IM 9–12 MATH v.1

Unit 2

Polynomials and Rational Functions

ALGEBRA 2

Lesson 4

Introducing Polynomials

Illustrative Mathematics®

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Learning Goal

Algebra 2

Let's see what polynomials can look like.

What are Polynomials?

Warm-up: Which One Doesn't Belong?

Which one doesn't belong?

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

A. $2x^4 + x^2 - 5.7x + 2$

A. $x^2 + 7x - x^{\frac{1}{3}} + 2$

A. $x^5 + 8.36x^3 - 2.4x^2 + 0.32x$

Card Sort: Equations and Graphs

Your teacher will give you a set of cards. Group them into pairs that represent the same polynomial function. Be prepared to explain your reasoning.

Let's Make Some Curves

Use graphing technology to write equations for polynomial functions whose graphs have the characteristics listed when plotted on the coordinate plane.

1. A 1st degree polynomial function whose graph intercepts the vertical axis at 8.
2. A 2nd degree polynomial function whose graph has only positive y-values.
3. A 2nd degree polynomial function whose graph contains the point (0,-9).
4. A 3rd degree polynomial function whose graph crosses the horizontal axis more than once.
5. A 4th degree or higher polynomial function whose graph never crosses the horizontal axis.

Introducing Polynomials

Lesson Synthesis

- Could the graph of a polynomial have a loop?
- How many terms could an expression for a polynomial have?
- Does count as a polynomial? What degree would it have?

I can identify important characteristics of polynomial graphs and expressions.

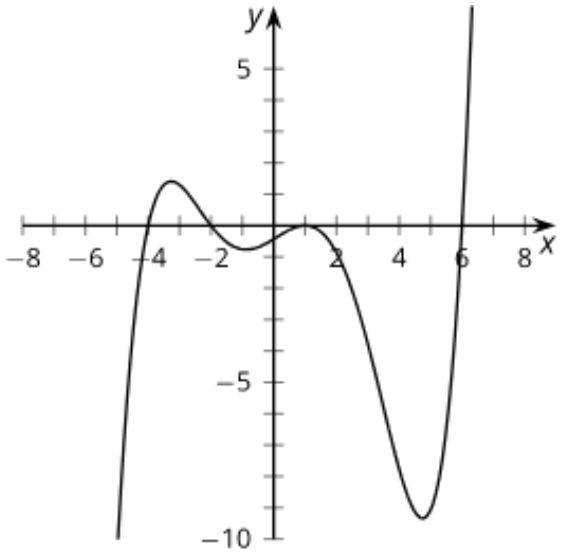
Learning Targets

Algebra 2

Identifying Features

Cool-down

1. Write an equation for a polynomial with all the following features:
   a. The degree is 5.
   b. The polynomial has 4 terms.
   c. The graph of the polynomial crosses the vertical axis at $y = 12$.
2. Identify the approximate input values of any relative maximums and minimums of this 5th degree polynomial.



degree

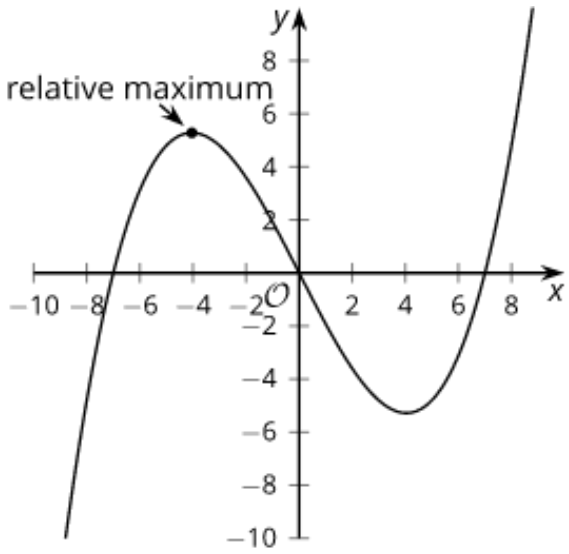
The degree of a polynomial in x is the highest exponent occuring on x when you write the polynomial out as a sum of non-zero constants times powers of x (with like terms collected).

polynomial

A polynomial function of x is a function given by a sum of terms, each of which is a constant times a whole number power of x. The word polynomial is used to refer both to the function and to the expression defining it.

relative maximum

A point on the graph of a function that is higher than any of the points around it.



relative minimum

A point on the graph of a function that is lower than any of the points around it.