Today's Objectives

- **Classify polynomials orally using academic vocabulary. Perform mathematical operations with polynomials to solve real-world problems** and write answers in complete sentences that describe the real-world meaning using sentence stems.

- Success Criteria:
  - Define polynomials
  - Classify polynomials by number of term
  - Classify polynomials by degree
  - Add and subtract polynomials
  - Multiply polynomials
  - Evaluate Polynomials for given values

- Vocabulary: term, degree, coefficient, monomial, binomial, trinomial, polynomial

Polynomial Function

Let n be a nonnegative integer and let $a_0, a_1, a_2, ..., a_{n-1}, a_n$ be real numbers with $a_n \neq 0$. The function given by

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + ... + a_2 x^2 + a_1 x + a_0$$

is a **polynomial function of degree n**.

The **leading coefficient** is a_n.

AM: Find degree of polynomials

3. $-3+2x^4+x^2$

[A] second degree   [B] third degree   [C] first degree   [D] fourth degree
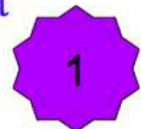
LO: The degree of the polynomial is _____ because the largest power of _____ is _____.

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AM: Find degree of polynomials

4. $5x^{\textcircled{7}} - 2y^6 - 9x - 6$

LO: The degree of the polynomial is _____ because the largest power of the expression is _____.

1

What if I have more than one variable?

- When you have more than one variable, simply find the degree of each individual term by adding the exponents. Your degree is the highest sum.
- Example:
  - $xy^2 - x^3yz^4 + x^5$
  - The degree of the first term is 3, because we have the first power of x and the second power of y.
  - The degree of the second term is 8, because we have the ___3rd___ power of x, ___1st___ power of y and ___4th___ power of z.
  - The degree of the third term is 5, _____
    _____
  - Therefore, the degree of the polynomial is 8, because_____
    _____.

The Vocabulary of Polynomials

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_0$$

- Each monomial
  - $a_n x^n$, $a_{n-1} x^{n-1}$, ... , a_0 in the sum $f(x)$ is a **term** of the polynomial.
- A polynomial function written with terms in descending degree, is written in **standard form**.
- The constants $a_n, a_{n-1}, \ldots, a_0$ – are the **coefficients** of the polynomial.
- The term $a_n x^n$ is the **leading term**, and a_0 is the constant term.

$$3 + 2x^7 + 5x$$

Polynomial Names and Terms

Term – an expression of the form $a_n x^n$ in a polynomial function.

*Note – these are normally separated by + and -

Name	# of terms	Example
Monomial	1	$3x^5$
Binomial	2	$x+5$
Trinomial	3	$-2x^4+5x-2$
Polynomial	More than 3	$7x^9-4x^8+x^5-2x+12$

Standard Form Polynomial: A polynomial written with the terms in descending order of degree is in standard form, in general

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_0$$

Example

$$
\begin{aligned}
g(x) &= 800 + 10x^2 + 2x^{15} \\
&= 2x^{15} + 10x^2 + 800
\end{aligned}
$$

Polynomial Writing Activity
Part 1

- In your envelope, you will find 8 cards labeled A-G
- Your graphic organizer has a space for you to write a polynomial or expression for each card.

  ~Example w/ card A $-3x^4 - x^2 + 3$

- You have 10 minutes to try and write a definition for each card **individually**.
- Be prepared to share you work with you group and justify your answers (sentences frames are available for you to use).

Polynomial Writing Activity
Part 2

- Each member will share their possible definition for each card, explaining why their answer is correct. The order for sharing is pink, green, purple, and blue.

- If all group members approve your solution, you can put a check in the check column of your table.

- *Challenge question:* What is the difference between directions the purple and white card? Provide a mathematical reason for this difference.

Exit Ticket

- Create your own **polynomial** and list its characteristics using the sentence frames on your exit ticket.