Lesson Title 4.1 Graphing Polynomial Functions DAY ONE Notes **ALG 2** **Date** _____

Polynomial Rules:
Because a monomial has only one term, it is the simplest type of polynomial.

Polynomials have:

- NO variables in denominators
- NO variables in exponents
- NO roots
- NO absolute values of variable
- **ALL** variables have whole number exponents

Polynomial	Not a Polynomial
$3x$	$3xy^{-2}$
5	$\frac{2}{(x+2)}$
$x-2$	$\lvert x-3\rvert$
$4x^3$	$\sqrt{x}$
$6x-4$	$x^{\frac{1}{2}}$
$5xy^3+7x^2$	$\frac{1}{x^2}$

TASK 2: Evaluating Polynomial Functions

Evaluate the function for the given value of x. Remember f(0) means x = 0 and you substitute in 0 for all x's to find the y value which in function notation is f(x) for this example.

a) $f(x) = -x^3 + 3x^2 + 9$; $x = 4$

$f(4) = -(4)^3 + 3(4)^2 + 9 = -7$

$f(4) = -7$ or $(4, -7)$

b) $g(x) = 3x^5 - x^4 - 6x + 10$; $g(-2)$

$g(-2) = 3(-2)^5 - (-2)^4 - 6(-2) + 10 = -90$

$g(-2) = -90$ or $(-2, -90)$

# of Terms	Degree
1) Monomial	0) Constant
2) Binomial	1) Linear
3) Trinomial	2) Quadratic
4) Polynomial	3) Cubic
	4) Quartic
	5) Quintic

Terms are separated by + or – sign.
Degree is the biggest exponent.
Coefficient is the number in front of the variable.
Standard Form is in descending order of exponent from left to right.
Naming has two words, one from each column of term & degree.

TASK 3: Identifying Polynomial Functions

Decide whether the function is a polynomial function. If so, write it in standard form, name the polynomial, state its degree, type, and leading coefficient.

a) $f(x) = -4x^5 + 7x^2 - 2$

D: 5
LC: -4
Quintic Trinomial

b) $g(x) = 0.5x^2 + \sqrt{3}x^4 + 19$

$g(x) = \sqrt{3}x^4 + 0.5x^2 + 19$
D: 4 LC: $\sqrt{3}$
Quartic Trinomial

c) $h(x) = -x^3 - 4x^{-4} - 3x$

X

d) $k(x) = x^2 + 9^x - 1$

X

Polynomial End Behavior

P(x) HAS...	Odd Degree	Even Degree
LC > 0	(- -) (+ +)	(- +) (+ +)
end behavior	As x ⇒ $+\infty$, P(x) ⇒ $+\infty$ As x ⇒ $-\infty$, P(x) ⇒ $-\infty$	As x ⇒ $+\infty$, P(x) ⇒ $+\infty$ As x ⇒ $-\infty$, P(x) ⇒ $+\infty$
LC < 0	(- +) (+ -)	(- -) (+ -)
end behavior	As x ⇒ $+\infty$, P(x) ⇒ $-\infty$ As x ⇒ $-\infty$, P(x) ⇒ $+\infty$	As x ⇒ $+\infty$, P(x) ⇒ $-\infty$ As x ⇒ $-\infty$, P(x) ⇒ $-\infty$

End Behavior

End Behavior depends on two things:

1. Even or Odd Degree
2. Positive or Negative Leading Coefficient

These two things and the chart to the left determine the end behavior of your graph without needing to graph the polynomial function.

TASK 4: Describing End Behavior

Determine your degree & leading coefficient to describe the end behavior of the given function.

a) $f(x) = -0.5x^4 + 2.5x^2 + x - 1$

D: 4 even
LC: -0.5 neg
As $x \to \pm\infty$, $f(x) \to -\infty$

b) $g(x) = 0.25x^3 - x^2 - 1$

D: 3 odd
LC: 0.25 pos
As $x \to +\infty$, $g(x) \to \infty$
As $x \to -\infty$, $g(x) \to -\infty$

Still need help with: