1. Monomial:

A real number, a variable, or the product of a real number and variables.

a Term

Give three examples of a monomial:

6 or Q or $5Q$

2. Polynomial:

The sum of one or more monomials

One or more terms

Give two examples of a polynomial:

$x+6$ or $a^3+7a-11$

A monomial is a polynomial with just one term

3. a. The exponents of monomials and polynomials must be what kind of numbers?

Whole Numbers

b. The coefficients of a polynomial must be what kind of numbers?

Real Numbers

4. What does a polynomial in standard form look like?

Terms are put in descending order using the degree(exponents) with the term having the largest exponent first.

5. The leading coefficient of a polynomial is

The coefficient of the term with the largest exponent.

If it's in Standard Form it will be the first coefficient.

6. The degree of a polynomial is

The largest degree(exponent) of any term.

If it's in Standard Form it will be the first exponent.

7. Complete these two tables by filling in the blanks.

Degree of Polynomial	Name by Degree
0	Constant
1	Linear
2	Quadratic
3	Cubic

# of terms in polynomial	Name by # of terms
1	Monomial
2	Binomial
3	Trinomial

8. Is each of the below a polynomial? If not give a reason.

a) $y = \frac{3}{7}x^2 + 3x - 14x^4 + 4$

Yes

b) $y = 4x^{-2} + x^3 \boxed{- \frac{8}{x}}$

NO

c) $y = 9\sqrt{x} + 3x^7 - x^{\frac{2}{3}}$

NO

d) $y = 9^x + 10ix^4 - 15$

NO

a) $9x + 2 - x^2$

Standard Form: $-x^2 + 9x + 2$

Degree: 2

Leading Coefficient: -1

Name by Degree: Quadratic

Name by # of terms: Trinomial

b) $15x + 8x^3 - 9x$ simplify first: $= 8x^2 + 6x$

Standard Form: $8x^2 + 6x$

Degree: 3

Leading Coefficient: 8

Name by Degree Cubic

Name by # of terms: Binomial

10. State the degree of each polynomial.

Polynomials in Expanded Form:

a) $7x^2 + 12 - 13x^4 + 8x$

Degree: 4

b) $9x + 1$

Degree: 1

c) 6

Degree: 0

1. $y = -2x^5 + 8x^3 + 24x^2 - 9x + 73$

DEG= 5

Lead Coeff= -2

2. $y = 10x^2 + 16x - 4x^4 + 3x^3 - 25$

DEG= 4

Lead Coeff= -4

This is called factored form

$$y = (3x + 1)(x - 8)$$

This is called expanded form

$$y = 3x^2 - 23x - 8$$

Polynomials in Factored Form:

d) $(x + 3)(2x - 1)(x + 6)$

$(x)(2x)(x) = 2x^3$

Degree: 3

e) $\underbrace{(x - 7)^2}_{x^2} \cdot \underbrace{(x - 5)^3}_{x^3} = x^5$

Degree: 5

State the degree and leading coefficient of each.

1. $y = (7x + 11)(9x - 15)$ Deg = 2 LC = 63

$7x \cdot 9x$
$= 63x$

2. $y = (2x - 7)(3x + 1)(4x - 9)$ Deg = 3 LC = 24

$2x \cdot 3x \cdot 4x$

State the degree and leading coefficient of each.

3. $y = \underbrace{(x + 5)^2}_{x^2}\underbrace{(x - 3)^2}_{x^2}$ Deg = 4 LC = 1

$x^2 \cdot x^2$
$= x^4$

4. $y = (2x + 3)(x - 2)^3(x + 6)^3$ Deg = 7 LC = 2

$2x \cdot x^3 \cdot x^3$
$= 2x^7$

State the degree and leading coefficient of each.

5. $y = -2x(2x - 5)^3(3x + 1)^2$ Deg = 6 LC = -144

$-2x \cdot 8x^3 \cdot 9x^2$
$= -144x^6$

6. $y = (2x + 9)^2(2 - 5x)^3(4 - 3x)^2$ Deg = 7 LC = -4500

$4x^2 \cdot -125x^3 \cdot 9x^2$

$= -4500x^7$

5. The leading coefficient of a polynomial is

The coefficient of the term with the largest exponent when the polynomial is in expanded form.

Only the first coefficient if it is written in Standard Form.

Find the leading coefficient of each polynomial.

1. $3x - 7x^2 + 5 - x^3$
   LC = 1
2. $(2x + 3)(6 - x)(5x - 1)$
   LC = -10
3. $x(3x - 4)^2(x + 8)(7 - 2x)^3$
   LC = -72

What will be important for Ch 6 is whether the leading coefficient of a polynomial is POSITIVE or NEGATIVE

6. The degree of a polynomial is

The largest exponent when written in expanded form.

Only the first exponent when written in Standard Form

Find the degree of each polynomial.

1. $4x^2 + 6x - x^4 + 12$

Degree = 4

2. $(x + 3)(x - 7)(x - 12)$

Degree = 3

3. $x(x - 4)^2(x + 8)(x + 1)^3$

Degree = 7

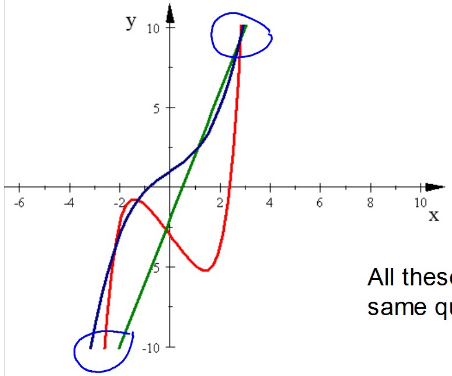
What will be important for Ch 6 is whether the degree of a polynomial is EVEN or ODD

End Behavior of polynomial graphs.

Graph all three of these in a Standard Window:

$$Y_1 = 4x - 2$$
$$Y_2 = 0.25x^3 + x + 1$$
$$Y_3 = 0.1x^5 - 2x - 3$$

What do the graphs have in common?



$$Y_1 = 4x - 2$$
$$Y_2 = 0.25x^3 + x + 1$$
$$Y_3 = 0.1x^5 - 2x - 3$$

All these functions start and end in the same quadrant.

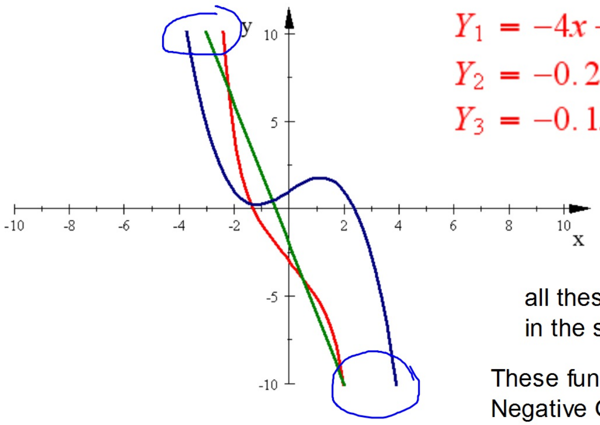
What do the equations have in common?

	Degree	Lead Coeff
$Y_1 = 4x - 2$	1	4
$Y_2 = 0.25x^3 + x + 1$	3	0.25
$Y_3 = 0.1x^5 - 2x - 3$	5	0.1
	ODD	pos

all these functions are considered Positive Odd functions

$$Y_1 = 4x - 2$$
$$Y_2 = 0.25x^3 + x + 1$$
$$Y_3 = 0.1x^5 - 2x - 3$$

What would happen if they all had a negative leading coefficient?



$$Y_1 = -4x - 2$$
$$Y_2 = -0.25x^3 + x + 1$$
$$Y_3 = -0.1x^5 - 2x - 3$$

all these functions begin and end in the same quadrant.

These functions would be considered Negative Odd functions.

Odd Functions

Positive Leading Coefficient:

Moves from the third quadrant to the first quadrant.

Like a line with a Positive slope

Negative Leading Coefficient:

Moves from the second quadrant to the fourth quadrant.

Like a line with a Negative slope

This is called the END BEHAVIOR of an ODD function