High School Algebra Playlist: Recognizing Structure

Aligns with CCSS.Math.Content.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*

Related Standards

- CCSS.Math.Content.HSA.SSE.A.1: Interpret expressions that represent a quantity in terms of its context.
- CCSS.Math.Content.HSA.SSE.A.1.a: Interpret parts of an expression, such as terms, factors, and coefficients.
- CCSS.Math.Content.HSA.SSE.A.1.b: Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.*

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Objectives

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

- recognize common structures within an expression
- use those structures to write equivalent expressions

Let's get started!

Key Terms

- A **factor** is a number that is multiplied by another number or by an expression to make a product.
- The process of **factoring** (factorizing) determines the factors of an expression.
- The **Distributive Property** states that multiplying a sum by another number is the same as the sum of the addends multiplied by that number – that is, that $a(b+c)=ab+ac$.
- The **difference of squares** names a pattern using one square less another, such as x^2-y^2.
- A **quadratic equation** is a polynomial of degree 2, typically written $ax^2+bx+c=0$.
- The **greatest common factor (GCF)** is the greatest factor that divides two numbers or terms in an expression.

Connections

- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 1.1
- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 1.5
- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 9.1

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Recognizing Structure

(CCSS.Math.Content.HSA.SSE.A.2)

A **factor** is a number that is multiplied by another number or by an expression to make a product. The process of **factoring** (factorizing) determines the factors of an expression. The **Distributive Property** states that multiplying a sum by another number is the same as the sum of the addends multiplied by that number – that is, that $a(b + c) = ab + ac$. The **difference of squares** names a pattern using one square less another, such as $x^2 - y^2$. A **quadratic equation** is a polynomial of degree 2, typically written $ax^2 + bx + c = 0$. The **greatest common factor (GCF)** is the greatest factor that divides two numbers or terms in an expression.

If your students…

Mishandle the Distributive Property:

Many students mishandle the Distributive Property. The typical error is to omit multiplications beyond the first; that is, students treat $a(b + c)$ as equal to $ab + c$.

Try the exercise: Distributive Property 2

https://www.opened.com/exercise/distributive-property-2/428306

Mishandle simplifying expressions:

Some students will benefit from additional review.

WATCH: Algebra 1A, Lesson 2: Simplifying Expressions

http://www.curriki.org/oer/Algebra-1A-Lesson-2-Simplifying-Expressions/

Have trouble finding the GCF:

Many students are great at finding the greatest common factor of several integers, but they have trouble when variables are involved. A student who can find the GCF of 18 and 24 has trouble finding the GCF of $18x$ and $24x^2$. Emphasize that the rules are the same: they can list the factors of each term, both numbers and variables, and look for common factors to "pull out". You can help some students by also having them find the least common multiple (LCM), which also requires that they find factors.

WATCH: Find GCF by Listing Factors

https://www.opened.com/video/find-gcf-by-listing-factors/881614

WATCH: Factoring Polynomials by Removing the GCF

https://www.opened.com/video/factoring-polynomials-by-removing-the-gcf-example-2/668578

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