High School Algebra Playlist: Polynomials and the Remainder Theorem

Aligns with *CCSS.MATH.CONTENT.STANDARD.HSA.APR.B.2:* Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x–a$ is $p(a)$, so $p(a) = 0$ if and only if $(x–a)$ is a factor of $p(x)$.

Related Standards

- *CCSS.MATH.CONTENT.HSA.APR.B.3:* Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Objectives

In this playlist, you will learn and practice the following skills:

- Understand and apply the Remainder Theorem
- Relate the Remainder Theorem to quadratic functions with real roots
- Understand and make use of the fact that a is a root of a polynomial function if and only if $x–a$ is a factor of the function

Let's get started!

Key Terms

- The **remainder** r of the quotient of a polynomial $p(x)$ and a linear binomial $(x - a)$ is defined by the equation $\frac{p(x)}{(x-a)} = q(x) + \frac{r}{(x-a)}$, where $q(x)$ is a polynomial of lower order than $p(x)$ and r is a constant.
- The input $x = a$ is a **root** of the polynomial function $p(x)$ if and only if $p(a) = 0$.
- The expression $(x - a)$ is a **factor** of polynomial $p(x)$ if and only if the polynomial can be written as $p(x) = (x - a)q(x)$, where $q(x)$ is a polynomial of lower order than $p(x)$.
- The **Remainder Theorem** states that, for a polynomial $p(x)$ and a number a, the remainder on division by $x–a$ is $p(a)$, so $p(a) = 0$ if and only if $(x–a)$ is a factor of $p(x)$.

Connections

- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 5.5