IM 9–12 MATH v.1

# Unit 2

**Polynomials and Rational Functions**

ALGEBRA 2

Lesson 3

## Introducing Polynomials

Illustrative Mathematics®

Kendall Hunt

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



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# 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.



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# 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.



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# Introducing Polynomials

Lesson Synthesis

- Could the graph of a polynomial have a loop?
- How many terms could an expression for a polynomial have?
- Does $y = 3$ count as a polynomial? What degree would it have?



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I can identify important characteristics of polynomial graphs and expressions.

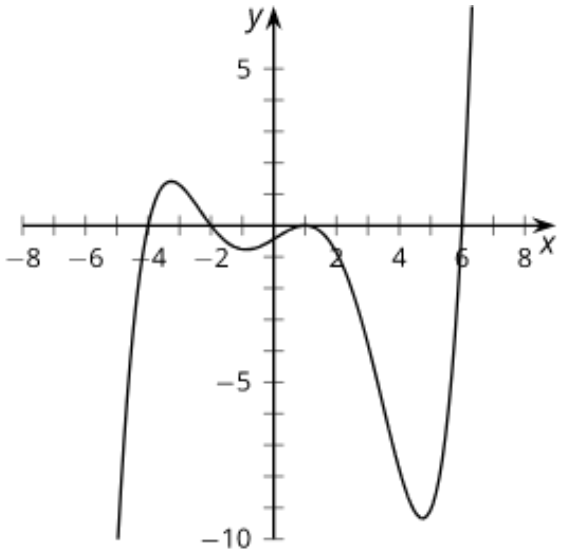
# Learning Targets

# 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.



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# 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).



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# 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.



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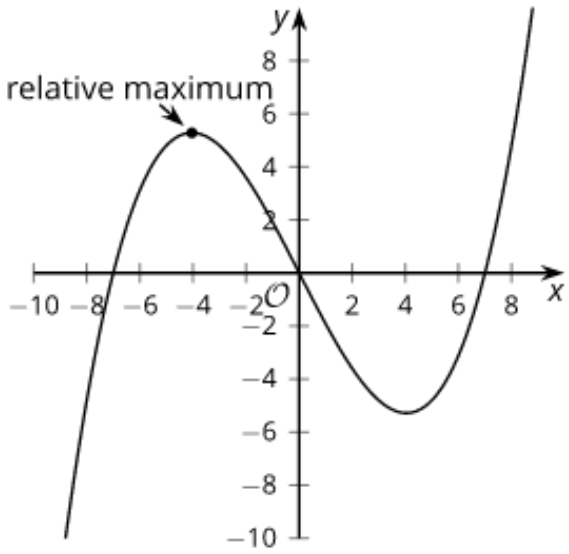
# relative maximum

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





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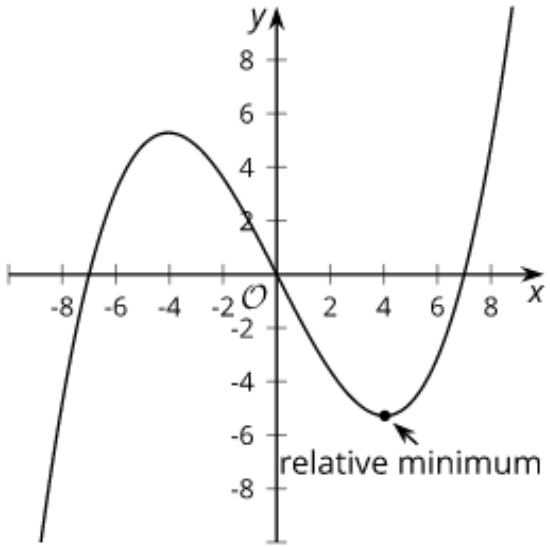
# relative minimum

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





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