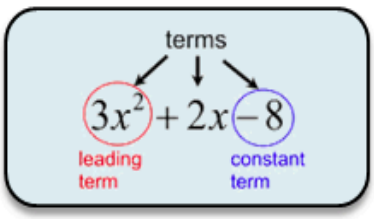
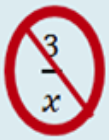
General Information about Polynomials

Definition: A **polynomial** is a finite sum of terms in which all variables have whole number exponents and no variable appears in a denominator.



Remember:
Whole number exponents:
{0, 1, 2, 3, 4, ...} no fractions!

Remember:
No variables in the denominator.



The leading term in a polynomial is the term of highest degree.
The constant term in a polynomial is the term without a variable.

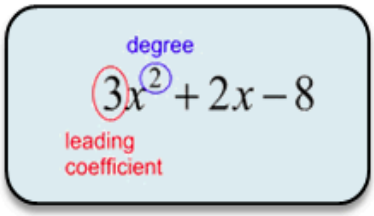
Polynomials: YES or NO	
$3x^{1/2}$	NO - exponent is not a whole number
$\frac{1}{x^2 - 1}$	NO - the variable is in the denominator
$-3x^2$	YES - satisfies the polynomial definition
$3\sqrt{x}$	NO - the square root of x can be written with a fractional exponent of x.
$2x^{-3}$	NO - exponent is not a whole number. Negative exponent places x^3 in denominator.
$\sqrt{3}x$	YES - the exponent of x is 1 which is OK. The coefficient being radical 3 is not a problem.

Classification by Terms	
monomial	*one term:* 12, $4x$, x^2, $-5xy$
binomial	*two terms:* $2x - 1$, $x^2 - 4$
trinomial	*three terms:* $x^2 + 2x + 1$
polynomial - *one or more terms:* polynomial means "many", but it can also be one term.	
The ending of these words "nomial" is Greek for "part".	
Classification by Degree	
Linear - *degree of 1 or 0:*	$3x + 1$ or 12
Quadratic - *degree of 2:*	$2x^2 - x + 7$
Cubic - *degree of 3:*	$3x^3 + 4x^2 + 3x + 5$

Definition: The **degree of a term** with whole number exponents is the sum of the exponents of the variables, if there are variables. Non-zero constants have degree 0, and the term zero has no degree. *Example:* $6x^2$ has a degree of 2; $4x^2y^3$ has a degree of 5 (the sum of 2 and 3).

Definition: The **degree of a polynomial** is the highest degree of its terms.
Example: $3x^2 + 4x + 1$ has a degree of 2; $x^3 - x^2 + 5x - 2$ has a degree of 3

The standard form of a polynomial is when all like terms are combined and the degrees are arranged in descending order.
Polynomial: $2x + 3x^5 + 4x^3 - 8$
Standard form: $3x^5 + 4x^3 + 2x - 8$
$3x^5 + 4x^3 + 2x^1 - 8x^0$



Will we ever really use the degree?
Knowing the "degree" of a polynomial function will let you determine the most number of solutions the function may have, and the most number of times the function will cross the x-axis.

FYI: The *standard form of a polynomial* is formally written as $a_n x^n + a_{n-1}x^{n-1} + \ldots + a_2x^2 + a_1x + a_0$, where n is a non-negative integer, and $a_0, a_1, a_2, \ldots, a_n$ are real number constant coefficients with $a_n \neq 0$.