Accelerated Geometry B/Algebra II
Unit 6: Polynomials Functions

References

Textbook:

- HMH Geometry B/Advanced Algebra, Unit 6 Module 11

Online Access:
http://www.my.hrw.com

Helpful Links:

- GA Virtual Learning
  http://cms.gavirtualschool.org/Shared/Math/GSEAdvancedAlgebra/PolynomialFunctions/index.html
- Fundamental Theorem of Algebra
  https://mathbitsnotebook.com/Algebra2/Quadratics/QDfundamentalThm.html
- The Polynomial Remainder Theorem
  https://mathbitsnotebook.com/Algebra2/Polynomials/PORemainderTh.html
- Polynomial Identities
  https://mathbitsnotebook.com/Algebra2/Polynomials/POIdentity.html
- Graph Polynomial Functions
  https://mathbitsnotebook.com/Algebra2/Polynomials/POGraphing.html

MathBitsNotebook Algebra 2
http://mathbitsnotebook.com/Algebra2/Algebra2.html

Dear Parents,

In this unit, students continue their study of polynomials by identifying zeros and making connections between zeros of a polynomial and solutions of a polynomial equation. Students will see how the Fundamental Theorem of Algebra can be used to determine the number of solutions of a polynomial equation and will find all the roots of those equations. Students will graph polynomial functions and interpret the key characteristics of the function

Concepts Students will Use & Understand

- use polynomial identities to solve problems
- use complex numbers in polynomial identities and equations
- understand and apply the rational Root Theorem
- understand and apply the Remainder Theorem
- understand and apply The Fundamental Theorem of Algebra
- understand the relationship between zeros and factors of polynomials
- represent, analyze, and solve polynomial functions algebraically and graphically

Vocabulary

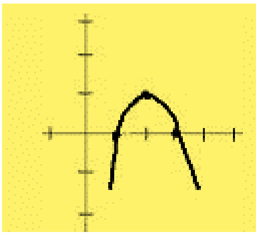
End Behavior: the value of f(x) as x approaches positive and negative infinity
Relative Minimum: a point on the graph where the function is increasing as you move away from the point in the positive and negative direction along the horizontal axis.
Relative Maximum: a point on the graph where the function is decreasing as you move away from the point in the positive and negative direction along the horizontal axis.
Fundamental Theorem of Algebra: every non-zero single-variable polynomial with complex coefficients has exactly as many complex roots as its degree, if each root is counted up to its multiplicity.
Multiplicity: the number of times a root occurs at a given point of a polynomial equation.
Pascal's Triangle: an arrangement of the values of ${}_nC_r$ in a triangular pattern where each row corresponds to a value of n
Rational Root Theorem: a theorem that provides a complete list of all possible rational roots of a polynomial equation. It states that every rational zero of the polynomial equation f(x) = $a_nx^n + a_{n-1}x^{n-1} + ...a_2x^2 + a_1x + a_0$, where all coefficients are integers, has the following form: $\frac{p}{q} = \frac{\text{factors of constant term } a_0}{\text{factors of leading coefficient } a_n}$
Remainder Theorem: states that the remainder of a polynomial f(x) divided by a linear divisor (x – c) is equal to f(c)

Sample Problems

1. The height of an arrow shot by a 6 foot tall person is given by the function equation image indicator where h is the height and t is the time. At what time would the arrow be able to hit a target 10 feet in the air?

   The arrow could hit a 10 foot target in 2 sec. or in 2 2/3 sec.

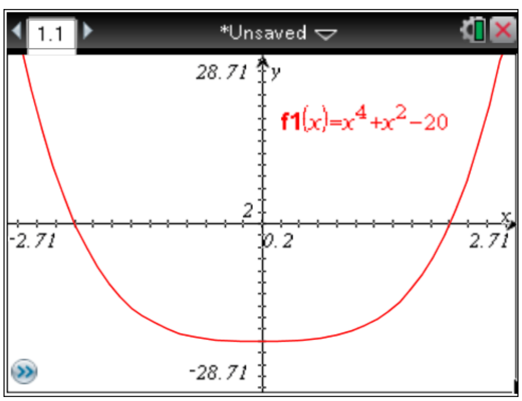
2. Draw a rough sketch of the graph of $y = -x^2 + 4x - 3$

3. A soccer ball is kicked from the ground. The height of the ball is modeled by the equation $h(t) = -4.9t^2 + 19.6t$ Height is in meters. Time is in seconds. How long is the ball in the air?

   4 seconds

4. Describe the key features of the following polynomial function:
   $f(x) = x^4 + x^2 - 20$

   Rational roots:
   $x = -2, 2$
   Irrational roots:
   None
   Non-real roots:
   $x = -\sqrt{5}i, \sqrt{5}i$
   Relative maximum points:
   None
   Relative minimum points:
   (0, -20)

End behavior:
$x \to -\infty, f(x) \to \infty; \quad x \to \infty, f(x) \to \infty$