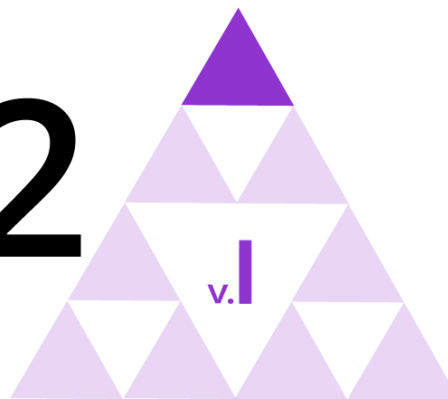


IM 9–12 MATH



Unit 2

Polynomials and Rational Functions

ALGEBRA 2

Lesson 2

Funding the Future

Learning Goal

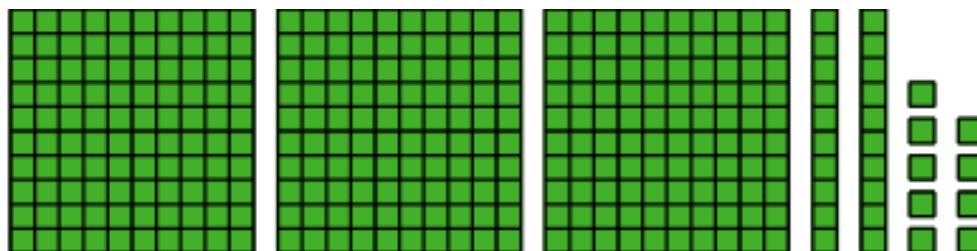
Let's look at some other things that polynomials can model.

Algebra 2

Writing Numbers

Warm-up: Notice and Wonder

What do you notice? What do you wonder?



$$300 + 20 + 9$$

3 100s, 2 10s, 9 1s

$$3(10^2) + 2(10^1) + 9(10^0)$$

Polynomials in the Integers



1. Consider the polynomial function p given by $p(x) = 5x^3 + 6x^2 + 4x$.
2. Evaluate the function at $x = -5$ and $x = 15$.
3. How does knowing that $5,000 + 600 + 40 = 5,640$ help you solve the equation $5x^3 + 6x^2 + 4x = 5,640$?



At the end of 12th grade, Clare's aunt started investing money for her to use after graduating from college four years later. The first deposit was \$300. If r is the annual interest rate of the account, then at the end of each school year the balance in the account is multiplied by a growth factor of $x = 1 + r$.

1. After one year, the total value is $300x$. After two years, the total value is $300x \cdot x = 300x^2$. Write an expression for the total value after graduation in terms of x .
2. If Clare's aunt had invested another \$500 at the end of her freshman year, what would the expression be for the total value after graduation in terms of x ?

Pause here for a whole-class discussion.

1. Suppose that \$250 was invested at the end of sophomore year, and \$400 at the end of junior year in addition to the original \$300 and the \$500 invested at the end of freshman year. Write an expression for the total value after graduation in terms of x .
2. The total amount y , in dollars, after four years is a function $y = C(x)$ of the growth factor x . If the total Clare receives after graduation is $C(x) = 1,580$, use a graph to find the interest rate that the account earned.



$$C(x) = 200x^{15} + 100x^{14} + 500x^5 + 300x^2$$

- How long ago did the account open? How can you tell?
- How can you tell that the last time money was put into the account was \$300 2 years ago?
- Suppose that \$300 was deposited into the account 8 years ago. How would you need to change the equation?
- Let's say the interest rate is 5%, and we want to know what $C(x)$ is. When we're putting values into a calculator to find $C(x)$, what might go wrong?

I can use polynomials to understand different kinds of situations.

Learning Targets

Algebra 2

An account grows at an annual interest rate of r , so it grows by a factor of $x = 1 + r$ each year. The function $A(x) = 800x^4 + 350x^3 + 500x^2 + 300x$ gives the amount in the account after 4 years when the growth factor is x .

1. What is the total amount in the account if the interest rate for the account is 3% each year?
2. How much money was put into the account at the beginning?
3. After 5 years, \$200 is added to the account. Use the expression for $A(x)$ to write a new expression $B(x)$ that represents how much is in the account after 5 years.



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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